# Challenges to the Implementation of Lean Practices in Higher Education: Is the Culture in Higher Education Conducive to Adoption of Lean Principles and Philosophy?

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**Abstract**

Lean in higher education, often abbreviated as LHE, has grown in interest over the past 20 years. The application of lean principles has been observed in higher education institutions throughout the world. Many researchers have investigated both the success and the failure of lean in higher education. Although lean originated in the automotive industry, and both the automotive industry and higher education report success and failure, there is no comparison of the factors between these groups. Culture is cited quite frequently in the literature as a barrier to success. Thus, there is a need for investigation into the cultural differences between higher education and the automotive industry as they relate to lean. This paper uses Schein's three elements of culture to evaluate the differences in culture between higher education and the automotive industry. It concludes with recommendations on how to best deploy the practices of lean in higher education given the cultural differences and challenges between the two sectors.

**Keywords**: Lean, culture, higher education, automotive industry, levels of culture.

## 1. Introduction – Lean success and failure

Higher education in Western countries has experienced many challenges in recent decades including a reduction in public and government funding, increased competition for students in a global education market, increased questioning of the value of tertiary education as compared to skilled trades or other workforce-related credentials, the academic tenure system being challenged, and most recently, the circumstances surrounding the COVID-19 pandemic. Quality management practices have been introduced and adapted into higher education for many years, however, the benefits of quality practices are still unclear and debatable (Harvey & Williams, 2010). Lean practices in Higher Education have increased in the past two decades, and, similar to applying quality management practices, the benefits from applying lean concepts in Higher Education are not clear, or at least are not measured quantitatively. For example, Balzer et al. (2016) conducted a review of 64 publications between 2009 and 2015. These publications consisted of case studies, (52%), conceptual papers (32%), and empirical research (9%). While the case studies were mostly positive towards the effective use of lean principles in higher education, empirical studies failed to measure the effectiveness of lean in higher education. Therefore, it is still uncertain if lean practices have a positive effect on the performance of higher

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education institutions. On the other hand, researchers such as Richter (2011) and Scoggin (2017) estimate the failure rate of lean in higher education anywhere from 50% to 95%, indicating lean initiatives often fail. Specific examples of this include Cano, Reilly, and Kourouklis (2014) who present a case study that targeted the improvement of administrative and academic processes using lean practices at a higher education institution in Scotland. The study concluded that the lean initiative failed to achieve the intended benefits and Shannon (2020) described lean as having a positive impact in a discrete unit while the university-wide implementation failed. In general, many researchers have investigated both the success and failure of lean in higher education. Factors that have been identified as having an adverse effect on the success of lean initiatives include, but are not limited to, leadership support, organizational culture, poor project selection, use of temporary lean experts, disjointed lean strategy vs organizational strategy, and the discrete use of lean tools vs an organizational-wide holistic implementation of the lean philosophy.

Lean originated in the automotive industry, and while both the automotive industry and higher education report success and failure, there is no comparison of the organizational and cultural factors between these sectors. As a result, this paper seeks to explore and identify these factors and their effect on the success of lean within the higher education sector. The authors seek to understand if lean practices are transferable given the cultural and operating differences between the automotive manufacturing sector and higher education; and, if these factors inherently are barriers to the successful application of lean in higher education, what can be done in the future to best exploit lean in the HE environment? Culture is cited quite frequently in the literature as a barrier to success, in both manufacturing and higher education, thus, an examination of the cultural differences may lead to an understanding of whether lean can be transferred to higher education or if there is a natural constraint based on culture. This paper focuses on the difference in culture between the higher education community in North America and Australia, and the automotive community in North America. It concludes with recommendations on how to best exploit the practices of lean in higher education given the cultural differences and challenges between the two sectors.

## 2. Problem statement

Lean principles have been applied across the globe in the higher education sector both with success and failure. There is a need to understand if, and why, cultural barriers exist in higher education that may limit the potential value of applying lean practices in a higher education environment.

## 3. Research questions

**Q1.** Do operating differences and norms between higher education and the automotive manufacturing sector pose a barrier to successful lean initiatives in higher education?

**Q2.** How can the lean philosophy be adapted to suit the needs of contemporary HE?

## 4. Method

The three levels of culture as outlined by Schein (2017), a comparison of the artifacts, espoused beliefs, and underlying assumptions of organizations, are used to assess the cultural differences between Higher Education and the Automotive industry. According to Schein, “culture can be analyzed at several different levels, with the term “level” meaning the degree to which the cultural phenomenon is visible to you as a participant” (Schein, 2017, p. 17). Schein asserts that each of these levels can range from the discrete and tangible level of culture to the subtle, unconscious, and inherently entrenched aspects that define a particular culture. Using the three levels of cultural analysis, the researchers present (in table 1)

observations from the automotive industry and higher education that in turn manifest as key differences between the two sectors. Pondering why these differences exist then lead the researchers to break down each dimension of the respective industries, outline the accepted underlying assumptions (for the researchers combined experience in these 2 industries), and provide examples of tangible artifacts that support the underlying assumptions. It is from this framework and analysis, the potential for lean to succeed or fail within higher education can be objectively evaluated. To help better understand these levels of culture, a brief description of each level is outlined below.

### 4.1 Authors Experience

These authors intend to introduce this important topic to the higher education community since lean is being applied at colleges and universities worldwide. Due to limited published work in this area, personal experience and dialog with colleagues form the foundation of this research. The researchers bring their collective experience in higher education and Kluse's experience working in quality management roles in the automotive industry, along with input from their respective networks, to help inform this paper. Before a full-time academic appointment in 2015, Kluse was a former Quality Professional with the majority of his 27-year industry career spent in the automotive sector and working in a lean environment with automotive component suppliers and OEMs. Shannon brings over 20 years of experience in the higher education sector working in central divisions, faculties, schools, and research centers.

### 4.2 Artifacts, espoused beliefs, and assumptions

***Artifacts,*** according to Schein (2017), are:

> the phenomena that you would see, hear and feel when you encounter a new group with an unfamiliar culture. Artifacts include the visible products of the group, such as the architecture of its physical environment; its language its technology and products; its artistic creations; its style, as embodied in clothing, manners of address, and emotional displays; its myths and stories told about its organization; its published list of values; and its observable rituals and ceremonies" (p. 29).

As such, most of what is visible in an organization is a form of artifact.

***Espoused beliefs*** and values are those beliefs and values that members of the organization say they believe in and desire. These can be reflected in missions and value statements, included in statements from senior executives, be included in the content on websites and in promotional material, and so on. They are the things that the organization claims to be, or would like to be.

***Underlying assumptions*** "are things that are taken for granted as being reality in the organization" (Schein, 2017, p. 30). Unlike espoused beliefs and values, these assumptions are embedded in the actions and behaviors of the organization and inform the way things are done

The challenge in understanding a different culture, be it an organizational culture or a national one, is that artifacts can look similar across cultures, but have very different meanings and uses. As Schein (2017) puts it, "It is especially dangerous to try to infer the deeper assumptions from artifacts alone, because your interpretations will inevitably be projections of your own cultural background" (p. 29).

**5 Results**

Using the framework described in the previous section, common aspects of lean in the automotive and higher education sectors have been identified and further explored in table 1 and table 2. It is from this analysis the potential for lean to succeed in higher education can be assessed and the future direction of lean in higher education determined.

Table 1 lists different aspects of lean implementation and the way that the underlying assumptions manifest during implementation.

Table 2 lists a number of characteristics that exist in both the auto industry and higher education, followed by statements of the underlying assumptions and examples of the artifacts in each industry. For example, quality assurance is essential for the automotive industry to sell cars. Because there is only a need to accredit some degree programs and not all aspects of university business, quality assurance is seen as optional.

## 6. Analysis

After analyzing common aspects of Lean in terms of artifacts, assumptions, and espoused beliefs, it is clear that cultural differences exist between the two sectors, and these surely contribute to the effective application of Lean in Higher Education. In the second edition of The Toyota Way, Dr. Jeffrey Liker (2021) presents two differing strategies for the implementation of lean. Liker initially presents what he terms "*a comfortable tendency toward mechanistic implementation (of lean)*" which is simply a non-preferred method to initiate a lean conversion within the organization. In brief, this entails the development of lean metrics that align with lean principles, the metrics are tied to management bonuses to spark motivation and commitment. An initial project is executed using the kaizen approach (aka as rapid improvement events or RIE in HE) with success; this strategy is taken forward through the organization by conducting monthly kaizen events, for several consecutive months – each led by a manager or engineer at each facility. Results are exceptional; however, they are not sustained. This is attributed to the management and/or staff not taking ownership. Without going into further detail about the mainly failed initiative, one can draw comparisons of this scenario to lean in higher education. An administrative process is chosen to improve, ownership and buy-in may or may not be established, and results *are* realized, however no real lean initiative or lean conversion takes place in the institution even when multiple kaizens are successfully conducted over a period of time. It implores the question – are we in HE culturally sound to accept what lean has to offer? Alternatively, is our cultural make-up and foundation counterintuitive to lean principles even if they are generally thought of as simplistic (reduce waste in all processes) and well aligned with most any industry?

Liker (2021) goes on to present a better approach to lean transformation whereby one is “Approaching Lean Transformation Scientifically” (p. 355). In this approach, before the organization delves into solutions (i.e., initiating periodic kaizen events), a big-picture look is established where the organization ponders questions based on an improvement model. According to Liker, these questions are: “(1) what is the challenge? (2) what is the current condition? (3) what is the next target condition, and what are the obstacles to that condition?, and (4) what is the next experiment I will run to overcome an obstacle?” (p. 355). Without presenting the entire approach in great detail, it is from this approach that lean conversion is most likely to succeed and results sustained. In presenting these two dissimilar strategies to lean implementation, Liker ultimately defers to culture as the ultimate building block for sustained lean practices. According to Liker (2021) “It seems that whatever the starting point of discussion of lean transformation, we end up talking about culture. Perhaps this is an indication that

**Table 1. Common Aspect of Lean – Perspective from Each Sector**

| Lean Perspective | Auto Industry Response | Higher Education Response |
|---|---|---|
| Lean acceptance | Lean is (essentially) universally accepted in the auto industry – best practices revolve around lean and/or TPS. Awards are lean-based (AME, Shingo, etc.) | Lean viewed as fad or latest initiative of the year, acceptance by HE unclear, and/or no universal acceptance |
| Lean rationale - to use lean techniques | Lean is applied to the core business of making automobiles. It is assumed that lean practices are required to compete with other OEMs | Lean is rarely applied to the core business of teaching and research. It is mostly applied to administrative processes that are deemed broken |
| Sense of urgency (to correct inefficient or poor performing processes) | Efficient processes and defect-free products are considered a must for competitive advantage and to sustain low-profit margins and/or avoid costly OEM production delays, line stoppage, or stock-outs | Efficient processes desired, urgency not necessarily important for competitive advantage |
| Elements of lean in use | Lean was created in auto industry. All elements are logically applicable to manufacturing | Some lean practices such as JIT or TPM are not well aligned with university processes or functions |
| Leadership/Administration | Industry leaders are often evaluated by discrete organizational metrics such as profitability, quality, productivity, etc., and rewarded for performance. Leaders are typically trained in leadership, management, and process improvement principles<br><br>Leadership can form a team, they have direct responsibility for team performance, create a vision and execute a strategy. Concept of Gemba “walks” practiced in industry. Leaders have direct authority over subordinates | University leadership is often senior academics that have excelled in a particular area of professorship such as externally funded research. Leadership often do not have formal training in management or leadership principles<br><br>Leadership in HE supervise faculty that are generally driven by individual goals tied to rank and tenure. Gemba “walks” rare – processes solved based on intuition. Leaders in academia do not necessarily have influence over subordinates |
| Leadership focus | Lean is applied to the core business of making automobiles and is critical to organizational success<br><br>Leaders/managers within the auto industry are generally versed in process improvement techniques and this is part of their daily responsibility – to monitor and improve all organizational processes | Lean is rarely applied to the university's core business of teaching and research and is seen as tangential to organizational success<br><br>Leaders/administrators in HE do not have daily focus on processes or process metrics, and are not trained in process improvement techniques |
| Perception of the workforce | The workforce is treated as "process experts" and often the first consulted when a problem arises. Leadership’s responsibility is to remove barriers to problems, workforce solves problems | Leaders (administration) solve problems or lead problem-solving efforts, especially in academic processes. The actual workers in the process and/or faculty are not always viewed as the process expert |
| Vision and Mission | Vision and mission are often quite clear and concise. The ultimate goal for the auto industry is to maximize profit, satisfy stakeholders, and continued business, and growth. Lean practices are a significant aspect that supports and help execute a company's vision and mission. Short and long-term strategies based on the exploitation of lean principles, considered a “must” for competitive survival | The University's mission and vision are driven by the board of directors, public need, workforce need, and administrators. Vision and mission holistic. The ultimate goal for HE can be somewhat varied, it can be the number of graduates, research funds obtained, university ranking, athletic success, or efficient use of tuition. Lean principles do not align with the vision and mission |

**Table 2. Cultural Analysis in Automotive Sector vs. Higher Education**

| Characteristic/Dimension | Auto Industry Assumption & Artifacts | Higher Education Assumption & Artifacts |
|---|---|---|
| Team focus | Teams are considered a necessity and organizational success is equated to high-performing teams. Teams-based activities are essential for success<br><br>**Artifacts:** Program launch teams, problem-solving teams, design teams, etc. AIAG core tools suggest the use of "cross-functional" teams. IATF 16949 requires the use of multi-disciplinary teams | HE is focused on individual academics. Individual success awarded/promoted by internal and external practices. Academics collaborate as needed in self-forming networks<br><br>**Artifacts:** Tenure track, personal promotion, indices like H Index, Fellowships. |
| Financial expectations | Low-profit margins demand efficiency. Mandated annual program "give backs" (LTA's) or pay-to-bid on a program force the need to consistently reduce costs/waste and improve through efficiency gains. Customer price considered "fixed" in lean<br><br>**Artifacts:** OEM LTA's, OEM supplier cost audits, | Internal and external expectations that costs rise each year. Pass along cost to "customer" i.e. students. Cost is variable. Universities seek to establish large endowments via philanthropy.<br><br>**Artifacts:** Enterprise bargaining increases, indexed grant funding, annual fee increases, tuition increases |
| Requirement for quality assurance | Required & suggested lean practices outlined in IATF 16949 certification and various other industry standards such as AIAG core tools<br><br>**Artifacts:** IATF registration required by all suppliers to OEM. Within the standard, improvement is mandatory, use of lean encouraged/ required. Quality can be discretely defined and measured. Poor quality results in potential loss of certification and business | Formal accreditation only applies to some degree programs. There is no requirement for specific practices to improve support and/or core processes<br><br>**Artifacts:** Accreditation processes for particular programs only. Focus on achievement of learning outcomes, cost and efficiency are not considered. Quality is not easily defined |
| Final product | Makes and sells a tangible product – motor vehicles. Quality is standardized and readily measured/assessed with common metrics across the industry<br><br>**Artifacts:** Public perception of quality, JD Power surveys that dominate OEM actions and leadership decisions. Specific measures reported common to each OEM, quality assessed by OEM and during third party certification & surveillance audits | Universities make and sell intangible products – education and research. Assessing quality is subjective and not standardized<br><br>**Artifacts:** Institution, state, and national teaching quality awards, student evaluations of courses, institution, and national research excellence measures and awards |
| Competition | Clear understanding of performance relative to competitors through internal analysis, industry reporting of metrics, and competitive benchmarking<br><br>**Artifacts:** Weekly production reports in "auto news", accepted productivity benchmarks among the industry, JD Power quality rankings, etc. | Universities have broad understanding of relative status via externally managed rankings. Each ranking system has its own measures of success<br><br>**Artifacts:** University ranking such as ARWU, THE, QS World University |
| Definition of the customer | The customer in the automotive sector is clearly defined<br><br>**Artifact:** For an automotive component supplier the customers are the subsequent operation during assembly, the OEM, and the consumer. For the OEM, customers are the subsequent operation during assembly and the consumer. | The customers for the University are often debated and not clearly defined<br><br>**Artifact:** Students, the public (service and consulting), and industry (applied research) are all measured and valued differently. Administration, faculty, and staff have differing end customers. |

culture is at the root of everything I have been discussing" (pg 364). Furthermore, Liker goes on to cite Schein and his definition of culture resulting in the following conclusion: "This [Shein's definition of culture] is a remarkably apt description of the Toyota Way culture in a number of ways:" (p. 365). Liker goes on to describe specific aspects of Toyota's culture that directly align with the definition of culture and then offers a model for a successful lean journey. Examination of the model shows a clear disconnect between the vision, mission, and culture in higher education with that of a successful lean conversion.

### 6.1 Main themes – Cultural analysis

Analysis of table 1, aspects of lean as viewed from the automotive industry and higher education perspective, indicates that many items in the table are not well aligned to cultural characteristics conducive to a healthy lean atmosphere. Regarding ***acceptance of lean, leadership, and vision/mission***, in general, lean is sporadically accepted in higher education and may also be only partially accepted within a university that seemingly practices lean. In contrast, universal acceptance is a norm in the automotive industry. Since culture is based on assumptions and shared beliefs, attempting to implement lean principles without a culture conducive to lean, and explicitly modeled by leadership is a clear barrier to lean. It is not a belittling statement of higher education culture, but it represents a situation that becomes quite important if lean is to be successful in higher education. Liker's (2021) model suggests that at the start of a lean journey, leadership vision and commitment to excellence are critical; without this commitment, the next logical path is to attempt to exploit lean tools resulting in short-term results that are not sustained (p. 369). Therefore, institutions that wish to successfully implement lean need to work on their culture before running any kaizen events or 'lean awareness' training.

Looking at the ***sense of urgency*** between the 2 sectors, it is evident that the interest in lean within higher education represents more of a suggested improvement approach rather than an immediate need to correct poor-performing processes. While improving processes is surely important in higher education, it does not have the same motivation as in the automotive industry where profit maximization is the ultimate goal. In contrast, the motivation for process efficiency in HE does not carry the same implications (degradation of profits) as those in the automotive sector.

It can be observed that many ***lean elements***, concepts, and tools such as Just in Time (JIT), Total Productive Maintenance (TPM), Single Minute Exchange of Die (SMED), involvement of people, Jidoka – just to cite a few examples, do not align with university operations and processes. It is not to say that some can be applicable or transferrable to some university operations, however as previously stated, lean taken as a holistic endeavor, rather than the application of selected tools, is the preferred and most conducive to success approach (Liker, 2021).

Regarding ***leadership focus***, leaders/managers within the automotive industry are generally versed in process improvement techniques and this is part of their daily responsibility, whereas, in HE, this responsibility or focus often only surfaces when a glaring problem exists in a process. Doing something about the problem often requires bringing in external experts. The discussion points outlined in table 1 indicate that cultural differences serve as a barrier to lean in higher education.

Upon examination of ***leadership, administration, and leadership focus***, clear disconnects exist between leadership skill set, motivation, and philosophy in higher education which may not align well with the mission and vision of the university, whose focus and reason for existence (research, transfer of knowledge, public service, etc.) differs greatly from the automotive industry (profitability). The ***mission and vision*** of the university are often driven by public need, a board of directors, and university administrators while the automotive industry in the US is driven by profitability and market share. Lean principles were developed by Toyota in the 1950s, in the context of an automotive industry in Japan that

exhibited: (a) a demand for a variety of products in low volume, (b) heavy competition both domestic and global, (c) fixed/falling prices, (d) dynamic technology, (e) a high cost of capital after WW2, and (f) a workforce that demanded involvement. The need for lean was a necessity for survival and this same view within the automotive industry is held today (Pascal, 2015). Therefore, the need for lean and its alignment with the university's core mission is assuredly different than that of the automotive sector.

Table 2, an examination of assumptions and artifacts, offers further insight into the cultural aspect of lean implementation. The underlying assumption that ***teams*** are a foundation of collaborative problem-solving and project execution in the automotive industry differs from the individualistic approach indicative of higher education. As observed in the assumptions and artifacts, the exploitation of teams is not only considered a preferred approach in the automotive industry; it is a preferred and implied required practice as part of achieving IATF 16949 certification. In contrast, while collaboration in higher education exists and is encouraged, formal teams are not necessarily the norm. Additionally, at the core of career advancement are individual metrics such as tenure, sole author publication, and obtaining external funding. The academic career is based on individual success, and this success is not dependent on institutional success. In fact, the success of individuals positively impacts university rankings and so drives institutional success.

In the higher education sector, it is often an assumption that ***costs*** will rise and these costs are then passed along to the customer through increased tuition fees or indexed grant funding. By contrast, in the automotive industry, it is often the expectation for suppliers to the OEMs to improve efficiency and reduce costs as a program (vehicle model) matures over time. This comes in the form of long-term agreements (LTA's) that stipulate cost reductions to the OEM by a contractually agreed upon value (i.e 3% reduction over 3 to 5 years) over the life of the program. Additionally, an emerging practice is to require an automotive component supplier to pay a fee just to get an *opportunity* to bid on a program. Thus, in the automotive industry, the use of lean principles becomes a necessity for survival. In higher education, lean can be one of many options to improve efficiency – but without the same sense of urgency or critical need.

From this analysis, the research questions are answered. In question 1, the authors inquired: *Do operating differences and norms between higher education and the automotive manufacturing sector pose a barrier to successful lean initiatives in Higher Education*? Based on the analysis and the comparisons outlined in table 1 and table 2, it can be concluded that operating norms and cultural differences do act as a constraint to the use of lean in a higher education setting. Question 2 asks: *How can the lean philosophy be adapted to suit the needs of contemporary HE?* Both tables outline these differences using the Schein (2017) model for the identification and analysis of culture. Furthermore, the researchers offer perspective, based on these differences, on what aspects of lean are well aligned for application in a higher education setting. This perspective is presented in the subsequent section.

## 7. Discussion

This paper discusses the fundamental cultural differences between the automotive industry and higher education. It also discusses observed responses to lean implementation in each industry. Accepting the validity of these differences, it is evident that attempts to implement lean, six sigma, or any other improvement methodology, are unlikely to succeed if treated as a *copy and paste* from manufacturing. A more nuanced and context-sensitive approach is required.

When Taiichi Ohno (2013) was leading the development of the Toyota Production System (TPS), he used a highly experimental approach and worked within the constraints of Japan's highly industrialized

workforce. “Nobody knew if the Ohno System would work. Nobody else was trying it. If the results were good, that was good, and if the results were bad we needed to change right away” (p. 80). In seeking to apply lean to its own unique culture and environment, there is no reason why lean practitioners in higher education cannot also be innovative and experimental, keeping what works and changing what does not. For instance, the predominance of the kaizen event as a lean practice may well address cultural needs in higher education (e.g., employee engagement in decision-making) but only if the culture also supports the implementation of ideas from the bottom up.

### 7.1 Lean in academia as well as administration

A fundamental difference between lean implementation in the automotive industry and higher education is the scope of work being '*leaned*'. The two clearest differences between industries are that the automotive industry has one core business – making motor vehicles – while universities have at least two – teaching and research – which are very different from each other. The second difference is that the automotive industry uses lean on the production line in the manufacture of vehicles. That is, lean is directly related to the core business of the automotive company. Universities typically use lean on administrative processes, and not on their core business activities. As such, lean is used on hygiene factors rather than motivators. It should not be surprising that academic leadership enthusiasm for lean is limited. With that said, a better opportunity to apply lean may lie with faculty as they can choose to implement lean practices with or without the support of leadership. Emiliani (2015) states that choosing to adopt lean teaching practices without any support from leadership – even at the department level – align with the professional responsibility of the faculty member. Emiliani (2015) suggests faculty to “get on board” regardless of leadership support (or lack thereof) and the potential benefit is an “immediate positive impact on one’s students – perhaps hundreds of students per year” (p. 2040). Furthermore, Emiliani suggests that the process, starting with one faculty member using lean could subsequently spread to others via shared experience thereby slowly catching on and spreading to a group or team of faculty that embraces lean principles. As a look at where lean can go in higher education, the approach by Emiliani seems the most logical and realistic approach to implementing and sustaining lean in higher education. The approach is aligned with a core focus of the university, which is teaching, and the customer, students, thus is clearly a value-added activity.

Wiegel (2020) describes the work done at the New Engineers School as an example of lean education. Distinct from the application of lean to already established higher education institutions as described in Balzer (2020), lean education is a lean approach to teaching as well as professional support to alter an educational system that "wastes talent of students and teachers on a grand scale" (2020:vii). Wiegel describes the founding of a small engineering school running on lean principles from inception.

### 7.2 Local implementation rather than the whole university

The benefit of a local implementation is that it can be implemented at a lower cost and with a lower profile in the university. A discrete organization unit may also be easier to effect change in, i.e. common issues are more easily identified, local leadership may be more trusted than university-level leadership, and the intended outcomes of the lean initiative may be more readily believed. The drawback to a local implementation is that many of the processes which impact most of the staff and students run across organization unit boundaries and are owned by central divisions or functions (e.g., the student admissions process or the new staff member account setup process will be centrally owned). Therefore, effecting meaningful change may be difficult. Shannon (2020) describes success in a veterinary teaching hospital set within a university. The hospital focused on processes unique to itself and which were owned end-to-end within the hospital. They did not require the rest of the institution to change in order to see

improvement. Deviating from the accepted or preferred organizational approach to implementation of lean and lean practices, a local implementation model in higher education could be much more aligned with the culture and operations of the university thus increasing the potential for success.

### 7.3 Simpler rather than complex

The kaizen event is the most common form of lean intervention in higher education, at least according to the available research. Instituting this simple kaizen concept locally and/or throughout the entire institution could have the snowball effect of incremental and continual improvement which is the direct intent of a kaizen program. While kaizen is considered a component of lean, taken as a single improvement philosophy in a higher education setting may prove quite valuable since it is readily aligned with the operations and culture of the university, so long as leadership will support the implementation of changes driven from the bottom up. However, there are many other forms of lean-inspired improvement initiatives which do not require the investment of time and effort that a multi-day kaizen event does. Embedding lean thinking in other activities, via existing organization development or continuous improvement teams may generate business and process improvements and also improve institutional readiness of wider programs in the future.

Balzer (2020) includes over 40 pages of examples of the successful application of lean in higher education, from 16 different universities over a 15-year period. These examples include kaizen events (referred to as rapid improvement events), process mapping, customer journey maps, structured problem solving, daily stand-ups, leadership walks, and 5S. They worked on processes related to human resources, student or academic administration, facilities, research administration, and finance among others. The universities used models ranging from small lean teams to the widespread use of lean champions across the institution. The authors are aware of other models which embed lean thinking in staff training initiatives without referring explicitly to lean, or any specific methodology. It is simply presented as useful ideas and tools to use. There have also been substantial changes to the way lean has been used in recent years due to COVID-19. The pivot to online teaching via platforms such as Zoom can also be seen in the way non-academic staff work, and the way lean practitioners work in universities (Shannon 2021, p. 47, 75-76).

## 8. Limitations of research

The authors acknowledge the following limitations to the research informing this paper:

While the theoretical framework to assess the cultural differences between the automotive sector and higher education is grounded in Schein's (2017) theory of organizational culture, the specific aspects of the two industries described in Tables 1 and 2 are drawn mainly from the author's experiences, observations, and discussions with colleagues. There is a lack of published literature comparing the two industries to validate the author's views.

There is a general lack of rigor in assessing the success of lean in higher education, as evidenced by the variety of approaches used, frequent use of anecdotal evidence to describe success or failure, and lack of any consistent measurement across institutions (Balzer 2015, 2019). The comparison of culture between the automotive industry and higher education as it relates to lean practices is mainly scarce.

## 9. Conclusions

After a preliminary evaluation using Schein's model for culture, it appears that the challenges and constraints to implementing lean in higher education are related to the difference in assumptions, beliefs, and norms associated with both higher education and the automotive sector. This does not

indicate that lean will not succeed in a Higher Education setting, however, it does suggest that before launching any lean initiative in a higher education setting, one must evaluate and be cognizant of the cultural differences that have made lean conducive to the automobile industry as well as to manufacturing in general. Recognizing these differences at the start of any lean initiative may be a determining factor in whether or not a particular lean initiative succeeds in higher education. This research provides the basis for examining the cultural differences between the two sectors as they relate to lean initiatives.

## 10. Future research opportunities

In writing this article, a typical literature search did not result in a significant number of applicable articles. Therefore, a systematic literature review to determine the magnitude of peer-reviewed articles relating to cultural differences between higher education and the automotive industry would be beneficial to expand the knowledge. Additionally, the collection of data to further support the tables developed in this paper can substantially further the knowledge of cultural differences and the potential to apply lean to higher education.

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