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The Lean Journey for Dutch Higher Education Institutions: a way to go?

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Foreword

This research was written for the final project for the Master Business Administration, followed at the University of Twente from February 2016 until June 2017. The preparations for the project ran started in May 2016, while the actual research phase started in December 2016. The thesis project concluded with a presentation on the 29th of June, 2017. I would like to thank dr. Van Dun, prof. dr. Wilderom and ir. Franken for their feedback and support during the whole process. Also, I would like to thank all the interviewees, who work at the institution of higher education (HEI) of the case study for their cooperation. It has been a small lean journey for me as well, but definitely an educative one.

Abstract

Lean management is an upcoming concept in the world of managing service organizations. Higher education institutions (HEIs) are an example of service organizations. HEIs are under constant pressure to deliver quality with resources that seem to decline every year. The implementation of lean management can be a solution for this problem. However, the field of lean in HEIs is relatively young. This research was written to add to this field, but it needs to be noted that it only concentrates on the implementation of lean in the supportive processes in a HEI. This research consists of two studies: a literature review and a case study. The case study is done at a HEI in the Netherlands where lean is currently implemented. For the case study, different interviews were held. The thesis found several conclusions. The main insight is that when lean at a HEI is seen as a goal, the chance that the implementation will succeed and will be sustained is likely low; but when lean is seen as a tool to bring departments together, it has a chance of succeeding.

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1. Introduction

Various influences and trends have caused the higher education institutions (HEIs) to change and adapt to the changing environment. For example, the globalization and digitalization has forced higher education to face formidable challenges. European higher education responded to this by setting up the Bologna Process, to erase the differences between higher education in different European countries. The Bologna Accords created the European Higher Education Area, in which the homogeneity of the structure of educational programs is required. So, several institutions have responded to this challenge. But now, institutions of higher education will face another challenge: the challenge of decreased funding.

There has been an increasing pressure on HEIs from all over the world to cut costs to survive. Budgets for HEIs have decreased (Altbach, 2004). For example, in 2013 the Dutch cabinet announced 40 million euros of cuts in the budget of higher education. Based on the works of Cameron, Freeman and Misha (1993), and Cameron (1994), Baarspul and Wilderom (2012) present three types of strategies to cut costs. Namely, the size reduction strategy, the organizational redesign or task reduction strategy and the strategy of continuous improvement. They also argue that the choice of strategy can have significant long-term effects on the organization.

It needs to be noted that cutting costs can have detrimental effects on organizations and their working cultures. Especially the size reduction strategy can have negative effects on an organization, such as the loss of key talent (Cascio and Wynn, 2004), "employee depression, decreased self-esteem, increased insecurity, conflict, bitterness, a loss of trust, and a decline in employee morale" (Feldheim, p.254, 2007). Baarspul and Wilderom (2012) argued that organizations who choose the strategy of continuous improvement are most able to reach their long-term goals. To execute such a strategy, an organization can choose to adopt a lean approach. Lean is a way of working that has its roots in some production plants in Japan. Lean production, according to Womack, Jones and Roos (1991) "is 'lean' because it uses less of everything compared with mass production – half the human effort in the factory, half of the manufacturing space, half the investment in tools . . . half the engineering hours to develop a new product in half of the time" (p.13).

Of course, this is in a production setting, but according to Womack et al. (1991) the "fundamental ideas of lean production are universal – applicable anywhere by anyone" (p.9). So, it also should be possible to apply the ideas of lean in a HEI, although a university differs radically from a production plant. First, a HEI is different from a production plant since it is service-based, while a production plant aims to produce physical goods. Next to that, a production plant is likely to be a private organization, while a university is likely to be a public organization. Although it is not empirically confirmed (Baarspul and Wilderom, 2011), it is generally assumed that a private organization behaves different than a public organization. So, although Womack et al. (1991) stated that the ideas of lean could be applied anywhere by anyone, this might not be the case for service-oriented organizations.

For example, the for a production plant it might be clearer which key performance indicators (KPIs) it needs to have in place. These KPIs are always expressed in numbers, and it might be easier for factories to express their output in numbers than organizations who produce service. And when it is hard to specify these "hard" outcomes, it might be hard to show the added value of lean, and

with that it might be hard to get the support of the management. According to Radnor and Bucci (2011), the most important element of lean is specifying and identifying the value. And it is the support of the management that is crucial for the success of lean in every organization. Antony, Krishan, Cullen and Kumar (2012) state that "it is absolutely crucial to have uncompromising management commitment and buy-in from the outset of the Lean initiative and without their support and commitment the effort will be absolutely futile" (p.942).

Lean in the setting of higher education is a new concept. Radnor et al. (2011) state: "… it is still relatively early days regarding the implementation of Lean in Higher Education" (p.5). However, Radnor et al. (2011) acknowledge the opportunity for lean in higher education, with "with many individuals recognizing that the need to deliver more efficiency and effective services to both students and for academics is critical" (p.5). A quick look at the literature about lean in higher education gives a quite negative look: most of the case studies show failed implementation, due to different factors such as weak conceptualization or lack of management support. It needs to be noted though, that most of the found literature is about the implementation of lean at higher education in the United Kingdom (U.K.).

This research takes a different approach. First, it gives an outlook of the main factors why lean implementations in the supporting processes of a HEI may fail. The second goal is to give an outlook of why it is indeed possible that the implementation of lean in the supporting processes of a higher education institution can succeed. This study focusses on the supporting processes, and not on the main research or teaching process. This was decided because otherwise the questions could potentially become too broad and the answers too vague. Initial scanning of the literature field showed that the implementation of lean in HEIs had mostly been limited to the supportive areas. Therefore, the implementation of lean in the supporting processes was chosen over the implementation of lean in the educational processes.

The thesis consists of two studies: a literature review and a single qualitative case study. The literature review makes sure that all the relevant knowledge available is considered when doing the case study. The case study gives an insight in the implementation process of lean at a Dutch HEI. In the end, the conclusions from both studies will be compared to develop several propositions. This study is academically relevant because there hasn't done such a study earlier, at least not to our knowledge. There have been some studies about lean in a HEI, but that was mainly about higher education in the U.K. This study will be different, since the case study will be done in a Dutch HEI. This study is also practically relevant, because there hasn't been much literature about how lean can be applied in a HEI. Most of the literature gives managers of the implementation of lean ideas about why lean can fail, but not why it can succeed.

i. Main Question: What are enablers and barriers of successful implementing lean in the supporting processes Dutch HEIs?

Sub Question 1: With which tools could lean in the supporting processes of Dutch institutions of higher education possibly be implemented?

Sub Question 2: What are the main reasons why the implementation of lean in the supporting processes of Dutch institutions of higher education could possibly fail?

Sub Question 3: What are the main reasons why the implementation of lean in the supporting processes of Dutch institutions of higher education could possibly succeed?

2. Theory

In this section the main concepts and ideas of this research will be described. First the concept of lean management is discussed. After that, Lean Enterprise House of Bicheno and Holweg (2009) is discussed, which is one of the two models that will be used to answer sub questions. Then the concept of lean in service organizations is discussed, followed by an explantion of the model of Van Dun and Wilderom (2002). To conclude we discuss the concepts of public organizations and higher education.

i. Lean management

The term lean management is given to a production system that has its roots in some of the production plants of Japan. The most major precursor of this system is the production system of Toytota, known as the Toyota Production System (TPS). In 1971, Drucker was the first who drew attention to the features of Japanese production systems, in an article in the *Harvard Business Review* (1971). Sugimori, Kusunoki, Cho and Uchikawa (1977) are generally acknowledged as the first to describe TPS in general. According to Staats and Upton (2011), TPS is "arguably the most important invention in operations since Henry Ford's Model T began rolling off the production line" (p.3). New (2007) goes even further in his praise for TPS: "Any manufacturing manager or production engineer who has not engaged with these principles at some level (even if to reject them) can fairly be called an amateur. Any engineering or MBA student who graduates without a clear grasp of these concepts has been failed by their institution" (p. 3546).

Radnor and Boaden (2004) and Ziskovsky and Ziskovsky (2007) define lean as doing more with less. Lean is linked to various other concepts, such as and Six Sigma, Continuous Improvement (CI), Just-in-Time (JIT), total quality management (TQM) and the Theory of Constraints (TOC). So, it is hard to give a generally accepted definition of lean, which is one of the biggest reasons why implementing lean in organizations (especially in the case of lean in service organizations, as will be pointed out later) often fails. According to Radnor and Boaden (2008), lean consists of 5 core principles:

- Specify the value desired by the customer.
- Identify the value stream for each product.
- Make the product flow continuously.
- Introduce pull between all steps where continuous flow is impossible.
- Manage towards perfection so that the number of steps and the amount of time and information needed to serve the customer continually falls (Womack, 2002).

Generally, "the lean thinking paradigm differentiates between waste and value within an organization." (Stone, p.114, 2012). According to Womack and Jones (1996), waste is "any human activity which absorbs resources but creates no value" (p.15). They define value as "a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer" (p.311). (Womack et al., 1996). Following the lean approach means being on a constant trail to identify and eliminate waste. The following types of waste can be identified, as suggested by Hines and Rich (1997), Sullivan, McDonald and Van Aken (2002), Wee and Wu (2009), Oehmen and Rebentisch (2010) and Brintrup, Ranasinghe and McFarlane (2011):

- Overproduction
- Waiting

- Transportation
- Inappropriate processing
- Inventory
- Unnecessary motions
- Defects
- Talent

Originally there were only seven types of waste, without talent. In the last few years, several other types of waste were proposed, and among them was the waste of talent. In a service setting, and especially in an educational organization, the waste of talent can prove to be extra costly compared to a factory setting.

ii. The Lean Enterprise House

Bicheno and Holweg (2009) describe the philosophies behind the well-known House of Lean model. The House of Lean model is very tool oriented, and the Lean Enterprise Model offers a far broader picture on how to implement lean at an organization. The Lean Enterprise Model "emphasizes philosophy and approach", and is about "the 'what's', not the 'how's'" (Bicheno and Holweg, p.17, 2009).

The foundation consists of challenge, kaizen, teamwork and Gemba. Bicheno and Holweg define it as "the ongoing challenge of continually adapting to the needs of customers, employees and environment" (p.32, 2009). Kaizen means "continuous improvement", while Gemba stands for "the workplace", or at least the place where value is added. Summarizing, this foundation stands for adapting to what the customer wants, while continuously improving at the work floor with teamwork. The pillars consist of two different mindsets or philosophies, namely continuous improvement and respect for people. They support the Toyota Way, which Bicheno and Holweg characterize as "that hard to capture set of principles that Jeffrey Liker has attempted to capture" (p.32, 2009). They refer to Liker (2004), who in his book sets out 14 principles that an organization should embrace to become a learning organization. The model is concluded with the thinking people system, which according to Bicheno and Holweg is "the real root of sustained performance" (p.17, 2009). Lean is not a tool that you implement in an organization, but a philosophy to teach employees to think with a mindset aimed at process improvement.

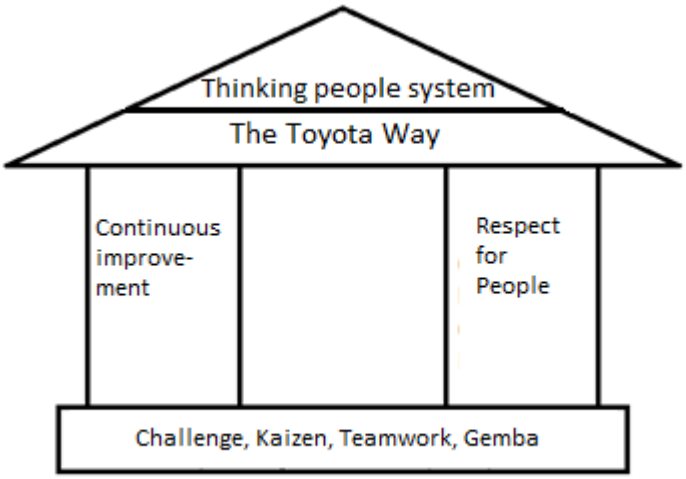

Figure 1: The Lean Enterprise House (Bicheno and Holweg, 2009)

iii. Lean management in service organizations

So, the origins of TPS and therefore of lean lie in the manufacturing setting. But, according to Womack et al. (1991) the "fundamental ideas of lean production are universal – applicable anywhere by anyone" (p.9). So, it should also be possible to apply the ideas of lean in organizations that don't produce tangible goods, namely service-oriented organizations. All the core principles

of lean as proposed by Radnor et al. (2008) are not exclusively for producing tangible goods, and can thus be applied to service-oriented organizations. Next to that, many service organizations have focused on imitating mass-production logic (Piercy and Rich, 2009). Service-oriented organization are also "struggling with customer demands for better quality service and managerial demands for cost reduction" (p.54). Continuous improvement might be the solution for this struggle. In lean research, one of the most prominent service-oriented sectors is the healthcare sector. According to Piercy and Rich (2009) research shows that lean can be applicable in every organization. That also supplies for the cooperation with suppliers.

They also argue that here is increasing evidence of the transferability of the lean toolkit to non-manufacturing environments. It needs to be noted though, that research mainly confirmed the use of value stream mapping. But Piercy and Rich (2009) admit that "despite a wealth of conceptual applications of lean to service, evidence of aspects of lean in service (such as service-blueprinting or waste reduction) and evidence of success in the trade press, the academic coverage of explicit lean implementation in the pure-service context remains limited" (p.58). They break this pattern though, with confirming empirically the applicability of lean in a pure service context, namely a call service center. Lean in the service sector differs from lean in the manufacturing sector in the terms of typical production elements but is similar in terms of information management.

Bortolotti and Romano (2012) acknowledge the potential danger of implementing lean in such a pure service context, because when "it is not clear when to streamline and when to automate the processes, you could automate errors and waste" (p.513). Their findings reveal that "lean management could be applied in services if some peculiarities of the sector are taken into account". According to Frei (2006), it is important to recognize the significant role of customers in a service process. He states: "If you run a service business, your customers aren't just open wallets at the end of your supply chain. They disrupt every step of your core operations with their unpredictable behavior". So, when lean is implemented in a service-oriented organization, the interests of the customer should be considered at every step of the process. Seddon and Caulkin (2007) also argue for taking the customer point of view when implementing lean.

So as we have seen, there are differences between lean manufacturing and lean service. As demonstrated by research, many lean tools are applicable in the service context. Others have stressed the importance of developing human resources as important for lean in service organizations (Bortolotti et al., 2012). But as Bortolotti et al. (p.516) argue: "It is time to clarify whether Lean Service is simply a methodology that applies the same tools used in manufacturing, or if it is a discipline with its own characteristics". To answer this question, they end with different propositions regarding the use of automation. They state that "unlike the manufacturing context, where Lean Management requires a reduction of automation and digitization, in the pure service context automation and digitization are desirable". They also stress the importance of streamlining, and implementing automation in relation to lean in the right order: "Lean the process first, then automate value-added activities" (Bortolotti et al., p.521, 2012).

iv. Lean Human Dynamics Model

The theoretical model, as presented in Figure 2 on the next page, shows how culture change can be achieved. The concepts that are found in literature are tested against the framework, so that the theoretical model will help answer sub questions 2 and 3. Van Dun and Wilderom (2012) define

the model as 'Model of Enablers In and Around Lean Teams' (p.142). However, as we will explain later, we will only use parts of the model that fit our sub question. The model links team culture change strongly to HRM and the support of the management. The model starts with the current team culture and climate, as can be seen in Figure 1. Van Dun and Wilderom (2012) classify higher-level leadership support, strategic and structural clarity, human resource policy and resource abundance as enablers of the transformation of teams into a high performing lean team. The next part of the model presents the dynamics that take place in human teams. Intra-team dynamics are defined as "all mediating or moderating factors that transform external team inputs into collective team outcomes" (Van Dun and Wilderom, p. 121, 2012).

The team dynamics are divided in three categories, namely affective, behavioral and cognitive. Van Dun and Wilderom quote from a study from Kozlowski and Ilgen (2006) to define the categories. In the "affective" category, human dynamics are included that capture "motivational tendencies, relations among team members and affective reactions" (Kozlowski and Ilgen, p.87, 2006). The category consists of psychological safety, team cohesion, team member support and conflict management. Van Dun (p.189, 2015) defines psychological safety as "a springboard for continuous improvement and cooperation". Team cohesion will establish or reinforce this psychological safety. The category "behavioral" is about "what teams do – their actions to strive toward goals, resolve task demands, coordinate effort, and adapt to the unexpected" (p.95, 2006). To conclude, the dynamics that guide "task-relevant interactions among team members" (p.81, 2006) are included in the category "cognitive". Van Dun and Wilderom (2015) note that the creation of such dynamics in teams takes considerable time.

High team performance and team climate change influence each other. Both also influence ultimately team culture change, as can be seen in the model. Information sharing is a cornerstone of lean. According to Van Dun (2015), team effectiveness improves when team members share factual information. Performance monitoring and innovation are also cornerstones of lean. Performance monitoring is related to KPI's, which show whether improvement is made. And to improve the ability of team members to come up with new ideas must be present. Then, the final team dynamic is organizational goal commitment of each individual team member. According to Angelis, Conti, Cooper and Gill (2011), team members at least must be willing to participate in the continuous improvement system. The change of the team climate starts very quickly. It is even "likely to have begun already the first moment new contextual enablers are being introduced" (p.96).

This eventually influences team culture change. But this is easier said than done. Van Dun notes that "managers can indeed not manage, but merely facilitate, or enable, the self-evolvement of a lean team's culture and climate" (p.97, 2015). Nowadays the principles of TPS are deeply rooted in the values of its employees, but that has taken many years to develop (Holweg, 2007). It gives an impression of how long it will take for teams to develop a lean culture. Or, as Van Dun puts it, "achieving long-term operational excellence within teams at the bottom of organizational pyramids is thus a path that takes determination, significant investment of resources and a long-term view" (p.97, 2015).

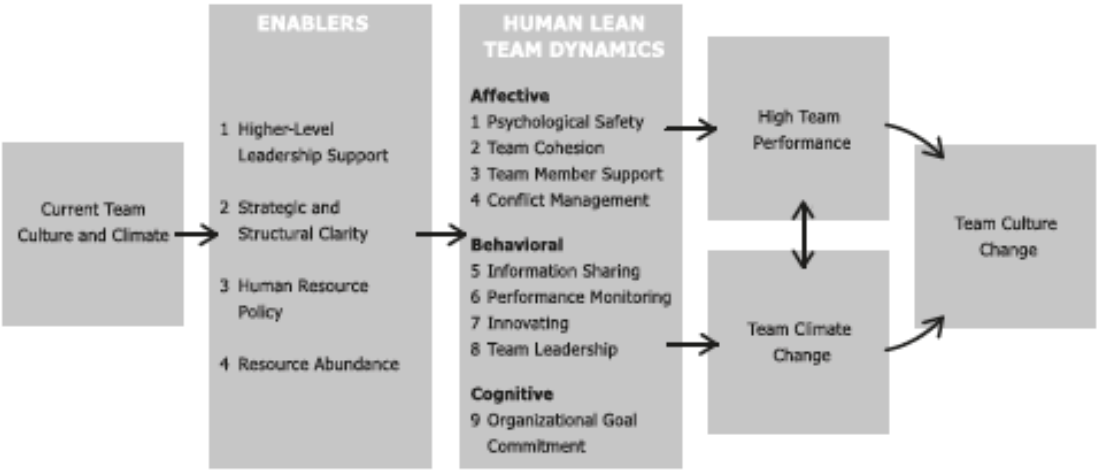

Figure 2: Lean Human Dynamics Model.
(Van Dun and Wilderom, 2012).

v. Public organizations

So, it may be clear that the implementation of lean is not completely the same for service-oriented organizations as for manufacturing organizations. But there is another distinction that might make the implementation of lean harder, namely the distinction between public and private organizations. The earlier mentioned study of Baarspul and Wilderom (2011) argued that it is generally assumed that a private organization behaves different than a public organization. At least, the differences need to be considered. Meyer (1982) argued that many attempts to compare public and private organizations showed that public organizations are less efficient than their private counterparts. Meyer refers to a study of Davies (1971) who studied the two trunk airlines of Australia, one public and one private airline. The two airlines charged equal fees and had quite similar routes. A study over an 11-year period showed that the private company was significantly more efficient than the public firm. The difference could even have been bigger, had the private company not been constrained by the law.

Throughout the years, there have been a lot of studies that compare public and private organizations to find discrepancies between them. They discussed studies on various topics, such as organizational structure, formalization and work-related attitudes and values. Some studies show differences between the two types of organizations, whereas other studies don't. Rainey, Backoff and Levine (1976) argued that literature showed that public and private organizations may distinct in three categories. The first category is that of purposes, objectives and planning: Rainey et al. state that public administrators have less flexibility in planning, and planning may be more complex.

Second is the category of selection, management and motivation. The concepts of this category may be harder for public administrators than for their private counterparts, since there may be greater constraints. They present also the category of controlling and measuring results. Public administrators "may find it not only harder to measure results, but also, partially as a consequence of that difficulty, harder to attain results and effective performance." Rainey et al. (1976) conclude with stating that "there are indications of a number of important differences between public and private organizations, which cannot be ignored in considerations of management research,

training, and practice" (p.234). They also encourage to continue with research on the comparison between public and private organizations. Bhatia and Drew (2006) argued that there are three sources of loss for a public organization, namely waste, variability and inflexibility. Waste is based on the seven types of waste of Toyota, which have been mentioned earlier. Variability is defined as "any deviation, in a service or product, that creates unnecessary costs" (p.5). They define inflexibility as "any systemic rigidity that prevents a supplier from meeting the customer's requirements at reasonable cost." Bhatia et al. (2006) point out that in the public sector "the staffing levels are often inflexible" (p.5).

vi. Higher education

Now, the concept of higher education will be discussed. In this research, the term "higher education" is used instead of "university", since the term HEI might be understood differently across different countries. The Oxford Dictionary defines higher education as "education at universities or similar educational establishments, especially to degree level". Academic institutions have three missions: teaching, research and public service (Pucciarelli and Kaplan, 2016). Pucciarelli et al. (p.311, 2016) point out that higher education "is not immune to changes affecting 21st century society". According to them, there is "a general consensus that the future of academia is and will be complicated, challenging, and uncertain". Pucciarelli et al. (2016) argue that HEIs "must still develop adequate strategies that will enable them to address the new environment of an ever-more competitive educational market" (p.312). For institutions of higher education, in an increasing competitive market with decreasing budgets, lean should at least be in the conversation when developing such a strategy for the future.

Employees of universities, especially the academic staff, might think of the HEI as different than other organizations. That might be because of academic freedom, one of the central values of higher education (Altbach, 2001). Academic freedom, Altbach argues, "affects the academic profession in all aspects of academic work" (p.205). It is defined as "the freedom of the professor to teach without external control in his or her area of expertise" (p.205). This academic freedom might be a reason for resistance for the introduction of manufacturing-based techniques in higher education organizations. Pucciarelli et al. (2016) note the delay in adopting business practices as a weakness of higher education. So, even before the actual literature review has started, it appears to be that the implementation of lean in higher education organizations will be hard. Revolutionary cultural change in higher education organizations institutions might be hard as well because of the human resource practices. The support staff, and especially the academic staff are often tenured, as Pucciarelli et al. (2016) point out. They argue that the cultural change must find place through the training, motivating and persuading of current administrators. But, as they argue, many institutions might not respond to the current changes in a time because of resistance from faculty members and alumni. So, cultural change must be done incrementally. Also, change strategies must be culturally coherent with the institutional culture (Kezar and Eckel, 2002).

Higher education falls in the category of public organizations. But it also differs from other public organizations. Higher education organizations might draw parallels with another type of public organization, namely healthcare institutions. Both institutions have two main departments: the academic (professors or surgeons) staff that so to say 'earns the money', and the support staff that does the administrative work. This division might cause a strong silo mentality, which automatically makes it harder to implement a lean culture in the whole organization. Another cause for a strong silo mentality could be the structure of the HEI, since it is likely to consist of

different faculties. There is always the potential of faculties favoring the reaching of their own goals over working together with other faculties and aiming at the goals of the whole institution. The struggle for funding in combination with decreased budgets for higher education could make the rivalry (and thus the silo mentality) between faculties even worse.

3. Study 1: Literature review

a. Methodology

In this part the methodology for Study 1 will be discussed. Study 1 is a literature review, and for that literature review the approach of Wolfswinkel, Fuertmueller and Wilderom (2013) will be applied. Wolfswinkel et al. (2013) discuss the Grounded Theory Literature Review Method (GTLRM). The GTLRM approach consists of five stages, namely define, search, select, analyze and present, as an overview of the approach is in Table 1 shows. Here, every step will be discussed shortly.

The first part is the search and select part. In this part, the scope of the study is set. The research questions, inclusion/exclusion criteria, the fields of research, the databases and search terms are defined. The fields of research will be the fields of change management, higher education and of course lean management. The chosen databases that will be searched are Jstor, Google Scholar, Scopus and Web of Science. Usually, Google Scholar would not be included to ensure the quality of the papers. But since lean in service organizations and especially in higher education is relatively new, and thus literature about these topics is rare, the choice was made to include Google Scholar as well. Articles can come from peer-reviewed journals, but also from the more "grey" literature, like for example articles from McKinsey or other well-known consultancies.

Number	Task
1. Define	
1.1	Define the criteria for inclusion/exclusion
1.2	Identify the fields of research
1.3	Determine the appropriate sources
1.4	Decide on the specific search terms
2. Search	
2.1	Search
3. Select	
3.1	Refine the sample
4. Analyze	
4.1	Open coding
4.2	Axial coding
4.3	Selective coding
5. Present	
5.1	Represent and structure the content
5.2	Structure the article

Table 1: Overview of Grounded Theory Literature Review Method (GTLRM) as presented by Wolfswinkel et al. (2013)

Part two is the actual search. After that, the doubles will be filtered out. Then, based on inclusion/exclusion criteria, the sample will be cut down. First, that will be done by reading the title and the abstract. Then, the step is repeated, but now the full articles are read. This is done so that only the useful and relevant articles remain. To conclude, backward and forward citations are checked to come up with the maximum available relevant articles. After no new articles appear, this process is over and the final dataset will be verified. Part three then is the refining of the sample of articles.

Next up is part four, the actual analysis of the articles. The phase starts with open coding, where the collected date is divided in segments and scrutinized for commonalities that could reflect categories or themes. Open coding starts with looking at all the excerpts which might be about the research question of the literature search. These excerpts form the basis of codes, and these codes show on their turn concepts in the text. After the identification of these concepts,

categories emerge. All these steps need to be noted so that decisions can be tracked back. This step is followed by axial, where concepts are formed into categories and tested against the data. The last step coding of coding is the so called selective coding which “is used to integrate and refine the categories that were identified” (Wolfswinkel et al., p.7, 2013). Then, when concepts and categories have emerged, the continuous comparing of these concepts with concepts from other papers already needs to be going on. This is the so called comparative analysis.

In the last phase, the actual final paper is written. Here it is decided which findings are put in the paper. Questions about the findings need to be asked. Which findings need to be summarized, and which do not? And if not, why are the findings irrelevant? Then the editorial questions are asked. These questions are about how to represent and how to structure the article (like the layout for example). Sub question 1 will be answered using the so called ‘house of lean’-framework of Bicheno and Holweg (2009). This model is very tools-oriented, so the model is the right model to answer sub question 1. To answer the question, the tools that were found in the literature will described. So, ultimately, sub question 1 will be answered by describing how this specific house of lean is applied in a higher education context.

b. Results

The starting point of the literature search were the databases of Scopus and Web of Science. If an article was found, it initially had to be published in a journal that was ranked in the Scimago Journal & Country Rank (SJR). From those articles, the H-index number was written down. But because lean management in HEIs was expected to be a relatively new and small research area, the literature search had to be more inclusive. That meant that also journals that are specifically about lean, TQM or agile were included. Also, articles from conferences that addressed this issue were included. To conclude, there turned out to be a lot of "grey articles", namely articles from consultancy's, or other experts. Websites or articles that documented the progress of the implementation of lean at other universities were also added, of course.

The initial literature search produced more results than expected. Table 2 and 3 show the search terms and the results it produced per database. Because of time restrictions, the article had to be clearly about lean or one of its relative concepts, like TQM or agile) in HEIs. That restriction alone was not enough to get a data set compact enough to effectively scan through. So, another restriction on the dataset was imposed, namely only articles from the last 15 years were used. That would also make sure that the most relevant and up-to-date information would be analyzed. Not all articles that were potentially useful were accessible. As stated earlier, all the steps as proposed by Wolfswinkel et al. (2013) were followed. The total number of articles was cut down after reading titles and articles. After that, the remaining articles were fully read. The useful articles were maintained, the unusable articles were left out. The back- and forward references of the articles were checked, until no new articles appeared.

Search terms Scopus	Results
"lean" AND "higher education"	114
"agile" AND "higher education"	72
"lean" AND "public service"	59
"agile" AND "public service"	24
"cultural transformation" AND "higher education"	29
"lean" AND "leadership" AND "higher education"	11
Total	309

Search terms Web of Science	Results
"lean" AND "higher education"	384
"agile" AND "higher education"	74
"lean" AND "public service"	114
"agile" AND "public service"	67
"cultural transformation" AND "higher education"	119
"lean" AND "leadership" AND "higher education"	5
Total	763

Table 2 and 3: Search terms and number of results

This ultimately resulted in a dataset of 63 articles and documents. Of those articles, 39 were empirical. Often these articles consisted of interviews with HEI staff members who had participated in a program of implementing lean. Of course, some articles were about implementation at an institutional level, while other articles were about lean at a departmental level. Some articles also were about designing a higher education course based on lean principles. Some articles concentrated on the academic side of the HEI, others focused on the supportive staff and the administrative processes. Although this research only concentrates on the supportive processes in a HEI, the articles about educative and academic processes were still checked. This was done because these articles could give an answer on the questions about management support and academic freedom. The remaining 24 articles were purely theoretical. Most articles of those were literature reviews.

Also, during the literature review, special attention was paid to the type of team that implemented lean at a HEI. Articles that discussed case studies regarding the implementation of lean were scanned to see which employees were responsible for this process. In almost every case, a cross-functional project team was formed. Sometimes, a special work team was formed, but that appeared only three times. It wasn't always clear which former roles the team members had, but it appeared that a member of the executive team never was part of such a team. This is exactly what was expected before the literature search started, namely that the participation of executive management is absent in the implementation of lean.

As stated earlier, the literature search ultimately resulted in 63 articles. Appendix A shows all the journals that contributed to the literature search. Appendix B shows the overview of the sample, which includes the contributing authors. With seven articles, the *Total Quality Management & Business Excellence* was the biggest contributor for this literature search. The *International Journal of Quality & Reliability Management,* the *TQM magazine* and *Quality Assurance in Education* each accounted for six articles. That the *International Journal of Quality & Reliability Management* is present in this list is logical, because in 2015 this journal published a special issue about lean in higher education. The *International Journal of Productivity and Performance Management* journal was found useful four times, while the *European Journal of Engineering Education* published three useful articles. The rest of the remaining 28 articles or documents came each from a different source. As the list shows, eight articles came from proceedings of conferences. The "grey" literature accounted for 10 articles. The remaining 43 articles came from journals.

As figure 2 shows, the interest of research for lean in HEIs is not something from the last few years, although 2015 and especially 2014 show significant difference when it comes to number of articles with the other years. The relatively high number of articles in 2015 can be explained, because the *International Journal of Quality & Reliability Management* published a special issue about "Lean Six Sigma for Higher Education". Note that two of the most prominent journals in this field, the *International Journal of Operations & Production Management* and the *Journal of Operations Management*, haven't touched this subject as of December 2016. That shows that lean in HEIs isn't only a small and new field, it also goes relatively unnoticed.

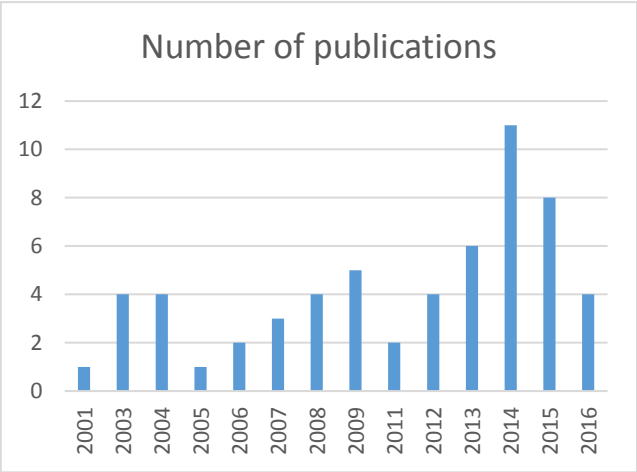

Figure 2: Number of publications per year

In what follows now, the three research questions are answered, solely based on the literature review.

i. With which tools could lean in the supporting processes of Dutch institutions of higher education possibly be implemented?

To answer this question, special attention was paid to how certain concepts of the article could fit in the Lean Enterprise House. However, since the strategy of implementing change must be developed regarding the institutional culture (Kezar et al., 2002), this question can't be answered too specifically. Therefore, this chapter may look a bit like a general enumeration of the known tools of lean. Appendix C shows the tools that can be used to implement lean. Here, they are discussed shortly. Only one article laid out a blueprint on how to start a lean HEI, namely the article written by Salewski and Klein (2009). They describe 5 steps to build up a lean HEI, based on their experiences of implementing lean at the University of Minnesota. They also argue that the (starting) approach to implementing lean in a HEI doesn't differ much compared to a normal service setting.

Foundation

Almost every case study in the literature sample showed an almost similar approach to starting up the process. Lean teams or project teams are being formed and the regular tools are being used. These tools include value stream mapping and two general six sigma methodologies, namely DMADV and DMAIC. However, the literature doesn't show any difference between the implementation in an old HEI, or a new HEI. Age thus doesn't have to pose a problem. In the ABS report, Radnor and Bucci (2011) notice that the attempts to implement lean often start in the business schools of HEIs. Salewski and Klein (2009) noted that the first step must be finding early adopters who have interest in process improvement. They also noticed that the implementation of lean often starts in the supporting parts of the organization.

The stakeholders and their roles must be defined, as is a part of any lean approach. That that poses some problems will be explained in the next chapter. It is hard to define quality in higher education and the literature doesn't show any consensus (Sahney, Banwet and Karunes, 2004; Cruickshank, 2003). Sometimes a few standards are mentioned, like ISO 9001, EFQM, or the Malcolm Baldridge National Quality Award. Quinn, Lemay, Larsen and Johnson (2009) mention AQIP, "a continuous improvement technique used exclusively in higher education" (p.139). The University of St. Andrews developed its own model, based on the experiences of their own lean journey (Robinson and Yorkstone). For service quality, Waugh (2002) mentions the SERVQUAL-scale.

The literature showed a lack of models and frameworks that show clear links between measures and outcomes. To measure service quality, the SERVQUAL – model might be applicable (Waugh, 2002). It is not at all clear whether these models are effective for a HEI-setting. Sadeh and Garkaz (2015) proposed the EFQM model as an effective means to implement the principles of TQM. The article of Douglas, Antony and Douglas (2015) discussed how waste could be identified in a HEI. Table 1 of their article presents the 8 traditional forms of waste, and how this applies to the processes of a HEI (p.977). Jenicke, Kumar and Holmes (2008) proposed different KPI's in a framework. These KPI's are categorized at three levels (p.459).

Pillars

Since a core business of HEIs is teaching and training, it might seem logical to implement lean doing the same thing. The literature shows that most HEIs use the training of their employees.

They organize workshops, or teach employees to become yellow- or green-belts. A business simulation game might also be part of the training.

Roof

However, since the institutional culture is very important when organizations are changed the usual models for implementing lean are not automatically applicable everywhere. There may also very well be a difference between different HEIs when it comes to institutional culture. Universities like Oxford, Cambridge and Harvard are known for their institutional culture (Todorut, 2012). Lean may very well be a tool for changing the institutional culture and mentality. Radnor and Bucci argue that the culture must shift “from 'it has always been like this' to 'striving to be the best'” (p.21, 2011). It could very well be that the change and ‘improvement’ of the culture and mentality are the drivers that motivate (academic) employees of HEIs the most, even more than the cutting of costs and the reduce of waste of time.

Summary

The literature didn’t show one general approach for implementing lean at a HEI. Only the article of Salewski et al. (2009) laid out a proposal for an approach; other articles weren’t too specific about the approach. However, their approach often had some tools that they used in common. As Appendix C shows, the organizing of workshops, the training of employees and the use of value stream mapping are the most used concepts. The workshops varied from quick workshops to improve processes, to workshops on several days to train employees. That training of employees is also often mentioned, to help employees identify the waste in the organization, and to shift the culture to a culture of continuous improvement. Value stream mapping helps to structurally analyze processes. That tool is of course very useful in a HEI, where many of the supporting processes are not visible for several employees. It needs to be mentioned that it’s hard to define quality in a HEI. The literature doesn’t show any consensus. That can be caused by a lack of definition about what lean in a HEI is.

ii. What are the main reasons that the implementation of lean in the supporting processes of Dutch institutions of higher education is likely to fail?

Appendix D shows all the found reasons for this sub question. Here, they are discussed shortly.

Barriers

The lack of higher-level leadership support was often mentioned in the articles included in the literature search, appearing nine times. Anthony (2016) found no clear link in the literature between academic leadership and lean six sigma. Balzer and Rada (2014) warned that sometimes the senior leadership who are not familiar with lean will not take the time learn the language of lean. They argue that if that is the case, it is unlikely that they will support the lean journey. In the article of Antony (2015), professor Neogy from the Indian Statistical Institute argues that the lack of motivation from management’ side is the main reason that lean six sigma hasn’t taken off in HEIs. This has also to do with the terminology of lean (p.895). Sunder and Sunder (2016) note a problem with the lack of structured management approach, regarding the implementation of continuous improvement. Koch notes that “the ability of a college or university to implement TQM can easily be frustrated by shared governance mechanisms” (Koch, p. 330, 2003). An example of this is that academia are not often penalized for not attending important meetings (Koch, 2003).

When it comes to strategic and structural clarity, the literature doesn't help much out. It was already the expectation that a definition of lean in general is hard to give, let alone how it applies in HEIs. The most depressing quote for the future of lean in HE comes from Thirkell and Ashman (2014). They state that "adoption and implementation of Lean Thinking is unlikely to succeed until greater conceptual clarity is attained and more account taken of particular/context" (p.2973). The article of Antony, Krishan, Cullen and Kumar (2012) mentions the problem of an unclear strategy of achieving leanness. There is also a lack of consensus about the success factors of TQM (Asif, Awan, Khan & Ahmad, 2013), and maybe even more problematic, a lack of definition of what quality is in HE (Cruickshank, 2003; Sahney, Banweg and Karunes, 2004). In the article of Thirkell and Ashman (2014), it was argued that academia can define lean, but do not see how it applies to their own role. In contrast, the supportive staff cannot define lean, but do see how it applies to their own role.

Author	Framework
Jenicke et al. (2008)	Framework for implementing Six Sigma methodology in academia (p.459)
Comm et al. (2003)	The lean enterprise framework (p.318)
Dužević et al. (2004)	Structural model of higher education performance (p.9)
Radnor et al. (2011)	House of Lean for Public Services (p.58)
Simons (2013)	Typical lean Six Sigma Green Belt program customized for higher education (p.13)

Table 4: Decision frameworks regarding the implementation of lean in HEIs

Because of the lack of conceptual clarity, frameworks that show causal relationships are very spare. As table 4 shows, only five frameworks applicable for the implementation of lean in HE were found. The literature about lean in HEIs clearly lacks frameworks that clearly shows causal relationships. Antony and Cudney (2016) recognized the problem regarding the lack of frameworks. They stated that "quantifying process improvement savings is extremely difficult without a recognized framework within higher education to point to", because "efficiencies and effectiveness are not as easily measured in less "transactional" areas of the institution" (p.10). Jenicke, Kumar and Holmes (2008) stressed the importance of a framework for the implementation of TQM in HEIs. Of the five frameworks, only one of them was empirically tested, namely the framework for determining higher education performance (Duzevic, Mikulic and Bakovic, 2016). Radnor and Bucci (2011) present a lean house aimed at public services (p.58), made applicable for the implementation of lean in HEIs. Even more problematic is the role of the student as customer. When it comes to the student as customer, there are a lot of uncontrollable factors that influence the performance of the student (Jenicke et al., 2008). The role of most of the customers of a HEI the role is clear, like for example companies. But the role of the student as customer is complicated. Some articles point out that the student is not the traditional customer who pays for a service and receives this service. The customer not only needs to receive the service, the customer himself must also achieve well to ensure a successful relationship between the institution and student.

Regarding human resource policy, another quite negative proposition Thirkell and Ashman (2014) present is that "the exclusion of relevant human resource professionals from the implementation of Lean thinking will be detrimental to the success of such initiatives" (p.2873).

Another problem is the “pervasive prejudice” that HR employees are not up to the task for cultural change (Thirkell and Ashman, p. 2970, 2014). The lack of resource abundance isn’t a problem very often. However, a lack of time is mentioned sometimes in the literature, for example by Cruickshank (2003). The ABS Report of Radnor and Bucci (2011) discovered that it is often hard to organize kaizen sessions with members from different faculties, automatically limiting the effectiveness of these kaizen sessions. This also automatically leads to a silo culture. Some universities also found it hard to find time for planning (Waterbury, 2015). Others signalized the lack of IT support (Waterbury, 2015), or the lack of a specialized toolkit (Sunder, 2015).

Human lean dynamics

A lack of psychological safety is felt in both the academic and the supportive departments of HEIs. HEIs are often hard to change, because of their resistance to change in general (Jenicke et al., 2008; Hess and Benjamin, 2005). As Appendix B shows, the factor academic freedom is also the most mentioned factor for why the implementation of lean in HEIs fails. We already expected this based on our theory. Lean in an academic environment is difficult, because uniformity is imposed on a non-uniform environment (Jenicke et al., 2008). Academics are not comfortable with terminology of lean because it seems to conflict or restrain their academic freedom (Antony and Cudney, 2016;). Or, as Balzer and Rada (2014) state it, “the language of Lean is both an asset and a liability in the application of LHE at universities” (p.3). Academics can show resistance to industry techniques (Hess et al., 2015), or may have low regard for administrators (Emiliani, 2005). Thirkell et al. (2014) connected “strength of professional identity” with “the willingness to engage positively with Lean Thinking” (p.2974).

Emiliani (2005) quoted a typical statement about the academic resistance: "It won't work here because we're very different" (p.46). Balzer, Brodke, Thomas and Kizhakethalackal (2015) stated it rather direct: "universities are places where good ideas go to die" (p. 929). Academics, as was argued in an article, first fear to engage fully in kaizen sessions where their superiors are also present (Emilliani, 2005). Academics also sometimes see the burden of administration, see how they can remove it, but are not willing to engage with it. (Emiliani, 2005). Also, Emiliani concluded that “faculty also tend to have low regard for improvement tools and methods imported from industry”, since they are viewed as corrupt, and that the use of it “will conflict with the mission of the institute or the traditions of academia” (p.46, 2005). At last, when implementing lean, the credibility of six sigma consultants may be not as high in a HE context compared to a normal service context (Quinn et al., 2008) This may very well have to do with academic freedom, because academia want to have their own source of knowledge, rather than getting the information from an “outsider”.

Detrimental to the psychological safety, and to the team cohesion, is of course a blame culture (Thirkell et al., 2014). There may be no interest in teamwork (Koch, 2003), or even opposition to teamwork (Jenicke et al., 2008). There also tends to be a silo culture in a HEI (Comm and Mathaisel, 2003; Antony et al., 2012; Thirkell et al., 2014; Antony, 2015, Sunder et al., 2015). That may also between the different faculty’s (Antony, 2012; Sunder et al., 2016). Sunder et al. (2016) noted that “specialized faculties passionately protect their turf” (p. 1096). We didn’t find any negative factors that can be categorized in the category team member support. For the category conflict management, we didn’t found any factors either. Information sharing can be a negative factor, especially when some (academic) employees deliberately misinform

management, because of their resistance against lean in the institution (Thirkell et al., 2014). Raifsnider and Kurt (2004) noticed that institutions sometimes "take a departmental approach rather than a holistic enterprise approach" (p.6). That creates "silos of information, resulting in information that can't be leveraged by everyone" (p.6). Balzer et al. (2014) noted that administrators fail to speak the language of lean at a HEI. The administrators must speak the language "to enlist their commitment and support" (p.2).

When it comes to performance monitoring, we can again note the questionable applicability of the lean toolkit (Sunder et al., 2015). Some articles discussed how KPI's could apply to the HEI setting. However, about the field of lean in HEI in general it must be said that the field does not reveal real empirically tested KPI's for the supporting processes. Innovating in a HEI context isn't easy because of resistance to change, as we have seen earlier. But when a need is spotted, and a solution is designed and implemented, another problem is that "LHE interventions are often poorly operationalized concepts" (Balzer et al., p.4, 2014). And during the implementation, the flexibility of attempting to implement such solutions, is often limited. That may be due to too structured planning (Waterbury, 2015), or due to bureaucracy (Kamat and Sardessai, 2012). Thus, there is little to no flexibility available to the implementers of these projects. Kamet et al. (2012), specify this with the term "hands are tied" (p.49). Another problem might be that certain projects do not align with the strategic objectives (Antony et al., 2012).

Lean wants to encourage employees to innovate on own initiative, but without a formalized event, employees might not be sure what to do with it (Moore, Nash and Henderson, 2007). And when innovating, "institutions take a departmental approach rather than a holistic enterprise" (Raifsnider and Kurt, p. 5, 2004). Or, as Antony et al. (2012) call it, processes are improved in isolation. The required effort for innovation and continuous improvement may be underestimated (Balzer et al., 2016) and there may be a lack of process thinking and process ownership (Antony, 2012). Team leadership can fall short when it fails to engage subordinates: "administrators often explain the need for improvement and benefits of participation poorly" (Emiliani, p. 46, 2005). Also, managers typically encourage "distorted perceptions of efficacy of TQM" (Koch, p. 326, 2003). Balzer et al. (2014) noted the "failure to show effectiveness of LHE" and the "failure to understand the dynamics of organizational transformation and change" (p.1) as why the implementation of lean at HEIs is failing.

The organizational goal commitment is often present in the supportive parts of a HEI, but to a lesser extent in the academic parts of a HEI. The article of Emiliani (2005) argued that academics do not always experience the need for lean at a HEI first-hand. Their experiences may even contradict the need. Adding to that some institutions find it hard to show the added value of lean. With no real improvements to motivate the employees even more, it is hard to maintain organizational goal commitment. Another potential negative factor is the belief that HEIs are already as efficient as they can be (Cruickshank, 2003).

Summary

Summarizing, the literature shows various reasons as for why the implementation can fail at a HEI. This includes the lack of visionary leadership, the lack of the understanding of lean language and principles by top management, and problems of getting management to see the opportunity. The governance mechanisms at a HEI are also mentioned as a reason why lean or one of its related techniques can be frustrated. Problems also arise due to the lack of

conceptualization. Therefore, it is hard to develop clear strategies with realistic timetables. That automatically causes employees to be unaware of their roles in the process.

The single factor that is mentioned the most is the academic freedom. Connected to that is the terminology of lean, which causes resistance. Lean is a technique coming from the industries, which won't help either. Emiliani (2005) notes the quote that "It won't work here because we're very different" (p.46). This factor is attributed to the category psychological safety, in which academic freedom is not the only factor. The regular resistance to change also occurs in HEIs, while the credibility of lean consultants in HEIs seems to be a problem as well. To conclude, a silo culture severely limits the potential of lean in HEIs. It not only limits information sharing, it also makes the implementation of solutions much harder.

iii. What are the main reasons that the implementation of lean in the supporting processes of Dutch institutions of higher education could possibly succeed?

Appendix E shows all the found reasons for this sub question. Here, they are discussed shortly.

Enablers

When it comes to higher-level leadership support, again, the role of senior leadership is essential (Salewski et al., 2009). Waterbury (2015) studied the implementation of lean at seven HEIs, and almost all noted the critical role of higher level leadership support. Miami University, the university that was mentioned as an example of a HEI that successfully implemented lean, calls leadership and support from the top as an important principle for sustainable success (Miami University, 2017). Regarding strategic and structural clarity the implementation of lean must be locked up in long-term strategy. Miami University calls structure one of "most important principles for success and sustainment" (Miami University, 2017). It is also important to "communicate the requirements and expectations of becoming a Lean university" (Balzer et al., p.928, 2015). As we have seen in the previous chapter, the involvement of Human Resources in the implementation of lean is crucial. That requires a shift of paradigm, since HR isn't regarded as a capable manager of cultural change (Thirkell and Ashman, 2014).

But an on-going training of the employees and project team-members is crucial (Bayraktar, Tatoglu and Zaim, 2008; Quinn, Lemay and Larsen, 2009; Calvo-Mora, Leal and Roldán, 2006; Radnor et al., 2011; Waterbury, 2015; Balzer et al., 2016; Thirkell et al., 2014; Robinson et al., 2014; Salewski et al., 2009). It is necessary to train the employees so that they can be co-facilitators of lean. The investment in your own people, as Miami University calls it, is very important for success and sustainment. Thirkell et al. (2014) call for more attention to "to the related rhetoric of Lean and human resource processes, techniques and outcomes" (p.2973).

Organizational readiness is also necessary (Radnor et al., 2011; Antony et al., 2012; Balzer et al., 2014, Balzer et al., 2016; Antony et al, 2016;). That must be present, even before the organization starts to implement lean. When the organization is ready, the process of implementing lean will go in a smoother way. Organizational readiness includes "linking improvement to the institution's strategy, establishing a customer focus and selecting the right people" (Balzer et al., p. 449, 2016). And above all, respect for people is always essential (Robinson and Yorkstone, 2014). Regarding the category Resource Abundance, Waterbury (2015) noted that the support of IT resources and structures could be very helpful, as one of the studied HEIs in this article found out.

Human Lean Dynamics

When it comes to pychological safety, a culture of openness, trust and acceptance is crucial (Antony et al., 2012), as we have seen in the previous chapter. It can also be characterized as a non-blaming culture (Robinson et al., 2014). Since the terminology of lean can be very intimidating for some individuals, academic employees must realize that kaizen doesn't affect academic freedom (Emiliani, 2005). Also, Miami University discovered in its lean journey that all employees must discover that lean does not mean that less employees are necessary. We didn't find any factors that positively influence team cohesion or team member support. Nor did we find any factors that help address conflicts, so the category Conflict Management is left unaddressed as well. When it comes to information sharing, the only found factor was the right communication. Miami University notes communication as one of the most important principles for sustainable success. Chen, Yang and Shiau (2016) argued that the Balanced Score Card (BCS) is a very useful tool for TQM, since it improves efficiency. That makes it a factor in the category Performance Monitoring. For the category Innovating, we found several factors. First, with many individual employees and probably as many ideas for improvement, the selection of the right projects can be crucial (Waterbury, 2015; Antony et al., 2016). Krehbiel, Ryan and Miller (2015) argued from the experiences of Miami University that the most ideal and natural department to start implementing lean in a HEI, is the central financial area.

In the previous chapter, we cited Antony et al. (2012) who noted the problem of improving process in isolation. As the solution, they propose that "processes must be designed from a systems perspective instead of designed in isolation" (p.942). Hines and Lethbridge (2008) proposed that attempts to implement lean must start with the muri approach. So, when a HEI starts to implement lean, it's first main goal must be to reduce the overburden of their employees. The team leadership must be shown by dedicated staff, who are skilled and experienced facilitators (Waterbury, 2015). Cruickshank (2003) argues that the "mindset of management of quality must be replaced with the mindset of management for quality" (p.1164). And when a team implements lean at a HEI, it can't just use a general approach, it must approach regarding the institutional specific culture (Balzer et al, 2016). Leadership and vision are also essential (Salewski et al., 2009; Antony, 2014; Antony et al, 2016). To conclude, Svensson, Antony, Ba-Essa, Bakhsh and Albliwi (2015) argue that process ownership must be clearly defined.

To conclude, we found seven factors that positively influence organizational goal commitment. To get the more skeptical employees and managers on board, momentum must be gained through quick wins (Radnor et al., 2011; Antony, 2015). Next to that, lean can't be viewed as a quick process. If it is viewed that may, employees may become unmotivated because they are not seeing the quick results that they expected (Antony, Krishan, Cullen and Kumar, 2012). Krehbiel et al. (2015) state: "the Lean journey is a marathon and not a sprint". Radnor et al. (2013) noted that visits to companies who have been successful in implementing lean produce positive results. Also, cooperating with these companies might be useful as well. Krebhiel, Ryan and Miller (2015) argued that "everyone must view himself as catalysator of lean, not as disciple". Balzer et al. (2014) notified the problematic terms that are used with lean. Outsiders may not be willing to learn the language of lean, and thus limiting their commitment to the lean journey. That may change if some terms are changed into more obvious terms. For example, they want to replace the word "kaizen" with "rapid improvement workshop" (p.4). In that case,

even the term “lean” itself is not untouchable, since it can carry a negative load. At last, a clear and concise summary of how lean can succeed at a HEI is maybe given by Balzer, et al. (2015):” Don’t just do lean, be lean” (p. 930).

Summary

Appendix E shows that the support of senior leadership is seen critical. This factor is mentioned in 11 articles, and with that the most mentioned factor for this sub question. The next most mentioned factor is only mentioned seven times, namely the factor of right communication. To ensure the progress of lean in the future, it must be locked up in a long-term strategy. Lean flourishes in a culture characterized by trust and openness. It flourishes in a culture where employees realize that lean doesn’t threat their jobs, while academics must realize that lean doesn’t threat their academic freedom.

Lean can’t be implemented in an organization just right away; organizational readiness is necessary. When innovating, it must be clear who is responsible for which process. The solutions must also be designed with regards to its consequences for other processes. That will prevent the development of improving in isolation. Especially academics do not always experience the need for lean or process improvement themselves. In an environment where the personal autonomy of the individual is relatively high, it can be hard to enforce the participation of employees. To ensure the commitment, it is necessary to clearly communicate the need for lean and the results of lean projects.

4. Study 2: Qualitative case study

a. Methodology

For this study 16 people will be interviewed. The findings of these interviews, and the findings of the literature study, will be used to develop propositions about the implementation of lean in higher education in the Netherlands. In this part, the way of how the questions are developed is described. Also, it will be discussed how the persons that will be interviewed are chosen. Study 1 resulted in several findings. Based on these findings, the main categories of the questions are determined. These questions will be semi-structured. Out of the literature, and especially out of the case studies, it also has become clear which employees will be interviewed. The selected employees must come from different employee groups (for example, senior management, or the supportive staff).

Also, to get a reliable and valid outcome of the interviews, the group of interviewees must consist of employees with different tenures. That's because some employees may only recently have joined the HEI and have come from other organizations where they learned about lean. Others may have worked longer at the HEI, and therefore have learned about lean at the HEI. With these precautionary measures, we will try to paint a picture about lean in a Dutch HEI that is as reliable as possible. When the answers are analyzed, special attention is paid to difference between the answers of academia and the answers of supportive employees. We do so, because we expect that academic freedom might play an important factor in the different facets of improving processes at a HEI.

i. Case context

The HEI started in 2015 with the lean journey. Lean was embedded as one of the major themes in the strategy plan for the next five years, called "Vision 2020". That means that lean is not seen as "quick fix", which is regarded as important (Antony et al., 2016). There were two major factors for the choice of implementing lean, namely the diffuseness of processes and the slow implementation of improvements. This led to a significant high workload and the waste of valuable time. To ensure that knowledge was brought into the HEI, an employee with experience in implementing lean in organizations was hired. In the beginning phase, remarkable (academic) resistance was faced. The institution developed its own way of working (WOW) through four pillars:

- Initiatives of improvement
- The development of own knowledge
- The realization of support of the HEI
- Sustainable lean

In the academic year of 2015/16, the HEI employed a total of 2602 employees. The foreign employees accounted for 23% of the total employees. The PhD students included, the academic staff consisted of 1528 employees. The supportive staff consisted of 1074 employees. In the academic staff, the male/female ratio was 70/30 while in the supportive staff the male/female ratio was 50/50. For the academic year of 2015/16, a total number of 9645 students had enrolled (Facts and Figures 2015/2016, University of Twente).

Two years into the program, over 350 employees had followed the simulation-game, an introduction to lean. Scattered throughout the faculties, 32 green-belts have been trained. In

2016, the month October was specially deemed as a theme month, regarding the high workload due to administrative processes. The focus was on the administrative process of processing educational grades. Kaizen sessions were organized and surveys were handed out. More than 200 employees attended the kaizen sessions. Problems were identified and the most urgent problems were addressed with improvement projects. The results of these projects were presented with a poster market, in February 2017. The interest for the poster market was relatively low. Wat is interesting to note, is the fact that the HEI struggled with the definition of the customer. Ultimately, they came up with one: their customers were those who need to choose for the HEI.

In 2017, the HEI organized a meet-up with other Dutch HEIs that were trying to implement lean as well. Seven different institutions made their appearance, of which six institutions gave a presentation about their approach of implementing lean. It turned out that almost all HEIs followed a similar approach in the beginning, namely by training a lot of employees. Only one of them didn't. While this was an initial meeting, it was decided that next year the same meeting would be held again.

ii. Categories for interview groups

The different groups make sure that the implementation of lean is viewed from different angles, thus offering different perspectives on the process. Out of the articles that were used for the literature review, we have defined the four different groups to which the interviewees belong. Appendix D shows that the lack of support of top management is a reason why the implementation of lean can fail. That makes interviews with top managers interesting. The same goes for the academics, since the role of academic freedom is often linked with resistance to lean (as Appendix D shows as well). Next to that, the supportive staff was chosen as a separate group, since this research discusses the implementation of lean in the supportive processes. To conclude, many case studies mentioned the forming of a project team as a start of the implementation process at a HEI. Therefore, the project team is a category as well. In this part we will also shortly discuss the persons that are going to be interviewed, belonging to each category. In total, 16 employees will be interviewed.

- Top managers

One of them is the vice president of the board, two others are director of operations at faculties, while the last one is the dean of a faculty. All have worked for at least more than five years at the HEI.

- Academics

The category of academics consists of three full professors and one associate professor. Person A works at the management faculty of the HEI and is also one of the advocates of lean. The remaining professors work at the electrotechnology faculty. Person B and C are also closely affiliated with one of the research institutes at the HEI. All have been employed for more than five years at the HEI.

- The supportive staff (floor-level)

The interviewees in the category Supportive staff haven't followed any lean training, or only the yellow-belt training. The supportive staff work respectively at the communications department,

the facility support department and the HR department. Also, one of the interviewed employees is educational director of a bachelor study. All have worked for longer than five years at the HEI, namely 15, nine, eight and 25 years. All have also been first introduced to lean at the HEI, but not all have followed training. To be specific, only Person D has currently followed the yellow-belt training.

- Green-belts

There was no project or work lean team formed at the HEI where the case study was done. However, several employees were trained to get the green-belt certificate. The green-belt employees are allowed by the top management to spend every year, 200 hours of their work to implement improvement projects. These green-belts could also be deployed outside their own faculty. The interviewed green-belts work at the financial department of a faculty, the educational support department, the student support department, and the grade administration department. Not all are currently working for more than five years at the HEI. While three of them have, the other only has worked for two and a halve years at the HEI and thus is relatively new at the HEI.

iv. Categories of interview questions

The interview with each employee can be divided into four categories, which are presented here. In this part, they will also shortly be discussed. Appendix F shows all the questions that will be asked to the interviewees.

- Definition and conceptualization of lean

The definition and conceptualization of lean, or mainly the lack thereof, is a main concept in the literature. A quote from Thirkell and Ashman illustrates this, saying that “adoption and implementation of Lean Thinking is unlikely to succeed until greater conceptual clarity is attained and more account taken of particular/context” (p.2973, 2014). Special attention is paid to the difference in the answers of academia and the supportive staff. In that same article, Thirkell and Ashman (2014) also argue that academia can define lean, but are not able to see how it applies to their role. On the contrary, supportive staff members are not able to define lean, but do see how it applies to their role. It is interesting to test whether this is also the case in this HEI.

- The role of top management

When the literature search was started, it was expected that the role of top management would turn out to be critical in an implementation process. The literature confirmed this expectation. After academic freedom, this was the most frequent mentioned factor in the implementation. The questions will not just be about just the support, but also about their role. Are they skeptical about lean, or are they advocates of lean? Do they actively engage in improvement projects, or is their role non-existent? Without their support, lean is likely to be less successful. Next to that, as Van Dun and Wilderom (2017) conclude, without the visible support of top management any lean attempt in any organization will after a certain period probably fade away.

- The role of psychological safety

With the implementation of lean always comes the threatening of psychological safety. Lean can be associated with less employees needed. It could also mean that the safe and trusted ways of working are changed drastically. Those effects arise in every setting where lean is implemented.

But at a HEI, another sort of psychological safety is threatened, namely the concept of academic freedom. The concept of academic freedom plays a major (negative) role in the literature, so this one could not be ignored. That was also expected when we started the research. The answers could of course be biased, but different groups are interviewed to provide different perspectives on this matter. In this research, the focus is on the supporting processes, and not the educational processes, but academic freedom could still play a role.

- The process of continuous improvement

The last category is about the lean process itself. That encompasses among others the following of training, the participation in improvement sessions, and the implementation of solutions. The literature showed that a blame culture is lethal for an environment where lean can fully blossom. The literature also showed some friction between, again, the supportive staff and the academia. The supportive staff is sometimes accused of not formulating their problems well enough. On the other hand, the supportive staff sometimes feels as not being seen equivalent by academics. That limits their input in for example kaizen sessions. Ambiguity about proposing an improvement process will also be a topic. The literature showed that some employees do not always know what to do with a potential project that they discover outside regular kaizen meetings.

B. Results

i. Report of the answers

The interviews were held over a span of four weeks. To do justice to what has been said, the full reports of the interviews are presented in Appendix G. In this part, a short report of what has been said is presented. In the methodology we already presented the categories for the interviews. In this part everything noteworthy that has been said about a category is presented with a table. The table consists of quotes or short summaries of what has been said. However, since not everyone in the same category felt the same about lean, we made a distinction between the interviewed employees as well. Some interviewees were enthusiastic about lean. Everything remarkable that they said is presented in the table in the category "Enthusiastic about lean". It needs to be noted that more employees of a group can be enthusiastic about lean. Therefore, the quotes of all those people combined are presented in the same category. The other two categories are "Not enthusiastic, not skeptical", and "Skeptical about lean". If a box is empty, it means that we interviewed no one who we can categorize in that category. Table 5 shows how much interviewees can be ascribed to each category. In the next part, the answers will be analyzed and remarkable aspects of the answers will be discussed.

Table 5: Interviewees and their stance relative to the implementation of lean at the HEI

	Enthusiastic about lean	Not enthusiastic, not skeptical	Skeptical about lean
Top managers	Three interviewees	One interviewee	
Academics	One interviewee		Three interviewees
Supportive staff	Two interviewees	Two interviewees	
Green-belts	Four interviewees		

Table 6: Definition and conceptualization of lean

	Enthusiastic about lean	Not enthusiastic, not skeptical	Skeptical about lean
Top managers	- "Lean is a set of processes, that are organized well, without waste or rework." - "Lean is a tool to, with all the parties in the chain, discuss an existing process at the hand of a certain set of steps." - "A way of working, thinking, to shape a continuous improvement of a way of working."	- "Locating the ballast in the organization, even when they have been implemented with the best intentions. It is looking for quick wins, counteracting waste."	
Academics	- "A philosophy of improvement or paradigm, for creating a culture of continuous improvement, where everyone is concerned with the customer: how can we add value, how can we reduce waste, and how can we create a professional culture?"		- "With little array, little obsolete organization." - "As less as possible, economic, efficient, not doing more than is necessary." - "Not doing more than is necessary. Looking very pragmatically to what it's about."
Supportive staff	- "Being able to design the processes in a more efficient and effective way." - "The continuous improvement of processes and procedures, for which lean is a tool."	- "Forgetting everything where the customer isn't in the center" - "The process of seeing every facet of every process as a piece of a puzzle, putting all those pieces together, and then trying to come up with a smaller puzzle while leaving some pieces out."	
Green-belts	- "Setting the customer at the central focus point, and seeing what the added value is for the customer. Next to that, it is analyzing the processes, and using the knowledge from the work-floor to improve those processes." - "Improving continuously, and constantly seeing where improvement is possible." - "Lean is a structured way of working to jointly deal with problems." - "Looking how we can do better, with employees from the work-floor. Countering waste."		

Table 7: The role of top management

	Enthusiastic about lean	Not enthusiastic, not skeptical	Skeptical about lean
Top managers	- Lean is clearly on the agenda of the board. - The vice president tries to emphasize the need for continuous improvement of the organization as much as possible. - Lean is not actively supported by top management, but their role isn't critical. - Lean is a tool, not a goal.	- "Support of board is present, but in a wise way. They don't force it." - Some managers would not stop their subordinates from following lean training, but would not recommend it either. Rather, they would recommend generic leadership courses.	
Academics	- "The support of top management for lean is inadequate." - When new members join the board, who are not a fan of lean, the future of lean at the HEI is in jeopardy. Lessons that have been learn during the lean journey will be eventually lost.		- "It had to be simpler, but the board doesn't seem to know how that can be realized." - There is skepticism amongst academics about management measures. - There had been a history of improvement projects which weren't suitable for the problem. - "The interests of different groups at the HEI aren't always fully understood." - There is a skepticism about visions for the future.
Supportive staff	- "The support of top management for lean is clearly visible. That can be said because of their verbal support, and the way the construct the organization." - Lean isn't completely embraced by the top management. That isn't a matter of function, but more of personal interest in lean. - The board can provide more resources by making sure that the green-belts deployed in projects are adequately replaced	- The support of top management varies, but that isn't always a problem. - "There is only sporadic support of top management. But it remains to be seen if lean fits the culture at the HEI."	

Green-belts	- “Most top managers don’t understand the philosophies of lean, and therefore don’t see the added value of it.” - It is regarded as another management tool. - “The support of top management is insufficient. The support is present in supportive departments, but in the faculties hard to find.” - “The support of top management was only visible in the theme-month about workload.” - The lack of support doesn’t decline enthusiasm about lean for now, but it can become a problem in the future. - The top management doesn’t provide enough resources, because green-belts cannot pick up projects without being “a thief of their own time”.		

Table 8: The role of psychological safety

	Enthusiastic about lean	Not enthusiastic, not skeptical	Skeptical about lean
Top managers	- Lean threats the way of working of employees, who have been working this way for a long time. - "Lean must be translated and packaged well." - Get academics onboard by addressing processes where they encounter problems too. - "Lean must be framed as something about excellence in research and education." - Lean isn't seen as a threat for jobs.	- There is no resistance against lean, as long as lean terminology isn't used. - "Terms like 'green-belt' seem to be almost something 'sectarian'." - "Lean seems to be another management term, a new name for something that we have been doing for a long time."	
Academics	- "Lean has become an infected word, which has been caused by consultancies." - "When employees are reluctant to engage with lean, it can point to a culture where employees don't feel safe." - "Lean can break a pattern where employees don't feel safe, because everyone sees the added value of process improvement." - "The solution for lean is to give another label to it, and to do exactly the same."		- Lean seems to be a process that is designed to improve processes. - Lean feels as "manage to manage". - The simplification of organization structures, for administrative purposes, can have detrimental effects for research institutions. - Academics want to have as much time for research and education as possible, without having to do much administrative tasks. - Academics are skeptical about management philosophies in general. - However, they are less skeptical about lean, since it has proven its value in companies. - "The suitability of management ideas at HEIs is very limited, since the autonomy of persons is relatively high."

Supportive staff	- “It is important to not mention the word lean, but to explain that helps academics to do their jobs better.” - Some employees feel threatened in their jobs, others don’t want to give transparency about their daily processes, because it reveals where the waste occurs. - “Lean causes skepticism because it is perceived to be something old, given a new name.” - Due to the demography of some employee groups, the threat of lean can be perceived as low.	- “There is a resistance to change in general, but that has nothing to do with lean, more with the education of the employees.” - “Academics are unfit for management, because they are specialists.” - There is an allergy for management terminology. - “Lean terminology is obsolete: only stating what has to be done would accomplish more.”	
Green-belts	- “The most resistance from academics is caused by incomprehension: it is seen as a play tool of the supportive staff.” - Green-belts don’t encounter hostility outside their own departments, if they explain what they’re doing. - Lean cannot be a goal, only a tool. The risk is that lean can be used too much and can go too far. - Asking one’s subordinate about the time a task takes can be problematic and intimidating. Especially if the manager asking is also the green-belt improving the process. - Employees can be skeptics of lean because it is perceived to be another trend. - In the longer term, employees can start to misuse the word lean, and ridicule it. Especially if employees think that such small measures are practically useless. - “Employees know that lean isn’t used as a tool to cut jobs, but remains to be seen whether that is widely believed.”		

Table 9: The process of continuous improvement			
	Enthusiastic about lean	**Not enthusiastic, not skeptical**	**Skeptical about lean**
Top managers	- Lean is a tool, not a goal. - Lean isn't useful for every process, but mainly for high-frequent processes. - Lean is a wake-up call for employees to get the focus on the customer again. - There is a silo culture, but the closer a service is to the primary process, the better the collaboration with the academic staff. - "The major benefit of lean is that departments who need each other but have lost contact with each other along the way are brought in a room to talk about a common process."	- There is a silo culture between the supportive and academic staff. - "But the more closely both sides work together, the more there is be a willingness to improve processes together."	
Academics	- There is a culture of "that's just the way it is." However, lean isn't capable of changing the culture on its own. - "Lean only harvests the low hanging fruits in the organization." - The culture of apathy was caused by centralization. - Lean increases the face-to-face between employees. - Lean also increases the awareness of employees about their role in a process.		- There is an interest in improving processes, but lean seems to be too thorough. - "Process must be improved with 10% effort for 90% of the results. The rest must be forgotten." - Asking all the stakeholders in a process is a waste of time. Only ask four or five stakeholders. - There is little awareness about the processes of the supportive staff amongst academics. - Much of the department in some research groups is ad-hoc. That is partly due to the unpredictability of research. - "Lean can play a role in the support of research when implemented in the processes of IT-support, or in the workplace." - Academics, especially in the technical faculties, already aim at process improvement without using lean techniques.

Supportive staff	- Because of the several improvement processes employees understand the tasks of each other better, as well as their problems. - In the past, supportive departments weren't able to present their added value. Lean offers a possibility for the supporting staff to explain their processes. - Green-belts are valued because of their role and their neutrality. - "Since green-belts are acquaintances, it can cause people to become curious about lean." - "It is a problem to uniformize processes at a HEI, because of the autonomy of faculties."	- When drawing out processes with a value stream map (VSM), processes can turn out to be much larger than was expected.	
Green-belts	- The autonomy of faculties pose a problem when implementing solutions. Too many studies or faculties hide behind their "uniqueness". - Many potential improvement projects can be wasted because employees do not know where to go with it, if they don't have time on their own. - The main benefit of kaizens is the fact that different groups engage in conversations. - "Lean empowers people to speak up, and makes sure that processes are no longer improved in isolation." - Mutual understandings improves because of improvement sessions. - "Lean must be spread out like an oil stain in this particular organization, because of the relational culture of the organization."		

b. Synthesis

i. Definition and conceptualization of lean

As Table 6 shows, the top managers gave various answers. No one included the role of the customer in the conceptualization, although one of the directors mentioned the fact that the customer got lost out of sight in the past. All saw lean as a tool and not as a goal, but everyone saw different benefits. One director saw it as a tool to discuss processes with all the stakeholders in a tool, while the vice president focused on cultural change. The other interviewed directors were looking to minimize waste. Three of the four academics didn't know what lean was, or how it applied to a service setting. Their answers were the same: efficiency, not doing more than is needed. The other professor knew about lean and gave a more extensive answer, the role of the customer included. The supportive staff gave more process-oriented answers, except for one. Three answers were about designing or improving efficient processes, where the other answers was about "forgetting everything where the customer isn't in the center". The green-belts gave answers that pointed to continuous improvement. Only one of them mentioned the customer as well.

So, concluding, we can say that the top management view lean as a tool. To academics who are unknown with lean in a HEI setting lean seems to be philosophy of not doing more than needed. It is also interesting to see that the customer wasn't mentioned often: only three times the customer was included in the definition. The focus on process improvement is clearly present, but if the interests of the customer are not at the center of any improvement proposal there may be no real improvement at all. The differences in the definitions can also point to a bigger problem: when everybody has a different definition of lean, they can also have different expectations of lean. That can influence the employees' perceptions of the feasibility of certain projects

ii. The role of top management

Table 7 shows that the answers in the category of the role of top management were the same. Many employees only knew some certain top managers who showed visible support for lean. Regarding the board the vice president was perceived to be the only one who fully supported lean. This was also recognized by the interviewees in the category top management. The interest in lean among top managers wasn't perceived to be a matter of function, but more a matter of personal interest. Three of the interviewed employees, who all belonged to the category academics, didn't even know that lean was being implemented at the HEI. Therefore, they couldn't judge the support of top management. Green-belts were the most negative group regarding the support of top management. However, although almost every interviewee mentioned that the support management wasn't fully present, also almost every interviewee mentioned that that same support wasn't critical. Five interviewees thought that because lean is seen as something that employees initiate themselves at the work-floor, the employees won't need (visible) support from the top management. Those answers may look social desirable, but it can also be that employees currently actually feel that way. However, regarding the future, some saw the lack of support as a threat because it could cause the awareness about lean to slowly fade away.

iii. The role of psychological safety

All the different groups gave somewhat similar answers, as Table 8 displays. The interviewees recognized that some employees feel that their job is at stake when they engage in process improvement, while others don't want to change the way they have always worked. While the latter was clearly present at the HEI, the first wasn't always present. Two potential explanations for this were offered. Some thought that this was due to the HEI clearly communicating that lean wasn't meant to cut jobs. Others felt that especially employees who were employed on a permanent contract didn't saw lean as a threat. However, there was resistance to change, and the quote "we have always done it this way" was heard often. Some employees were scared to give clarity about their way of working, because this could possibly bring an inefficient way of working to light. A professor stated that some others even feared to end up with more work.

Academics didn't want to be bothered with administrative processes. That seemed to distract them from their core business, namely research and education. That could explain one part of the academic resistance. The other part could come from the allergy for management philosophies and terms. Management philosophies were perceived to be scientifically inadequately proven, while the lean terminology seemed to be "fast marketing terms". Next to that, lean was also perceived to be a too thorough process for the benefits it produces, especially with the lack of time that academics must deal with. Lean is also often adopted by enthusiastic employees, who sometimes turn into "lean prophets". And as one professor noted, academics don't like prophets, let alone what those prophets promote. However, not all interviewees concluded that academics don't like lean. The vice president noted that she hadn't concluded this yet, since the implementation at the HEI had only recently begun. In fact, in some improvement processes academics had even played a key role.

iv. The process of continuous improvement

When we analyze the statements in Table 9, we discover various points. All employees interviewed in the category top management saw a distance between certain supportive departments and academic departments. The interviewees of all categories had encountered or could think of "us-versus-them"-thinking. Especially, the interviewees signaled a silo culture between the academic and supportive staff. Next to that, the interviewees had experienced a silo culture between the academic and supportive staff, between different faculties, between different academic groups, and between professors One director especially valued the fact that lean bridged this distance. It brought people in the same room to talk about a common process. Next to that, lean was also seen as a wake-up call for (groups of) employees who had always worked in the same way, or who had lost the customer out of sight. A silo culture turned out to be present at the HEI. Next to that, the autonomy of faculties or studies also could play a major negative role when implementing solutions. However, that may be the case when lean at the HEI is a goal.

But when lean is a tool, it can be a tool that not only improves collaboration by redesigning processes. It can also improve collaboration because it increases the (complete) mutual understanding between employee (groups), since all parties in a chain get in a room and discuss all the required steps in a process. Those steps often come with other legal or administrative requirements, of which some parties are not always aware of. In almost every interview, the interviewee mentioned a silo culture at the HEI, or a feeling that the other parties didn't

understand the processes of others. But many interviewees also mentioned their satisfaction with the fact that lean improves this same understanding. Especially the supportive staff feel that they are being heard, because of being able to participate in improvement session. Before the HEI started to implement lean, and especially before the common kaizen sessions at the HEI, many employees (from the supportive department) didn't have that feeling. It was for that very same reason that in the theme month the supportive staff came up in such big numbers: they wanted to form a united front at those sessions, as one of the green-belts stated.

Thirteen interviewees answered that they would engage with it a potential improvement project if they encountered one, although that answer is social desirable. But interesting to note: it was also often mentioned that when one encountered a potential improvement project, they would not start with it right away. Many mentioned that they would first consider who the stakeholders in the potential improvement project were. Some would see if they could find a sponsor for the project. Others would go to the central lean coordinator and ask for a green-belt. However, the interviewees would not improve processes in an ad-hoc manner, but look for improvement in a structured way. Eleven interviewees also noted that they saw a slight reversal in the organization, that many employees started to look critical at their own processes more.

5. Discussion and conclusion

Our first proposition is about the lean journey itself. In the short-term, lean takes time – literally. This is clearly present in the literature. Time that most of the academia don't have, regarding their high workload. The planning of kaizens is hard, since most (academic) employees already have a high workload and different faculty's may have different time schemes. Having kaizens with all necessary employee's present seems almost unrealistic – since these (academic) employees likely won't be penalized for not attending. But that will automatically limit the effectiveness of these kaizens, and therefore the effectiveness of lean at HEIs. The interviewees didn't saw the absence of academics that support lean as a negative.

The literature also sees the support of top management as necessary (Sirvanci, 2004; Bayraktar et al, 2008; Jenicke et al.; 2008; Salewski et al., 2009; Asif et al., 2014; Antony, 2014; Antony et al., 2016; Balzer et al; 2015 Waterbury, 2015; Balzer et al, 2016; and Sunder et al, 2016). But the case study showed a different picture. Many (supportive) employees are quite enthusiastic about lean in HEIs even though they also acknowledge that most top managers don't (actively) support the implementation. But it needs to be noted that the lean journey had only relatively recently (two years) been started. That means that the lack of support of top management doesn't hinder the progress of the implementation in the beginning. Employees view lean as something that the floor-level employees apply on their own, rather than depending on top management to encourage them.

On the long-term, lean requires commitment (Salewski et al., 2009; Balzer et al., 2015; and Krehbiel et al.). It takes time to train the right people, and to identify the root causes of problems (Antony et al., 2012). After that, the benefits of small improvement projects may be visible very quickly, but the real problems require more time. Without real successes to present, it is hard to get the more skeptical employees onboard. So, it may take much more time to get the skeptics to join the lean journey. That means that the process of building up must be done patiently. The management must also be aware of this, so that the project of lean is not abandoned, if in the starting phase the significant benefits are not immediately visible. Therefore, especially the long-term commitment of top management is essential. Two interviewees voiced their concerns about lean at the HEI in the long term. They feared that when the initial enthusiasm about lean would fade away the lack of top management support would result in the abandonment of the complete lean journey. To summarize, we pose proposition 1:

Proposition 1: The lean journey is a slow and hard journey, and the support of top management is critical – at least in the long run.

When we started this research, the expectation was that the research field of lean in HEIs was a relatively new field. Therefore, we expected that there would not be much articles, so it was also decided to include the more "grey" literature. But the opposite turned out to be true. In fact, the literature search turned so much articles that scoping became very important to keep a manageable dataset. Therefore, no articles older than 15 years were included in the dataset. However, the field lacks frameworks that have been empirically tested. Implementers of lean complain about a lack of a tools that are adjusted to the HEI setting, and the literature cannot help them with that. The major part of the literature field consists of case studies and literature reviews. The articles show some consistency about the success and failure factors of lean in a HEI.

The articles don't show consensus about the conceptualization of lean in a HEI. It is hard to give a widely-accepted definition of lean in general, let alone define how it applies to a HEI. And to again quote Thirkell and Ashman (2014): "adoption and implementation of Lean Thinking is unlikely to succeed until greater conceptual clarity is attained and more account taken of particular/context" (p.2973). The development of conceptual clarity will enable the development of frameworks, specially developed for lean in a HEI setting. The field currently lacks these frameworks. Conceptual clarity will also enable the development of a more specialized toolkit for the implementation of lean in HEIs. This also includes the development of KPI's applicable to the supporting processes of a HEI.

It will also help to formulate more clear strategies and goals. Now, without an accepted conceptualization it is hard to form an extended and clear strategy. Because of that employees can have too low or too high expectations of lean, both with regards to the speed of improvement, and what lean can accomplish. When employees start with lean with the wrong expectations they can become discouraged after a while, which is detrimental for the success of lean. The conceptual clarity will also make clear what role each employee must play in an implementation process. Therefore, our second proposition is:

Proposition 2: The field of lean needs to develop conceptual clarity to succeed in HEIs.

The implementation of lean in any organization can cause uncertainty for employees, as we have seen in the literature (Jenicke et al., 2008; and Hess et al., 2015). Employees can fear their jobs, or don't want to change their way of working. As we have seen in the interviews, those aspects were present at the HEI as well. As one interviewee noted, sometimes employees even resist lean because they fear ending up with more work. However, as we've seen mainly in the literature, there's another component of psychological safety when implementing lean at a HEI. Namely, the role of academic freedom. The interviews with the showed that when professors first encounter lean, it could appear to be a philosophy to not do more than is needed. That can explain why lean can encounter resistance among academia when they first encounter it, because research and education are seen as uncertain processes of which the efficiency is hard to measure. Next to that, academics tend be skeptical of management philosophies or don't want to spend time improving administrative and supportive processes. Others fear the consequences it might have for their research and education. However, it needs to be noted that in the interviews a view emerged that academics did want to improve processes. On the other hand, when academics hear what lean management really is, they might perceive it as too thorough. While lean sounds as not doing more than is needed, it brings a structured and thorough way of improving processes to table. It is presented as making processes better and simpler, while it seems to make processes more complex, at least in the beginning. As one professor noted, it looks like "managing to manage". All this leads to our next proposition:

Proposition 3: Academic freedom is another aspect of psychological safety that plays a role in the implementation of lean at a HEI, along the other usual aspects of psychological safety.

In the literature, this doesn't play a major role, since it is only mentioned a few times (Comm et al., 2003; Antony 2014; and Balzer, 2016) The interviews at the Dutch HEI revealed that this played a major role. The motivation to improve processes is present in faculties and the supportive departments. But there tend to be a dislike for management terms, especially when the employees realize that it's a new name for an old concept. The first reaction most managers

and academics have when they first are confronted with lean is, “another management-term”. Especially when lean is perceived to be the next in line in a long history of improvement projects, it can cause skepticism amongst employees.

Not only the name lean can cause resistance, it is also the terminology of lean. Words like ‘kaizen’ and ‘green-belt’ can cause resistance and even mockery, as one of the green-belts noted in the interviews. A dean called the term ‘green-belt’ “seeming to be almost something sectarian”. Notice that it’s the function title and not the function itself that causes the resistance. If the green-belt explained his role and didn’t mentioned his function title, there was less resistance. Others even valued the role of the green-belt because of his or her neutrality in the process. Therefore, proposition 4 is:

Proposition 4: The problem with lean that employees of HEIs have may be not so much with process improvement, as with management terminology itself.

Only the literature was used to develop this proposition. The article of Salewski et al. (2009) proposed a potential approach, but there is no evidence that that approach was widely used by other HEIs. As we have seen, the approaches that HEIs followed had similarities. For example, the training of employees is a recurring theme. However, there is no standard on how to train these employees. Some HEIs provide training of several days, while others provide quick one day training. Appendix C shows the techniques and quality standards that were used at different HEIs for implementing lean. The lack of a widely-accepted toolbox may very well be caused by a lack of a widely-accepted conceptualization of lean in HEIs. This lead to the development of proposition 5:

Proposition 5: There isn’t a single, widely accepted and used toolbox for implementing lean at HEIs.

In the interviews, some employees noted that they hadn’t followed lean training because they saw it as obsolete. During improvement sessions, they discovered that the lean techniques were already familiar to them. Others saw lean as too thorough, or as an obsolete process. If lean is not able to sell their added value to (skeptical) employees of a HEI, it will never be able to accomplish its full potential, since the only the interested part of the workforce will engage with it. Especially if the HEI implements lean with a bottom-up approach, it is necessary to show skeptical employees the added value of following training. The literature recognizes this as well. Antony (2015) argues that “until highly competent, intelligent well trained individuals recognize that they too have a vital role to play in any LSS change program success will always fall short of its potential” (p.895). This lead to our next proposition:

Proposition 6: In order for the implementation of lean to succeed at a HEI, lean must be made more interesting to all of the employees of a HEI.

However, while the literature didn’t show it, the interviews revealed another potential benefit of lean. During the interviews, it became clear that employees valued the soft side of lean the most. The supportive staff felt that they were heard, and that their input was valued. Others valued the fact that they understood their own processes better, including their own role in the process. The supportive staff also could use break the pattern where they weren’t able to present their added value to the academic staff. In the past, the supportive staff at the HEI was mainly centralized and because of that lost the contact with the academic side of the HEI.

Therefore, the amount of face-to-face contact between the two sides declined. That worsened the collaboration between the academic and supportive staff. As many interviews made clear, improvement sessions made this loss of contact undone. However, because this soft side of lean consists of things that can not immediately be expressed in money or time, it will be hard to develop KPI's that show the improvement of these factors. Hence, our proposition:

Proposition 7: The biggest benefit of lean in Dutch HEIs may be improved collaboration, improved work satisfaction and a better mutual understanding of processes.

When it comes to the role of the customer, the literature mainly speaks about the external customer perspective and never about the internal customer perspective. Nevertheless, the literature sometimes mentions a silo culture as a problem in HEIs (Comm et al., 2003; Antony, 2012; Thirkell, 2014; Antony, 2015; and Sunder et al, 2016). However, no article concluded that lean could help bridge the gap between different departments. This proposition was solely developed based on the interviews. In lean thinking, the customer is at the center. However, that focus point sometimes fades away after a period, as one of the interviewed top managers noted. The interests of the customer can be forgotten, especially if the demands of the customer change while the way of working at the HEI stays the same. Next to that, a HEI can be subject to we-them thinking, since it can consist of two organizations that need to work together. Namely, the supportive staff and the academic staff. Both organizations can have different organization structures, and a completely different way of working, as the vice president of the HEI noted.

Especially if the supportive functions aren't close to the primary processes (anymore), or have lost close contact with the academic staff, lean can be a solution. When processes are drawn out, employees can be made aware of the customers they are serving. They can also be made aware of the needs of their customer. The customer may not only be the student or the companies, but also the academic staff at the same HEI. Even though they work for the same HEI, the academic staff may also be the customer of the supportive staff. Because at the end of the day, the academics are the ones that need to bring in the grants. Without those grants the possibilities of a HEI will be limited. But if a HEI wants to deploy an academic as effective as possible, it means that academics should be burdened with administrative tasks as little as possible. That means that the academic could very well be defined as an internal customer. Other possible internal customers can be the faculties or the research institutions.

One of the complaints of the interviewed professors was that the interests of institutions or academic groups are not always understood. Of course, that opinion may be biased because the focus of an academic is on education and research and not on efficiency. But it can also very well be the case that the supportive staff indeed does not fully understand their role in the complete process. In that case, lean can be suitable solution. Lean can be used to discuss all the steps in a process, and to make everyone aware of the complete process and their role in it. If academics become aware lean helps their internal suppliers to serve them better, because the interests of the academics are understood better, it could improve the commitment to lean among academics. Or, as the vice president of the HEI in the case study stated, it must be framed as "something about excellence in research and education". That leads to our last proposition:

Proposition 8: Lean helps to recover the focus on the customer, on both the internal and external customer.

6. Strengths and limitations

This research possesses several strengths. First, the literature in the field of lean in HEIs was scanned in a thorough way, using the grounded method. Next to that, the insights from the literature were used to develop the interview questions. That ensured that the answers that interviewees gave were usable for the field of lean in HEIs. To give a view of the implementation at the HEI that is representable, insights from employees across the whole HEI were collected. The risk of social desirable answers was of course always present, but several statements from different interviewees pointed to the fact that interviewees were giving honest answers. Almost all employees were available for an interview. If a potential interviewee wasn't available, a worthy replacement was found very quickly.

However, there are also some limitations for this research. First, this research only focused on the supporting processes in a Dutch HEI. That means that the setting is narrowed down, and therefore it is hard to generalize the results. It needs to be noted though, that no HEI is the same, especially in different parts of the world. For example, as the vice president of the Dutch HEI said in the interviews, the business model of Anglo-Saxon HEIs is very different compared to the business models of Dutch HEIs. That is because of various reasons, including the financing of the activities. That means that for a HEI in the Anglo-Saxon environment, the incentives to implement lean may be very different compared to the Dutch HEIs. This reason made it hard to use worldwide literature for answering this question that aims at Dutch HEIs. Another limitation was the fact that not all articles were accessible in the literature search. Books weren't included, but there seem not to be many books written about this topic.

In the category of academics, not every professor knew the concept of lean, or at least not in a HEI setting. That limited the effectiveness of their interview. However, that doesn't mean that their interviews were useless though. Their interviews gave an insight in a professor's reaction when they first encounter a concept of lean at a HEI. In fact, especially their unfamiliarity with lean gave insight in why academics resist lean when they encounter it. To conclude, we've only interviewed 16 employees of a HEI which employs 2602 employees. That is of course a very limited sample. Therefore, it is hard to give any general and reliable conclusions, we can only point to certain trends that might be going on. However, we countered this with interviewing employees from all over the HEI. The interviewees worked in the supporting departments, the faculties or were members of the board.

7. Suggestions for further research

The most obvious suggestion for further research is the development of the conceptualization of lean in general, and lean in HEIs. This will help the development of strategies. It can also help to form realistic expectations of what lean can do at a HEI. Too high expectations can lead to dissatisfaction after a period. Too fast expectations can also lead to dissatisfaction. Too low and too slow expectations can lead to an unmotivated workforce to engage with lean. Once that hurdle is taken, more steps can be made. Frameworks that specifically focus on the HEI setting can be developed. It will also help the development of a lean toolkit, adjusted to the HEI setting. At last, it will help to develop lean KPI's. For this research, only attention to the supporting processes at HEIs was given. The next step is to look at how lean can improve educational quality. We've already encountered some articles that discuss this topic. Another suggestion for research can be on how the problematic conceptualization of the student as customer can be solved.

The same is the problem with the development of KPI's. The literature stresses the need for the development of these KPI's, but the question remains whether an academic environment is the right environment for this since a HEI produces and teaches knowledge. The most efficient learning process may not be the most effective one. The same applies to the supporting processes. Some indicators may be the throughput times of certain processes, and another indicator can be the amount of complaints a supporting desk gets. But as one of the green-belt employees noticed, it is the question if progress can be measured beyond those obvious indicators.

However, there is a problem with the terminology as we have seen. Lean can also be seen as a process that is to thorough. Next to that, lean training can be perceived as a waste of time, since employees already put techniques that are taught there into practice themselves. We have already concluded that many HEIs start the implementation of lean with the provision of training. But when lean is implemented with a bottom-up approach, which many interviewees saw as necessary, a significant part of the employees won't follow training. Therefore, lean needs to find a way to make itself more attractive to skeptical employees. Otherwise, the efficiency of an implementation of lean that follows a bottom-up approach will always fall short of its potential. So, as a suggestion for further research, lean must find terminology and training that attracts the employees of HEIs.

To conclude, we pose a more philosophical question. This research only focused on the supportive functions, but already touched the subject of academic freedom. We have seen that lean, or process improvement, can be implemented in the supportive processes of a HEI. But to which extent can lean be implemented in an educational process? To implement lean, one must have a clear idea about what efficiency in a process means. But what is exactly educational efficiency? The dean of one of the faculties mentioned the example where relatively few students attended class. Is that course inefficient? Or is a course efficient when those few students who are present are well educated? And how do we define efficient research? It is easy to say that implementing lean in those areas is doomed to fail, and therefore to end the discussion before it has even started. But in the future, it can be interesting to ask this question.

8. Practical implications

When lean is a goal, various problems arise. Academics don't have the time to really engage in improvement sessions, or at least don't want to spend time on it. Without all the stakeholders in a chain, the threat of improving processes in isolation is relatively high. And even when a solution is found, implementing a solution is a hard process and takes time. People are not always aware of the time that such an implementation requires. Next to that, as one of the interviewed members of the supportive staff stated, imposing uniformity on different faculties and studies is very hard. The autonomy of faculties and studies is seen to slow down the implementation of lean.

And while sometimes lean can be a tool to transform the culture into a culture of continuous improvement, the main benefit of lean may be the increased satisfaction of employees. Employees feel that they are heard, or feel that others understand their processes better, or experience more job satisfaction because they understand the complete processes better and therefore have less rework to do. Therefore, to answer the main question: although we have presented several enablers, the main enabler might be the realization that the main benefits of lean are better collaboration, increased mutual understanding and increased job satisfaction. That counters the persistent belief that lean has no place at in a HEI. Emiliani (2005) was earlier quoted with a typical statement: "It won't work here because we're very different" (p.46). That statement probably sees lean as a tool to cut costs or to start work efficient. But lean can bring the two different organizations of the supportive and academic staff together and clarify their daily jobs to each other. Therefore, when lean at a HEI isn't seen as a tool to cut costs but as a tool to help the departments understand each other, the statement should change into: "It will work here, because we're very different".

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Appendix A

Overview of journals included in sample

Source	Total
2nd International Conference on Lean Six Sigma for Higher Education	1
122nd ASEE Annual Conference and Exposition: Making Value for Society(122nd ASEE Annual Conference and Exposition: Making Value for Society)	1
16th Toulon–Verona Conference; Faculty of Administration, University of Ljubljana, Slovenia; 29-30 August 2013.	1
2014 ASEE Annual Conference & Exposition	1
2016 ASEE Annual Conference and Exposition	1
20th Annual Conference for the Australasian Association for Engineering Education, 6-9 December 2009: Engineering the Curriculum	1
Agile India	1
ASQ	1
ASQ Higher Education Brief	1
Best Practices of Southern Association of College and University Business Officers (SACUBO).	1
DS 74: Proceedings of the 14th International Conference on Engineering & Product Design Education (E&PDE12) Design Education for Future Wellbeing, Antwerp, Belguim, 06-07.9. 2012.	1
Efficiency and Modernisation Task Group	1
European Journal of Engineering Education	3
International Journal of Lean Six Sigma	1
International Journal of Productivity and Performance Management	4
International Journal of Productivity and Quality Management	1
International Journal of Quality & Reliability Management	6
International Journal of Six Sigma and Competitive Advantage	1
International Journal of Sustainability in Higher Education	1
Journal of Business and Economics	1
Journal of Educational Administration	1
Miami University	1
Procedia-Social and Behavioral Sciences	1
Proceedings of the Ireland International Conference in Education	1
Public Money and Management	1
Leadership and Governance in Higher Education	1
Quality & Quantity	1
Quality Assurance in Education	6
Radnor and Bucci	1
Research Bulletin	1
The International Journal of Human Resource Management	1
The International Journal of Management Education	1
The TQM Journal	1
The TQM magazine	6
Total Quality Management & Business Excellence	7
White Paper–Global Services in Consulting	1

Appendix B

Overview of literature sample

Number	Authors	Journal
1	Waterbury (2015)	International Journal of Quality & Reliability Management
2	Antony et al. (2012)	International Journal of Productivity and Performance Management
3	Balzer et al. (2016)	Quality Assurance in Education
4	Antony (2014)	International Journal of Productivity and Performance Management
5	Mazumder (2014)	American Society for Engineering Education
6	Antony et al. (2016)	2016 ASEE Annual Conference and Exposition
7	Thirkell et al. (2014)	The International Journal of Human Resource Management
8	Eagle et al.	Quality assurance in education
9	Cruickshank (2003)	Total Quality Management and Business Excellence
10	Balzer et al. (2015)	International Journal of Quality & Reliability Management
11	Balzer et al.(2014)	2nd International Conference on Lean Six Sigma for Higher Education
12	Svensson et al. (2015)	International Journal of Quality & Reliability Management
13	Douglas et al. (2015)	International Journal of Quality & Reliability Management
14	Jahan et al. (2015)	122nd ASEE Annual Conference & Exposition
15	Thomas et al. (2015)	International Journal of Quality & Reliability Management
16	Antony (2015)	International Journal of Productivity and Performance Management
17	Sunder et al. (2016)	International Journal of Productivity and Performance Management
18	Doman (2011)	Quality Assurance in Education
19	Watt et al. (2012)	DS 74: Proceedings of the 14th International Conference on Engineering & Product Design Education (E&PDE12)
20	Kamat et al. (2012)	Agile India
21	Cubric (2013)	The International Journal of Management Education
22	Suárez-Barrara et al. (2015)	Total Quality Management and Business Excellence
23	Emiliani (2004)	Quality Assurance in Education
24	Emiliani (2005)	Quality Assurance in Education
25	Hines et al. (2008)	Public Money and Management
26	Comm et al. (2003)	International Journal of Sustainability in Higher Education

27	Robinson et al. (2014)	Leadership and Governance in Higher Education
28	Isaksson et al. (2013)	16th Toulon–Verona Conference
29	Krehbiel et al.	Miami University
30	Hess et al. (2015)	International Journal of Lean Six Sigma
31	Aldowaisan et al. (2015)	European Journal of Engineering Education
32	Sirvanci (2004)	The TQM Magazine
33	Sahney et al. (2004)	The TQM Magazine
34	Moore et al. (2007)	Oklahoma State University
35	Chen et al. (2006)	The TQM Magazine
36	Koch (2003)	The TQM Magazine
37	Barton et al. (2013)	Journal of Business and Economics
38	Rice et al. (2003)	Research Bulletin
39	Universities UK Efficiency and Modernisation Task Group	Universities UK Efficiency and Modernisation Task Group
40	Raifsnider et al. (2004)	White Paper–Global Services in Consulting
41	Christoforou et al. (2008)	European Journal of Engineering Education
42	Al-Nashash et al. (2009)	European Journal of Engineering Education
43	Arjomandi et al. (2009)	20th Annual Conference for the Australasian Association for Engineering Education
44	Asif et al. (2013)	Quality & Quantity
45	Bayraktar et al. (2008)	Total Quality Management
46	Chen et al. (2009)	The TQM Journal
47	Sahu et al. (2013)	International Journal of Productivity and Quality Management
48	Sadeh et al. (2015)	Total Quality Management & Business Excellence
49	Quinn et al. (2009)	Total Quality Management
50	Asif et al. (2014)	Total Quality Management & Business Excellence
51	Al-Hemyari et al. (2014)	Proceedings of the Ireland International Conference in Education (IICE)
52	Sakthivel (2007)	The TQM Magazine
53	Todurut (2013)	Procedia-Social and Behavioral Sciences
54	Dužević et al. (2016)	Total Quality Management & Business Excellence
55	Calvo-Mora et al. (2006)	Quality Assurance in Education
56	Anthony et al. (2016)	International Journal of Quality & Reliability Management
57	Jenicke et al. (2008)	The TQM Journal
58	Kamat et al. (2016)	International Journal of System Assurance Engineering and Management
59	Sunder (2014)	International Journal of Six Sigma and Competitive Advantage
60	Waugh (2002)	Journal of Educational Administration
61	Radnor et al. (2011)	ABS Report Final
62	Salewski et al. (2009)	ASQ
63	Simons (2013)	ASQ Higher Education Brief

Appendix C

With which tools could lean in the supporting processes of Dutch institutions of higher education possibly be implemented?*

*The factor is mentioned in the left column. Between brackets is the number of the article in which the concerned factor is mentioned. Appendix B shows the numbers of the articles.

Factor	Category
Kaizen [24] 63]	**Challenge, Kaizen, Teamwork, Gemba**
A3 [7] [37]	
Agile L&T Method [21]	
Workshops [1] [2] [11] [27] [37]	
Value Stream Mapping [26] [40] [63]	
8 Forms of waste in HEI [13] [14]	
Project selection [12] [63]	
Team selection [63]	
Pareto analysis [2]	
Balanced Score Card [35]	**Continuous Improvement**
DMADV [6]	
DMAIC [40]	
EFQM Model [43] [48] [55]	
ISO 9001 [30] [49]	
Malcolm Baldridge National Quality Award [30] [49] [55]	
QFD [30] [49]	
AQIP [49]	
SERVQUAL scale [60]	
TQM [30]	
Training of employees [27] [29] [61] [62] [63]	**Respect for People**
	The Toyota Way
	Thinking People System

Appendix D

What are the main reasons that the implementation of lean in the supporting processes of Dutch institutions of higher education is likely to fail?*

*The factor is mentioned in the left column. Between brackets is the number of the article in which the concerned factor is mentioned. Appendix B shows the numbers of the articles.

Factor	Category
Lack of leadership support [1] [10]	**Higher Level Leadership Support**
Lack of visionary leadership [2]	
Management doesn't take time to learn language of lean [11]	
Challenge to let leadership see the opportunity [16]	
Literature doesn't show link between "Academic Leadership" and "Lean Six Sigma" [56]	
Lack of motivation from Leadership[16]	
Lack of structured management approach [17]	
Shared governance can frustrate process of TQM [36]	
Conceptual clarity of lean [7]	**Strategic and Structural Clarity**
Conceptual clarity of quality in education [33]	
Unclear strategy of achieving leanness [2]	
Conceptual clarity of TQM in HEIs [36] [44]	
Academia can define lean, but don't see how it applies to their own role [7]	
Supportive staff can't define lean, but can see how it applies to their own role [7]	
Role of student as customer [16] [49]	
Exclusion of HR Profesisonals [7]	**Human Resource Policy**
Lack of time [1] [9] [61]	**Resource Abundance**
Lack of time for planning [61]	
Lack of IT Support [1]	
Questionable applicability of Lean Toolkit [17]	
Academic freedom [1] [3] [5] [6] [7] [9] [16] [17] [26] [30] [36] [61]	**Psychological safety**
Uncomfortable terminology of lean [6] [11] [26]	
Imposing uniformity in a HEI [57]	
Presence of superiors in kaizen sessions [24]	
Opposition to teamwork [36] [57]	

Low regard for administrators [24]	
Resistance to industry techniques [24]	
Resistance to improvement tools and methods [24]	
Resistance to change [30] [57]	
Credibility of lean consultants [49]	
Blame culture [7]	**Team Cohesion**
Silo culture [2] [7] [16] [17] [26]	
	Team Member Support
	Conflict Management
(Deliberately) Misinforming management [7]	**Information Sharing**
Departmental approach in information sharing [40]	
Failure to speak the language of LHE [11]	
Failure to communicate the language of LHE [11]	
Questionable applicability of Lean Toolkit [17]	**Performance Monitoring**
LHE Interventions poorly operationalized concepts [11]	**Innovating**
Too detailed planning [1]	
Limited flexibility during implementation [7] [20]	
Weak alignment of improvement projects with strategic objectives [2]	
Confuse about innovating on own initiative outside formalized event [34]	
Improvement of processes in isolation [2]	
Underestimating required effort [3]	
Lack of process thinking [2]	
Lack of process ownership [2]	
Poor explanation of need for improvement and benefits of participation by leadership [24]	**Team Leadership**
Encouragement of distorted perceptions of efficacy of TQM [36]	
Failure to show effectiveness of LHE [11]	
Failure to understand the dynamics of organizational transformation and change [11]	

Academics do not always experience need for improvement first hand [24]	**Organizational Goal Commitment**
Widespread belief amongst academics that HEIs are efficient as they should be [9]	

Appendix E

What are the main reasons that the implementation of lean in the supporting processes of Dutch institutions of higher education could possibly succeed?*

*The factor is mentioned in the left column. Between brackets is the number of the article in which the concerned factor is mentioned. Appendix B shows the numbers of the articles.

Factor	Category
Senior leadership support [1] [3] [4] [6] [10] [17] [32] [45] [50] [57] [62]	**Higher Level Leadership Support**
Lean locked up in long-term strategy [10] [29] [62]	**Strategic and Structural Clarity**
Involvement of HR in Lean [7]	**Human Resource Policy**
On-going training [2] [62]	
Related rhetoric of lean and HR processes [7]	
Organizational readiness [2] [3] [6] [10]	
Respect for people [27] [39]	
Support of IT resources [1]	**Resource Abundance**
Culture of openness, trust and acceptance [2]	**Psychological safety**
Realization that lean doesn't affect academic freedom [24]	
Realization that lean does not mean less employees are necessary [29]	
	Team Cohesion
	Team Member Support
Right communication [2] [6] [7] [52] [57] [61] [62]	**Information sharing**
Balanced Score Card [35]	**Performance Monitoring**
Right project selection [1] [6] [62]	**Innovating**
Start of implementation of lean in central finanicial area [24]	
Design of processes from a systems perspective [2]	
Start lean with the Muri approach [25]	
Dedicated staff, skilled and experienced facilitators [1]	**Team Leadership**

Management for quality instead of management of quality [9]	
Implementation of lean with regard to the institutional specific culture [3]	
Leadership [62]	
Vision [62]	
Clear definition of process ownership [12] [27] [61]	
Gaining of momentum through quick wins [11]	**Organizational goal commitment**
Not viewing lean as a quick process of cutting costs [2]	
Visits to companies who have successfully implemented lean [60]	
Being a catalysator of lean, not just a disciple [29]	
Changed Lean Terminology [11]	

Appendix F

Questions asked during the interview

Definition and conceptualization of lean

- How would you define lean in a short and concise sentence?

The role of op management

- How do you experience the support of top management? Is the top management present at improvement sessions? Do they show clear visible support for lean?
- Which resources does the top management make available to help the implementation of lean? Is that enough?
- In which way is lean included in the strategic plans for the future? Is that communicated to every employee?

The role of psychological safety

- Do you sometimes experience resistance against the implementation of lean? If so, which group offers the most resistance against this? Managers, academics, or the supporting staff? Why do they offer resistance?

The process of continuous improvement

- How would you the describe the relationship between the supportive staff and the academic staff? To which degree is there a culture of openness and trust?
- Do you sometimes get an idea of a potential improvement of a process? What would you do which such an idea?
- Can you describe an example of an improvement session? Who speak up the most in such an improvement session? Is that especially the supportive staff, or the academic staff?
- What is your motivation to actively engage in the lean journey of the HEI? If not, what are the reasons why? What are the barriers to engage in it?

Appendix G

Reports interviews

<u>Top management</u>

Three of the top managers already knew about lean before the HEI implemented it, the other only knew the term. As main factor for joining the lean journey, or the journey of process improvement, different reasons were given. Person A cited the increased professionalism of the organization, person B cited continuous improvement, and person C noted the increased mutual understanding. Person D saw lean as beneficiary because it puts "people in their power".

Conceptualization of lean:

Person A	Locating the ballast in the organization, even when they have been implemented with the best intentions. It is looking for quick wins, counteracting waste.
Person B	Lean is a set of processes, that are organized well, without waste or rework.
Person C	Lean is a tool to, with all the parties in the chain, discuss an existing process at the hand of a certain set of steps.
Person D	A way of working, thinking, to shape a continuous improvement of a way of working.

The role of top management:

Person A didn't have too positive first thoughts about lean: just another management term, a new hype, another inflated marketing term. Lean seemed to be a new nice term for something they had been doing for a long term already. He perceived the category titles like green-belts to be almost something sectarian. However, he didn't resist the lean journey. On the other hand, he would stimulate his faculty members to follow a course about leadership or theatre skills, more than joining a lean course. His lack of interest in lean didn't came from a lack of interest in process improvement, but rather from a lack of interest in management terms or tools in general. The support of the Executive Board for lean was classified as active but in a wise way. They saw the usefulness of lean, but they weren't the major advocates.

Person B had a background in Business Administration, where he first encountered the concept of lean in the literature. When the HEI started its lean journey, he enrolled for the first class that followed the green-belt training at the HEI. After that he had participated in some improvement projects, for example the improvement of the hiring process in his faculty. He saw the most room for improvement in the admission process. He clearly saw that the Executive Board had lean on the agenda, and that they supported it. He could see that because the hiring of certain people, and the development of certain year plans. He could clearly see the will to improve continuously. Continuous improvement was also his main drive to support and engage in the lean journey of the HEI. Lean, he argued, was a wake-up call for him and his employees, who often had worked for a long time at the same position.

Person C was also a Director of Operations. When lean was introduced at the HEI, he immediately made sure that green-belts were trained in his department. Asked about the role of

the top management, he was not so positive, but he also noted that he didn't saw the role of top management as critical. Top management supported lean with their words, but not with their actions. Person D was the vice president of the Board. She had experience with lean due to her tenure at a consultancy. To her, lean was a way of working and thinking, to shape a continuous improvement of the way of working. The vice president tried to promote the continuous improvement of the organization as much as possible. She recognized the need to be a continuous improving organization, because of developments in the sector, and the fierce competition. The board wanted to develop the organizational ability to analyze and solve problems, instead of looking to the board to plug the solution. Time and education were the main resources that the board provided for the implementation of lean. If additional resources were necessary, it had to be shown that those resources were necessary for an improvement project.

The role of psychological safety:

Person A didn't notice any resistance to process improvement in his faculty, as long as green-belts didn't use lean terminology. However, the dean expected that many of his professors would not even know that the HEI was trying to implement lean. Person B saw lean as a tool, a means, not a goal. The word lean as a management term was perceived as an unnecessary label, and that caused resistance. He perceived a lack of interest for lean when it comes to academia, but they did see the need of process improvement. The director mentioned that process improvement must be "translated and packaged well". The supporting staff was sometimes vulnerable to working in a certain way "because they had always done it like this". He wanted to make them look with a critical view at this. But, lean brought change to their way of working, which caused uncertainty and some resistance. The director tried to counter this with explaining why lean is implemented at the HEI. In general, he didn't think that the supportive staff saw lean as a threat to their jobs.

Discussing the role of academics, Person C stated that they require a different approach regarding lean. Asking them to join a session about lean won't work. But if he would talk to them about a problem the academics recognized, they would be more open to an improvement session. His aim was not to get the academics onboard, but if they outed their frustrations he expected them to join the improvement sessions. Next to that, he never used the term green-belt. He saw that many of his (executive level) peers weren't too enthusiastic about lean management. According to him, they saw lean as unpractical, or as another management hype. The director didn't use the term lean often as well. He didn't care about the terminology, but saw the added value of process improvement.

Person D hadn't concluded yet that the academic staff would be against lean, although she knew that that was the general impression. Instead, she noted that the academic staff in its activities was more aimed at continuous improvement, compared to the supporting staff. The only difference was the fact that the academic staff aimed at improvement in research and education, compared to the supporting staff who aimed at improvement in supporting processes. The vice president recognized the need to frame lean as something about excellence in research and education, instead of framing it as a way of management. Next to that, she didn't used the word lean too often. The term green-belt caused resistance, but so did terms like project manager, or project-based work. There was an awareness in the organization that lean wasn't used as a tool to cut HR costs, so that threat of lean was limited.

The process of continuous improvement:

Person A noticed a silo culture between the supportive staff and the academic staff. He also noticed a pattern, that the more closely the relation between the supportive and the academic staff was, the more there would be a willingness to improve processes together. He saw a relatively close relationship between the supportive staff of the faculty and the academic staff, compared to the general supportive staff of the HEI and the academic staff of his faculty. Person B thought that lean wasn't automatically useful for every process. However, the process of admission was mentioned as an example where lean was useful. Next to that, he mainly used lean to improve the high-frequent processes. Lean wasn't always the right way, since he sometimes preferred a more revolutionary way above an incremental improvement of process. The director stressed the need to only have a small number of improvement projects at the same time going on. Next to that, he stated the need for right project selection.

Person C noted that lean was a wake-up call to think about the process with the customer as the central focus. That awareness often faded away, according to the director. Next to that, the major benefit of lean was the fact that groups who need each other but had lost each other along the way, were brought back together in one room to talk about a common process. The relationship between the supporting staff and the academic staff very often wasn't as optimal as required. The academic staff was unaware about the work many departments must do, which sometimes resulted in the academic staff seeing some departments as somewhat obsolete (or at least to big). The communication between the two departments was often through e-mail, limiting the face-to-face contact between employees from the two sides. That automatically decreased the quality of collaboration. As an example, the director mentioned a meeting where a professor was stunned about the procedures some of the supportive employees had to follow. That meeting, among meetings, increased the common understanding. The director of operations noted that factor as the biggest win.

Person D noted that the collaboration between the supporting staff and the academic staff was sometimes marked by openness and trust, but not always. The vice president noted that both were completely different organizations: the supportive functions were a machine bureaucracy while the academic functions were an organization of professionals. When it came to the supporting functions, she would make the distinction between generic and specific services. All supporting services were organized centrally, but not all were close to the primary process. And the closer a service was to the primary process, the better the collaboration with the academic staff. For the future, the vice president saw a step-by-step process for the implementation of lean. The HEI didn't want to become the leanest HEI of the world, but they wanted to continue the journey. The board wanted lean to get in the vessels of the organization.

<u>Academics</u>

The interviews with the academics turned out to be a bit different. It needs to be noted that only Person A had heard that the HEI was currently implementing lean. The others didn't know about lean at all, or only heard about lean in a manufacturing setting. Therefore, the main factor for joining the lean journey couldn't be asked to all; only person A noted that his main motivation was the increase of labor joy.

Conceptualization of lean:

Person A	A philosophy of improvement or paradigm, for creating a culture of continuous improvement, where everyone is concerned with the customer: how can we add value, how can we reduce waste, and how can we create a professional culture?
Person B	With little array, little obsolete organization.
Person C	As less as possible, economic, efficient, not doing more than is necessary.
Person D	Not doing more than is necessary. Looking very pragmatically to what it's about.

The role of top management:

Person A classified the support of lean from top management as inadequate. He feared that new persons would join the board, who would have less affinity with lean, and therefore bringing the lean journey of the HEI to a stop. He saw the attention for continuous improvement as one of the character traits of an administrator. Person B had heard about the lean journey of the HEI, but had the impression that the board didn't know where they wanted to go as a HEI. It was decided, he stated, that it had to be simpler, but people didn't know how that could be realized. He saw skepticism amongst his peers. Person C hadn't heard about lean either. The professor feared the simplification of some organization structures, for administrative purposes. That immediately caused a problem for the research institutions, since these institutions are dependent on inter-faculty collaboration. Therefore, the institutions needed to be structured outside of the faculties. This was an example where simplification for administrative purposes would hurt research. To conclude, person D hadn't also heard about lean at the HEI, but noted a significant skepticism about visions for the future.

The role of psychological safety:

When it came to lean as a threat, person A classified lean as an infected word. The reason for this were some certain consultancies who promised a certain percentage of improvement, but eventually didn't change much. To him, it points to a culture where employees don't feel safe. Then employees will do their jobs, but not a single thing more. He saw how lean could break this pattern, since everyone sees that everyone benefits from it. The professor saw the increased face-to-face contact between employees, something that was missing before. The academic resistance came from an allergy for dogma's or (lean) prophets. Some of the professors didn't want to be bothered at all with supporting processes. As an example, he mentioned a professor who refused to fill in the grades in the grade administration system. Instead, the certain professors wanted to fill in the grades on a piece of paper, while an employee from the supportive staff had to fill in these grades in the administration system. An example of waste, person A added. Lean causes certain thoughts, but as a solution for this, he proposed different terminology. Give another label to it, and do the same things.

Person B was a skeptic of lean. He thought of it as designing a process to improve processes. According to him, the HEI needed processes and structures, but the current situation was that it was too organized. He saw a willingness to improve processes, but also knew that the last 10 years many improvement projects were implemented without being suitable for the problem. Next to that, the professor lacked time to seriously engage with lean. Person C was a skeptic as

well: he felt that lean meant “manage to manage”. The professor wanted to have as much time available for research and education, while having to do as less administrative or supportive work as possible. Next to that, he feared that the interests of the different groups at the HEI weren’t always understood in a way that was necessary. Person D stated that he was, as many of his peers, skeptical about management philosophies in general. These theories were perceived to be proven scientifically insufficient. However, interesting to note: he was less skeptical about lean, since he had seen the added value of it in many companies. The professor also noticed that in an academic environment, the role of personalities is very strong. There also tend to be a lot of local cultures. Because of that, the suitability of management ideas was very limited.

The process of continuous improvement:

Person A noticed an apathic culture of “that’s just the way it is”. However, he didn’t saw lean as capable of changing this culture. He saw lean as something to go after the (many) low-hanging fruits in the organization. He saw lean as the bottom-up approach to process optimization, while a top-down approach was necessary at the same time. A problem with process optimization is a silo culture, which person A signaled at the HEI. There was a silo culture between faculties, between study departments, and between groups. He saw a lack of focus on a smart organization of the primary process. Next to that, there always was a discussion about what the primary process is.

The culture of apathy was also caused by the decentralization and professionalization of the organization, which according to the professor lead to a culture of indifference. This indifference resulted in multiple forms of waste, and examples of bad service to the customer (the student). Examples of this were inefficient scheduling of the rooms at the HEI. Other examples pointed to a silo culture were the supportive staff increasingly became an island, without any knowledge about the consequences of their actions for the primary process. They had no more feeling with the primary process, but lean solved this problem a little bit. The professor tried to solve the scheduling issues with the development of an automatic, just-in-time scheduling process. But not all problems are easily solved, as the professor noted. However, this was not always recognized throughout the organization.

Person B saw the value of improving processes, but didn’t want to improve them in a thorough way. His philosophy was to do something with 10% effort for 90% of the results. The last 10% had to be forgotten, since those 10% always costs a lot of time. His problems with kaizen meetings was the fact that everyone had a say at those meetings, and thus absorbing a lot of valuable time. He proposed to ask four or five major stakeholders in a process about things for improvement, without asking everyone. He would prefer a process like this instead of designing a process to improve processes. When asked about his relationship with the supporting staff, he noted that he valued personal contact. For example, at the supporting ICT-department, he knew an employee who always helped him out. He saw that many of his colleagues complained about the supporting staff, if they didn’t know the persons at the supporting staff. If lean meant that the personal contact between the two departments would improve, he would be positive about that.

Person C noticed the problem that academics had to work too much for the supporting staff. While these people should work for the academics, the reality was sometimes exactly the opposite. Next to that, he signaled a lot of viscous processes. He already mentioned the silo

culture, and the insufficient understanding of the interests of the different groups at the HEI. The professor also noticed a “we-them” culture. He admitted that he hadn’t really eyes on what some of the supporting (financial or educational) departments were doing, but he and his peers still had the impression that some processes were inefficient or oversized.

Person D noticed that much of the management in his department was ad-hoc. That was partly because there had never been looked for a structural process, but also partly due to the unpredictability of research. For the support of research, namely the workplace or the process of IT support, he saw a role for lean or process improvement. In other areas, not so much. In fact, he thought that he and his peers were already aimed at continuous improvement, but then in science. They also already looked pragmatic to processes, and asked themselves why they do the things that they do. When asked about the relationship between supporting and academic staff, he perceived a good relationship. However, he also could think of situations where the supporting staff might feel different.

Supportive staff

All had also been first introduced to lean at the HEI, but not all had followed training. To be specific, only Person D had followed the yellow-belt training. Person A and B hadn’t followed any lean training, since they discovered in an improvement session that they already applied many of the philosophies and techniques in practice. Person C cited time as a reason for why they hadn’t deepened their knowledge of lean. As a factor to take part in the improvement of processes, various reasons were mentioned. Person A cited the improved understanding of processes of his peers, while person B noted the structural improvement of general work satisfaction. Person C cited the continuous improvement as a factor, and person D noted the prevention of treacly processes.

Conceptualization of lean:

Person A	Forgetting everything where the customer isn’t in the center
Person B	The process of seeing every facet of every process as a piece of a puzzle, putting all those pieces together, and then trying to come up with a smaller puzzle while leaving some pieces out
Person C	Being able to design the processes in a more efficient and effective way.
Person D	The continuous improvement of processes and procedures, for which lean is a tool.

The role of top management:

Person A stated that the support of top management varied, but that wasn’t always a problem. However, the top management followed the progress of lean, and they were present at some of the important moments (for example the introduction session). The management facilitated lean by allowing employees to spend time on improving processes. Person B hadn’t noticed any support for lean from the top management, and classified it as only sporadic. He saw that enough resources were provided, and that at some meetings it had been brought to the table. But he also questioned whether lean fitted at the culture of the HEI.

Person C was more positive. She clearly saw to support of top management, especially the vice president of the board. According to her, she tried to speak the lean message in a positive way, and she tried to construct the organization in a lean way. Directors weren't always present at improvement sessions, but only if their presence was necessary. When asked about the role of the top management, person D stated that lean wasn't embraced by the complete top management. It differed per director, or board member. It wasn't a matter of function, but more a matter of personal interest. The board could provide additional resources by making sure that the green-belts deployed in projects would adequately be replaced. That was currently a problem.

The role of psychological safety:

According to person A, lean wasn't seen as a potential threat by his peers for their jobs. He noticed resistance against change in general, but according to him that had nothing to do with lean. However, he saw that the organization of a HEI consisted for the biggest part of employees who had their education at a HEI, which would harden the change even more. According to him, people would not be open to a change or improvement in processes if they now weren't encountering any problems. He regards academia as unfit for management, since they were specialists. Academia, he stated, didn't want to be burdened with processes that don't concern their area of specialty.

Like many of his HEI-colleagues, person B saw the added value of improving processes, but he didn't saw the added value of lean terminology. The team leader classified it as an "allergy" for management terminology. During the interview, he asked whether lean needed to be packaged into management terminology: only stating what had to be done would accomplish more. According to him, lean wasn't seen too much as a threat by his colleagues. What he did saw was an increased ability of people to look critical at their own processes: he saw that his peers asked themselves the why-question more often.

Person C had worked with academics in an improvement project, but couldn't say much about the role of academic freedom. However, she noted that it was important to not mention the word lean. Instead, it had to be explained to academics that this project was meant to ease up their jobs. According to her, lean was presented as something that helped employees to do their work in a better and more joyful way. That didn't prevent that many employees felt threatened in their jobs, though. Others felt threatened to give transparency about their daily processes, because it reveals where the waste occurs. However, although people were skeptical about management terminology, they valued the role of the green-belts because of their neutrality. As potential pitfall person C mentioned the overuse of the word lean.

Person D saw skepticism coming from the fact people perceived lean to be something old, given a new name. According to him, academic freedom didn't pose a problem for lean. What did cause a problem was the fact that at a HEI, it is a struggle to uniformize processes. This was a problem caused by the autonomy of faculties. Regarding the supportive staff, he saw some resistance. Again, employees feared their jobs or their way working being changed. However, due to the demography of his workforce, he perceived the influence of the threat to be relatively small. The terminology didn't cause any resistance either. In fact, because many green-belts were acquaintances it caused people to be curious about lean.

The process of continuous improvement:

Person A had taken part in some improvement sessions, for example the admission process. That process turned out to be far more complex than was expected. The sessions of improving processes created a common understanding of how processes exactly worked. He knew that processes could be comprehensive and complicated, and that improvement of those processes required that the whole process was understood in its total. He again mentioned the example of a process where drawn out with a value stream map (VSM), and to do that a whole wall of a large room was necessary. The coordinator understood that process improvement costs a lot of time, since it costs a lot of time to understand the whole process. He himself tried to improve by continuously looking critical to processes. If he would get an idea for an improvement, he would do something with it. The coordinator also saw that the results of some improvement projects were sometimes perceived as insignificant, but the most reactions were positive.

Person B had also done some improvement sessions with his peers. His team was responsible for different processes, including the relocation processes at the HEI. Due to his function as manager of the supportive facility staff, he wasn't confronted with a silo culture very often. Person C had engaged in different improvement processes. She noted that those processes needed to be improved, with an old way of working, a high workload and a lot of waste. Next to that, departments worked at cross-purposes, causing a lot of rework. That automatically lead to frustration at both sides. She saw that because of the several improvement processes employees understood the tasks of each other better, as well as their problems. Eventually this lead to a joint improvement proposal.

Person D, due to his function, had experienced in the past that his department wasn't able to show their added value. They also couldn't show why they did the things they do. That lead to the impression amongst academics that the supporting staff was very busy with things that didn't matter. Lean offered a possibility for the supporting staff to explain their processes, and the legal or fiscal obligations of that process. He saw process improvement as the main benefit of lean, but the increased mutual understanding between the departments was an extra. For the future, he thought it would be useful to improve the communication about lean. For example, he could see a better presentation of reached results by developing a special website dedicated to lean at the HEI.

Green-belt

There was no project or work lean team formed at the HEI where the case study was done. However, several employees were trained to get the green-belt certificate. When asked about the main factor for joining the lean journey, person A cited his interest in lean as a factor. Person B valued the fact that lean started a conversation between academics and the supportive staff. Person C saw the need for a change in culture: the HEI provided education but wasn't a learning organization itself. Person D noted that she valued the fact the improvement no longer takes place at a distant drawing table, but with people from the work-floor.

Conceptualization of lean:

Person A	Setting the customer at the central focus point, and seeing what the added value is for the customer. Next to that, it is analyzing the processes, and using the knowledge from the work-floor to improve those processes.

Person B	Improving continuously, and constantly seeing where improvement is possible.
Person C	Lean is a structured way of working to jointly deal with problems.
Person D	Looking how we can do better, with employees from the work-floor. Countering waste.

The role of top management:

Person A argued that most of the top management do not seem to understand the philosophies of lean, and therefore don't really see the added value of it. That limits their engagement with the process. Some seem to regard it as "another management tool". However, he expressed his satisfaction with the resources that top management had made available. The management saw lean not as a tool to cut costs, but as a tool to improve processes. But since lean had started as a bottom-up initiative, as a request from the work-floor, the motivation of green-belt employees was not limited because of the lack of engagement of top management.

The support of top management was classified as insufficient by person B. Directors of the supportive functions showed their support, but at the academic faculties she didn't recognize the support for lean. That was also due to a lack of time. However, that didn't limit the motivation to implement lean. The interest in process improvement was always present, she noted. But she saw that interest only present in the supportive functions. From the work-floor several improvement initiatives had developed. In the academic faculties that interest had still to come. As an indicator of that, only employees of the supportive functions had followed the green-belt training. She thought that they would come onboard if they saw the successes of process improvement in the supportive functions. For the future, the supervisor saw some unclarity about the lean journey. The next phase for her department was the development of KPI's, with which they would start. But there was unclarity about whether the HEI wanted to train more green-belts, or that the group of green-belts would stay the same. Her worries indicated that a HEI does not only need to have a plan to start the lean journey, but also to sustain the journey.

Person C saw that the director of her department was very lean-minded. She also saw the support from some members of the board. She thought that a top-down approach regarding lean would not work at the HEI. The top management supported the lean journey with the provision of time and money, which she classified as sufficient. However, she proposed extra time for improvement as a means the board could provide, since she saw that many employees couldn't free up time to improve processes. Person D only saw the support of top management in the theme-month. Outside of that, she didn't see any support. However, that could also be due to their function, she added. It didn't reduce motivation, but she could see the decline of enthusiasm amongst her peers if the top management didn't show visible top management. On top of that, she stated that top management didn't provide enough resources. They provided money, but didn't provide time. When she wanted to pick up a project, she still had to finish her own work. That made her feel like a "thief of her own time". She noticed a little decline in her enthusiasm to act as a green-belt because of that.

The role of psychological safety:

Person A thought that the most resistance from academia was caused by incomprehension. They viewed it as a play tool of the supportive staff. Academia, to him, wanted to have to do as little as possible with the supporting processes. He thought that if successes could be presented, more people would come aboard. Person A had also been deployed at other faculties for improvement projects, but he didn't experience any hostility as an outsider. If he explained what his motives were, namely to help improve their work, people would be open to it. However, he expressed the problem that it was not clearly communicated that lean at this HEI does not stand for "less employees are needed". That limited the effectiveness of lean.

Person B warned that lean must not be a goal, it must be a means to an end. She also expressed one of her concerns, namely that lean had gone too far. She argued that some of her colleagues and subordinates started to become tired of lean. Everything was done under the label of lean, and that caused some resistance. This was also because the employees had spent a lot of time in process improvement, without really seeing the results of it. On the other hand, the tiredness of lean could also be caused by lean being another management term. When Person B would encounter a problem, she would immediately pick up the improvement project. First, she would look with her peers if an improvement was possible and logical. If that was the case, the project would start. There was a problem, though. As a supervisor, she knew that sometimes her asking one of her subordinates about the time a task takes could be problematic and intimidating. Especially if someone else managed to complete the task in lesser time.

Person C saw a skepticism about the word lean, being afraid of another trend. She sometimes noticed that people misused the word lean, and sometimes even ridicule it. She saw the skepticism coming from the fact that people thought that small measures couldn't solve the problems at the HEI. She also saw that academic freedom often played a (negative) role. Some academics were interested, but most didn't engage with it. What did play a role, was the fact that many people had worked in a certain way "because they had always done it that way". Some of these people resisted a change of their way of working. Others were afraid of losing their jobs, when improving processes in improvement sessions. On the other hand, she saw an alteration in the culture: she noted that people started to look more critical to their processes.

Person D had encountered the autonomy of faculties when implementing a solution. That solution could have been implemented much earlier, hadn't it been for the autonomy of faculties. Too many studies or faculties hid behind their uniqueness. That lead to fact that many things at the HEI could be aligned, but weren't. Next to that, she noticed the influence of psychological safety in three ways. Academics resisted because of their academic freedom, while employees were afraid for their jobs. Others didn't want to change their way of working. People knew that lean wasn't used to cut jobs, but she wasn't too sure that that was widely believed.

The process of continuous improvement:

If person A recognized room for a potential improvement project, he would directly start this project. However, if it was not directly possible for him to start with the project, he would go the central coordinator of lean at the HEI. For him as a green-belt this option is obvious, but employees without a yellow- or green-belt don't know this. That means that many potential improvement projects could be wasted because the employees without any lean training do not know what to do with it. Regarding the relation between the academic and supportive staff, person A noted that the academic staff sometimes sees the supportive staff as a burden.

However, he argued that the supportive staff was professional enough to let it self not be distracted by that.

Person B saw the need for process improvement at the HEI, and she saw how lean could be used. According to her, many employees at the HEI carried out processes because they had always done it that way. She also had participated in the theme month about workload. The results of the theme month were presented at a poster market, which according to her visualized these results more. However, the interest for this poster market was relatively very low. Person B thought that the communication about this poster market upfront was flawed. The supervisor saw that the theme month was perceived to be very useful. The main benefit of it was, as she stated, that different groups engaged in conversations. This theme month improved the common understanding and awareness between these groups. Lean can be a tool to bridge the gap between employee groups, but all groups need to be present at those improvement sessions. In the theme month about workload the academic staff was present, but that was due to the way they informed. The academic staff had been spammed, as she stated. She mentioned that the improvement session with the academia and the supportive staff was one of the main productive sessions, because all the stakeholders in a process were present.

Person C also saw that people felt that they were heard. She saw that because of improvement sessions, many departments started a conversation with each other: the mutual understanding improved. Or, as she stated: “people finally understood why people do things in a certain way”. At the HEI, she said, there was an “us versus them”-culture. She also described the environment as very relational-oriented. She also saw that when presenting the results of the theme-month with a poster market: the interest for that market was relatively low, but acquaintances were interested. Because of the relational factor, she saw the need for to spread like an oil stain in the organization, through individuals.

Person D had worked for the quality assurance in a previous function. There she discovered the elements of continuous improvement, which she was missing in her current function. Lean was a way to do so. She encountered resistance, because colleagues perceived it to be the new project-based work. But at the improvement sessions, she noticed that many employees from the supportive staff were present. She discovered that that was because many supportive employees always had felt overlooked. At those improvement sessions, they wanted to be heard, a thought that they stood stronger together. She saw that lean empowered people to speak up, and it made sure that many problems were unveiled. Next to that, it made sure that processes were no longer improved in isolation.