

Applying lean methodology to curriculum revision and internship placement process – a case study

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Abstract

Purpose – The purpose of this paper is to study, examine and apply lean management principles to the curriculum revision and internship placement process in an academic program at an institution of higher education.

Design/methodology/approach – This paper consists of two sections. The first section reviews the literature on lean principles, lean tools, nonvalue-added activities and the application of lean methodology to academic settings. The second section presents a case study, where a team of faculty members applied lean principles to the process of curriculum revision and internship placement at an academic institution.

Findings – Lean principles can be successfully applied to curricular revision and the internship placement process. By applying the concepts of value, identification of value stream, removal of wasteful activities to achieve flow and creation of a pull-based system, faculty and program leaders can streamline processes at academic institutions. Furthermore, ongoing data collection helps to foster the culture of continuous improvement and ensure that processes are revisited and adapted to meet the needs of customers.

Practical implications – This paper is of value to faculty members and college administrators interested in applying lean principles to academic processes. Usage of lean methodology may lead to the identification and elimination of waste in curriculum and the field placement process.

Originality/value – This manuscript can provide a structure for the application of lean in academic processes at institutions of higher education.

Keywords Lean management, Curriculum, Internship placement, Value, Value stream, Flow, Pull, Perfection

Paper type Case study

In the rapidly changing world of health care management, students are looking for high quality academic programs that would help them to enhance their skill set to lead and manage increasingly complex health organizations. The students working in the field of health care management hold highly responsible positions as they have to make important decisions about the delivery of health care services. They have an obligation to provide high quality, safe and efficient care to patients and the communities they serve (Parand *et al.*, 2019). The duties of health administration students, once they join the workforce, include but are not limited to management of a hospital/senior care facility; various departments, such as emergency departments and care units and other key areas in a health care organization. These individuals are also involved with policy initiatives, new program planning and the smooth running of operations in a health care entity. A firm understanding of health practices, evidence-based methods and the changing health care environment enables health managers to redesign and build a safer health care system for patients [1].

Growth in the elderly population, scarcity of resources, technological advancements and illness trends require administrators to constantly think about innovative ways they can



deliver what is most value-added to their customers. Health care policies, reimbursement methods, treatment options and everything in between is constantly changing [2]. Thus, it is extremely important to build a high quality, organized educational program so that students can get exposed to a variety of topics/subject areas in the field of health administration. Once admitted to the health administration program, students must be exposed to different fields so they can develop the skill set required to work in a high-paced environment. More specifically, students should learn about health care delivery, business practices to run health care organizations and the political environment that impacts decision-making and planning on a regular basis. Professionals in the field of health administration should have sound knowledge of leadership skills, financial methods, privacy laws surrounding patient care processes and other important practices [1] [2].

Because of ongoing changes in the field of health care, it is important to make revisions and updates to the existing curriculum and course offerings. Curriculum development and revision are not only important from a quality improvement perspective they also allow students to learn the most current concepts in the field of health care. Furthermore, a regular review of the curriculum and teaching methods can help to ensure that courses remain applicable and current in times of rapid change [3]. This will also appeal to students as these revisions/updates will help them prepare for future employment in the field of health care administration. From a faculty standpoint, however, curricular revision means labor intensive activities, such as program review, data collection, changes to existing curricula, new sets of reports and additional meetings. Faculty members who play an important role in revising curricula may not get enough time to engage in scholarly activities and research projects. It is also important to note that university leadership may not take such duties into account when important decisions regarding tenure and promotion are made (Collins, 1997).

Health care environment is ever-changing. Cost, quality and access continue to create challenging situation for the practice of health care delivery. Recent research suggests that academic settings still emphasize isolated topics rather than interprofessional team-based approach that encourages students to build skill set needed to practice in real world health care setting. Furthermore, there is evidence suggesting top leadership in health care organizations have consistently expressed dissatisfaction with traditional health administration programs at academic settings. Leaders have expressed need for health administrators who are able to work with diverse teams and are equipped with problem-solving skills (Frenk *et al.*, 2010; Herzlinger *et al.*, 2015).

Having worked in academia and lean health care for several years, this author believes that the curriculum revision process may appear to be a daunting task to faculty members. This can be even more challenging for faculty members who are new to academia. However, the adoption of a process-oriented approach, such as lean methodology, may help simplify the entire project. The usage of lean principles also enables programs to implement a culture of continuous improvement in ongoing activities on a more regular basis. While many academic institutions have successfully implemented various administrative processes (Balzer, 2016; Krehbiel *et al.*, 2015; McKinney, 2017; Wilson, 2011), there is still a paucity of research that shows lean principles can be successfully applied to curricular revision and other academic processes in programs at institutions of higher education. This paper presents the case of a health administration program at a public university in Minnesota, United States, where lean methodology was utilized to improve and streamline curriculum and the internship placement process in an academic program.

Because there is still a scarcity of research on the application of lean principles to the processes/activities noted above, this research can have wide practical applications. Usage of lean principles may allow faculty to examine current programs, existing data collection and the reporting process and support mechanisms available at academic institutions to support

programs and students. The dissemination of findings can also help program directors, department chairs and faculty members as they plan for program review and accreditation.

Lean philosophy and principles

Lean is a customer-driven approach that emphasizes waste reduction and continuous process improvement. Organizations eliminate waste inherent in work processes by applying five lean principles as follows: defining value from the customer's perspective, identifying value streams, eliminating unnecessary activities (flow), applying pull and perfection (Womack and Jones, 2003).

Defining value from the end user's perspective is a very important critical starting point for lean thinking. Organizations that create product would like to learn about their customer and what that customer would want from the product. Emiliani (2004) indicated that the customer is someone who is using and paying for the services/products they have purchased. Evidence also suggests the customer would only like to pay for activities/products that add value to them. Thus, nonvalue-added activities should be eliminated [4].

The second principle involves mapping the value stream to achieve value as identified by the customers. Creation of a value stream map requires process owners or stakeholders to investigate their processes and identify/uncover waste in the system. Once waste has been uncovered, it is important to examine current/existing practices that do not add value to the overall process [9]. The third lean principle, flow, allows one to see how the work is progressing through a system. Efforts should be made to remove nonvalue-added activities/work identified during value stream mapping to create products that meet or exceed the customer's expectations. Furthermore, team members or individuals who have a role in the process should be given a chance to look at existing processes and identify bottlenecks or activities that create barriers to producing what customers want from the process [9]. Once team members recognize the importance of removing waste in the process, they will participate in process improvement activities more proactively [4].

The fourth lean principle, pull, highlights the importance of customer pull. More specifically, goods or products should only be produced if the customer asks for them. This will allow manufacturers to practice the pull approach, rather than pushing previously manufactured product onto customers. Process owners and manufacturers should make efforts related to what the customer actually wants from the process before creating products for them (Pinkney *et al.*, 2016). The fifth lean principle, perfection, requires key stakeholders to consider ongoing assessment activities to further improve processes. Identification and use of metrics allow individuals to focus on continuous improvement activities with suggestions so lean becomes a "cultural way of life" (Pinkney *et al.*, 2016).

Lean tools

Lean tools, also known as lean building blocks, can help to reduce waste/nonvalue-added activities to the process. Usage of these tools helps to identify waste and time spent on activities that do not add value (redundant activities), which, in turn, results in identification of methods to improve workflow, processes, enhance productivity and reduce costs. Usage of these tools helps to reduce administrative expenses, streamline processes and enhance workforce participation in day-to-day activities (Gupta *et al.*, 2014; Singh *et al.*, 2010). Table 1 briefly describes lean building blocks and how they can be used to improve current processes.

Lean wastes

According to lean methodology, there are seven types of waste. Under the lean approach, waste can be defined as all the nonvalue-added activities or steps in the process that have an

Lean tools	Explanation
Kanban	The Kanban system allows for the examination of the process and links upstream activities to downstream operations Adnan et al. (2013) . This system allows for the production and delivery of components when they are actually needed Aguilar-Escobar et al. (2015)
5S	The 5 S methodology (sort, set in order, shine, standardize, sustain) aims to add order and cleanliness to operations Kanamori et al. (2015)
Value stream mapping (VSM)	VSM is a powerful tool that aims to map the flow of information or materials from the first step until the product is delivered to the customer Dighe and Karkirde (2014)
Going to the Gemba and voice of customer	Gemba helps to achieve a deeper understanding of the needs and problems of the customer when the customer actually uses the product. Gemba can be achieved through worksite visits/inspections, observation and customer interviews. This process helps to understand the voice of customers Ronney et al. (2000)
Standardized work	Is an evidence-based, well-documented process that has minimal or no error. Helps to apply best practices and should be a living document
Error proofing/mistake proofing/Poka-Yoke	Method to identify and avoid mistakes that could add to the overall cost
Root cause analysis	Methods to evaluate an adverse event/failure and identify the need for corrective actions. Commonly used tools include the 5 whys and causal tree Williams (2001)
Just-in-time (JIT)	The JIT approach aims to improve efficiency by producing the right parts at the right time when they are actually needed by the end user (customer or next process) Adnan et al., (2013)
Takt time	Facilitates smooth operations by examining time needed for the production of services demanded by customers. It helps with planning and utilizing the entire business capacity to deliver the right thing at the right time to the customer [4]

Table 1.
Lean tools

adverse impact on quality, add to wait times and add to cost of the final product ([Ahmed-Soliman, 2017](#)). [Table 2](#) illustrates seven lean wastes that should be minimized as a result of process improvement activities ([Ahmed-Soliman, 2017](#); [Kang and Manyonge, 2014](#)).

Application of lean principles

Lean methodology has been successfully applied across a variety of industries. More specifically, organizations, such as Taco Bell, Southwest Airlines, Virginia Mason Medical Center (VMMC), Thedacare, Walmart and educational institutions have applied lean principles to improve quality, efficiency and the flow of services to customers ([Leite and Vieira, 2015](#)).

Lean principles require organizations to think about what customers want, where they want the services, potential wait times and how to solve problems in case there are problems with the products/services being delivered. For example, shopping centers open stores so that customers can easily reach out to them. Several food chains and airline companies have implemented lean principles to improve their customer processes. Furthermore, adoption of lean practices at health care organizations has led to the elimination of medical errors, reduction in wait times and significant cost savings ([Leite and Vieira, 2015](#)). Evidence suggests that the application of lean principles have allowed VMMC to save \$2m in construction costs and successfully eliminate waiting times for patients [\[5\]](#). Another health care system, Thedacare, saved an amount equal to 5% of their annual revenue and doubled the operating margin within three years of lean implementation ([Toussaint, 2009](#)).

Table 2.
Lean waste

Lean waste	Explanation
Overproduction	To produce things that are not required by customers. Leads to waste of resources Kang and Manyonge (2014)
Waiting	Waiting due to slow process or unnecessary delays because of wasteful activities Kang and Manyonge (2014)
Transportation	Moving items from one place to another, rather than delivering them to the point of use. This can be reduced by implementing a standardized approach to processes in the workplace setting Kang and Manyonge (2014)
Over-processing	Overprocessing or doing extra work to create a product. Extra work adds extra steps and nonvalue-added activities to the process Kang and Manyonge (2014)
Excess Inventory	Items or inventory that is not required by the customer. This leads to storage of unwanted items and waste of resources, such as space, time, and money Kang and Manyonge (2014)
Defects	Deviation from standard design or the customer's expectations that would lead to waste of resources. The final product does not meet the customer's expectations; so it is either not purchased or creates dissatisfaction Kang and Manyonge (2014)
Excess motion	Wasteful motion that does not add any value to the manufacturing process. Standardized processes and clear roles and responsibilities can help in avoiding excess motion Kang and Manyonge (2014)

As noted above, the application of lean principles across different industries shows promising results. [Kang and Manyonge \(2014\)](#) reported data that showed the implementation of lean methodology could improve productivity, enhance flow, reduce mistakes and decrease waiting times for customers. Evidence also suggests that all the processes can be improved, and approximately 80% of the steps in any given process are unnecessary. Careful examination of the process and defining what the customer needs from the process efforts can be made to identify and eliminate wasteful activities. The higher education system is full of processes. Lean methodology can be applied in higher education settings to improve current practices, create flow, reduce variation and reduce unnecessary delays ([Ziskovsky and Ziskovsky, 2007](#)). [Table 3](#) highlights cases of successful lean implementation in administrative processes at academic institutions.

Description of health administration program

In 1995, the original Health Services Administration (HSAD) program was developed to meet the need for health administration education in Minnesota and North Dakota, United States. The program serves a variety of students, including traditional students seeking a four-year undergraduate degree, students who plan to take the Nursing Home Administrator (NHA) examination in Minnesota and North Dakota and practice and students interested in gaining knowledge of a broad field of health services administration [7]. The program offers a curriculum focused on health care issues, including specialized health management courses. Elective courses allow the students to specialize in a variety of health care delivery fields, such as acute care management, long-term care, public health management and community health initiatives. In order to graduate from the program, students are required to complete a practicum/internship in a health care facility. While students specializing in the field of long-term care administration have to complete 1,000h of internship in a skilled nursing facility, other students only need 240h of practical experience at a health care organization.

The HSAD program received the initial BENHA, MN accreditation in 2005 for a period of 10 years. In these 10 years, faculty turnover and lack of leadership created a huge void in the program. These problems also contributed to a decline in the number of students in the program. In 2015, a new faculty member was hired to serve as a full-time faculty and coordinator/director of the program. Upon hire, one of the first tasks the program director undertook was the extensive review of curriculum, instruction and assessment activities

Academic institutions	Area of implementation	Results/outcomes
Miami University	Major area (80% of lean projects) – finance and business services other areas (20% of lean projects) – Academic affairs, information technology, university advancement, enrollment management, intercollegiate athletics (Source - Krehbiel et al., 2015)	Number of employees trained – 1,400 Number of Lean projects – 284 Financial gains - \$20 million (Source - Krehbiel et al., 2015) Savings in a year – £120k Increase in revenues – £2.5m [6]
University of Starthclyde	Business processes [6]	Savings of £30,000 and around 13,000 sheets of paper (Working smarter, 2015) Reduced waiting time for students [6]
University of the West of Scotland	Electronic method for managing the health and safety of contractors at the university [6]	
Edinburgh Napier University	Redesigned matriculation system [6]	
The University of central Oklahoma	Physical plant work order process (University of Central Oklahoma, 2009)	Reduction in process steps, staff satisfaction (University of Central Oklahoma, 2009)
	Other projects – administrative and business processes	Improved financial and operational efficiency Cost savings - \$400,000 per year 70% reduction in work orders at the physical plant Physical plant process is 99% paperless, leading to a savings of \$15,000/year (Wilson, 2011)
The University of Iowa	Human Resources, University processes (shared services), Information technology (IT) (McKinney, 2017)	Streamlined search process for staff. This process resulted in (1) Time savings – 92,832 employee hours (2) Cost savings - \$2,902,000 redirected University Shared services (3) 38% decrease in processing time (4) 98% error reduction (5) Cost savings - \$407,452/year IT services saved \$644,570 annually (McKinney, 2017)

Table 3. Lean approach in the administrative processes at academic settings

within the program. Because of an extensive background in lean methodology, the program director utilized lean principles to streamline and update these processes in the program.

Methodology – how lean principles were integrated

Defining value from a customer’s perspective is the starting point in the lean journey. [Emiliani \(2004\)](#) indicated that the customer is someone who uses and pays for the services/products he/she has purchased. It is important to collect the customer’s feedback and pay attention to the voice of the customer as it can help to enhance products or services provided by the organization. At academic institutions, students and employers can be considered customers. While students are considered direct customers, it is also important to understand

value from the employer's perspective as they hire students/graduates from these educational programs. Furthermore, many employers also provide tuition assistance (Emiliani, 2004) or have other employee assistance programs in place to offset the cost of tuition. This author feels that accreditation bodies and their requirements are also taken into consideration when any program level changes are made. Accreditation brings a gold seal of approval to any academic program, and evidence suggests that students give preference to accredited programs when they select programs to further their education [1].

In an effort to answer the question, "What do our customers want from a health administration program at the university," faculty adopted a three-fold approach. After consulting with college and school leadership, faculty established an employer advisory board and student and alumni council. Furthermore, the program director also met with representatives from the accreditation body to understand the new accreditation requirements. Figure 1 highlights customers of the program.

Formation of an employer advisory board

Faculty members in the health administration program reached out to major health care employers in Minnesota and North Dakota and invited them to serve on the community advisory board. Approximately 15 representatives from a variety of health care organizations agreed to serve on this board. Board meetings were organized regularly to obtain feedback on program curriculum and coursedelivery methods. This committee examined the curriculum and helped to make much needed changes to the program. The need to include additional classes and/or content in areas related to process improvement, quality improvement, interprofessional education, leadership and research methods was highlighted. In addition, members of the advisory board highlighted the need to include activities/assignments in classes so that students can improve their verbal and written communication skills. The importance of teamwork and collaboration in health care was also highlighted.

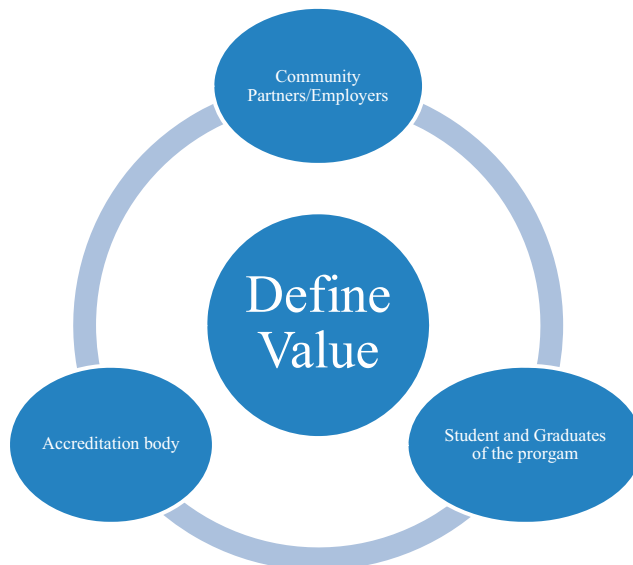


Figure 1.
Value - customers

Meeting with the accreditation body

The program director arranged several meetings with members of the accreditation body to ensure that the requirements are correctly understood. The Board of Examiners of Nursing Home Administrators (BENHA) requires accredited programs to maintain a high standard in education and experiential preparation of administrators who wish to serve in a senior-care setting. The curriculum of the accredited program should provide adequate coverage of organizational management, managerial accounting, gerontology, health care and medical needs, long-term care support and services, human resources, regulatory management and quality measurement and performance improvement. Furthermore, accredited programs needed to include 1,000h of practicum/internship experience within the academic program structure. It is important to note that these requirements, both coursework and internship, were significantly different from the time the program received initial approval from BENHA. These meetings helped the program director understand the concept of “value” from the accreditation body’s standpoint.

Formation of a student and alumni advisory council

In order to collect students’ feedback on current curriculum, a team consisting of current students and graduates of the programs was constituted. This team met on a regular basis (twice a year) and provided feedback on curriculum in the program. More specifically, this committee provided feedback on content, course delivery methods and skills/knowledge that were considered essential to function in a health care environment. The need for more online classes was indicated to accommodate the need for working professionals who may not have the time to come to a college campus to attend classes. In addition, the students indicated that the internship placement process needs to be streamlined as the current process is unclear and leads to confusion among students.

Once the value had been identified, second and third step typically requires a thorough examination of the existing process to find waste in the current system. Examination of the process helps people see the flow of the process from beginning to end and better understand areas where waste may exist (Kim *et al.*, 2006). After collecting feedback from employers, students, alumni and the accreditation body, the program director summarized all the information and made a presentation to the school and college leadership. Faculty members who had a major role in the program were also invited to the presentation. This presentation allowed the leadership and faculty members to see that a gap existed in the current curriculum and that efforts should be made to further improve the program by making necessary changes. It is noteworthy that both the faculty members and leadership felt that changes to the program would not only help to secure accreditation but also help with improving curriculum and course delivery methods.

Formation of a faculty committee

A program council comprising faculty members in the undergraduate health administration program, graduate health administration program and adjunct faculty members was constituted. It is important to note that faculty members in the health administration programs had prior experience working in health care leadership roles at a variety of health care settings. The team met to reevaluate the entire curriculum based on feedback received from the accreditation body, employee advisory board, student and alumni advisory board.

A document called a current program map was created by the faculty members and advisors to make the structure of the current program visible to all the team members. Another document that described content of all the courses in the program was created to make sure that the faculty team was able to look at courses during committee meetings. Efforts were made to include course sequencing, as well, so that team members were able to

see classes the students took from the beginning to the end in the program. These documents served as a powerful tool that allowed team members to see the actual value stream and recognize waste in the current process.

The team also identified coursework/classes that have become irrelevant or obsolete due to the ever-changing nature of the field. Furthermore, the team also identified nonvalue-added activities in the internship placement process that led to dissatisfaction from students and preceptors. Lack of a process-centered approach resulted in unclear expectations, unnecessary motion and other wasteful activities in the process. [Figure 2](#) highlights the Fishbone analysis completed by the faculty.

[Table 4](#) below highlights issues/problems/waste in the program (as identified by faculty members).

The team then brainstormed ideas for improvement and proposed changes to the curriculum to eliminate waste from the existing program. By including feedback provided by the advisory boards and accreditation bodies, a complete new set of classes were proposed. Once changes were identified, efforts were made to prepare the future state curriculum for the program. The entire program curriculum was revised to meet the new accreditation requirements. The revised program provided adequate coverage for all the core areas required by BENHA. In addition, the revised program also provided in-depth coverage of US health care, population/community health, organizational development, issues related to cultural competency in health care, operation assessment and improvement, health informatics, health care law, policy, economics, postacute care, health care finance, marketing and ethics in business clinical decision-making. These changes were made to include the most recent and updated curriculum in the field of health administration. [Table 5](#) presents changes that were made to include customers' feedback.

Using the pull system for online classes

In accordance with undergraduate education standards, students are required to complete 120 credit hours at institutions of higher education. Liberal arts and sciences are an integral component of education and must be completed in order to graduate from baccalaureate degree programs. Out of the 120 credit hours students have to complete, 42 credit hours are required in areas related to communication, natural science, mathematics, social sciences and humanities [8]. While evaluating the program curriculum, the faculty committee selected several online options that students could take in case they did not want to attend on-campus classes. Furthermore, the committee started to examine technology tools to begin exploring online and/or hybrid course offerings for online health administration classes. Efforts were made to ensure that the advisors were aware of the online options as they helped students select course options during the registration process. The new process was implemented based on the concept of the pull system in lean. This new system allowed faculty to select classes based on actual demand by students who want to register for online classes. Rather than working with a list of predetermined classes, faculty members were able to implement the just-in-time (JIT) approach for students. This helped to produce a list of classes based on actual demand, rather than working with anticipated demand. [Figure 3](#) highlights the Pull-based System for Online Classes.

Pull system for internship placement

New internship approach

The Health Services Administration program offers students several internship options. The program also works with several health care organizations so that students can complete their internship at these sites. Students who wish to work in health care settings other than

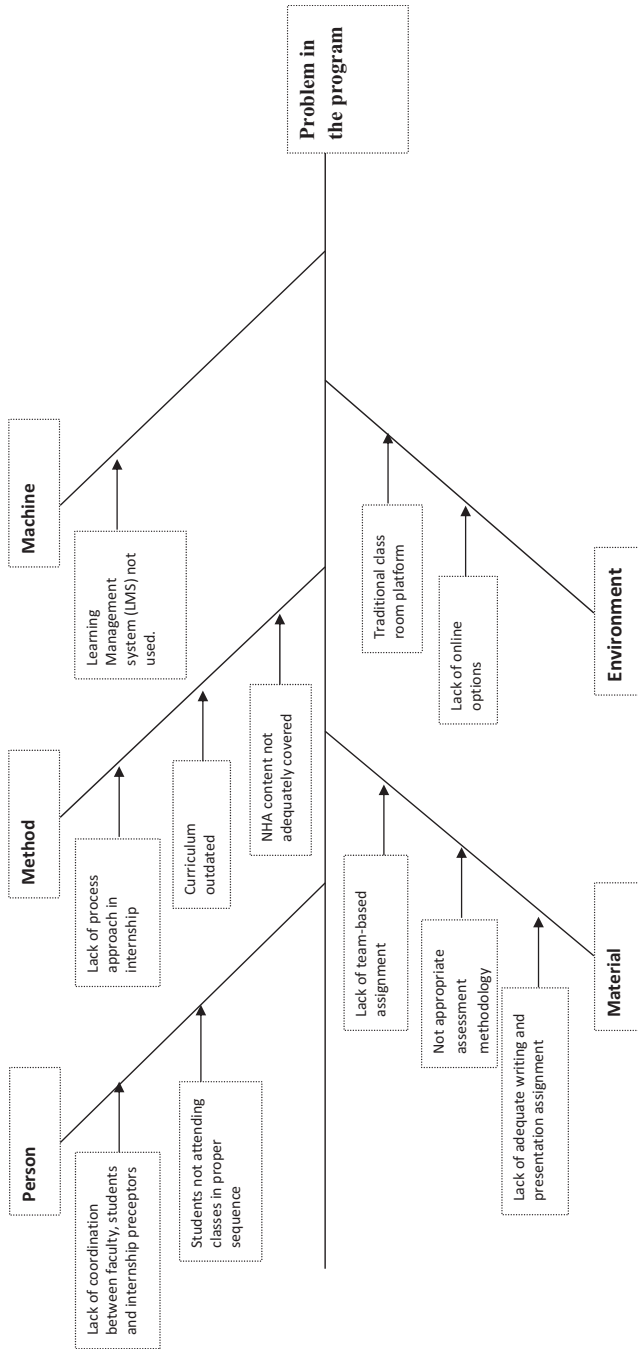


Figure 2. Fishbone analysis

Items	Explanation
Lack of standardization	Lack of a standardized approach in internship placement Information about internship placement was not communicated in a standardized method No internship orientation process for preceptors
Lack of feedback/voice of customer	Lack of a standardized format for collecting feedback from students and preceptors
Wait	Students had to wait to hear from faculty members regarding the process of internship placement
Motion	Students were making unnecessary trips to the university to meet with faculty. Lack of clarity in internship placement led to confusion among both students and preceptors
Transportation	Multiple emails with attachments between the faculty member and students to explain the internship placement process Multiple emails with attachments between faculty member and preceptor to explain the internship placement process
Defects	Classes that were shared among the different programs did not include content related to health care Faculty members teaching outdated material Lack of attention to accreditation requirements Lack of team-based assignments
Overproduction	Providing information about the different types of internships (without asking) Making a list of internship sites before talking to the students Printing internship documents before meeting with the students
Overprocessing	A review of the existing courses revealed that there was repetition of content in several classes

Table 4.
Waste in the health
administration
program

skilled nursing facilities needed to complete 240 internship hours. On the other hand, students interested in earning their license to practice as the administrator of a skilled nursing facility need to complete 1,000 internship hours. It is also important to note that these students have to complete specific requirements outlined by the NHA licensure board, in addition to undergraduate program requirements by the university. Initially, the internship coordinator met with students during advising sessions and provided them with information about the different types of program internships. Students received “too much” information in a limited timeframe. Because of the different requirements, this information session often led to confusion and dissatisfaction among the students. Lack of communication between faculty and the internship preceptor often led to multiple phone calls, prolonged wait times and excess motion. The faculty team adopted a pull-based approach to streamline the internship placement process. Rather than provide internship information to students during advising sessions, usage of the pull-based system allowed faculty members to achieve a higher level of work flow efficiency in the internship placement process. [Figure 4](#) highlights the pull-based system for the internship placement process.

Preinternship class and new internship website

[Emiliani \(2016\)](#) indicated that faculty creates class modules based on the concept that they possess the “best solution” to the problem presented to them by students and prepare the teaching modules using the material they think students should learn. Usage of the pull system allows instructors to build a class platform based on students’ needs. Creation of a supermarket in learning management helps instructors implement the pull-based system ([Emiliani, 2016](#)).

EAB feedback	Changes
Content on quality improvement and performance improvement	A new class was added because the program lacked adequate coverage of the topic/content
Content on interprofessional education	Modules on interprofessional education and leadership were included in the existing courses
Content on leadership and research methods	Additional content on leadership in health care facilities, including long-term care facilities, was included in the existing courses
	New class on evidence-based practices and research methods was added as the program lacked adequate coverage of the topic/content
Communication	Faculty reexamined current assignments and included opportunities so that the students could develop effective communication skills
Accreditation requirements	Changes
Content on organizational management, managerial accounting, gerontology, health care and medical needs, long-term care support and services and human resources	Content was updated to meet new requirements by the accreditation body
Regulatory management	A new class was added to provide adequate coverage for this area
Quality measurement and performance improvement	A new class on quality improvement was added as the program lacked adequate coverage of the topic/content
Internship	Information regarding new internship requirements was communicated to the students
Student and alumni advisory board	Changes
Content on health care reimbursement methods and finance	Content was updated to reflect the most current changes in the field
Online class options	Flexible options (online/hybrid) were incorporated into the new curriculum. This allowed the students to attend classes from a distance
Internship	A new internship placement process was created
	A new website was created that provided complete information about the internship class
	Students were required to complete the internship preparation class prior to their internship placement

Table 5. Changes made based on customer's feedback

Instructors utilized the concept of pull and supermarket while creating the preinternship class. Content related to the different types of internships, expectations from students, the role of instructors during the internship and process background checks that should be completed prior to beginning the internship experience were included in the learning management system. The students were required to review the material and pull information from this supermarket based on their needs. For example, if a student is interested in completing an internship at a skilled nursing facility for a nursing home administration license, she/he can pull information related to the internship from this supermarket. Students were given five weeks to examine the course material and identify questions they wanted to ask the instructor. On-campus and online meetings with students were held after five weeks to answer questions they had about their internship at a health care facility. In addition, the

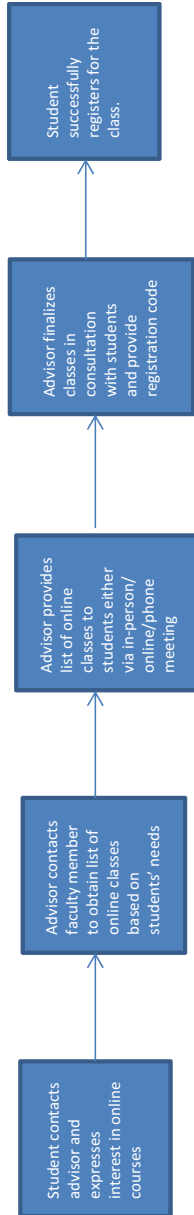


Figure 3.
Pull-based system



Figure 4. Pull-based internship process

internship website was created, and incoming/new students were directed to the website in case they had questions about internship requirements. Figure 5 highlights the pull-based system for the preinternship class.

The fifth and final step in lean implementation requires consistent effort to pursue perfection so that lean thinking becomes part of the everyday culture. In order to sustain the changes that were made, a number of measurement strategies were implemented. A variety of assessment activities, such as a student program survey, exit survey, alumni survey, employer advisory board survey and faculty survey were included to continuously monitor the changes that were made. This allowed faculty members to pay attention to the voice of the customers and adopt a culture of continuous improvement.

Discussion

This study's goal was to describe how lean principles were utilized to revise the curriculum and internship placement process of the health administration program at an academic institution. A rapidly changing health care environment requires instructors to continuously evaluate and update their curriculum so students can learn the most current concepts and skills required to function in today's environment [1] [2]. Evidence suggests that lean methodology has been successfully applied across processes at a variety of institutions (Balzer, 2016). Pusca and Northwood (2016) successfully implemented the lean methodology to improve course design, instruction methods and assessment methodology in engineering education. The application of lean principles to courses in business schools has resulted in improved quality and customer satisfaction (Emiliani, 2004). However, there is a scarcity of research that shows lean principles can be successfully utilized to enhance curriculum and standardize the internship placement process for the health administration program. This case study shows how lean principles can be integrated to streamline the health administration curriculum, including the internship placement process. The main goal of education is to produce satisfied customers. In the case of an accredited program, these customers include students, current employers and future employers. Usage of lean methodology may lead to better processes and a value-added experience for students and other customers.

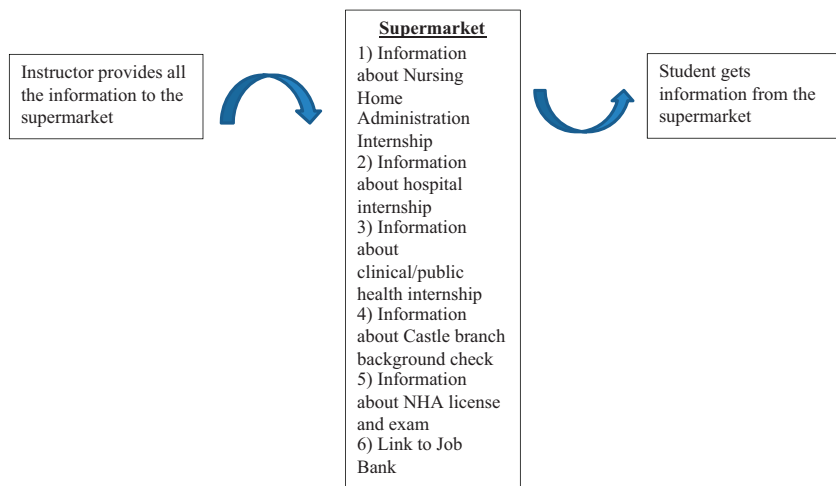


Figure 5.
Pull-based
supermarket system –
pre-internship class

Recommendations for future work

The purpose of this paper was twofold. The first part of the paper examined recent literature in the field of lean management. The second part presented a case where lean principles are applied to curriculum revision and the internship placement process in a health administration program. Efforts should be made to apply lean principles in core academic processes, such as course planning, delivery of classes, earning academic accreditation and similar activities to reduce waste and avoid problems that lead to dissatisfaction among customers. As online education continue to grow, application of lean principles may result in streamlined processes and better system for students who may not be able to come to university campus for classes. Furthermore, this may also help in enhancing retention of students at academic settings. It is also important to examine issues surrounding lean implementation and training needs that faculty may have before they start applying this methodology in day-to-day processes at academic institutions. More data-driven (qualitative and quantitative) research projects should be conducted to add to the existing body of work in the field of education.

Conclusion

Beginning with an in-depth literature review on lean principles and the use of lean methodology in an academic setting, this paper presented the case of a health administration program where lean principles were implemented. The successful application of lean principles led to the identification of wasteful activities and elements in the curriculum and the internship placement process. A new streamlined approach based on the pull system has been presented. By continuously focusing on the reduction of nonvalue-added steps, lean can create a win-win situation for students, instructors, employers and administrators at institutions of higher education. Furthermore, the lean philosophy, when correctly applied to core academic processes, may lead to the reduction or elimination of issues that lead to dissatisfaction among customers. As academic institutions work toward expanding online course offerings, application of lean methodology may help in creating better systems for students. The information and tools included in this paper will allow instructors and academic administrators to see how lean principles can be applied to improve the quality of curriculum and standardize existing processes.

Notes

1. <https://www.healthcareadministrationdegrees.org/degrees/bachelors/>.
2. <https://healthcaremba.gwu.edu/blog/how-we-can-expect-the-healthcare-industry-to-change-in-the-future/>.
3. <https://www.jisc.ac.uk/guides/how-can-i-keep-the-curriculum-relevant-in-a-time-of-rapid-change>.
4. <https://online.kettering.edu/news/2016/07/19/using-takt-time-and-cycle-time-your-advantage>.
5. <http://www.ihl.org/resources/Pages/ImprovementStories/VirginiaMasonMedicalCenterImplementsLeanManagementPrinciplesToDriveOutWaste.aspx>.
6. <https://www.universities-scotland.ac.uk/wp-content/uploads/2016/02/Working-Smarter-2015-final-no-spreads.pdf>.
7. <https://www.mnstate.edu/health-services/>.
8. <https://www.ohe.state.mn.us/pdf/baccalaureate.pdf>.
9. <https://www.asme.org/topics-resources/content/5-lean-principles-every-should-know>.

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