

IMPLEMENTATION OF LEAN THINKING IN A HIGHER EDUCATION INSTITUTION: AN OVERVIEW OF PROBLEMS AND COUNTERMEASURES

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Abstract. The growing interest in implementing Lean thinking in non-manufacturing sectors is encouraging higher education institutions (HEIs) to keep pace with integral innovation. We aim at identifying the challenges of implementing Lean thinking in HEIs and exploring why Lean principles, although recognised as effective in the private and public sectors, are experiencing implementation problems in HEIs. We focus on preventive systems, measures and strategies that could contribute to minimising the risks of resistance towards the implementation of Lean thinking and, simultaneously, to increasing the quality of education in HEIs. This paper discusses the differences between Lean and Hierarchical Management Systems, the concept of the quality of education, the elements of customer value through benefits and burdens, the margins between optimising performance and overloading employees, the measurability of value stream processes, and the links between improving communication processes and performance indicators in a Lean framework. We carried out an overview of the scientific literature to define the constituents of the Lean mindset in HEIs and the problems that may arise in the implementation of these Lean strategic elements. This study leads to a better understanding that Lean thinking contributes to HEIs’ “customer” satisfaction, institutional efficiency and quality of education, all whilst corroborating the point that innovative top management, their devotion and a supportive and flexible workforce are essential components in fostering the effective implementation of Lean thinking in HEIs.

Keywords: Lean thinking, Lean principles, higher education institutions, quality of education, educational leadership, customer value, process optimization.

JEL Classification: D02, I23.

1. Introduction

Although in retrospect Lean was developed and applied specifically in the manufacturing sector, the abundance of successful cases of Lean implementation has shown that the methodology can be promoted in the administrative service sector as well (Höfer & Naeve, 2017). HEIs are no exception. In the context of rapidly evolving global dynamics and heightened competition within the HE sector, we the processes of research and teaching in HEIs face challenges.

In the pursuit of educational excellence in HEIs, a rapid increase in the degree of complexity of the various processes and the expansion of the influence groups can be observed. In the past, universities were able to concentrate and focus their resources on two main objectives: research and teaching, but now, with rapid globalisation, HEIs are entering a global marketplace with many

different and strong competitors fighting for a decreasing number of students and trying to attract the academic staff that is strongly needed in the private sector (Höfer & Naeve, 2017). HE institutions are confronted with increasing complexity in their operational processes and a diversification of influential stakeholder groups (Höfer & Naeve, 2017). In line with these tendencies, this research aims at investigating Lean implementation in HE while considering the implications of globalisation on HEIs, particularly regarding their ability to maintain educational excellence amidst heightened competition for students and academic talent.

To keep pace with the rapid development of society and the ever-changing needs of customers, institutions need to effectively implement management practices and adopt innovative management approaches (Awais et al., 2023). In addition to retrospectively aiming at exploring Lean thinking principles and providing a thorough

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overview of them with a focus on their applicability in the particular setting of HE, *the purpose of this study* is to thoroughly investigate the opportunities and challenges associated with the application of Lean thinking within the context of HE. It will allow to propose appropriate countermeasures and strategies that will help to highlight recommendations for tailoring Lean to the unique nature and constraints of HEIs by evaluating implementation barriers and resistance factors that may impede the successful implementation of Lean thinking in a HEI. Furthermore, this study aims at drawing attention to the impact of mentioned methodology on the overall quality of education and performance of HEIs all whilst adding to existing body of knowledge by offering recommendations for future research, providing insights of the best practices and Lean thinking implementation efforts in the context of HE.

Research method: scientific literature overview.

The topic has been analysed according to the following structure: Introduction, Theoretical analysis of the literature (Chapter 2. Lean thinking principles in Higher Education Institutions, Chapter 3. Challenges of Implementing Lean Thinking in Higher Education Institutions (and Sections 3.1–3.3), Chapter 4. Countermeasures and solutions on implementation of Lean thinking in Higher Education Institutions (and Sections 4.1–4.7), Conclusions.

2. Lean thinking principles in Higher Education Institutions

Increasing the value offered to the customer by eliminating unnecessary waste in the value-adding process and using fewer resources is the purpose of Lean management, which drives the Lean mindset (Womack & Jones, 1997). At the epicenter of this mindset are the core principles of Lean (Sharma & Gandhi, 2017). Lean thinking, shaped by these principles, is defined not only as the integral use of certain managerial toolsets, but also as a business strategy the essence of which is the commitment to questioning the behaviors of all parties involved at each hierarchical level, the desire to learn from mistakes and the development of new and innovative approaches towards waste-free processes (Höfer & Naeve, 2017).

An excellent mechanism for enabling HEIs to compete in the global marketplace and to improve the quality of the education provided would be *the implementation of a Lean mindset based on the five key principles of Lean* (Womack & Jones, 1997) depicted in Figure 1.

The first principle is highly relevant to HEIs as they become mass knowledge production organisations that must create tangible value. When considered at a generic level, this principle encourages the organisation to reassess themselves and reconsider who their real customers are and what they consider to be value (Thangarajoo & Smith, 2015). This principle requires the optimisation of processes that provide the product or service with the attributes that the customer expects, and the abandonment or improvement of processes that are inefficient, so as to

avoid investing resources in areas that the customer does not value (Kelendar, 2020). This principle is particularly difficult to implement in HEIs, due to the dualism of the latter and the different groups of value recipients – customers (LeMahieu et al., 2017).

Understandably, the main customers of HEIs are the students (Octavia et al., 2023), and their perceived value should be the foundation and center of the implementation of Lean thinking in HEIs (LeMahieu et al., 2017). Potential value can be created through a variety of processes associated with student support services, some of which could be related to improving admissions, student accommodation – provision of dormitories, classroom management and other processes (Balzer, 2020). The training process itself ought to be designed in such a manner as to enable students to perform better and to prepare them fully for participation in the dynamic labour market (Ngugi et al., 2021). To realise such a system, it is essential to place students actively involved in the teaching/learning process at the epicentre of the analysis of study quality and to consider their complaints, suggestions or preferences when making decisions (Klein et al., 2022; Turner et al., 2024). Another group of customers, inherent to HEIs are institution's teaching, academic and administrative staff (Cano et al., 2020). Therefore, adequately meeting the needs of these internal customers is yet another key factor in achieving the best organisational and managerial outcomes for the system (Klein et al., 2022).

Another group of customers are the HEI's *social partners, private and public sector representatives – businesses, companies and other* (Höfer & Naeve, 2017; Mykhaylyova et al., 2023), who also work with universities and expect tangible value through effective collaboration, quality management of contracted research and other services.

Without departing from the external customers of HEIs, it is possible to define another very important customer of HEIs – society (Klein et al., 2023). A modern, informed society depends on quality education as it is considered a catalyst for social change (Masengu et al., 2023). All educational institutions, including HEIs, in order to compete in the marketplace, need to pledge to meet society's quality requirements – to produce professional students, scholars who produce high quality research outputs that can be used for the benefit of the society (to solve its practical problems, to enhance the values shared by the larger society) (Ibidunni et al., 2023).

Considering that most processes do not have a single obvious customer, but have many different clients, HEIs, by implementing Lean thinking methods, need to perform their activities by defining the value they create for both their internal customers and most importantly external ones – the students (Höfer & Naeve, 2017; Klein et al., 2022; Šimonytė et al., 2021).

The second Lean principle relates to the identification of the *value stream*. The value stream is defined as the aggregate of all the specific activities required to deliver a particular product or service as it is passed through

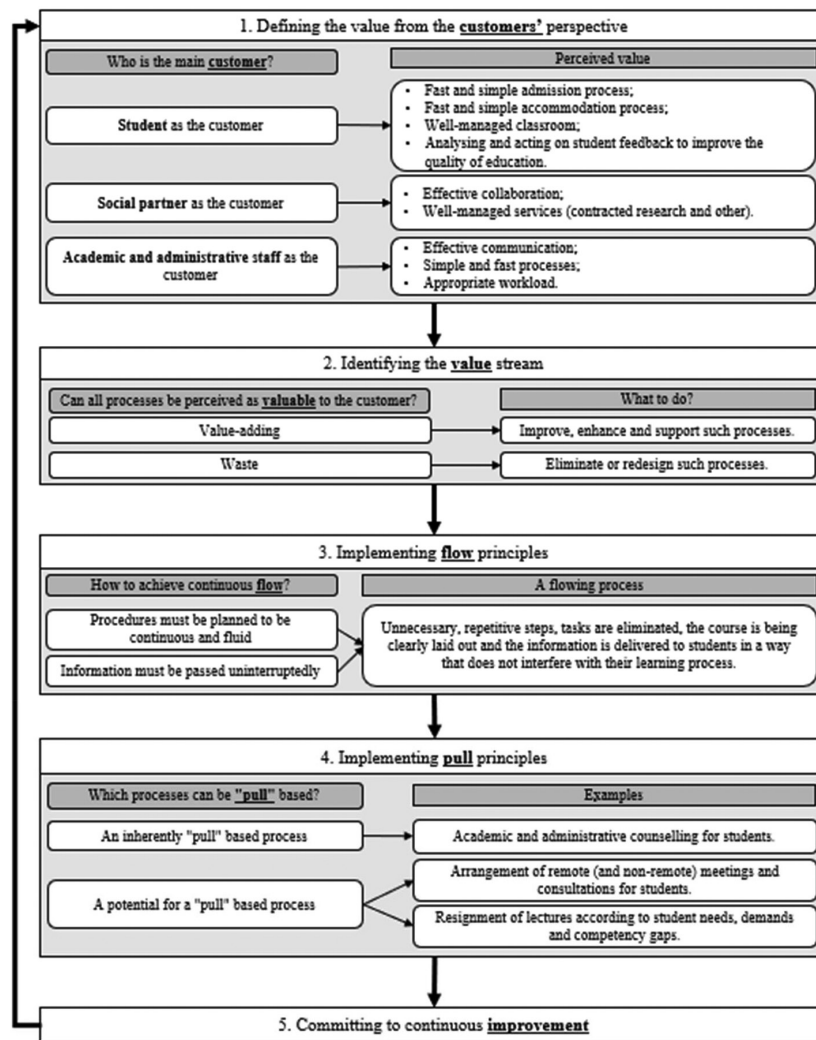


Figure 1. Lean thinking system in HEIs (source: compiled by the authors)

the three key management tasks of a business unit: problem solving (planning activities, concept development), information management (organising and co-ordinating product delivery), and physical transformation (transforming raw materials into final products) (Womack et al., 1990). This process requires excellent planning and analytical skills, as it involves the identification of all activities directly and indirectly related to the development of the product and its delivery to the final customer (Thangarajoo & Smith, 2015). These activities are also divided into "value-adding" and "waste". In the context of manufacturing, value-adding activities are understood as those that alter the suitability, form or function of a raw material bringing it closer to the final product, while non-value-adding activities refer to the effort invested in the same transformation process, but they do not add value to the customer, on the contrary, only absorb resources for initiated activities (Womack & Jones, 1997; Ohno, 1988). As customers perceive the outcome of a process as a whole rather than as the result of a single step, these processes need to be analysed and categorised as "value adding" and "waste" while considering the customer's perspective (Höfer & Naeve, 2017).

When analysing *wasteful actions in production systems*, seven most common ones have been identified: **overproduction, inventory, unnecessary processing, non-required motions, defective products, waiting and transportation** (Ohno, 1988). Another category of **non-utilised talent** has been added subsequently, which reveals problems in the deployment of people's knowledge, skills, and abilities (Kadarova & Demecko, 2016). In HEIs, the purpose of the value stream does not deviate from its roots in manufacturing companies, but is related to the *elimination of unnecessary steps from processes and procedures that do not add any value for students, faculty or administrative staff*, which usually result in waste such as: overlapping course modules, redundant and repetitive information, unclear and overcomplicated procedures, multiple approvals that prolong the process of validation itself, data entry errors, etc. (Kang & Manyonge, 2014). The following examples have been used to define different categories of waste in HEIs (Höfer & Naeve, 2017; Douglas et al., 2015):

- Overproduction – study programmes that are not fully filled, professors issuing recommendations to students who do not use them;

- Inventory – old papers that need to be preserved for a long time after the thesis is already presented;
- Unnecessary processing – multiple signatures or validations for a single researcher’s secondment, a personal performance register kept by lecturers (e.g., in an excel file), and then uploading the same information to the university’s system;
- Non-required motions – rotation of lecturers through different auditoriums, classrooms that are not fully prepared/unorganized;
- Defective products – students attending a lecture without noticing a change in the timetable when the professor is unable to deliver the lecture for certain reasons, going to the wrong classroom (iteration);
- Waiting – changing the time of a lecture/seminar due to delays by students or lecturers, waiting for missing approvals;
- Transportation – the shortcomings of the transmission of e-mails to the university community;
- Non-utilised talent – lack of credentials, undefined teaching, and administrative personnel responsibilities.

Value stream mapping develops an understanding of the causes behind waste in an organisation and enables stakeholders to better comprehend how they can positively influence it (Höfer & Naeve, 2017), while improving activities that add value for the customer and eliminating waste that helps to ensure the quality of the education provided. In most cases, different processes have a very high potential for improvement, and different solutions based on a Lean thinking perspective can help to ensure clarity of the process from their beginning to their end.

The third Lean principle is the *introduction of flow* in the rest of the value-added processes, eliminating the obvious waste in the value stream (Thangarajoo & Smith, 2015). The flow system being developed in an organisation means that the product has to reach the customer at the exact time the customer needs it, it should be assembled one piece at a time, by sending it through the production line cohesively, and there should not be any additional waiting time in between manufacturing stations (Šimonytė et al., 2021; Thangarajoo & Smith, 2015). The aim of this continuous flow is to deliver more value to the customer through an optimised and recognised value creation process with a continuous flow and zero waste (Zhang et al., 2017; Trubetskaya et al., 2022). However, as idyllic and appealing as this principle may sound, in fact, the transition from conventional manufacturing to flow manufacturing is itself a challenge for many companies (Thangarajoo & Smith, 2015). Considering this fact, it is only natural that this perspective is also scarcely explored and applied in the context of HE (Klein et al., 2022). HEIs can increase productivity, reduce turnaround times and improve overall service delivery by putting the flow principle into practice. A good example of an efficient flow for HEIs would include the elimination of non-value-added tasks/assignments, the elimination of

irrelevant and redundant extra steps, ensuring that the layout of the course in retrospect is clear and that the information is presented to the student in a way that does not interrupt the learning process (Myhovich & Kurylo, 2021). To successfully achieve objectives of an organisation, work processes must be designed to be fluid and uninterrupted, and raw materials and information must “flow”. When this flow is disrupted and the latter materials stop at any station, they create delays and become idle inventory (Womack & Jones, 1997). The implementation of a flow system in HEIs helps to streamline processes and reduce waste.

The fourth Lean principle promotes the idea of *implementation of pull based production*. “Pull” is defined as a concept that states that no one at the top of the supply chain should produce an item until the next unit in the production line demands it or the customer requests it (Womack & Jones, 1997; Šimonytė et al., 2021). This principle is the exact opposite of the traditional “push” approach. “Push” companies have long reaction times and rely on accurate and timely demand forecasts to organise their production process in order to set production rates and inventory levels (Kelendar, 2020; Thangarajoo & Smith, 2015). Naturally, errors in forecasting and market analysis lead to the risk that certain stations of the production line will not be occupied and will instead wait for parts to arrive from another station, or that certain stations will accumulate unprocessed inventory and will not manage to transform them in time (due to overloading of parts) (Berry, 2018). While companies guided by this principle try to convince customers that they need a certain product or service, “pull” companies allow the customer to pull the value of the company, producing only as much as is needed to serve the customer, avoiding overproduction and overstocking (Kelendar, 2020). The upstream operation of a value stream responds only to the demand from the downstream operation (Kuijpers, 2020). This is how the above-mentioned risks: wastage of time, effort, inventory and capital are avoided.

The “pull” principle can be applied to HEIs, as most administrative processes that exist in universities are inherently and by definition classified as “pull” (Höfer & Naeve, 2017). For example, administrative staff will never consult a particular student without the student asking them a question and contacting them – a pull process. Although lecture material is usually designed on a “push” basis – the lecturer decides what and how to teach – this “pull” principle can be applied to re-designing of lectures. For example, students can ask the lecturer to outline a relevant topic up to a certain time before the lecture (Höfer & Naeve, 2017), or the lecturer can adjust their teaching programme if they see that students do not understand or do not have the necessary competences for a certain topic. This maximises value for students: they get what they need, when they need it, and can immediately apply it and delve deeper into relevant topics (Thomas et al., 2017). Other

examples of the “pull” principle in HEIs could be related to the arrangement of remote (and non-remote) meetings and consultations for students based on their needs (Myhovich & Kurylo, 2021). HEIs, using the “pull” principle, responding to real demand and listening to users’ needs, can improve the use of their available resources, increase the satisfaction of students and staff as a whole, and most importantly, increase the efficiency of the various procedures as well as the quality of the education provided.

Moving on to the final fifth Lean principle – the *continuous pursuit of improvement*. This principle requires companies to iterate continuously through the four principles already mentioned, turning this cycle into a habit that continuously aims for improvement until all waste and non-value-adding operations are removed from the value stream (International Labour Organisation, 2017; Kelendar, 2020). An organisation that embraces Lean thinking continuously strives for perfection – an unattainable goal – making the improvement process continuous and never-ending. Once the customer’s perceived value has been identified, the value stream/chain has been defined, the flow and the pull have been established, the whole cycle is reinitiated, aiming for a perfectly functioning incremental process where only the actions that create value with zero waste are left (Kelendar, 2020). This process of continuous improvement and progressing towards satisfying customers, is well represented by the Kaizen cycle, which helps to improve the performance of an organisation (Asnan et al., 2015; Maldonado et al., 2020). As in all other organisational settings, continuous process improvement and the pursuit of excellence are essential practices in HEIs (O’Reilly et al., 2018). Lean thinking needs to be part of the HEI’s management strategy, where cyclical improvement and waste reduction are among the key objectives (Wiegel, 2019). Based on this cycle, new solutions are constantly emerging that further improve the process, and a culture of striving for excellence, in which all employees are expected to continuously iterate on the university’s processes, empowers the latter to find and correct bad processes wherever they observe them (Balzer et al., 2015).

In summary, although Lean has its roots in the manufacturing sector, it can be successfully applied in HEIs, with the potential for its application that is still not fully explored. Putting Lean principles into practice by taking actions to create a flawless value stream, as well as reducing or eliminating all sources of waste, while increasing the value created for the school’s stakeholders, including students, teaching staff, researchers (Thomas et al., 2017), is an effective way to increase the quality of education generated by HEIs.

3. Challenges of implementing Lean Thinking in Higher Education Institutions

Various factors such as globalisation, economic difficulties, the decline in the popularity of traditional HEIs,

market oversaturation (including but not limited to on-line courses) and other external pressures to continuously improve are pushing HEIs to evaluate new ways of working (Balzer et al., 2015). Responding to these trends, by fostering a Lean mindset to improve the efficiency of HE processes, institutions are giving themselves the opportunity to radically improve the way in which they deliver HE and the services that support it (Balzer et al., 2015).

Although the previous section has shown that it is possible to adapt and transfer Lean thinking from manufacturing to HE, the application of Lean thinking in the context of teaching and learning is much more complex and resource/effort-intensive than it may appear (Sfakianaki & Kakouris, 2019). They are related to the difficult nature of education, characterised by complex and interconnected procedures, a high degree of human interaction and a rather fixed and difficult to change nature (Mhlongo et al., 2023). All these aspects also form the basis of the challenges and the ground roots of the implementation of Lean thinking in HEIs.

A review of the scientific literature reveals some recurrent patterns of challenges in implementing Lean thinking, which can be grouped into three categories: organisational, technical and individual challenges (Antony, 2015). Based on this classification, Table 1 is constructed.

Table 1. Groups of challenges and their patterns in implementing Lean thinking (source: compiled by the authors using the sources cited)

Organisational challenges	
Lack of management support and commitment.	Antony, 2015; Emiliani, 2015; Yorkstone, 2019.
Lack of knowledge, accountability, and resources.	Thirkell and Ashman, 2014; Antony, 2015; Yorkstone, 2016.
Insufficient communication.	Antony, 2015; Thirkell and Ashman, 2014.
Technical challenges	
Difficulties in characterizing the customer and the created value.	LeMahieu et al., 2017; O’Reilly et al., 2018; Antony, 2015.
Difficulties in selecting metrics for measuring performance.	Antony, 2015; Sunder and Antony, 2018; Klein et al., 2021.
Individual challenges	
Negative employee opinion and resistance.	Balzer et al., 2015; Thirkell and Ashman, 2014; Hines et al., 2020; Bakke and Johansen, 2019; Antony, 2015.
The inability to convey Lean principles in the academic society.	Thirkell and Ashman, 2014; Antony, 2015.
Willingness of faculties to protect their autonomy.	Thirkell and Ashman, 2014; Emiliani, 2015.

3.1. Organisational challenges

The process of adopting a Lean mindset faces the problems of **the absence of a culture based on continuous improvement and the lack of management support** (Yorkstone, 2019). In most instances, HE managers are not fully realised Lean leaders who are not afraid to fundamentally change the process, making improvements to achieve full efficiency, which poses significant challenges for the organisation. Managers with a large baggage of work experience in HE may prefer traditional training methods and lack the motivation to learn fundamentally new ways of thinking and doing (Emiliani, 2015). Managers can often only see the hard work, the managerial commitments, the responsibilities, the investments in people and the difficult structural changes associated with implementing a Lean mindset, but it is difficult for them to see the potential of Lean, to realise that this methodology can help improve various functions, in parallel there was not strong enough of a financial incentive to insist on or actively advocate for using the methodology (Antony, 2015). Furthermore, to learn Lean principles and practices, managers need to be involved in process improvement activities, which puts them in the position of a non-expert, most senior managers do not like it and try to disassociate themselves and instead delegate process improvement to others (Emiliani, 2015). Managers often assume, based on preconceived mental models, that “No problem is knocking at my door”, a statement often heard in complex organisations, and because of this preconceived notion and mentality, many managers may believe that advanced Lean training is as harmful to their organisation students as it is to the university itself (Antony, 2015; Emiliani, 2015). The lack of visionary leadership and motivation poses a strong problem when implementing Lean thinking in HEIs, no implementation of Lean thinking will be successful, nor will reach its full potential, unless highly capable and competent managers understand that they also have a crucial role to fulfill in the implementation of this mindset.

Another organisational problem relates to lack of **knowledge, accountability and resources**. Both managers and employees find it difficult to understand the concepts, principles, and methods of Lean thinking, and have difficulty defining the benefits of applying the mindset, how to implement the strategy and where to start (Antony, 2015). Without the support of competent staff, it is difficult to undertake improvement actions in HEIs, and it is difficult to involve them in improvement processes, as they are not aware of Lean tools and methods (Thirkell & Asshman, 2014; Yorkstone, 2016). Aspects such as lack of responsibility of employees and the use of certain defence mechanisms are also strongly related to the state of unfamiliarity about the implementation of Lean thinking in HEIs. Resistance to Lean implementation through employees can manifest itself in rather passive forms, such as the evidence in various studies shows that employees informed their senior managers that they were applying Lean principles as they understood them, when in fact

they knew that this was not the reality (most likely they were applying previously tested methods) (Thirkell & Asshman, 2014). This culture of passing the blame and shrugging off responsibility poses a significant threat to the adoption of Lean approaches in HEIs, as by not acknowledging employees own contribution (active or passive) to process improvement, organisations are not given the opportunity to learn from mistakes and objectively assess potential problems.

The third problem of Lean implementation concerns **insufficient communication**. This communication ineffectiveness can be understood as two-dimensional, it includes the failure of the administration to convey and communicate Lean ideas and principles to the academic community, as well as to inspire them to adopt the methodology and contribute to its deployment (Thirkell & Asshman, 2014), and the next dimension relates to the term “silo mentality” (Antony, 2015). This phenomenon occurs when different departments, units or groups in an organisation do not share information or knowledge with each other, employees focus on their own goals and are siloed (Israilidis et al., 2020). HEIs often face a ‘silo mentality’ due to the inherent characteristics of the public sector (Thirkell & Asshman, 2014). Due to the fragmentation and exclusion of academic and/or administrative staff, the atmosphere in HEIs is rather isolated and employees often do not feel that they are working together towards a common purpose (Thirkell & Asshman, 2014). Considering that Lean-based change reflects integral process improvement, waste reduction, value stream consistency, to which many people in the organisation have to contribute, the “silo mentality” is one of the biggest problems that make it difficult, if not impossible, to implement Lean in HEIs.

In summary, the challenges identified regarding the implementation of Lean thinking in HEIs in terms of managerial commitment, motivation, lack of knowledge and responsibility, and absence of effective communication in the organisation, show that the implementation of Lean thinking is a complex process that requires a transformation of the organisational culture and preparation before the system can be implemented in universities. Successful integration of a Lean mindset can lead to more efficient operations, saving time and resources and improving the overall competitive position of the organisation.

3.2. Technical challenges

Proceeding to the second category of challenges – “Technical challenges”, the first one is related to the task of **precisely defining your client and the proposed value for them**, which is quite difficult for HEIs. A recurring thought when reviewing the literature was that, although it may seem evident, defining who the real customers, the service recipients, are, in education this can be challenging because education provides value to a number of different stakeholders, essentially resulting in a “customer chain” where all stakeholders benefit from the provision

of education services, but each perceive “value” in a slightly different manner (LeMahieu et al., 2017). Potential HEI customers include groups such as: students, their parents or the government (groups that typically pay for education), teachers, units, social partners, the society itself and future employers (Antony, 2015; O’Reilly et al., 2018). Although there is a consensus, based on various sources, that students are the main customers of HEIs, there is still a challenge, as they differ in many ways from regular business customers (Antony, 2015). For example, students are admitted to universities on merit, based on academic standards and requirements, while businesses generally do not do this because they do not want to prevent potential customers from purchasing their goods or services (Antony, 2015). Due to the unique concept of HEI customers, it is difficult to even develop a high-level process map of “supplier – input – process – output – customer” (Antony, 2015). Contemplating this, already at the first stage of the implementation of Lean thinking, guided by the first principle of defining the customer and its perceived value, there are critical difficulties and risks to misidentify one’s target customers and thus to start redesigning inefficient processes or those that are not implemented to their full potential.

The second technical challenge relates to difficulties in **selecting metrics for measuring performance**. A major technical challenge in any HEI is the definition and measurability of educational quality and the collection of appropriate and representative data (Antony, 2015). Comparing these institutions to the manufacturing sector, HEIs’ processes are not as simple and transparent as those of manufacturing company, where it is easy to identify when something is going awry, production lines are easily trackable with rapid and simple identification of problems in them (Sunder & Antony, 2018). If we refer to the idea defined in the previous paragraph that students are the main customers of HEIs, then their academic achievements should be an excellent indicator for measuring the quality of services provided by the university. The results of the various tests are easy to measure and analyse, but there are several other attributes circulating in the value chains created by HEIs that distinguish them from manufacturing companies, including: student engagement, student satisfaction, relevance of the course material, the teachers’ personal qualities, their skills, exam patterns, etc., and quantifying these attributes traditionally classified as qualitative variables is an extremely complex task (Antony, 2015; Kazancoglu & Ozkan-Ozen, 2019). Moreover, the identification and disposal of waste in service areas, whether public or private, can pose additional challenges due to the intangible nature of the information inherent in these areas. This makes it difficult to identify, select and segregate waste in HEIs (Klein et al., 2021). Reflecting on these challenges, identifying the fact that applying Lean thinking approaches in HEIs without adapting them to the nature of HE, presents the risk of quantifying many of the process performance indicators, missing the important

qualitative meaning and opportunity of evaluating these criteria.

In summary, these technical challenges show that the successful implementation of Lean thinking in HEIs depends not only on the changes in the organisational culture of HEIs discussed in the previous section, but also on the ability to accurately plan the technical aspects of implementing the Lean methodology, such as: a focused definition of the customers and their perceived value, the organisation’s process improvements based on this definition, and the selection of clear indicators for performance and quality of education measurement, appropriate data collection methods and analysis strategies.

3.3. Individual challenges

Individual challenges are mainly related to the personal attitudes, feelings and rejection of Lean thinking among HEI employees. The first of these challenges is **negative employee opinion and resistance to Lean implementation** (Balzer et al., 2015; Thirkell & Ashman, 2014). Introducing a Lean mindset in organisations is often associated with improving productivity, efficiency, scrupulous performance tracking and public communication, but in turn emerges the risk of overburdening employees with excessive workloads, which, if not properly managed, can lead to burnout and lower morale (Hines et al., 2020; Bakke & Johansen, 2019). Often HEI employees do not tolerate too much emphasis on performance measurement in a Lean framework (Thirkell & Ashman, 2014), and as the previous section has shown, not everything in HEIs can be measured, so some measurements are inaccurate or unrepresentative. Naturally, an overemphasis on metrics and constant monitoring can lead to a stressful and negative working environment, and consequently to staff resistance of Lean implementation in HEIs.

Introducing Lean methods, which are new to the culture, can also be challenging as employees need to be coaxed to think and act in ways that are alien to them, they can find it difficult to think in terms of new concepts such as “customer value” and “waste” (Bakke & Johansen, 2019; Antony et al., 2012). Considering the idea that in many HEIs procedural thinking is not very prevalent, with everything being treated as a task or a procedure, but not as a process, it can be difficult for staff to shift their thinking from procedural to consistent processual (Antony, 2015). Without considering how difficult it is to push people out of their comfort zone, HEIs may experience setbacks at the first stage of change. To make transformation possible, it is necessary to understand the important role that employees in HEIs perform when implementing Lean thinking methodologies.

The second individual challenge relates to the **inability to convey Lean principles in academic society**. Incorporating Lean thinking methodologies into academic activities is particularly challenging, and universities often restrict the implementation of Lean thinking to administrative/non-academic units (Antony, 2015). The

indicative of academic staff's ambivalence can be the fact that they understand the reasons for implementing Lean thinking in HEIs, but are not committed to adopting the practices of this methodology in their own activities (Thirkell & Ashman, 2014). The reasons for this are related to the fact that Lean thinking challenges the educational theoretical framework of certain disciplines, as the academy is made up of people who are trained to debate opinions that differ from their deeply held beliefs (Antony, 2015). Another reason for academics' resistance relates to pre-constructed working models based on Lean thinking perspectives, which academics tend to instinctively reject, as the latter independently construct their own working models and refine them based on their work experience (Thirkell & Ashman, 2014). Lean ideas are also alien to many academics, as lecturing is inherently an emotional process of interacting with people, where the personality of the lecturer emerges (Thirkell & Ashman, 2014). All these debatable subjects pose a huge challenge for the implementation of Lean thinking in HEIs, because it is not possible to justify the implementation of Lean in organisations where its core "business" is unrefined.

The final individual challenge, closely related to the problems discussed in the previous paragraph, is **HE institutional inertia, the willingness of faculties to protect their autonomy**. Naturally, this problem is particularly acute within the academic and administrative university community (Thirkell & Ashman, 2014). The processes within the university and the complexity of the institution itself are only increasing due to the difficulty in defining the boundaries of academic freedom (Klein et al., 2021). Both university management, administrative staff and academic staff are reluctant to give up a certain autonomy and, at the same time, a peculiar position of expert, while believing that the activities carried out without Lean thinking have been efficient and faultless (Emiliani, 2015). Academics often see their professional autonomy as the main reason they became teachers and researchers, and any perceived encroachment on this freedom can become a basis for opposing Lean implementation (Thirkell & Ashman, 2014). Similarly, lecturers may resist encroachment on their authority and autonomy in the classroom due to a disdain for Lean thinking methods, believing that once they have emerged in the manufacturing industry, they have no prospect of being applied in HE (Emiliani, 2015). The desire for autonomy will continue to pose challenges to the implementation of Lean thinking in HEIs, but by assessing these risks and increasing knowledge of Lean thinking in HEIs, the implementation of the latter can be catalysed and accelerated.

In summary, although the fears and resistance of HEI employees, the reluctance of academics to change their methodologies for delivering knowledge and the unwillingness to lose some of their autonomy may hinder the successful implementation of a Lean mindset in the HE environment, by overcoming these challenges HEIs can

achieve a more efficient operation, a more creative environment and a greater ability to adapt to the rapidly changing market demands.

4. Countermeasures and solutions on implementation of Lean thinking in Higher Education Institutions

Although the discussed challenges can be identified and compared with the main problems in implementing new processes in any large organisation, for a successful introduction of the Lean concept, certain preventive actions need to be tailored to the need, culture and specificity of individual companies (Bakke & Johansen, 2019). Based on this, 7 critical success factors have been identified for the successful implementation of Lean thinking in HEIs (Antony et al., 2012), they are summarised in Table 2.

Table 2. Success factors and the elements that contribute to the implementation of Lean thinking in an organisation (source: compiled by the authors using the sources cited in Chapter 4 and Sections 4.1–4.7)

Uncompromising top management support and commitment.
<ul style="list-style-type: none"> – Leader who inspires employees; – Leader who creates a motivated, motivating and comfortable culture; – Leader who delegates work effectively; – Leader who engages in ongoing processes; – Leader who is learning together with the whole organisation.
Strategic and visionary leadership.
<ul style="list-style-type: none"> – Leader who is capable of long-term planning and strategic thinking; – Leader who contributes to the formulation of a Lean-based vision; – Leader who uses performance tracking indicators; – Leader who evaluates if the desired outcomes are being met; – Leader who efficiently allocates resources; – Leader who facilitates the development of well-functioning teams; – Leader who helps to create a culture of accountability and rewards for efficiency; – Leader who encourages employee communication.
Developing organisational readiness.
<ul style="list-style-type: none"> – Developing individual action plan; – Establish maturity models; – Examine the following preparedness factors: management commitment, customer focus, leadership, vision, and alignment of Lean with the organization's strategy; – Determine whether a "Kaizen-type" implementation or a complete implementation of the methodology will be the most beneficial to the organization.
Project selection and prioritisation.
<ul style="list-style-type: none"> – Prioritise which processes can be improved now and which can be addressed later (academic or operational); – The processes that are redesigned must be related to customer's pain points, but at the same time they must be feasible to execute.

End of Table 2

Effective communication at all levels vertically and horizontally.
<ul style="list-style-type: none"> – Demolish the “silo mentality”; – Promote a comprehensive understanding amongst employees; – Communicate the improvement journey goals; – Create a common language of change and improvement.
Resources and skills to facilitate implementation.
<ul style="list-style-type: none"> – Investing in training to ensure that employees have the competencies and skills needed to implement Lean; – Equipping employees with the competences needed to use different Lean tools.
Organisational culture.
<ul style="list-style-type: none"> – Promoting the respect for employees; – Creating a safe environment for employees where the latter see their workplaces as secure; – Respecting employees’ efforts and contributions.

4.1. Uncompromising top management support and commitment

Successful implementation of Lean thinking in HEIs requires strong leadership, commitment, and support from managers (Yorkstone, 2019; Balzer et al., 2015). Leadership becomes particularly important for the successful implementation of organisational change when the institution’s environment is hostile to change (Lu et al., 2017). Leaders of HEIs need to inspire employees, create a motivated culture, delegate work effectively, engage in ongoing processes and regularly review whether certain short-term goals are being achieved on time (Antony et al., 2012). In support of this, the scientific literature emphasises that even managers with many years of experience in HE should be involved in process improvement tasks, learning together with the whole organisation how to move away from traditional organisational approaches (Emiliani, 2015). It is also important that during Lean implementation, managers convince employees that problems or certain mistakes they make are just opportunities for improvement and in no way something for which employees should be punished or blamed (Sfaki-anaki & Kakouris, 2019).

4.2. Strategic and visionary leadership.

To improve Lean implementation in HEIs, managers and leaders need to have the qualities of strategic planning and long-term thinking (Balzer et al., 2016). Leaders need to define a Lean-based vision that is aligned with the strategic goals of the organisation, use performance tracking indicators, assess promptly whether the intended goals are being achieved, and plan resource allocation effectively (Balzer et al., 2015; Nadeau, 2017). Managers need to create a culture of accountability, well-functioning teams and incentives that help break down the embedded “silo mentality”, while maintaining an orientation towards delivering value to its customers (Balzer et al., 2015). They need to adopt a “we want, support, value,

celebrate success and reward those who have implemented change” position that is continuously communicated to the organisation (Höfer & Naeve, 2017). If management does not critically evaluate their role, Lean success will be limited to isolated success stories and will not become a sustainable part of HEIs (Rother, 2013, cited from Höfer & Naeve, 2017).

4.3. Developing organisational readiness

The university’s adequate readiness to implement coherent system-wide change is crucial for the success of these organisational changes (Šimonytė et al., 2021). In an effort to find out whether an organisation is ready to embrace new initiatives, an individual action plan should be developed, certain maturity models should be established and several readiness factors should be examined (Antony et al., 2012; Antony, 2014). These factors include leadership, vision and alignment of Lean with the organisation’s strategy, management commitment and resources, selection of the right people and customer orientation (Antony, 2014). Before fully adopting Lean in HEI activities, it is also important to assess which type of implementation of the methodology is most beneficial for the organisation: full implementation or “Kaizen-type” implementation (Radnor et al., 2006). A “Kaizen-type” deployment will involve a smaller-scale introductions of the theory in specific processes, whereas a full deployment will involve a broad, inclusive, plenary application of Lean theory in the organisation. Due to the bureaucracy prevalent in public institutions, anchored in complex legal, social accountability systems, processes and procedures in HEIs are interconnected, which makes it very difficult to fundamentally redesign the system, therefore a “Kaizen-type” deployment would be inherently more suitable for public sector HEIs (Thirkell & Asman, 2014). In planning the implementation of Lean thinking in HEIs, the perspective of Lean thinking should be translated into practical experiences rather than just scientific exercises (Balzer et al., 2015).

4.4. Project selection and prioritisation

To manage the potential threats when implementing Lean in HE, institutions need to clearly prioritise which processes can be improved now and which can be improved later. When considering this, the selection of projects must be based on several principles: the processes selected for redesign must be related to the main customer’s pain points, but at the same time, the projects selected for redesign must be feasible to execute, considering resource and data availability (Antony et al., 2012). Given the problem of improving academic processes discussed in the previous section, improving this area would raise many more feasibility issues. This is the perspective in which researchers are divided. Analysing the qualitative data discussed by Antony (2015), some experts express the opinion that the biggest challenge in implementing Lean is convincing managers that this way of thinking

offers many opportunities and positive financial results. This can be demonstrated by starting with a few minor projects, for example, the use of water, heating and air-conditioning systems, while areas such as curriculum development are better left for a later stage, when it has been demonstrated that Lean thinking is working successfully in organisations. Other experts point out that such an approach is contrary to Lean principles. They argue that HEI Lean thinking should be introduced first in the processes that directly add value to customers (academy) and only later in the support processes (administrative, etc.). In general, universities can benefit greatly by envisaging and planning which processes to improve first, but if the wrong projects are chosen then the wrong processes will be improved (Balzer et al., 2015; Antony et al., 2012).

4.5. Effective communication at all levels vertically and horizontally

Based on the scientific literature, the previous section identified one of the key reasons for the failure of Lean initiatives in HEIs as poor or no communication, the “silo mentality”. Miscommunication, misunderstanding the integrity of the improvement journey goal, is a very important problem in implementing Lean thinking in HEIs. Only through effective communication organisations can create a common language of change and improvement that will help staff to communicate effectively with each other, as well as to engage and work within a team to address the various issues that arise in HEIs (Antony et al., 2012).

4.6. Resources and skills to facilitate implementation

Successful Lean implementation in HEIs requires building human capital through effective employee education (Antony et al., 2012). The institution needs to invest in training to ensure that its academic and administrative personnel have the competencies and skills needed to implement and sustain Lean (Balzer et al., 2015). There are many effective tools and methodologies available to support employees in implementing Lean (value mapping, cause-effect matrix, root cause analysis, 5 S's, PDCA, etc.), and by equipping them with the competencies needed to use the latter tools, an organisation can ensure success and build an infrastructure that supports and promotes Lean (Klein et al., 2021).

4.7. Organisational culture

Creating a Lean culture with respect for employees and a continuous improvement mentality is a critical success factor in HEIs (Balzer et al., 2015). Respect for employees needs to be manifested through a safe and secure environment for employees where they do not feel like an ordinary part of the service supply chain, Lean in HEIs is about reducing waste and not the number of employees, if employees do not perceive that their workplaces

are secure, they will automatically reject any Lean related changes and will not participate (Balzer et al., 2015). Strengthening organisational structures and culture to successfully implement Lean, providing a framework for Lean implementation by respecting employees' efforts and contributions are just some of the steps for a successful Lean implementation in HEIs (Balzer et al., 2015; Antony et al., 2012).

In summary, analysing some of the measures to prevent failures of Lean thinking in HEIs highlights even more challenges than those identified by the authors in the previous sections, but by using the specific practices and tools defined, it is possible to ensure the successful implementation of Lean thinking in HEIs and the long-term effectiveness of these organisations.

5. Conclusions

The implementation of Lean thinking in the context of HE is confronted with multifaceted challenges that extend beyond the successful transfer of principles from manufacturing sphere. The complexity and resource-intensity (both human, knowledge and other capital) of applying Lean thinking in education are substantial. Organisational challenges pose significant hurdles, including the absence of a culture of continuous improvement, the lack of visionary leadership, and insufficient motivation. The reluctance of HE managers to fully embrace Lean leadership principles and make fundamental changes to existing processes hinders the potential success of Lean implementation. Additionally, the lack of financial incentives and the challenge of involving managers in improvement processes due to their non-expert status present organizational barriers. Technical challenges further complicate Lean implementation, particularly in defining clients and the proposed value in the diverse context of HE. The complexity of measuring performance metrics, beyond academic achievements, adds another layer of technical challenge, as qualitative variables like student engagement and satisfaction defy easy quantification. Individual challenges encompass negative employee opinions and resistance, often stemming from the perceived burden of increased workloads and the stress associated with constant monitoring. Shifting the mindset of staff from procedural to processual thinking becomes a crucial but challenging aspect. Resistance from academic society, driven by pre-constructed working models and the protection of professional autonomy, further complicates the individual challenges associated with Lean implementation. Successful implementation of Lean thinking in HEIs demands a comprehensive set of countermeasures, such as top management support and commitment, strategic planning, project selection and prioritisation, effective communication, employee education and positive organizational culture that supports and promotes Lean implementation. Based on the conducted review it can be stated that successful integration of a Lean mindset has the potential to lead HEIs to more

efficient operations, saving time and resources, thereby enhancing the competitive position in the HE market. The inclusion of clear measurement strategies and appropriate data collection methods further ensures the effectiveness of Lean practices in improving the quality of education. HEIs can not only ensure the successful integration of Lean thinking but also sustain its long-term effectiveness, paving the way for continuous improvement and adaptation to the dynamic demands of the education sector.

The conducted scientific literature overview provides us with a better understanding of the multifaceted challenges associated with implementing Lean thinking in HEIs. This, in turn, can be used to generate new knowledge of effective strategies and countermeasures for Lean implementation in HEIs, enhancing their operational efficiency and competitive position in the HE market.

The analysis of the literature has revealed some opportunities and perspectives for further research. With different researchers expressing conflicting views on which Lean thinking implementation approach would be most appropriate for HEIs: plenary or Kaizen-type, further research could undertake a comparative analysis between Kaizen-type Lean deployment and full Lean deployment in HEIs, exploring the advantages and disadvantages of each approach. Such research would provide nuanced insights into which deployment strategy aligns better with the complex interconnected processes and structures in HEIs. In addition, considering the divergence of scientific opinion on which processes are better to implement Lean in the first place: academic or operational, further research could include the examination of merits and drawbacks of a sequential introduction of Lean principles in various processes within HEIs. Understanding whether starting with minor projects, as suggested by some experts, is a viable approach, and comparing this with the opposing view that emphasizes introducing Lean in value-added processes, such as students education, first, would contribute to a systemic and holistic view on Lean thinking implementation in the context of HE. As this study relied on the scientific literature analysis, the expressed research ideas should be further empirically tested by case studies of implementing Lean thinking in HEIs. The analysed issues can as well serve as a key list to build an expert HEI representative focused empirical research.

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