Specification of a Debureaucratization Model in Teaching: Case Study

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Abstract

Nowadays data is crucial for any organization and its success depends on how it is managed. The management´s information process of the education system in general, and of an education institution, in particular, is a complex and bureaucratic process, where occurs information´s fragmentation. In order to counter this reality, people should be encouraged to simplify procedures by adopting a culture of continuous improvement. On the other hand, it is suggested an appropriate infrastructure that enables not only data integration but potentiates its transformation into knowledge. The data simplification and computerization will remove the bureaucracy associated with the management of processes, streamlining and translating them into the creation of value in the education sector. It should be noted, however, the importance of ensuring that the proposed solution is based on the needs and characteristics of each education institution, and the education system, in general. There is also the need for the involvement of all participants, as well as the recognition of their perceptions because these are influential factors in the successful implementation of the change process.

Keywords: Value Creation in Education, Lean Philosophy, Re-engineering Process, Integrated Information System, Waste Reduction.

1. Introduction

The process of information management in an education institution is a bureaucratic and complex process. If we extend this reality to the entire education system, that is, to all education institutions, complexity increases exponentially, which translates into the unprecedented need to resort to the concept and application of logistics management. Given the size of the organization that such gear represents, logistics management should be used as the instrument that guarantees the correct and timely flows, essentially of information, among all actors of the education system. In Portugal, there are some governmental initiatives with the aim of introducing administrative modernization in the Public Administration, in particular in the education sector. However, it was verified that these are still not enough, and there are some shortcomings in the management of education establishments and their communication with the Ministry of Education, thus raising the need for the establishment of an integrated information system. It is becoming increasingly clear that information technologies should be seen as a strategic component in the management of an organization, regardless of its specificities. This way of thinking and acting should not be neglected in the field of education, since education institutions are no more than organizations, with very own characteristics. Any of the areas of activity of an education institution is full of processes that are directly or indirectly related to the creation of value in education. In this sense, these should be the target of continuous improvement. In this way, the application of the Lean Philosophy in the education sector aims to detect and eliminate wastes in the various processes that integrate the network of institutions of the Education System, in order to improve them, guaranteeing a better service. This transformation in the education sector requires the definition and implementation of a strategy of

change, starting from a joint will and effort between the Ministry of Education and the globality of all the existing education institutions of the country.

2. Lean Philosophy in Education

The Lean Philosophy has the ability to reduce costs and drastically improve quality and its limits are not yet known (Womack, Jones and Roos, 1990). It is a reengineering tool used to implement change and aims to change work processes through the continuous reduction of waste (Sanders, 2012; Fliedner, 2012; Pinto, 2006). According to the Lean Philosophy, it is not possible to apply and maintain a flow of value in an organization, if an excess of people, space, time and tools are identified (Womack and Jones, 1994). The focus of the Lean Philosophy is improving processes, i.e. improving performance, doing more with less, using the least resources (Russel and Taylor, 2011). If used correctly, it provides two ways to increase value: reducing waste, therefore reducing the cost of a product or service, and increasing the number of activities that add value without increasing the cost of the service or product. This can be achieved by simplifying processes and having the ability to create more value with less resources (Radnor, 2011; Greasley, 2009). The Lean Philosophy cannot only be applied in industry, nor can it be seen only as a way to reduce costs. It should be seen as a strategic improvement, universal application and when adapted to the specific needs of an organization leads to greater performance, increased effectiveness, reduced costs, increased employee satisfaction and increased customer satisfaction and quality (Ziskovsky and Ziskovsky, 2007). It can be very useful for service sector organizations if it is used as an approach to continuous improvement and innovation in work processes (Suárez-Barraza, Smith and Dahlgaard-Park, 2012). Lean principles can be successfully adopted in public sector organizations, and there are a number of case studies that have yielded significant results (Radnor and Walley, 2008), e.g in the legal sector of Portugal and Wales (Hines, Martins and Beale, 2008). However, the implementation of the Lean Philosophy in the public sector still faces some challenges (Radnor and Boaden, 2008):

• How can you persuade people to adopt lean principles when they can lead to the extinction or relocation of their position?

• Which processes can be targeted by lean principles?

• How to ensure that the Lean Philosophy is more than a toolkit? Is it the only way to work in public services?

There is a lot of potential for lean application in education institutions to improve customer value and eliminate waste (Hines and Lethbridge, 2008). However, they should be more focused on the operations side or the administrative side rather than on the teaching or research side. The success of its implementation is only possible if the initiative originates from the top, since any approach other than top-down, can lead to failure (Comm and Mathaisel, 2005).

In order to develop an integrated and comprehensive improvement strategy that helps education institutions improve their performance, four key elements should be considered (Stecher and Kirby, 2004):

• Define a self-assessment system as one of the institutional objectives;

• View the school system as an integrated process;

• Develop and apply a knowledge base on effective practices in different contexts/situations;

• Involve all participants in the process, in particular, the teachers, so that they feel as integral parts and contribute to the improvement.

The purpose of the Lean Philosophy is the elimination of waste and it can be found in the form of inventory, defects, overproduction, handling, waiting, transportation and processing. In order to eliminate waste and make education institutions more efficient and effective, it is recommended to apply (Maguad, 2007):

• 5S Philosophy (in this case, the places that could benefit more would be the storage areas);

• "Mistake Proofing" (processes must be implemented in order to determine when and where errors may occur and possible causes and ways to prevent them from happening);

• Value Stream Mapping (the objective is to demonstrate how activities, materials and information are interlinked, in order to determine where the value of the customer is created and what steps do not add value to the process and which contribute as waste);

• Quick Exchange concept (equip rooms with all necessary material, so that teachers do not have to bring their own equipment for each class);

• Self-inspection (each employee must be instructed to be responsible for his/her own work, in order to identify and correct mistakes at an early stage of the process);

• Total Preventive Maintenance (i.e. ensuring equipment and machinery are operational and available when needed);

• Kaizen (continuous improvement, using the PDCA approach to problem solving);

• Teamwork.

Lean principles can be applied, in some way, to almost all kinds of tasks, including those involving intellectual work, that is, they are performed by people who have the knowledge of the "know-how" in their head. For this, the following principles must be followed (Staats and Upton, 2011):

• Constant elimination of waste;

• Specify any and all types of knowledge considered fundamental, that is, they should be put on paper;

• Specify how employees should communicate;

• Use the scientific method to solve problems quickly;

• Recognize that a lean system is an ongoing process;

• There must be leaders leading the implementation of lean processes.

Concerning the application of the continuous improvement concept in education, it is possible to collect suggestions from other sectors of activity, in order to develop strategies to improve the performance and effectiveness of education institutions. In this sense, Stecher and Kirby (2004) present five case studies in the USA: two in the industrial sector, applying models for organizational improvement (the national quality award program - Malcolm Baldrige - and Toyota Production System - TPS) and the remaining three in the services sector, including the health sector and the legal sector, which could serve as a basis for the development of some performance benchmarks.

Another project on the application of the Lean Philosophy in a university administrative processes resulted in an improved new process over a period of eight weeks, allowing the elimination of much of the existing waste and meeting established goals. Initially, it consisted in learning the principles, tools and practices of Lean Philosophy by the students, and later, in a common effort among students, teachers and administrators, it was possible to apply those in the university processes as a form of innovative and engaging learning (Doman, 2011).

Also presented are four case studies in schools, regarding the application of the Lean Philosophy in education, in particular in improving student learning. These projects were developed by Lean Education Enterprises, according to the philosophy of Lean Education (Le2™), i.e. the Lean concept adapted to education (Ziskovsky and Ziskovsky, 2007):

• Case Study 1: Detection of the factors that influence the learning time and elaboration of a management plan of the same. The results obtained were: recovery of an average of 120 hours of work of each teacher; higher levels of cooperation between teachers and an improvement in student learning;

• Case Study 2: determination of the best approach to improve math scores in a public school of the first cycle, which included the design and creation of an assessment tool to measure student performance. The project contributed to significant student performance (mean test group - improvement of 116%, highest individual improvement - 343%);

• Case Study 3: determining the best way to improve student performance, in particular, the results of diagnostic tests, so that teachers can review and improve teaching methods to prepare students for the national examinations;

• Case Study 4: development of an education system for the continuous improvement of student learning. The project resulted in the development of a recognized national education system, which allowed for a 65% increase in the number of students passing the national language examination.

Other examples show the impact of the application of lean principles in several schools in the USA. The projects cover a wide range of areas ranging from improving grades and student performance, collaborative professional development, workspace organization, and more (Lean Education Enterprises, 2012).

Another aspect of lean thinking application has been in software development. Its application allows the identification of wastes in the process, helping to continuously improve and adjust the development process in order to improve its performance (Petersen and Wohlin, 2010). It also improves customer responsiveness, creating value for customers (Petersen and Wohlin, 2011).

For the lean approach to be successful, the change must be made in a continuous and incremental way, so that is possible to evaluate the performance of the software development process (Petersen and Wohlin, 2010). The following recommendations should be followed in software development: eliminating waste, building quality, creating knowledge, postponing commitment, speeding delivery, respecting people and optimizing "the whole" (Poppendieck and Poppendieck, 2006). The implementation of continuous improvement only makes sense in a broader and longer-term process of planning and quality control of the organization's performance and should be planned, controlled and monitored (Sanders, 2012). In order to implement a quality management system, it is necessary to define correctly the activities, procedures and tasks of each process and to carry out it is technological updating, in order to improve and simplify the organization (Capricho and Lopes, 2007).

A quality system can be applied to any type of organization (production, services, governmental, non-profit) and promotes product and service improvement, customer and supplier satisfaction, financial results, cost reduction (Walton, 1986, in Powell, 1995), reduction of repetitive tasks, increased employee involvement, teamwork, redefinition of processes, competitive benchmarking, constant measurement of results, closer relationships with suppliers, among others (Ross, 1993 in Powell, 1995). In order for the implementation of the quality system process in a higher education institution to be successful, the following is suggested (O'Mahony and Garavan, 2012):

• The focus should be on the process and not just on the results;

• A policy of continuous improvement should be created;

• The quality policy to be implemented must be clear;

• The needs of customers should be understood;

• There must be a full commitment from management and stakeholders;

• Be prepared to take a long-term perspective;

• The role of external consultants is very important.

Any higher education, private sector or public sector organization can develop a methodology for continuous improvement, either in a context of Total Quality Management or as an independent strategy. It must, however, be adapted according to the particular characteristics of each one (Tarí, 2008), and it is necessary to counteract the possibility of dealing with a culture resistant to change (Powell, 1995).

3. Conceptual Model

The main objective of the model is to simplify or reduce bureaucracy in the management and communication process between the Ministry of Education and their all individual education institutions (mainly schools and local and regional administrative bodies), as well as among all the Education System stakeholders, in order to contribute to the creation of value in education. In particular, it aims to:

• Standardize the processes for collecting and processing data;

• Improve the integrity and quality of data;

• Allow real-time access to data, ensuring security and privacy;

• Promote new communication channels and/or improve existing ones;

• Optimize available resources;

• Encourage simplification and improvement of processes and practices, reducing execution time and promoting waste reduction/elimination;

• Create a culture based on a philosophy of continuous improvement;

• Provide support in decision-making, both at the education institution level and at the Ministry of Education level;

• Simplify and improve the provision of services to the various actors in the Education System: Ministry of Education, Education Institutions, teachers, non-teaching staff, students, parents, municipalities, suppliers, among others;

• Meet the needs of the current Education System, but also to satisfy those arising from possible future changes in it (size, structure and functioning);

• Adopt an integrated vision of the whole Education System;

• Contribute to the creation of value in education;

• Guarantee ways of evaluating the solutions to be implemented, in order to monitor the increase in value.

As mentioned, the main objective of the proposed model is the creation of value in education. In this sense, there are two fundamental concepts that present themselves as the foundation of the model itself and that should be an integral part of any approach to it: Lean Philosophy and an integrated vision. As unifying and supporting characteristics of the whole process, simplification of processes and information technologies should be considered. Since the objective is the creation of value in education, a plan of action must be defined that includes the identification of existing activities in the Education System, which add value or do not add value, are nevertheless necessary. On the other hand, it should also allow eliminating activities that do not contribute to value creation. In this sense, starting with Porter's Value Chain Model (Porter, 1985), we intend to make an analogy, identifying the Education Value Chain (Figure 1).
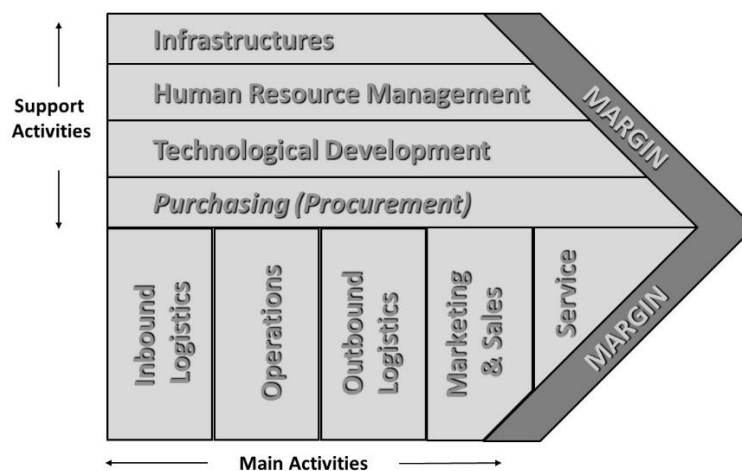

Figure 1 – Education Value Chain (adapted from Porter, 1985).

As in the author's model, the value chain includes a set of primary and supportive activities, which contribute to the construction of value, but in this case, in education. The following paragraphs describe each of these activities. For the creation of value in education can be considered as primary activities: Inbound Logistics, Operations, Outbound Logistics, Marketing & Sales, and, finally, Service.

Inbound Logistics includes all the services needed to produce another service: value creation in education. In this case, it may include the student's enrolment in the various stages of the Education System, the process of recruiting teachers and other activities that may add value. Since value creation in education means above all the creation of value for the student, these activities should be seen as services that must add value to the education process of the student. Students will only benefit if the recruiting process of their schools effectively selects the best teachers. In the case of student admission, this can be seen as the set of services provided that ensure that teaching is effectively thought of in the student's education and learning, and that the student does not suffer some type of formatting in order to meet or exceed the criteria of any defined system.

In a more simplistic approach, which considers the creation of value for the organization (Ministry of Education and/or Education Institution), entry logistics may concern the enrolment process and the recruitment

process of teachers, but merely the point of management. In this case, it coincides with what is described as being a support activity (human resources management).

Operations include the students learning process, the teaching process, teacher competencies and training, structuring / reviewing curriculum programs and other activities that can add value in education.

Outbound logistics presupposes all activities related to the evaluation of students and teachers and other assessments that contribute to the increase of value in education. It should be considered according to the various stages of a student's school journey. The way a student's assessment is made influences their transition to the next level of their learning. In the transition from one school stage to another, the exit logistics from the previous stage can be seen as the input for the entry logistics for the next stage.

Marketing & Sales refers to the promotion activities of education institutions, surrounding their relationship with the community in general. The purpose is to gain a competitive advantage over other education institutions as a way to catch more students.

Finally, the service refers to the student's follow-up activities, both in their pursuit of studies, integration in the job market, and other activities that can add value to the service offered.

Support or secondary activities should be considered in both administrative and teaching facets: infrastructure, human resources, technological development and purchasing. Infrastructure refers to the management of the entire Education System, including the legislative, financial, accounting, and other components. Human resources refer to all activities of recruitment, selection and management of persons working in the Education System. Technological development includes all activities of innovation, development, re-engineering and process automation, whose purpose is to support all primary activities. The demand encompasses the activities of acquisition of material, services, equipment, relation with suppliers, partners, among others.

3.1. Integrated Vision – Single Portal

The management of the physical and information flows throughout the Education System is only possible if instead of considering a management paradigm where the education institution is the main centre of attention, it considers a management paradigm where the main focus is the network of all education institutions, interconnected with each other and with the Ministry of Education, where full integration prevails. In this sense, as support for the fundamental characteristics of the model (Lean Philosophy and integrated vision) and also as support for the management of processes, it is suggested the development and implementation of an integrated Information System, allowing access in time data from any computer/device with an internet connection. The solution refers to the importance of having a single portal that serves as an interface between the Ministry of Education, education institutions (including higher education) and other related stakeholders (Figure 2).
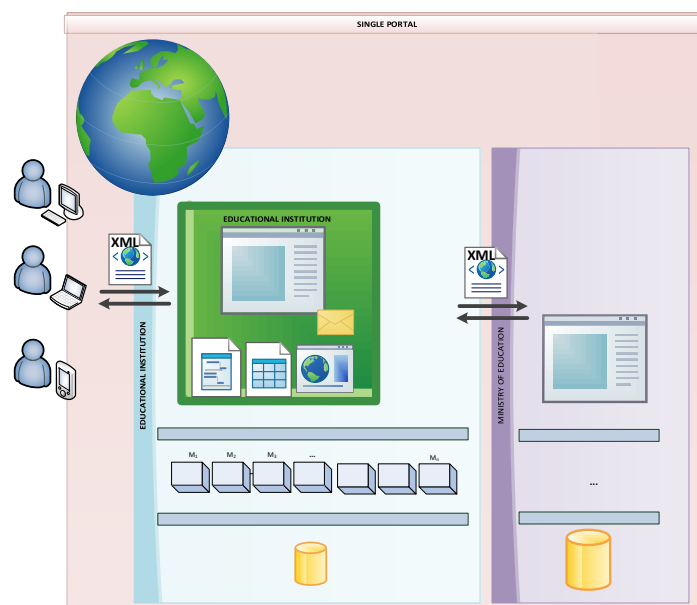

Figure 2 – Conceptual architecture for the Education Single Portal.

The objective is to ensure the feasibility of implementing all the necessary functionalities in communication between the Ministry of Education and education institutions, including the interface between them and the other Education System stakeholders: students, parents, teachers, non-teachers, municipalities, suppliers, as well as other entities, for example in the case of protocols with companies (Figure 3).
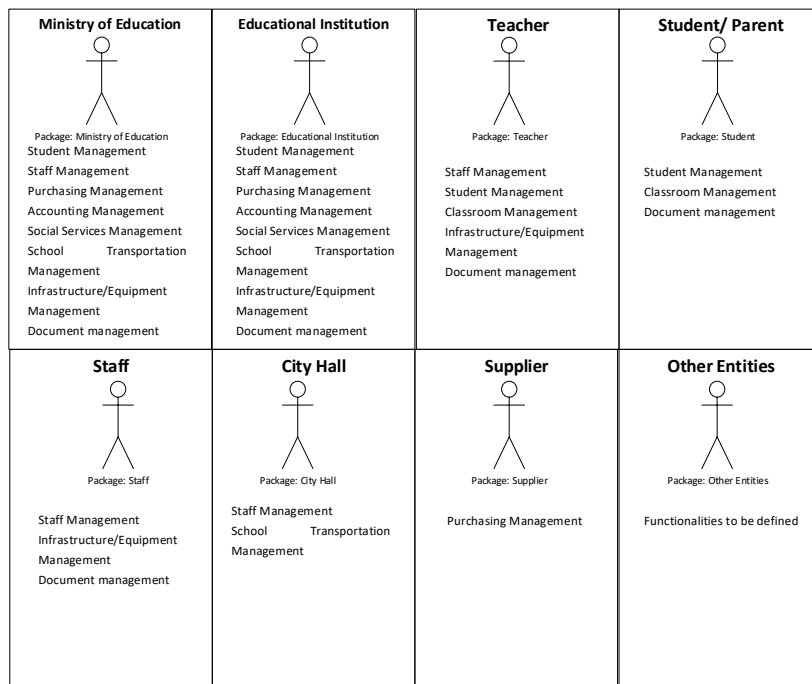

Figure 3 – Education Single Portal Users.

From the point of view of the teaching/learning process, the teacher has a more detailed notion of the learning of his students, based on the knowledge extracted from the data patterns, which allows adjustments in the teaching process. The goal is to help the teacher identify and understand the difficulties of their students and predict their performance. In a collaborative environment, it is still possible to keep track of interactions among students and between them and the teacher, in order to analyse student participation. From the point of view of the management of the entire Education System, it is possible not only to make statistical analyses of data, as well as to extract knowledge of them, e.g. in order to identify possible causes for the success or failure of the students (Figure 4).
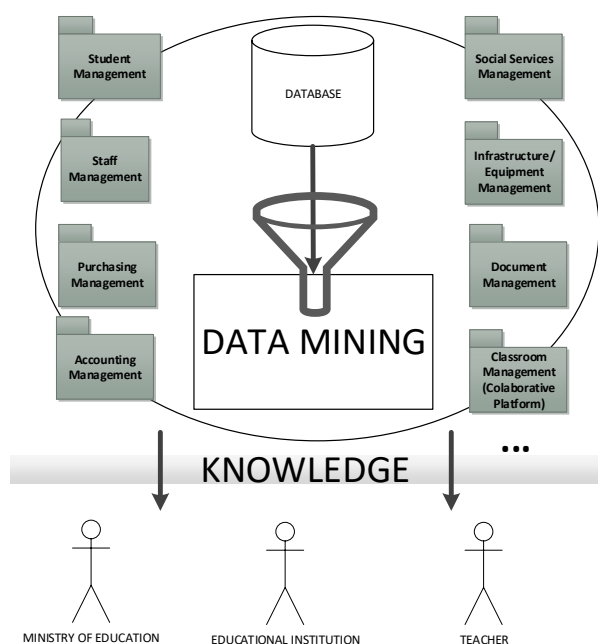

Figure 4 – Intelligent System (Data mining).

One of the problems that many education institutions face are the costs associated with the acquisition of software licenses, as well as costs associated with maintaining computer equipment. For example, it is known that the ideal situation is having one computer per student. However, this is not always the case in the classroom. So, it is not enough to acquire an information system that supports only the flow of information while allowing explore the virtual organization concept of the potential to reduce costs and further improve the efficiency of the entire system. That is, the ideal is that each education institution adopt an integrated management system that allows not only processing of all activities of the organization, as well as the communication of this with all stakeholders in the education process, which is in such a structured way that makes possible the implementation of the concept of cloud computing. In this way, all education institutions must be involved in a solution that will share the infrastructure, platform and software, facing these resources as a service, adjusted to the real needs of each (Figure 5).
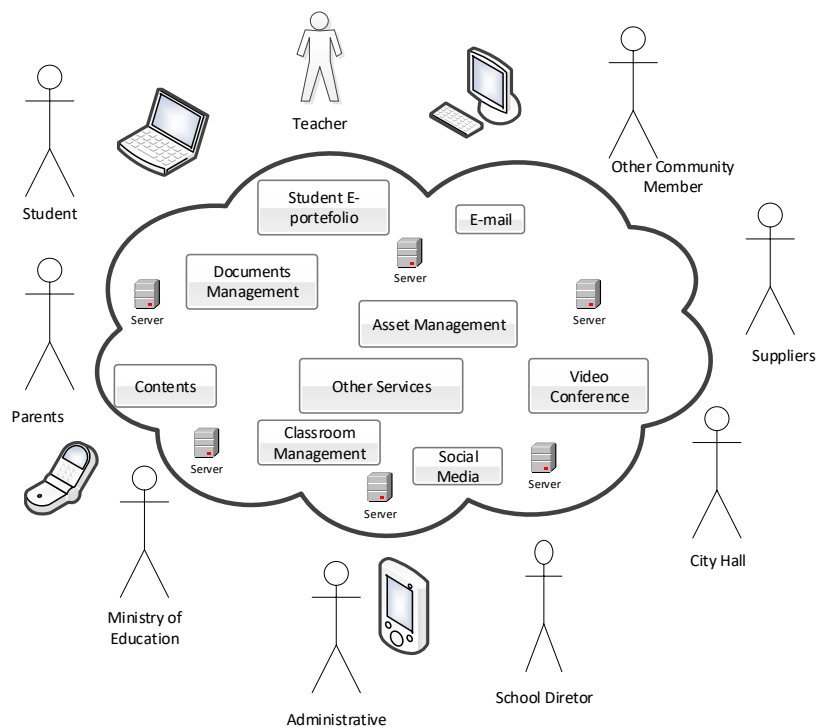

Figure 5 – Cloud Computing based solution.

4. Main Conclusions

After an analysis of some of the initiatives by the Government for the modernization of Public Administration, in particular in the education sector, and also on some issues related to management in education establishments and communication between them and the Ministry of Education, the study made it possible to confirm that there are opportunities for improvement in education establishments in Portugal, particularly at the level of management, noting that processes are not always carried out in the most appropriate way and some waste has been detected. On the other hand, it has been confirmed that existing forms of communication do not guarantee or accelerate the correct and timely information flows between education institutions and the Ministry of Education. This confirmed the need for computerization of processes and the development of an integrated information system.

Some tools were also suggested in the application of the Lean Philosophy, emphasizing the automation of activities, the standardization of processes, tools of visual control, TPM, poka-yoke system, among others. To mention some of the benefits of applying the Lean Philosophy in the processes: shortening waiting times, improving information flows, accessing data in real time, reducing the probability of error, optimizing human resources, reducing waste of material resources, among others. It was also considered pertinent to include in this approach the teaching/learning process, since this contributes directly to the creation of value for the student and, consequently, for the education institution. In this sense, some possible tools have been proposed to be used, in order to allow the concentration of efforts in the teaching/learning process.

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