

Operational Excellence through Process Improvement at a Public University

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Operational excellence (OE) is not something new to the manufacturing and services; including private higher education institutions locally and abroad especially in the US, UK, Canada and the Scandinavian countries. However, for the public universities in Malaysia, it is something of a novelty. As the largest public university in Malaysia with more than 160,000 students, Universiti Teknologi MARA (UiTM) has taken the initiative to spearhead the operational excellence in the country's higher education. Moreover, in the face of reduced funding from the government, UiTM must be responsive and transforms to become more process-centric as it is through operational excellence that strategic outcomes can be achieved. The aim of this paper is to investigate the implementation of operational excellence through process improvement by the university; its achievements; and challenges faced pertaining to the implementation. The university adopts the concepts of Lean and Six Sigma DMAIC approach to process improvement in its journey to achieve operational excellence. The process improvement data was recorded in an 'Online Process Improvement Register' (OPIR). So far, the university has been able to train 5.9% of its 18,188 staff in doing process improvement. The findings showed that as a result of doing improvement on some of its processes, the university has managed to save 48.99% on cost. Apart from that, the university has been able to reduce the time taken on the processes, the number of manpower needed for the processes, the number of complaints, and also improve customer satisfaction. Some of the challenges that have been identified during the implementation are department and staff engagement; inadequate manpower; and lack of knowledge on the part of some of the Quality Managers and OE Trainers.

Keywords: Operational Excellence, Process Improvement, Higher Education, Public University

1. Introduction

Operational excellence (OE) is a philosophy of leadership, teamwork and problem solving resulting in continuous improvement throughout the organization by focusing on the needs of the customer, empowering employees, and optimizing existing activities in the process. In the context of a university, it means that the university must do the process right with no or minimum errors, do the right process so it could meet the objectives set, and do it with minimum waste so that it becomes cost effective. A process-centric organisation is focused on documenting, managing, monitoring and improving the performance of their process outcomes.

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Universiti Teknologi MARA (UiTM), as the university of the future, needs to face challenges in order to be competitive and sustainable. Some of the challenges facing higher education are operating in a global market, rising student expectations, increasing costs, a demand and need for new technologies, attracting and retaining the best talent, and making research sustainable (Deloitte, 2015).

UiTM is a large university with more than 160,000 students scattered at different locations in Malaysia. It has 26 faculties and 35 branch campuses with many processes at the individual location. The OE project was done with the objectives of improving processes that are critical to quality so that they become efficient in order to increase customer satisfaction; sharing of knowledge on process improvement with staff and improvement teams; minimizing wastes, reducing costs, and optimizing the use of the university's resources.

Process improvement must be done as part of a continuous improvement of the university in order for the university to be competitive and sustainable in the face of challenges. The OE project which is based on the Lean Six Sigma (LSS) approach was introduced in middle of 2016 to systematically improve business process quality in the academic and administrative procedures of UiTM. Staff were given the opportunities to initiate process improvements of their departments. Academic and administrative staff were trained on process improvement tools and techniques beforehand. Departments comprised of faculties, branch campuses, academic centres and offices of the whole university have actively participated in the drive towards operational excellence of the university.

This paper is a case study on how operational excellence has been executed in higher education through a large public university. The achievements and challenges faced in the journey towards operational excellence were also identified.

2. Literature Review

Operational excellence (OE) is a wide concept and there are many models exist for OE. It is an element of organizational leadership that focuses on meeting customer expectation and stresses on the application of a variety of principles, systems, and tools toward sustainable improvement of key performance metrics. In an ongoing competition for the brightest minds and external funding, the motivation for universities to redesign processes is often to reduce the administrative overhead and improve the services delivered to students, industry partners, faculty and researchers (Svensson et al., 2015). Therefore, universities are increasingly working systematically to improve business processes. OE is based on continuous improvement methodologies such as Lean, Six Sigma and Scientific Management. To achieve OE, systems and processes have to be improved especially when there is excessive waste, slow throughput time, poor customer satisfaction, excessive complexity and variability, and high operating costs.

A number of researchers have investigated the application of Lean (Balzer et al., 2015; Comm & Mathaisel, 2005; Doman, 2011; Douglas et al., 2015; Hines & Lethbridge, 2008; Thirkell & Ashman, 2014; Waterbury, 2015), Six Sigma (Kumi & Morrow, 2006; Pryor et al., 2012; Yua & Uengb, 2012; Zhao, 2005) and Lean Six Sigma (Antony et al., 2012; Antony, 2015; Hess & Benjamin, 2014; Kanakana et al.,

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2015; Svensson et al., 2015) in higher education. The aspects that have been investigated include: motivation for implementation; challenges and barriers to deployment; readiness for implementation; and benefits from implementation. Some examples of universities that have successfully implemented OE are the University of Wisconsin-Madison, University of St. Andrews, Cardiff University, Nottingham Business School and Warwick Business School. The University of Wisconsin-Madison through their quality improvement programme improved their admission cost by 38% and eliminated the backlog of admission work.

There are many approaches, tools and techniques that can be applied when embarking on OE. ISO 9001 and Baldrige Excellence Framework are broad generic models while the most popular approaches are Lean, Six Sigma, and Lean Six Sigma (LSS) which is a combination of Lean and Six Sigma. Lean is a process improvement methodology that focuses on eliminating waste or non-value-added activities. On the other hand, Six Sigma is a tool that aid companies in reducing defects, improving process output quality, and increasing customer satisfaction (Kanigolla, Cudney, and Corns, 2013). According to Bandyopadhyay (2014), Lean Six Sigma enables continuous improvement by replacing traditional approaches with aggressive management techniques such as Quality Function Deployment, Six Sigma quality management, and Lean service management. Universities are increasingly showing interest in the Lean Six Sigma (LSS) method, which is a structured approach to process improvement (Svensson et al., 2015). Antony et al. (2012) discussed the relevant LSS tools that help in improving quality in higher education such as process mapping, cause and effect analysis, visual management, and Pareto analysis. In addition, Supplier-Input-Process-Output-Customer (SIPOC) and improvement workshops help identify the key outputs and engage the faculty as well as the administration in the change process.

According to Hess and Benjamin (2014), the four institutional functions identified that can improve their efficiency with the help of LSS are curriculum delivery; business and auxiliary services; admissions, enrolment management, and marketing; and research. They concluded that by adopting LSS methodologies, universities will experience meaningful change and that can improve various administrative processes such as admissions, enrolment and the number of other business and research functions. Sunder (2016) offered some examples on the application of LSS in higher education institutions. According to him, in 2012, a review team of Kings College, London identified 150 opportunities and evaluated them against the potential commercial benefit, cost of and impact of change. They followed LSS tools such as failure mode and effect analysis in redeveloping processes for asset management. Meanwhile, the University of North Carolina (UNC) benefited significantly from applying LSS techniques to its inpatient pharmacy since 2014 by conducting three (3) Kaizen events to improve work flow and customer service to patients and nurses so that employee and customer satisfaction was improved. The third example is the case of Sri Sathya Sai Institute of Higher Learning in India which believes LSS can bring quality excellence to the integral education system, and hence promotes student engagement in improving various departments of the college with the help of self-reliance departments, set-up as part of their various campuses.

Issues and challenges faced by organizations in implementing operational excellence are many. Antony (2015) points out the numerous challenges facing

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anyone wishing to implement LSS in a higher education which include the definition of quality, data collection, and staff engagement. The use of a vast number of tools and techniques, understanding of the process from an education system perspective, lack of awareness of benefits of LSS in a non-manufacturing sector, viewing LSS as a quick fix rather than a continuous improvement technique, lack of vision for establishing desired culture, understanding the voice of students, and lack of resources were identified as challenges of applying LSS in higher education by Antony et al. (2012). The critical success factors identified from the same study were uncompromising top management support and commitment, effective communication at all levels, strategic and visionary leadership, project selection and prioritization, and organizational culture.

LSS can provide a meaningful change when implemented with shared responsibility and collaboration (Hess and Benjamin, 2014). Antony (2014) described the readiness factors that are required for successful implementation, deployment, and sustainability of LSS in higher education which include: an institution should have active leadership with a clear vision for developing the desired culture for continuous improvement; there must be constant and consistent managerial support and commitment for the required resourcing; the LSS projects chosen must be aligned to the strategy of the university; the projects chosen must be customer focused; and the right people must be chosen to be trained and involved. Some of the benefits of applying Lean, Six Sigma, and LSS that are reported from the studies include: elimination of waste and improvement in customer value (Hines and Lethbridge, 2008); improvement in business efficiencies (Svensson et al., 2015); increased efficiency and improved processes in higher educational institutions (Antony et al., 2012).

3. Methodology

UiTM adopts the concept of Lean and Six Sigma DMAIC approach to process improvement in its journey to achieve operational excellence. DMAIC stands for Define, Measure, Analyse, Improve, and Control. These 5 steps guide the improvement on the processes very systematically: 'Define' phase is understanding the customer requirements or the *voice of the customer*; 'Measure' phase is when the selected processes are mapped and measured; 'Analyse' phase is when the data collected on current process performance are analysed; 'Improve' phase is when all wastes and non-value added activities are removed, solutions offered, and future state is charted; and 'Control' phase is when the new process is implemented and monitored.

Sixty departments including faculties, branch campuses, academic centres, and administrative departments were invited to participate in this project. Head of the Departments are the champions of this project with the help of the Quality Managers and the OE Trainers that had been trained on using several tools and techniques for process improvement. A total of 194 OE teams consisted of 1,115 staff were formed to carry out process improvement. The teams were trained by the Quality Managers and OE Trainers at their respective location.

An *Online Process Improvement Register(OPIR)* was designed and used to record and capture data related to the process improvement. From the system,

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Performance Dashboard was utilised to display the performance results of the project. To ensure that management and staff of the university are aware of the project and have the knowledge and skill to execute the project, a series of training, workshops and briefings were conducted prior to the commencement of the project. The whole project took 17 months to complete.

4. Findings

The OE implementation strategy of UiTM can be divided into several stages as follows:

Identification of OE Trainers (June-July 2016)

Quality Managers were informed of the OE project and its objectives by the Project Director. They then were asked to identify candidates from their faculties, branch campuses and departments to be trained as OE trainers. The role of OE trainers was to train the Excellence Team on process improvement at their respective departments. Trainers were then appointed formally by their respective Head.

Communication on OE Implementation Strategy to Department Heads (Augt-Sept 2016)

A briefing was conducted with the Deans, Rectors, and Head of Departments where the Vice Chancellor himself informed the attendees of the project at the beginning of a two-hour session. The OE implementation strategy for the whole university was then explained by the Director of Operational Excellence as the director of the project.

Development of Online Process Improvement Register (OPIR)Software

Phase 1 (July-Oct 2016) was carried out to design a system software which can capture and record the details of departments, their current processes, measures chosen, selected processes for improvement, their current performance, and mapping. A performance dashboard was created to display the status of the project. During Phase 2 (Jan-Mac 2017), the system designed was able to capture the performance of the processes after improvement was done - the future state. The system was able to generate reports on savings and improvement obtained by the departments. Phase 3 of OPIR (Augt-Mid October 2017) was designed to monitor the performance of the new/redesigned processes that have been implemented by the university. Processes will be refined if they are found not to be working as planned. Changes or adjustments done to the processes were then recorded during this stage.

Training for Quality Managers, OE Trainers & Excellence Team (Sept-Oct 2016)

Sixty-nine staff were trained as OE trainers university-wide. Together with the OE trainers, forty-two Quality Managers were trained on process improvement tools and techniques. Their training modules include Lean & Six Sigma, Process Improvement, Improvement Tools, Measuring Process Performance, Process Analysis & Redesign Tools, and OPIR. A total of 806 members of the Excellence

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Team were trained by the Quality Managers and OE trainers later. Overall, fourteen sessions of training were conducted.

Identification and Documentation of Current Processes (Oct-Nov 2016)

The Quality Managers at each department were asked to investigate the number of processes that they have at their departments. They were asked to record the particulars of the processes identified in the OPIR system. Data captured by OPIR showed that there are 2046 processes recorded throughout the whole university.

Execution of DMAIC Approach to Process Improvement

This phase took place from December 2016 to October 2017. During the 'Define' phase, the OE team of faculties, campuses, and departments which comprised of the Quality Manager; the OE Trainer; and the Excellence Team, identified the weak and critical processes for improvement based on several sources such as customer complaints and dissatisfaction, audit findings and also process performance during review. 165 processes were identified and selected for improvement.

Then the current processes were mapped, and their performance were measured during the 'Measure' phase. Departments can choose the type of measures or elements that they want to improve; cost, time, manpower, complaints, and customer satisfaction. Tools used include the Flowchart, Process Mapping, Value Stream Mapping and Service Blueprint. Time taken, costs and other resources data were recorded in a system known as an 'Online Process Improvement Register' (OPIR).

The third phase is the 'Analyse' phase whereby process analysis was carried out on the current processes identified, measured and mapped earlier. Tools used include Fishbone Diagram, Pareto Diagram, Check Sheet and many more. The 'Improve' phase was carried out to remove waste, non-value-added activities, and unnecessary steps in the process that would create customer dissatisfaction. During this stage, processes were redesigned, and the new processes were measured and mapped. The 'before process improvement' and 'after improvement' data were recorded in OPIR which can monitor the project performance through its 'Performance Dashboard'.

Last but not least, the 'Control' phase of the DMAIC is the final phase of the project whereby processes that have been improved were implemented, its performance monitored, and any adjustment will be done to the process if necessary to stabilize the process. This phase took place from June to October 2017.

OE Symposium

After the performance data were collected, analysed and verified, an OE symposium was held for several reasons; to recognise and appreciate those who have participated and engaged in the OE initiative of the university; to share knowledge within the university on the processes that have been improved by the faculties, campuses and departments especially on the impact of process improvement; and to internalise the culture of operational excellence throughout UiTM. This one-day event took place in August attended by about 200 people from staff to management and also inclusive of Quality Managers, OE Trainers and Head of Departments. An

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international speaker who is a Six Sigma Master Black Belt, was invited to deliver a keynote address at the symposium. A shortlist was created to choose the winners for the best improved processes from the academic, administration, and finance categories, and the overall winner. Nine teams out of 27 shortlisted were selected as winners by panel of judges prior to the symposium. The teams shared their process improvement experience by presenting the improved processes during the symposium. Posters on the improved processes were displayed at the symposium as well. The award winners received their trophy and certificate from the Vice Chancellor.

Achievements

Out of the 60 departments identified for the project, 52 (86.7%) departments actively participated in the project. 165 (8.06%) processes were improved by the departments of the university as captured by the OPIR system. Out of this, 60 are academic; 95 are administrative, and 10 are finance processes. This has exceeded the university's target to improve at least 5% of the processes in the system. The total cost of the selected processes before improvement was RM5,987,065. As a result of doing improvement on the processes, UiTM managed to save RM2,933,167 on costs.

In terms of staff development, the target set by the university was to develop 5% of staff and teams capable of doing process improvement (based on 18,188 staff). However, a total of 1,067 (5.9%) staff were trained on process improvement. Quality Managers and OE Trainers were trained by the Director of Operational Excellence and an external training provider engaged by the university, while the Excellence teams were trained by the Quality Managers and OE Trainers at their respective departments later. They were trained on: how to identify processes for improvement; process analysis; process mapping; value stream mapping; service blue printing; measuring process performance; Lean concept and Muda; Six Sigma DMAIC approach; and The Seven Basic QC tools. They were also taught to use the OPIR software. The Excellence teams are now capable of doing process improvement. In addition, courses on 'Introduction to Operational Excellence' and briefings on OE were also conducted for other staff to create awareness.

The final target is to achieve at least 10% performance improvement on each of the process improved in order to reduce waste and optimize the use of the university's resources. Most of the processes improved exceeded the 10% target. With regards to saving on time, the university managed to reduce time taken to perform the processes selected by 61.52%. In terms of manpower, through process improvement, UiTM managed to reduce the need for manpower to work on certain processes by 59.09%. Reduction on the use of resources such as time and manpower mean that these resources can be shifted elsewhere and re-allocated for other productive work.

At the end of the day, as a result of improvement on the processes, the university also managed to reduce customer complaints by 13.13% and improve customer satisfaction by 30.17%. This coincides with the finding reported by Simmons & Young (2014) and Antony et al. (2012) on the benefits gained in some higher education institutions by implementing operational excellence through adopting the LSS method in the journey towards operational excellence. Table 1 shows the savings and improvement made by the university.

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Table 1: Savings and Improvement Made by the University Out of 165 Processes

Measures	Before Improvement	After Improvement	Difference/Savings (Improvement)	
Cost	RM5,987,065	RM3,053,898	RM2,933,167	48.99%
Time	307.2 days	118.2 days	189 days	61.52%
Manpower	22	9	13	59.09%
Complaints	769	668	101	13.13%
Customer satisfaction	65%	95.17%	-	30.17%

Challenges

As this is the first time this project is carried out by UiTM, several challenges arose during the implementation of the project as follows:

Department and Staff Engagement

Lack of interest, attention, and participation in the project from departments. Lack of interest and attention by people has resulted in submission of documents into the OPIR system done not according to the requirements despite being briefed and communicated repeatedly through emails and letters. It has also contributed to inappropriate people being sent for training. Lack of interest from some of the people (management, Quality Managers, and OE Trainers) resulted in miscommunication, misunderstanding, not paying attention during training, not sending the right person to be trained, and switching people during the project. In terms of participation, a few major departments in UiTM did not participate actively in the process improvement. The finding is supported by Antony (2015) who points out that one of the numerous challenges facing anyone wishing to implement LSS in a higher education is in terms of staff engagement.

Inadequate/Insufficient Manpower

Lack of manpower to assist the OE Unit has resulted in work overload for the Unit. At the same time, the *Online Process Improvement Register (OPIR)* needed help from the IT department on transferring data development to production to keep the project on schedule. The staff were not reliable as they were not dedicated to this project thus, resulting in delays and disruption of project progress for a few weeks. However, due to a strong support from the top management, the matter has been resolved after 6 months. This in line with Antony et al. (2012) study whereby it was found that uncompromising top management support and commitment is one of the critical success factors of LSS implementation.

Lack of Knowledge

Some of the Quality Managers and OE trainers were not well-versed with quality improvement of processes and its tools and techniques despite being trained at the start of the project. Although the results from the survey conducted at the end of every courses showed that they were satisfied and found the courses effective in providing them with the knowledge to carry out process improvement, they found it difficult to execute the 'measure', 'analyse', and 'improve' phases of the DMAIC

approach. A few of them also found it difficult to identify the processes suitable for improvement at the early stage.

5. Lessons Learnt and Conclusions

The operational excellence through process improvement carried out by UiTM has been a great success considering it was the first time for the university. The project has achieved its objectives in terms of improving processes that are critical to quality; educating staff on process improvement; reducing costs and complaints; and most importantly, increasing customer satisfaction.

Some of the challenges faced by the university during the project are; department and staff engagement; inadequate manpower; lack of knowledge among the Quality Managers, OE trainers and OE team. To overcome these challenges, communication and dissemination of information pertaining to the project to all levels of staff needs to be done more rigorously to ensure that all staff are aware of the project. Top management of all faculties, branch campuses, and departments must be made aware of the seriousness of this improvement exercise; for the right people to be sent for training, and for a better university-wide participation and engagement in the project.

Secondly, training conducted must be effective so that staff can apply the theories they have learnt in class during the process improvement. At the same time, more training on how to identify processes for improvement should be conducted to ensure that the right processes be selected for improvement to give the greatest impact to customers. Processes chosen should be the ones that are critical to quality. The improvement process itself must be done systematically using the DMAIC approach. The 'before' and 'after' measurement and maps must be clear so that calculation and comparison can be made easily by the staff. Tools that need to be applied for process analysis, process redesign and process improvement must be mastered before the actual improvement can be done. More people should be trained in Six Sigma as Green and Black Belt in future to improve staff effectiveness and competency in process improvement. Only then improvement carried out on the process will make sense, long lasting and meaningful to the university. At the moment, due to financial constraint, the number of training hours and staff trained is limited.

Finally, apart from motivation and skill, the success of this OE initiative depends as well on the attitude of people. In this case, the top management of the university; the Vice Chancellor has been the sponsor of the project and has been supportive of the project. However, on the ground, more efforts are needed to drive staff to seek the opportunities for improvement on the university's processes towards operational excellence. The Deans, Rectors, and Head of Departments must play their role in motivating their staff to become more engaged in process improvement if it is to benefit the university in the long run.

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