

CHAPTER 4
CASE STUDY 3
OPERATIONS MANAGEMENT MODULE
INNOVATION IN ADMINISTRATIVE PROCEDURES: REGISTRATION
PROCESS FOR NEW STUDENT INTAKE

4.1 Preamble

The third applied research case will be dealing with the operations sector. For USIM, and being a service-oriented provider, the range of operational activities that can be investigated that provide the original intent of improving the overall performance of the universities are many. But the research must be selective (within the constraints experienced), and yet contribute significantly to the original intention. Operational activities in USIM ranges within the three major areas of academic activities namely, teaching, research and advisory in addition to the need for efficiency in managing all of them. A very critical component is the handling of the students and the 10,000 population in number forms the major component of a university population. The intake of about 2,400-2,600 new students yearly, and its physical activities and logistic to be done in a week and efficiently is a big challenge and need to be addressed. This is the focus of this 3rd case research and will be deliberated further.

4.2 Introduction

In selecting the appropriate operational process in USIM for the applied research, there were others that were given consideration too especially those linked to the three (3) core activities of the university.

There are about hundreds of teaching activities in all with their respective process and procedures related to each programme, faculties and lecturers. Then there are the various research activities starting from the grant application process. There were 75 grants application process in year 2018 and up to the final report submission which can also be looked into. The advisory activities are another set that were available for considerations. But all these are quite unique on their own and doing applied research on solving the problems encountered are not possible within the time constraint allocated for this study.

Furthermore, tackling the registration process has several other valid reasons such as:

- a. the process starts and finish within a short time duration and feasible,
- b. the number of students affected is large and can have an impact on the public perception (students, parents and stakeholders) on university's efficiency,
- c. good for public image.
- d. cutting the time taken even by half is good enough and will save time, finance and many other resources.
- e. numbers of personnel (staffs) involved as it creates too massive crowds and incurred cost.
- f. productivity in terms of logistic and venue of the event.
- g. rental of equipment which caused the cost expenditure.

4.2.1 Issues and Project Brief

USIM receives new students to pursue their studies at the Undergraduate level every year. As of March 2018, there are 9 Faculties in USIM and offers 27 courses in social sciences, science, engineering, architecture, medical and dentistry. Normally, the result for admission to all public universities will be announced by the Ministry of Higher Education during the month of August, approximately three weeks before the registration day which will be held in September every year.

New students' intake registration process is one of the most important modus operandi in every university including USIM. Every year, USIM receives an average of 2,400-2,800 new students for undergraduate programmes. The goal of registering new students is to determine that they would have registered for courses within the university. From the new students' point of view, their registration is only to let them know that they have been accepted to study at the university. On the other hand, the registration process will enable the university's administrator to keep track the record up to date on the number of students that have accepted the offer for admission to USIM.

4.2.2 Problem Identification

New students' intake registration process is one of the most important operations activities in every university including USIM. Nevertheless, there have been umpteen complaints from the students, parents and guardians that the registration processes were very inefficient and too time consuming.

This issue has been highlighted by the University's Management with regards to the current process of registration for the new students. Therefore, the processes of analysing the problems mentioned to be undertaken will go through various steps as listed below:

- a. Map and draw the current registration process from the beginning to the end.
- b. Draw and label all steps in sequence plus the time taken for each and the number of personnel and equipment involved for each.
- c. The chart/ map will be in two (2) version, a simple and a complete detail chart.
- d. Identify appropriate tools that are effective in trying to achieve the objective of the research (through literature search and use of correct methodology for the analysis).
- e. To get relevant data that are available for the various steps (administrative files) from the relevant department (especially personnel and time spent).
- f. Generate data that are not available like suggestions for improvement from administrators (those who had been involved in the process) to give feedback on opinion.

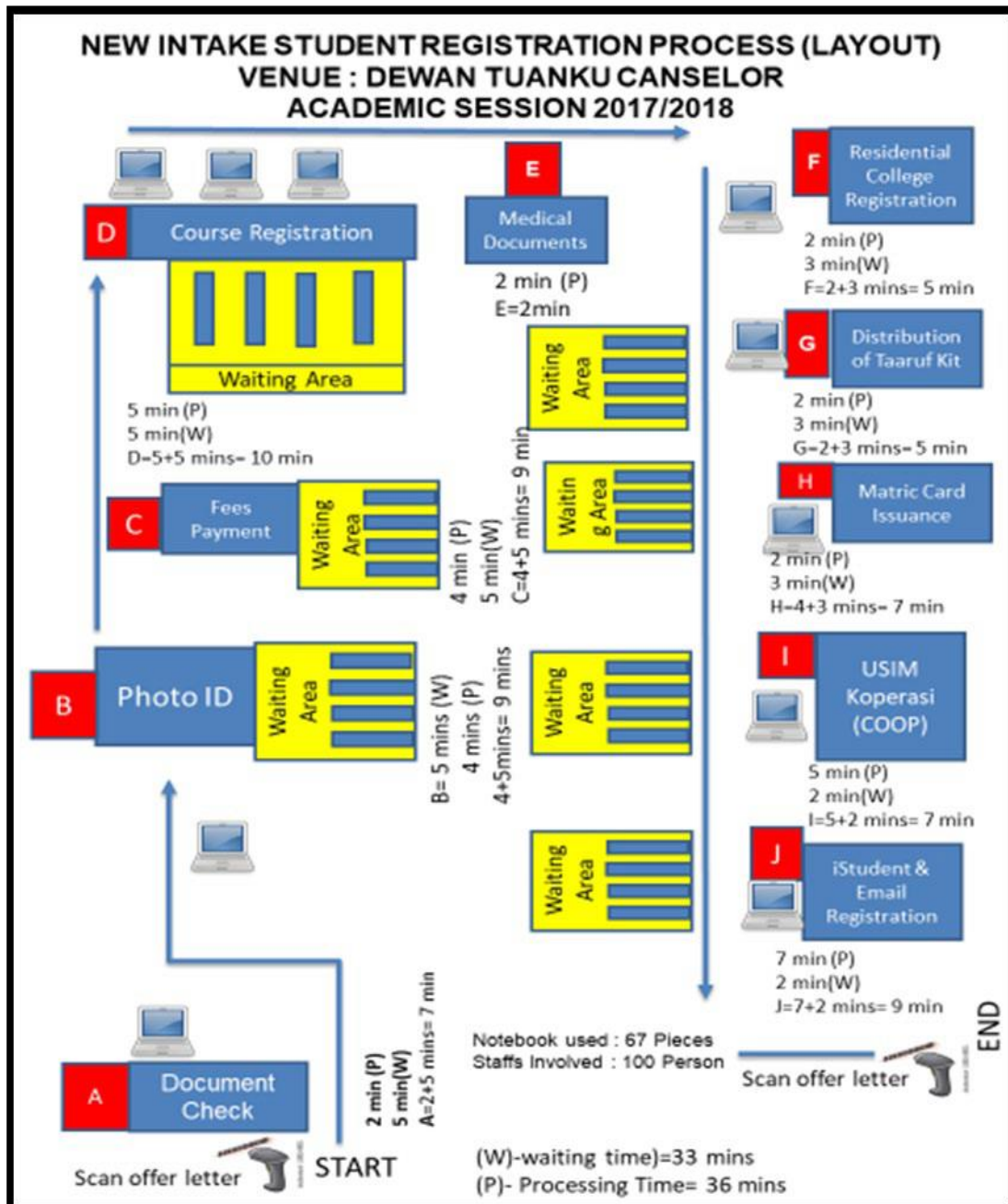
What has been practised, the information obtained from USIM's Division of Academic Management, which is the gatekeeper for the registration process, USIM will send the offer letter to selected candidates by mail using the domestic mail called *Poslaju*. The administration Team will record these and update the total number of students that registered on the day of the registration at USIM.

The general flow of the current registration process is demonstrated in Table 4.1 and the detail process and activities are as shown in Figure 4.1. In general, there are ten (10) different steps that a student would have to go through to complete the registration process. This simplified version is as shown in Table 4.1.

Table 4.1: Registration Process Steps

Steps	Description	Ideal Time Duration (in Minutes) Per Student	Staffs Involvement
A	Document checking	2 mins.	5
B	Photo shoot for student card	4 mins.	5
C	Submission of bank slip representment as evidence of payment for registration and tuition fee	4 mins.	10
D	Course registration and class timetabling issuance	5 mins.	25
E	Submission of medical report	2 mins.	5
F	Residential college registration	3 mins.	10
G	Orientation kit distribution	2 mins.	10
H	Issuance of student card	2 mins.	10
I	Purchase of USIM's corporate shirt and tie	5 mins.	10
J	Email and student's portal registration	7 mins.	10
Total		36 mins.	100

Developed for the Current Study



Source: Division of Academic Management of USIM (2018)

Figure 4.1: Lay Out (Floor Plan) and Flow of Current Registration Process for New Student Intake

In the registration process, the new students need to undergo all the steps/processes as illustrated in Figure 4.1. There are ten (10) counters (**Counter A to Counter J**), the students need to go through to complete the registration process. Normally, a total number of 100 staffs will be on duty for the registration process. The

staffs would have been divided and located accordingly. There will be 5 staffs at Counter A, 5 staffs will be at Counter B, 10 staffs at Counter C, 25 staffs at Counter D, another 5 staffs at Counter E, 10 staffs at Counter F, 10 staffs at Counter G, 10 staffs at Counter H, 10 staffs at Counter I and 10 staffs at Counter J. The counter starts with Counter A and end up at Counter J.

- a. At Counter A, the barcode on the offer letter will be scanned to record the registration start time (sample of offer letter in Appendix 17). This barcode will be rescanned at Counter J to record the completed registration time for the student. At this point (Counter A), relevant documents will be checked by the staff to verify the details of the students based on the offer letter posted to them. The students need to queue accordingly and take turns to start the process. It is the process to ensure and verify that the student received the correct offer letter sent to them based on their faculty and course. Based on time calculated by the IT Department, this process took about 2 minutes to be completed for each student. The queue time or waiting time from a student to another counter is about 3 to 5 minutes depending on the smoothness of the process. The takt time or complete process at Counter A is roughly about 7 minutes per student. The students will then move to the next phase, which is Counter B.

- b. Counter B is a place for the photo shoot for the ID card (student card). Before the photo is taken by the staff on duty, they need to queue and wait at the waiting area for about 3 to 5 minutes before undergoing the process.

The duration taken to complete the process is about 4 minutes for each student, which indicates that the takt time for the process is about 7-9 minutes per student. Next, they will move to Counter C (Bursar Counter).

- c. Counter C is, where the students need to show and submit the proof of payment (bank slip presentment) to verify that payment has been made to the university's account for the university's registration and tuition fees via online as instructed in the offer letter posted to them. If they have not done so, they need to pay the fees before they can proceed to the next counter (Counter D) for course registration. This process should be completed in about 4 minutes for each student without considering the waiting time for their turn to come. It is believed that the waiting time is between 3 to 5 minutes per student.
- d. Counter D is for the course registration and class timetabling. At this point, the students need to show their offer letter again to the staffs on duty for the issuance of timetable according to their respective programmes (courses) and Faculty. The students need also to submit their details, academic transcript, certificates to the staff to be inserted in the personal student file individually in a hard bind file. Normally, the process will take an average of 5 minutes for each student to be completed. Waiting time is approximately in the range of 3 to 5 minutes at the waiting area before the process begins. Subsequently, the students will proceed to Counter E.
- e. At Counter E, the students need to submit their medical report to the university's medical centre. This process should take only a couple of minutes for each student. The following counter will be Counter F.
- f. Counter F is for the registration of residential college. At this counter, the students need to wait for a while at the waiting area as the staffs need to sort out the student's name from the list of registered students to get their room key from the Student Housing Centre. Normally, this process will take about 3 minutes for each student. Then, they will move to Counter G.

- g. Counter G is the place for the distribution of orientation (*Taaruf*) kit by the Student Affairs Department (HEP). The students will receive a bag pack which contains the schedule for the orientation days, tentative programmes and other leaflets related to the students' rules and regulation. This process took about 2 minutes. Next, they will proceed to Counter H.
- h. At Counter H, will be the issuance of the student ID card. It will take about 2 to 4 minutes per student to collect their ID card. Next, they will proceed to Counter I.
- i. Counter I is the University's stationery essentials counter (COOP), the place whereby the students purchase USIM's corporate shirt and tie. This process takes about 5 minutes for each student as the cash transaction will occurs here where the students need to purchase those items by cash only. Finally, they will proceed to Counter J.
- j. At Counter J is for registering official university's email and student's portal. Normally this process will take about 7 minutes per student to complete the process.

Based on the umpteen complaints from the stakeholders, the University's Management has instructed for this issue to be resolved. Therefore, there is a need for the study to investigate the whole process of the registration for new students prior to its inefficiencies and issues behind it.

To resolve this issue, a steering committee has been set up for this purpose which led by Deputy Vice Chancellor (Academic & International) as the advisor, Head Academic Management Division of USIM as the Chairman and the rest of the committee were from IT Department (Goal-ITQAN), Bursar Department, Student

Affairs Department, Student Housing Centre and Division of Academic Management. The purpose of the discussion is to get a clear picture on the entire registration process. The issues discussed mainly on the operational aspects which pertaining to the process itself, logistic preparation, expenses incurred, duration for each counter per student as the time was recorded by IT Department every year during the registration process, equipment needed, total number of staffs involved, rental of buses, equipment, cost and expenditure incurred.

These inputs are vital and needed for the study to come out with ideal solution for this problem. As a result, the discussion discovers opportunities and further improvements in creating greater value for both USIM and the students.

From the discussion, the identified issues were as follows:

a. Registration Process

The flow of the registration process was too complex. At present, there were ten (10) counters and steps were needed to carry out the registration process for new students as illustrated in Figure 4.1.

b. Time Consuming

The registration process was time consuming as complaints received from the students and guardians. The students were not being informed by the University the precise time to come for the registration. It was only stated in the offer letter that the registration time is from 9.00 am to 4.00 pm. It is a waste of time and not efficient for the students which they had to come as early as possible, thinking of avoiding queues.

c. Time Duration

Every year, during the registration process, the time duration taken by the students will be recorded by USIM's IT Department. Based on the time duration recorded by USIM's IT Department during the previous registration process session, it has shown that the bottleneck of the process was due to the waiting time from one counter to another. The actual or ideal time duration taken is approximately 36 minutes per student to complete the entire processes. But, due to the transportation time (movement from one counter to another), waiting time and queue at each counter, the total time taken by the student can reach up to 56-71 minutes to be completed per student. It can be quicker if the flow is smoother which mostly affected by the queue of the students and the waiting time to go from one counter to another. The waiting time to complete the process from one counter to another as recorded by the staffs was approximately 1 to 5 minutes per student as tabulated in Table 4.2.

Table 4.2: Time Recorded for the Registration Process

Counter	Processing Ideal Time (in Minutes)	Waiting Time From One Counter To Another (in Minutes)
A	2 mins.	3-5 mins.
B	4 mins.	3-5 mins.
C	4 mins.	3-5 mins.
D	5 mins.	3-5 mins.
E	2 mins.	1-2 mins.
F	3 mins.	1-2 mins.
G	2 mins.	1-2 mins.
H	2 mins.	2-4 mins.
I	5 mins.	1-2 mins.
J	7 mins.	2-3 mins.
Total	36 minutes	20-35 minutes

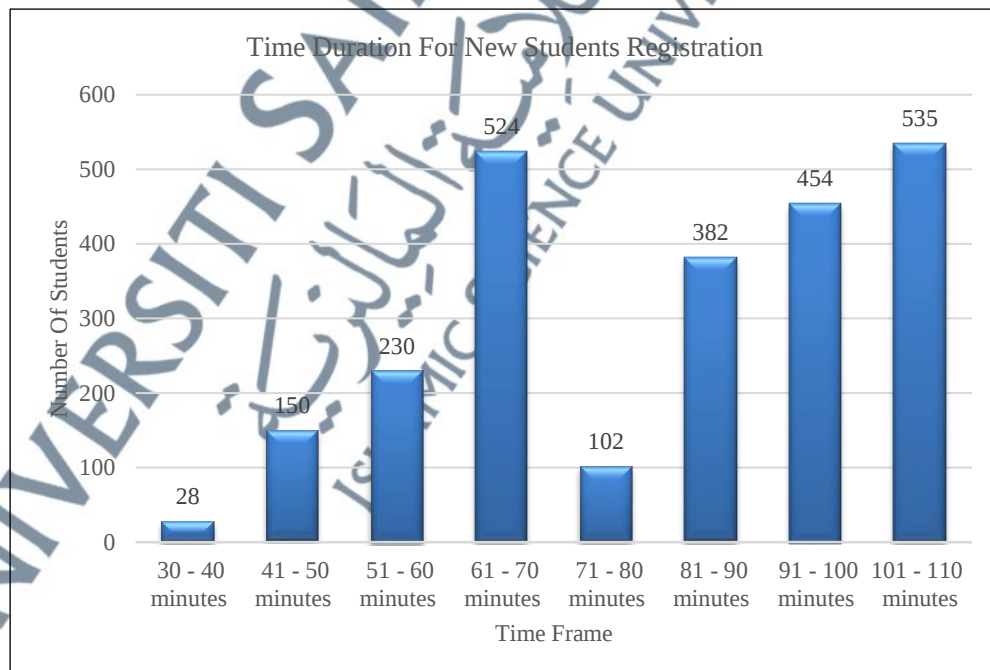
Source: Goal-ITQAN USIM (2018)

However, the total time taken by the students to complete the registration process was varied. The recorded time obtained by deducting the time of barcode scanning at counter J with the initial scan time at counter A. These data are tabulated as in Table 4.3 and Figure 4.2 respectively. Meanwhile, Figure 4.3 shown the comparison on the ideal time taken compared to the actual time taken by the students on previous year registration process.

Table 4.3: Time Duration for New Students' Registration

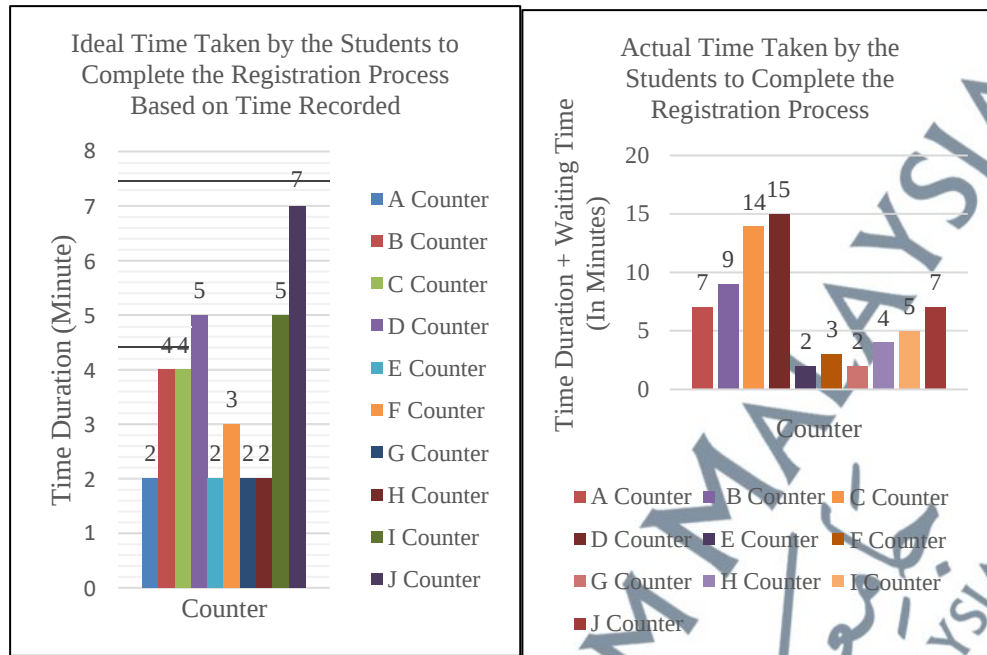
Time frame	Number of Students
30-40 minutes	28
41- 50 minutes	150
51-60 minutes	230
61-70 minutes	524
71- 80 minutes	102
81-90 minutes	383
91-100 minutes	454
101-110 minutes	535
Total	2,406 students

Source: Goal-ITQAN USIM (2018)



Source: GOAL- ITQAN USIM (2018)

Figure 4.2: Time Duration for New Students' Registration



Source: GOAL- ITQAN USIM (2018)

Figure 4.3: Ideal Time vs Actual Time Taken by the Students to Complete the Registration Process

d. Course registration

The course registration was carried out during the registration day. The administrator team of the relevant Division did not set up the timetable and subjects that will be taken by the students during their first year of study even though it is much easier to be scheduled and arranged earlier by the administrator. This has not been the case where the course registration will only take place during the registration day. This creates time wasting during the registration process in terms of time consuming especially when students need to queue up and wait for their turn to register for the course subject according to their programmes and respective faculty.

e. Organized During Weekends and Work Force Involvement

The registration day is held during the weekends. This incurred waste in terms of the involvement of the workforce during weekends where there are about one hundred (100) personnel involved during the registration day. Financial expenses were incurred during the day since overtime is paid to eligible employees. The university had to pay for an extra overtime allowance to the workforce and needs to spend on the refreshment including breakfast and lunch to the staffs involved during the registration day.

f. In Terms of Efficiency (Students' Movement)

The registration day was held in USIM's *Dewan Tuanku Canselor* (DTC) Hall. The venue at DTC Hall was also not helping in terms of expediting the registration process and reducing the movement of the students moving from one place to another.

g. In Terms of Logistic

Throughout these years, they need to travel or move from DTC to the residential college which was time consuming. This is because the university needs to bring the students from DTC to the residential colleges.

On the other hand, in terms of the financial cost involved were as follows:

i. Send Offer Letter via Mail

The current practise of USIM is to send offer letters to the successful candidates to their home address via the mail, using domestic postage mail or known as *Poslaju*. This practise will increase the university's expenditure in terms of postage expenses. The postage cost is RM 6.00 for each student. There are 2,600 prospective students and the total cost spent for the postage was RM 15,600.00.

ii. Organized During Weekends and Work Force Involvement

The registration day is held during the weekends. This incurred waste in terms of the involvement of the workforce during weekends where there are about hundred (100) staffs involved during the registration day. Financial expenses were incurred during the day since overtime is paid to eligible staffs. The university had to pay for an extra overtime allowance during weekends (100 staffs involved x RM 12.80 per hour x 8 hours) = RM 10,240.00. and need to spend on the refreshment including breakfast and lunch to the staffs involved during the registration day (100 staffs x RM15.00) = RM 1500.00.

iii. Venue for the Registration

The registration day was held in USIM's *Dewan Tuanku Canselor* (DTC) Hall where the cost of rental is RM 30,000 per day; in which it is more useful if the Hall is rented to other parties that can generate income to the University. The use of DTC Hall was also not helping in terms of expediting the registration process and reducing the movement of the students moving from one place to another.

iv. Logistic

Throughout these years, the students need to travel or move from DTC to the residential college which was time consuming and cost inefficiency to the University. This is because the University needs to bring the students from DTC to the residential college where the buses usage incurred cost. The cost for rental the buses which RM 400.00 per bus, which equivalent to RM 8,000.00 per day as the total number of buses need to be rented was 20 buses.

v. Student's Files

All the while, the University possesses the student's file where the cost for preparing the hardcopy files incurred quite an amount of money spent. According to USIM's Division of Academic Management officer *"Every year USIM has to spend RM 5.50 for a hard bind file per student which amounted to RM 14,300.00 per year"*.

vi. Rental of Equipment

Next is the usage of the laptops during the registration day to compile the student's data before converting to hardcopy files is also an issue to be taken care of. The need to rent 100 pieces of laptops for the registration process caused USIM to spend approximately RM 15,000 every year based on the feedback given by IT Department.

4.3 Analysis of Issue

Based on all the measures specified in the problem identification section, it was time consuming. It had utilised excessive resources and unnecessary wastes including but not limited to manpower, overtime expenses, logistics utilization, uses of papers, overutilization of university's assets and utilities.

4.3.1 Criticality of Issues

There are few problems that USIM are concern about the registration process on the registration day since the university's administrator did not have the initial information of how many students will register on that day before hand. It is because the current process cannot determine how many students will register as student in USIM. In terms of time wasting, there are some counters which have encountered stagnation. This brings students through longer waiting periods.

In terms of costs, it is uneconomical and wasted since the university needs to spend more for the usage of rented laptops and the overtime costs for staffs involved. Furthermore, there is also a significant cost for using the Hall; *Dewan Tuanku Canselor* (DTC), unnecessary transportation (buses) to bring students from the Hall (DTC) to their residential colleges as well as postage costs for delivering offer letter to their home address. Apart from that human error may occur when staffs keyed in student information wrongly by mistake. This will create waste in terms of rework, additional time consuming and perhaps additional cost due to overtime staff working.

The proper planning for the new student registration process should be given as priority. From the Management perspective, there is a need for a comprehensive investigation towards the whole process of the registration for new students prior to its inefficiencies and issues behind it.

It is not only due to the complaints received from the stakeholders, but mainly related to the financial concerns. On the other hand, the satisfaction level by the students as the main stakeholder of the university on the efficiencies of the registration process should be prioritised. Therefore, a new process mechanism that is efficient and reliable need to be thought of for the registration process.

4.3.2 Case Study Objectives

The focal point of this applied research is to analyse the existing registration process and to reduce waste in organisational administrative processes, particularly in the registration process of new student intake in USIM. Thus, the objectives of this case research are:

- i. To identify the key activities in the current registration process that need to be revamped.
- ii. To analyse the current registration process of new students and to evaluate the cause and effect on USIM's resources.
- iii. To look for alternatives, so that there will be a drastic improvement on the outcome.

4.4 Literature Review

This section presents the review from literature pertinent to the present study and theories focusing on lean principles and how it has benefitted operations in many industry sectors that could be adopted in the process of registering new students in USIM.

4.4.1 Introduction

Over the last two decades, lean techniques and principles have been applied for improving production systems in manufacturing processes and have had a profound impact on productivity. More recently, the method is used other than the manufacturing sector such as hospitals, government agencies, institution of higher learning and service industries.

The term "lean" was originated by Womack & Jones in 2003 that used it to describe the previously mentioned Toyota Production System. The method was able to produce more productivity while using fewer resources. Lean can be described as tools that comes in to help in identifying waste and provide guidelines on how it can be eliminated. Moreover, lean also focuses on cost effectiveness, time reduction, high quality of services and products. It is a customer-oriented principle as it provides high

satisfaction for customers to reduce bureaucracy and provides simplified processes. In addition, under lean principles, the customers can gain more benefits. There are reductions on human effort, time, space, machinery and materials, but the customers' needs are still fulfilled despite saving on all these resources.

According to Womack & Jones (2003) "all activities to design, order, and make a product can be sorted into three categories: (a) activities which create value for the customer, (b) activities which do not create value but are required by the current product development, order filling, or production systems and therefore cannot be eliminated and (c) actions which do not create value for the customer and can be eliminated accordingly". These non-value-adding activities or operations are waste, and in Japanese term, it is called as '*muda*'. The purpose of lean manufacturing is to reduce waste and the assurance of step flow remains.

A lean principle is a modern philosophy that has been the cornerstone of industrial and business organisations around the globe for a continual quality improvement and has grown into a manufacturing industry, which aims at eliminating non-value-added activities from the supply chain through the removal of waste.

4.4.2 Lean Techniques and Principles in the Administrative Context

Even though lean has been initiated and evolved in manufacturing, it has recently been applied with some degree of service effectiveness (Ruiz-Lozano et al., 2019). Organisation depends critically on administrative services through the correct techniques and principles where people and resources must be corresponded, quality and customer satisfaction must be supervised, orders must be processed, and deliveries need to be scheduled. Lean tools and techniques are implemented in the administrative

context. After waste detected and inefficient flow in the current process, the techniques and principles provide mechanisms to assess the degree of lean effectiveness.

4.4.3 Framework Implemented to Reduce and Eliminate Waste

Prakash Yadav et al. (2017) stated that the requirements are straightforward for Toyota company to implement the lean concept, the demand for variety is low, and the volumes are high, where it is extremely effective. The same applies to the administrative processes which these conditions can be applied for multiple service processes. In fact, without a proper tool, a lot of administrative processes are repetitive and can occur in high volumes; in which it occurs several redundant processes, similar possession/production of documents and inefficient costs.

Lean thinking shifts management orientation to maximize products and resources flow across entire value streams that runs horizontally across technology, properties, and departments, instead of optimising separate technologies, assets and vertical departments. After wastes are identified, proper techniques and principles are applied, and former processes are redesigned, it is crucial to introduce the right system or tools timely in order to obtain better results in an efficient manner.

4.4.4 Continually Improving the Process Using the Tools with The Goal to Achieve Perfection for Customer Satisfaction

Pearce and Pons (2017) stated that the weakness in some implementation approaches is the emphasis on tools which promote isolated improvement rather than optimising the entire production system. Thus, Azyan et al. (2017) stated, for further improvement in any process, it might involve managing supply and demand with just-

in-time (JIT) pull systems and level scheduling. In the registration process for new student intake has been analysed to achieve modernization and efficiency. Lean was described in the context of one method of continuous improvement that has shown potential within university's administrators, primarily to ensure quality in times through reduced budgets and increased efficiency.

4.4.5 The Use of Technology in Managing Registration Process

The rapid changes in the educational globalisation resources through the arrival of modern technology, the use of devices or the electronic interactive medium that delivers information to users has been commonly used in this millennial area. Such web applications have been developed to overcome the manual system weaknesses, which involves the registration through the conventional methods and time consuming. By understanding the limitations of the conventional ways, an electronic platform may ease the issue of ineffective manual system. Through the use of technology, managing educational resources are becomes more effectively. In the research by Noraziah et al. (2011), one of the strategies to improve the registration process is by developing an online registration process in a convenient and simplest way, thus reduce the cost of expenditure. The advent of technology indeed assists the administrator to keep record up to date and help the university keep track on their new student activities and provide them access to all facilities provided by the university.

4.5 Research Methods

In order to meets the objectives of this applied research, the data obtained from primary and secondary resources. Primary data refers to the information obtained first-

hand on the interest for the specific purposes of the case study. Secondary data refers to the information collected from the sources that already exist (Bougie, 2013).

The primary data consists of questionnaires has been distributed among the students from the previous year intake (Academic Session 2017/2018) to measure their level of satisfaction on the registration process which they had gone through in the past year. The findings will be deliberated further in the research methodology section.

On the other hand, the secondary data has been obtained from the relevant departments in USIM such as the Bursar Department, Division of Academic Management and Goal-ITQAN.

4.5.1 Introduction

This section describes the methodology of the research by which it refers to a systematic method used in conducting research and determining effective procedures to achieve the objectives of the research.

Research methodology concentrates on the specific process that involves identification, selection and analysing all the related information obtained from primary and secondary data. As indicated by Sekaran and Bougie (2016), research methodology can be defined as the stages used to gather the sources and data for the motive in the research decisions. Apart from that, it enforces researcher to be critically evaluate the method chosen in achieving the objective of the study. This section offers detail explanation regarding research design, sampling and population, instrumentation, data collection and data analysis. These processes will assist in enhancing the reader understanding about the research.

4.5.2 Research Design

Research design can be described as the structure of procedures to paste together the variety of research's components for handling the efficient research problem (Abutabenjeh & Jaradat, 2018). As stated by Creswell & Clark (2011), research design is an important aspect that needs to be considered by the researcher that refers to specific plan in manoeuvring the research. The process encompasses of problem statement determination, analysing research question, methodology, result analysis and writing justification and explanation. This applied research chooses descriptive research as the research design. Descriptive research can be defined as one of the research methods that explains the attribute of the population, phenomena or situations of the research as well the study (Samar, 2017). The form of descriptive analysis as the instrument has been utilised.

4.5.3 Research Population

Research population is an important approach in conducting a research. The determination of population before starting the research will help the researcher in directing the research align with the outlined objectives. Purposive sampling will be used to collect the data in completing this applied research. Purposive sampling is a form of non-random sampling that requires certain criteria in selecting the sample. The sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Creswell & Clark, 2011). Therefore, in this applied research, the population were from the first year, second semester students, who had enrolled to USIM during the previous semester's intake (September 2017/2018) are the identified respondents and the focus

group for this study. The survey is focused mainly on their satisfaction level on the previous registration process.

4.5.4 Sample Size

Based on the statistical report for new student enrolment for academic session 2017/2018 (undergraduate level) obtained from USIM's Division of Academic Management (2018), there was a total number of 2,406 students have registered. Thus, from that population number of the new students for the undergraduate level, a sample size could be calculated and determined by that number in order to conduct a survey. For this study, the population size has been determined by using the sample size formula based on desired accuracy with confidence level of 95% by Gill et al., (2010) in (Taherdoost, 2017). The description of minimum amount of sample size subset from population displayed as in Table 4.4.

Table 4.4: Sample Size Based on Desired Accuracy of 95%

Population Size	Variance of the population P=50%					
	Confidence level=95% Margin of error			Confidence level=99% Margin of error		
	5	3	1	5	3	1
50	44	48	50	46	49	50
75	63	70	74	67	72	75
100	79	91	99	87	95	99
150	108	132	148	122	139	149
200	132	168	196	154	180	198
250	151	203	244	181	220	246
300	168	234	291	206	258	295
400	196	291	384	249	328	391
500	217	340	475	285	393	485
600	234	384	565	314	452	579
700	248	423	652	340	507	672
800	260	457	738	362	557	763
1000	278	516	906	398	647	943
1500	306	624	1297	459	825	1375
2000	322	696	1655	497	957	1784
3000	341	787	2286	541	1138	2539
5000	357	879	3288	583	1342	3838
10000	370	964	4899	620	1550	6228

Source: (Taherdoost, 2017)

Based on the sample size of respondents as displayed in Table 4.4, the size of population respondents in the range of 2,000-3,000 people, the ideal sample size is 322 to 341 respondents respectively. However, the number of respondents was 1,980 which equals to 82% of the total population of the new student enrolment population in Academic Session (2017/2018) for the focus group of this study.

4.5.5 Research Instrument

Selection of instrumentation is important that drives a desired result aligned with the objectives of this study. According to Creswell & Clark (2011), the instrumentation selection is an important process that resembles the reality aspects that turns into specific numbers and values that can be interpreted accordingly.

The researcher had to review past researchers that had already done the research in order to construct the questionnaire. Therefore, research instrumentation (questionnaires) has been adopted from previous study conducted. The questionnaires developed were adopted from 'The Office of Institutional Effectiveness' (2003) regarding registration survey conducted towards the students and by Rahman and Bakar (2019) research on 'Exploring Users' Perspectives on Co-Curricular Registration System using TAM Model'. Li et al (2017) supported the statement by emphasize the accurate instrumentation will lead to empirical values that will indicate the right form of the statistic.

The justification of these instrumentations' selection is due to several reasons such as:

- i. The questionnaire constructed is depicted the definite idea that has been discovered previously.

- ii. The questionnaire constructed is fit with the objective of this research.
- iii. The questionnaire constructed can be use generally that has not developed by focusing on specific organisation or institution.

According to the justification listed, the instrumentation chosen is appropriated to be applied in the study that has not bind with any specific related industries. The questionnaire is practically used a specific language that can be understood by individual. Further action has been taken to coordinate the entire instrument chosen into one design of questionnaire. The questions developed incorporated with different segments that could ease the process of data collection in the next process.

The questionnaire has been divided into two sections, A and B. In Section A, it is to explore on respondents' demographic specifically the gender, age, and faculty of the students. In Section B, are the questions pertaining the student's satisfaction on new student intake registration process which consists of five questions. This study chooses specific 5 Point-Likert Scale that represents 1- Strongly Not Satisfied 2- Not Satisfied 3- Neutral 4-Satisfied 5- Strongly Satisfied. Likert scale is a psychometric scale usually included in research that deployed in questionnaire (Martín et al., 2018). The Five Point-Likert scales is employed in this study is to ensure that the response rate and response quality increased and it is relatively easier for respondents to understand (Joshi et al, 2015). On the other hand, Likert scales are employed as it has the advantage that the respondent does not expect a simple yes or no answer from the respondent, but rather allow for degrees of opinion, and even no opinion at all (Joshi et al, 2015). Therefore, quantitative data is obtained, which means that the data can be analysed with relative ease Besides that, the agreement term uses in the questionnaires as it allows respondents to answer more precisely, and it provides with more nuanced survey responses to

analyse (Joshi et al, 2015). It is commonly used to ask participants to rate a set of attitude statements using scales with common categories and in attitude measurement (Van der Linden, 2016). For the fifth question, it is the close-ended question, whereby the respondents need to tick in the box provided on the duration taken to complete the registration process.

The questionnaire constructed is in English as a medium of communication. According to “The Role of English in Present Day Higher Education” (Al-Khalil, 2017), English language has become an important language in any sectors such as banking, education, manufacturing, services and many more.

4.5.6 Validity

Validity refers to the degree to which the instruments can quantify the differences between individuals on the construct one seeks to measure. In this study, content validity was determined by an in-depth literature review and the usage of validated survey instruments from previous research. Besides that, an in-depth literature review was conducted to guarantee that the instruments covered the concepts intended for this study. The instruments were examined and approved by Panels of Supervisors Committee for Operations Management Module, Faculty of Economics and Muamalat, USIM in order to ensure the content and face validity. Their comments were provided below:

- i. Language: Panels have suggested that the language used in the questionnaire should be proofread in a way to capture respondents understanding.
- ii. All the title of the questionnaires must be in English to avoid misunderstanding either to the researcher or respondent.

- iii. Set of questionnaires must be with the serial number to help the researcher to analyse information better and avoid any repetitions of the same respondent.

4.5.7 Pilot Study

Before the process of collecting data taken place, a pilot study has been conducted. A pilot study refers to the mini version of a full-scale study or a trial run conduct in planning of the whole study. It is also known as a 'feasibility' of the study. Gay et al. (2011) stated that pilot study is conducted to ensure the researchers are able to interpret valuable data. The measuring instruments used to collect those data must be both valid and reliable. In addition, it also serves as a platform to verify appropriate instrument in collecting data for the actual study.

Pilot study is an approach that has been implemented by researcher using a questionnaire instrument to conduct a survey (In, 2017). For this case research, 10 respondents among the 1st year/ 2nd semester students, academic session 2017/2018 were involved in the pilot study. Although it was a small quantity, it has same preferences in actual study. The systematic practice of a pilot study was useful to help the researcher to understand the process of conducting a survey well (Becker et al., 2017; Heaton et al., 2016; Johnston et al., 2017; Pedder et al., 2016). Furthermore, a pilot study led to additional look at the consistent quality of the instrument.

Further, all information obtained from the pilot study analysed using the IBM SPSS 23 to identify the reliability of the questionnaire. Data obtained by using internal consistency reliability of coefficient alpha or also known as Cronbach's Alpha co-efficiency, and according to Muijs (2004), the instrument is internally consistent and reliable if the test result is over 0.7.

Cronbach's Alpha was additionally performed to test the consistent quality and consistency of the more significant part of the measurements, which will be gained from an exploratory element examination. It demonstrated that the instrument utilized was dependable. The result of the pilot test as shown in Table 4.5 provided helpful information on the questionnaire design, wording, and measurement scales. Thus, it gives a clear picture to the researcher to plan and execute on fieldwork based on the time obtained.

Table 4.5: Reliability Analysis of the Dimension

Variable	Cronbach's Alpha	N of Items
Level of Satisfaction Among the Students During the Registration Process	0.954	5

The validity and reliability test were necessary because of the researcher must ascertain that the instrument used were fully examined and consistent with the allocated time (Lee et al., 2016). Validity is a vital venture at the present examination, paying little mind to whether the exploration is qualitative or quantitative (Creswell, 2012). Lee et al. (2016) discovered validity as suitability, rightness, importance, and value of the derivations focused on the information gathered.

Creswell (2008) stated that reliability of the question guarantees a quality when the scores from an instrument are steady and reliable. Meanwhile, Lee and Seomun (2016) characterized dependability as the consistency of the scores obtained and how predictable they are for every involved in the research.

4.6 Data Collection

4.6.1 Introduction

The study was conducted among the students from the 1st Year/ 2nd semester, who had enrolled to USIM during the previous semester's intake (September 2017/2018). Online survey has been carried out by the Division of Academic Management by requesting to fill in the survey questions through the *iStudent* Portal. Data were collected to measure the level of satisfaction with the previous registration process. Out of the total number of 2,406 1st year/ 2nd semester, 1,980 students have responded which equivalent to 82.2%.

Based on the sample size of the respondents that has been calculated by using the Table for Sample Size of Respondents as stated in the sample size section, it was recommended the ideal sample size of this study was in the range of 2,000 to 3,000 people, the ideal sample size is 322 to 341 respondents respectively. However, in this study a total number of 1,980 respondents' data has been collected for this study that refers to 82% of the total population of the new student enrolment population in Academic Session (2017/2018) for the focus group of this study.

4.6.2 Data Analysis

Information data analysis was divided into descriptive statistic. The information data was coded into and analysed with the IBM SPSS 23 by Einspruch (2005). The information data obtained are analysed by using descriptive statistic. The description of the following research objective was described below. In achieving the research objective, the findings used percentage, frequency, mean and standard deviation as representative of the descriptive data analysis. According to Kim et al., (2017), in conducting a descriptive analysis, the information that has been obtained need to be

in a set of data. Meanwhile, according to (Devlieger et al., 2016), mean used to analyse each score in the distribution. The standard deviation was conducted to measure the data dispersion (Boley et al., 2017).

4.6.2.1 Findings Derived from the Survey

Descriptive analysis was utilized to generate a description of the data obtained from the study. The study's concise research is on the registration process during the new student intake in USIM and to measure the level of students' satisfaction for the registration process was clarified by the respondents' number (N), mean and standard deviation.

4.6.2.2 Demographic Profile of Respondents

As illustrated in Table 4.6, out of the total number of 2,406 student of 1st year/ 2nd semester, 1,980 students have responded which equivalent to 82.2%. In terms of gender, it shows that female respondents have the highest percentage with 57.7% (N=1143) while male respondents are 42.3% (N=837). For the age range, the age range between 18 to 20 years old is 79.1% (N=1567). The age range between 21 to 23 years old is 19.5% (N=386) followed by age range between 24 to 26 years old with 1.4% (N=27).

In terms of participation from the faculty. The highest percentage were from Faculty of Science and Technology (FST) with 23.1% (N=457) followed by Faculty of Quranic and Sunnah Studies (FPQS) with 20.7% (N=410). Next, 18.3% (N=362) were from Faculty of Leadership and Management (FKP) while Faculty of Syariah and Law

(FSU) with 15.3% (N=302). Faculty of Major Language Studies (FPBU) with 12.6% (N=249) and Faculty of Medicine and Health Sciences (FPSK) with 5.0% (N=99).

Second lowest with 3.3% (N=65) were from Faculty of Economics and Muamalat (FEM) and least respondents with 1.76% (N=35) were from Faculty of Dentistry (FPg). There is no participation from Faculty of Engineering and Built Environment (FKAB).

Even though, the result does not represent the entire faculties and all students from the 1st year/ 2nd semester students in USIM, but this study represents and reflects the majority of the students from the 1st year/ 2nd semester in USIM with 82.2% out of the whole students' population of the previous registration process for new student intake.

Table 4.6: Demographic Profile of Respondents (Undergraduate Students)

Description		Frequency (N)=1980	Percentage
Gender	Female	1143	57.7
	Male	837	42.3
Age	18-20	1567	79.1
	21-23	386	19.5
	24-26	27	1.4
Faculty	Faculty of Science and Technology (FST)	457	23.1
	Faculty of Quranic and Sunnah Studies (FPQS)	410	20.7
	Faculty of Leadership and Management (FKP)	362	18.3
	Faculty of Economics and Muamalat (FEM)	65	3.3
	Faculty of Medicine and Health Sciences (FPSK)	99	5.0
	Faculty of Major Language Studies (FPBU)	249	12.6
	Faculty of Engineering and Built Environment (FKAB)	0	0
	Faculty of Dentistry (FPG)	35	1.76
	Faculty of Syariah and Law (FSU)	302	15.3

4.6.2.3 Students' Level of Satisfaction Towards the Registration Process

Based on Table 4.7, it was recorded that the students were Strongly Not Satisfied (N=1,584, =80%), Satisfied (N=396, =20%) with the registration process that leads to mean of 1.87 (SD=.834).

For duration taken to complete the registration, it was recorded that the students were Strongly Not Satisfied (N=1,624 =82%) and Satisfied (N=356, =18%) that leads to mean of 1.84 (SD=.852) which indicates the students were strongly not satisfied with the duration taken to complete the registration process.

Meanwhile, the students were also not satisfied with the service given from the staff during registration process with Not Satisfied (N=1103, =55.7%), Satisfied (N=877, =44.3%) that leads to mean of 1.86 (SD=.826). Nevertheless, the student expressed their dissatisfaction in regards with the efficiency of the registration process of new student intake with Strongly Not Satisfied (N=1,884, =95.2%) and Satisfied (N=96, =4.8%) with a total mean of 1.93 (SD=.807).

Finally, on duration taken to complete the registration process, only 36 (1.8%) respondents spent 20 to 40 minutes to complete the registration process while 380 (19.2%) respondents spent between 40 to 60 minutes. Majority of the students of 1,564 (79.0%) spent more than 60 minutes to complete the registration process. (See Table 4.8).

Table 4.7: Students' Level of Satisfaction Towards the Registration Process

Questions	N	Minimum	Maximum	Mean	Std. Deviation
I am satisfied with the registration process	1980	1	3	1.87	.834
I am satisfied with the duration taken to complete the registration	1980	1	4	1.84	.852
I am satisfied with the service from the staff	1980	1	4	1.86	.826
The registration process for new student intake is efficient	1980	1	4	1.93	.807
How long does it take to complete the registration process?	1980	1	3	2.41	.723
Valid N (listwise)	1980				

Descriptive Statistic

Questions	N	Strongly Not Satisfied	Not Satisfied	Neutral	Satisfied	Strongly Satisfied
1. I am satisfied with the registration process	1980	N=1584 (80%)	N=396 (20%)			
2. I am satisfied with the duration taken to complete the registration	1980	N= 1,624 (82%)			N=356 (18%)	
3. I am satisfied with the service from the staff?	1980	N=2 (2.0%)	N=1,103 (55.7%)		N=887 (44.3%)	
4. The registration process for new student intake is efficient	1980	N=1,884 (95.2%)			N=96 (4.8%)	

The duration taken to complete the registration process.

Table 4.8: Duration Taken by The Students to Complete the Registration Process

How long does it take to complete the registration process?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-40 Minutes	36	1.8	1.8	1.8
	40-60 Minutes	380	19.2	19.2	21.0
	More than 60 Minutes	1564	79.0	79.0	100.0
	Total	1980	100.0	100.0	

4.7 Discussion on the Findings

Generally, from the findings on the level of satisfaction among the students during the registration process, it has demonstrated that majority of the students (n=1.584) which equivalent to 80% were strongly not satisfied and (n=396) were not satisfied with the registration process they had gone through in the previous year. It shows that, there is need for improvement in terms of the administration procedures and operations.

Based on the discussion among the Management Team on the issue pertaining to the registration process which was held as mentioned in Section 4.2.1, the inefficiencies identified were as follows:

i. Weakness in the Process Flow

The administrator of the relevant Division did not set up the timetable and subjects that will be taken by the students during their first year of studies which do not help to improve the process flow of the registration. It would be much easier if the timetables and course subjects were arranged in advance prior to the registration day.

ii. The Venue (DTC Hall)

The registration held at DTC Hall does not accelerate the registration process. It exerts restricted mobility on the students. The students need to travel or move from DTC Hall to the residential college. The movement by the students from one place to another has brought to uncomfortable feelings among the students.

iii. Waste in terms of Time

Findings derived from the survey has demonstrated the students' satisfaction level towards the duration taken to complete the registration. The result illustrates the low level of satisfaction on the duration to complete the registration. Hence, an ideal solution or techniques to eliminate wasted time is needed in this administrative operation services. This is supported by the findings which shows the time duration taken to complete the registration, in which has portrayed that most students spent more than 60 minutes to complete the registration process. The transportation time (movement from one counter to another) and waiting time was a bottleneck and resulting in time wasting. To illustrate and quantify the issue raised by the students, the detail process of the registration will be quantified. As what has been illustrated in Table 4.1 on steps to be

taken by the students in the current registration process and Figure 4.1 on the lay out (floor plan), it has clearly described the steps and flows to be followed by the students for the process from one counter to another. The ideal time for each student to complete the circle of the process had also been determined by USIM's IT Department.

However, based on the time duration recorded by USIM's IT Department during the previous registration process session, it has shown that the bottleneck of the process was due to the waiting time from one counter to another. The actual or ideal duration taken is approximately 36 minutes per student to complete the entire processes. But, due to the transportation time (movement from one counter to another), waiting time and queue at each counter, the total time taken by the student can reach up to 56 -71 minutes to be completed per student. It can be quicker if the flow is smoother which mostly affected by the queue of the students and the waiting time to go from one counter to another. The waiting time to complete the process from one counter to another as recorded by the staffs was approximately 1 to 5 minutes per student as tabulated in Table 4.9.

Table 4.9: Time Recorded for the Registration Process

COUNTER	PROCESSING IDEAL TIME (in Minutes)	WAITING TIME FROM ONE COUNTER TO ANOTHER (in Minutes)
A	2 mins.	3-5 mins.
B	4 mins.	3-5 mins.
C	4 mins.	3-5 mins.
D	5 mins.	3-5 mins.
E	2 mins.	1-2 mins.
F	3 mins.	1-2 mins.
G	2 mins.	1-2 mins.
H	2 mins.	2-4 mins.
I	5 mins.	1-2 mins.
J	7 mins.	2-3 mins.
Total	36 minutes	20-35 minutes

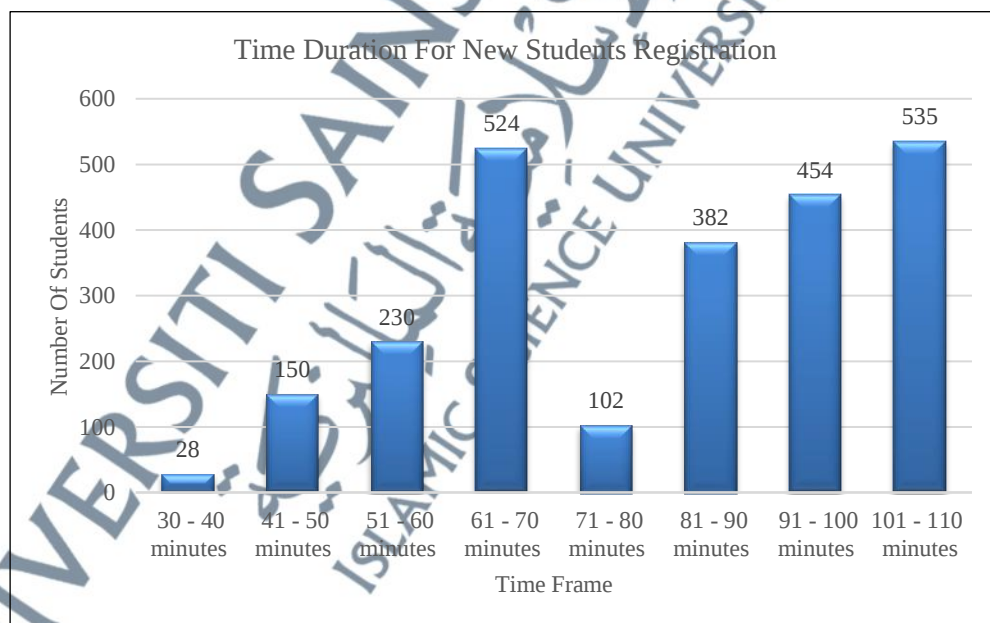
Source: Goal-ITQAN, USIM

However, the total time taken by the students to complete the registration process was varied. The recorded time obtained by deducting the time of barcode scanning at counter J with the initial scan time at counter A. These data are tabulated as in Table 4.10.

Table 4.10: Time Duration for New Students' Registration

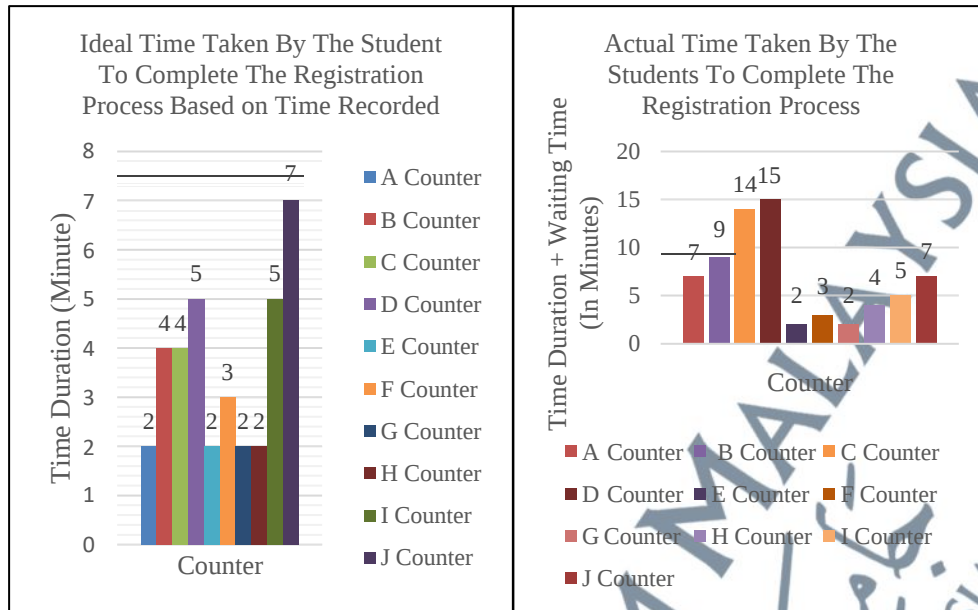
Time frame	Number of Students
30-40 minutes	28
41- 50 minutes	150
51-60 minutes	230
61-70 minutes	524
71- 80 minutes	102
81-90 minutes	383
91-100 minutes	454
101-110 minutes	535
Total	2,406 students

Source: Goal-ITQAN, USIM (2018)



Source: Goal-ITQAN USIM (2018)

Figure 4.4: Time Duration for New Students' Registration



Source: Goal-ITQAN USIM (2018)

Figure 4.5: Ideal Time vs Actual Time Taken by the Students to Complete the Registration Process

Findings derived as indicates in Table 4.8 and Figure 4.4 and the comparison shown in Figure 4.5 on the ideal time taken compared to the actual time taken by the student, it is noticed that the time required by each student to complete the registration process and the time required answered by the students in the survey question has a resemblance.

The waiting time queuing from one counter to another which took them between 1 to 5 minutes waiting time at each counter to complete the process from Counter A to Counter J. It was clearly indicated that the time recorded by the IT staff has a resemblance.

iv. Discrepancies in Managing Workforce

Further, from the findings, it was also mentioned that the satisfaction level of the services from the staff during the registration process. The satisfaction level was just above the average. Thus, the Management needs to identify the factors affecting the service of the staff. This is the room for improvement that the University should take

care of to avoid further mistakes that may lead to the churn of human resource wastes.

In addition, the outcomes from various related department also demonstrated that the cause for the slow registration process was due to other factors too such as:

- i. waiting area was too crowded since the students called to register at the same time.
- ii. waste of space also proven by the usage of the laptops during the registration day to compile student's data as well as converting them to hardcopy files, which then consuming space to store the files.
- iii. Too many equipment, tools and stationeries were positioned at the same location at *Dewan Tuanku Canselor* (DTC) Hall. This also creates waste in terms of space provided. Then, waste of space also proven by the usage of the laptops during the registration day to compile student's data as well as converting them to hardcopy files, which then consuming space to store the files.
- iv. The flow of the registration process itself creates space waste, as ten (10) counters were needed to carry out the registration process. In addition, from one angle, the use of *Dewan Tuanku Canselor* (DTC) Hall itself can be characterized as space waste due to its location. It is more useful if it is being used by other parties for other purposes or activities that can generate income to the university.
- v. In terms of financial expenditure, the current registration process incurs several wastes in expenditures, such as staff payroll. By conducting over the weekends, USIM needs to spend more on the staffs' overtime rate. Prior to the registration process high expenditure was already spent on postage via *Poslaju*, when individual offer letter has been sent to successful candidate. The usage of the DTC Hall is underutilized and due to its location, extra transportation cost to commute registered students to their respective residential colleges.

4.8 Models and Formulae Used

There are various Operations Management tools and models across the discipline which are designed to help organisations to develop their action plan in order to achieve their goals. However, for this case research, the lean principles and techniques, Business Process Reengineering (BPR) and the Value Stream mapping (VSM) Model are seen as the most appropriate models to be used due to its principles and framework to overcome the existing scenario faced by the organisation to accomplish the desired outcome.

4.8.1 Lean Principles and Techniques

Information gathered from the findings can be concluded as an issue of inefficiency and waste in terms of process, workforce, time and cost. A lean approach, which is originally to eliminate waste and inefficiency in its manufacturing operation is adopted to the administrative processes. Even though lean was initiated and evolved in manufacturing, it has recently been applied in services with some degree of success (Castaldi et al., 2016). Lean method is also designed to identify waste or redundancies to save cost and develop an efficient process for new students' registration.

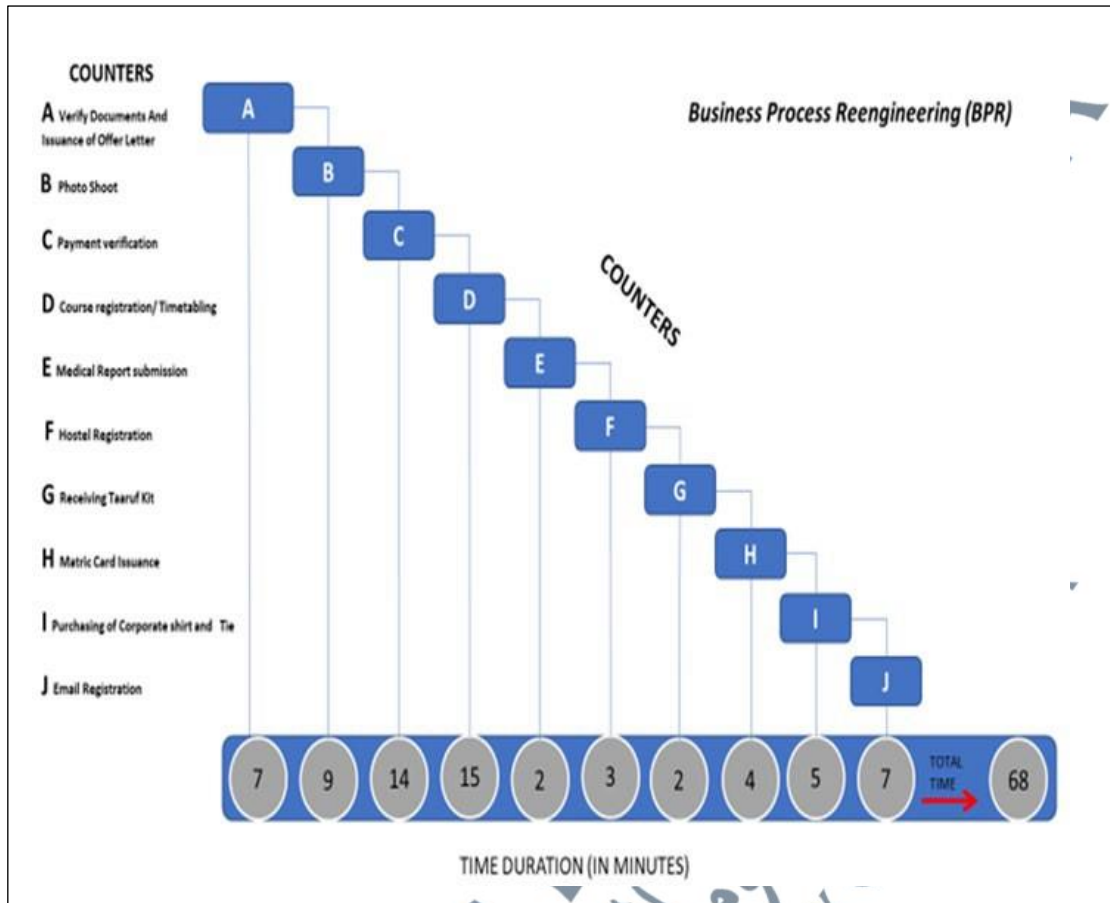
Existing applications of lean in service contexts are presented where its approach and techniques meant to reduce waste, focus on customer value, standardize work, make steps flow, reduce inventory, increase employee involvement and taking a holistic perspective. Gupta et al. (2018) mentioned that the customer becomes part of the value creation of the organisation and the organisation seeks to find to find opportunities for creating greater value for both the customer and the organisation.

4.8.2 Business Process Reengineering (BPR)

In an article by Hammer (1990); entitled Reengineering Work: Don't automate,

obliterate in the Harvard Business Review, August 1990, the study adopted and developed a framework for implementation of the Business Process Reengineering (BPR). It is a proper execution in operations, which not only increasing the profit but driving growth. Business process reengineering is the act of recreating a core business process with the goal of improving product output, quality, or reducing costs. The process involves enforcing change in an organisation; tearing down something people are used to and creating something new.

In this process, typically, it involves the analysis of organisation workflows, finding processes that are sub-par or inefficient, and figuring out ways to get rid of them or change them. Figure 4.6 shows the total time taken by the students from Counter A to Counter J which includes the processing and the waiting time based on the Business Process Reengineering (BPR) which leads the researcher to improve the workflows of the registration process for this coming new student registration process in September 2018.

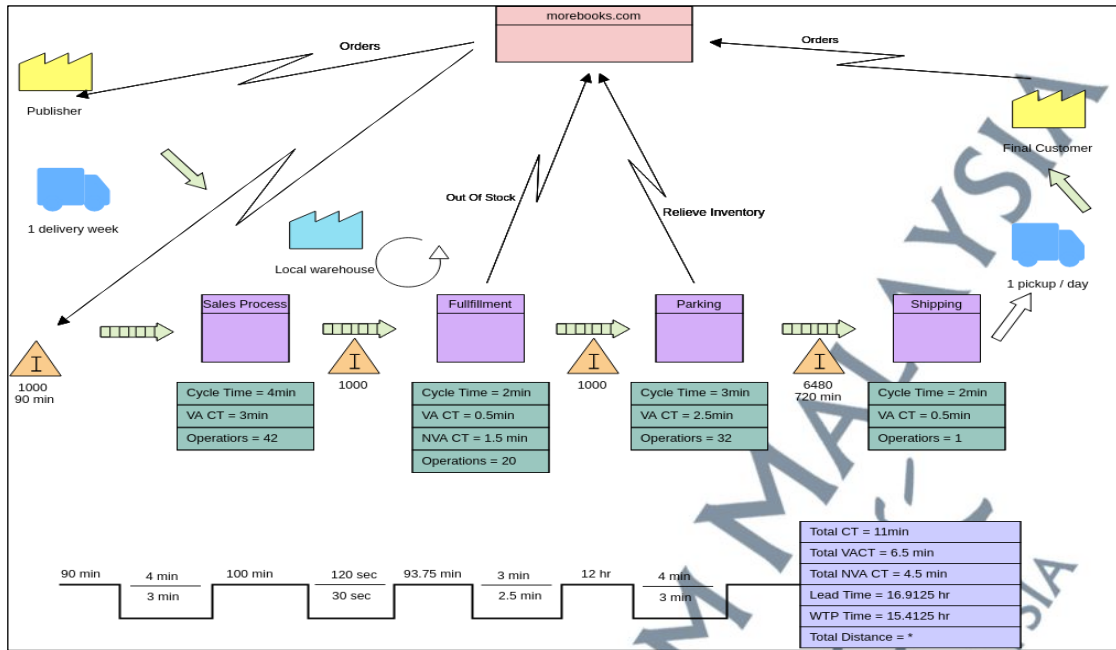


Source: Developed for the Current Study

Figure 4.6: Business Process Engineering Model (BPR)

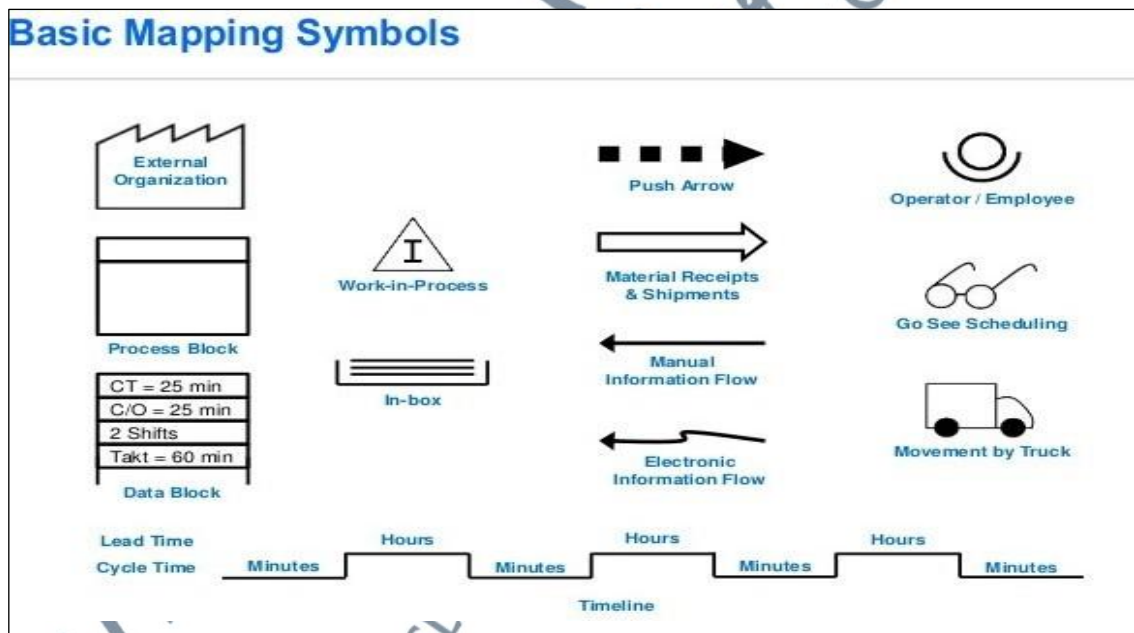
4.8.3 Value Stream Mapping (VSM)

One of the most effective Lean Method to apply in this context is Value Stream Mapping (VSM). Pearce & Pons (2017) claimed that VSM defines a desirable future state, illustrates the current state of processes, and clarifies the path of improvement. It is a method for analysing the current situation and designing a future state for the series of events that take a product or service from its beginning with reduces lean wastes as compared to current map. Value Stream Maps are usually drawn using a set of standard symbols, which are illustrated in Figure 4.7 and Figure 4.8.



Source: Karen Martin (2010)

Figure 4.7: Sample Illustration of Value Stream Mapping (VSM)



Source: Karen Martin (2010)

Figure 4.8: Basic Mapping Symbols for Value Stream Mapping (VSM)

The purpose of Value stream mapping is to identify and remove or reduce "waste" in value streams that increase the efficiency of a given stream value. Waste removal increases productivity by creating leaner operations that effectively facilitate waste identification and quality issues. Value Stream Mapping provides has supporting methods that are often used in lean environment to analyse and design flows across multiple processes. Value Stream Mapping usually utilizes standard symbols to represent items and processes, therefore knowledge of these symbols is essential to correctly interpret the production system problems. No mapping technique fits every situation and purpose. In the case of USIM's new student intake registration process, the researcher used the symbols to represent items and processes as Figure 4.9.

4.9 Potential Impact and Recommend Solution to the Organisation

The overall success of the university depends on how crucial the university can attract and retain students. Little attention was paid to the admissions and enrolment process can shake the foundation of the university's image on the initial stage. Besides applying the Business Process Reengineering Model as shown in Figure 4.6, by identifying waste in terms of complaints for weaknesses, cost inefficiencies and time, an instrument in terms of tools or system can be designed to overcome the situation. Lean clarified what is desirable in terms of value creation, smooth flow of materials, and so on as well as what is undesirable, which is waste. Lean is also a problem-solving and action tool or instrument. It is a continually improving process tools with the goal to achieve perfection for customer satisfaction.

Pearce and Pons (2017) stated that the weakness in some implementation approaches is the emphasis on tools which promote isolated improvement rather than optimising the entire production system. Thus, Azyan et al. (2017) stated, for further

improvement in any process, it might involve managing supply and demand with just-in-time (JIT) pull systems and level scheduling. In the registration process for new student intake has been analysed to achieve modernization and efficiency. Lean was described in the context of one method of continuous improvement that has shown potential within university's administrators, primarily to ensure quality in times through reduced budgets and increased efficiency.

To initiate the application of Value Stream Mapping towards new student intake registration process, the researcher must identify types of wastes according to lean even though the researcher has initially identified waste according to Process, Time, Workforce, Space and Expenditure.

4.9.1 Types of Wastes According to Lean

Types of Waste identified in new student intake registration process according to Lean are as follows:

1. Expenditure of Resources That Does Not Add Value for the Customer

According to Gopinath (2019); Liker (2018), waste is any expenditure of resources which does not add value from the customer's point of view.

- a. In the context of USIM's registration for new student intake, the expenditure that does not add value for the students are as follows:
 - i. USIM has to pay overtime to staff who are eligible to claim when working during weekends.
 - ii. USIM's *Dewan Tuanku Canselor* (DTC) Hall as the venue for the registration day.

- iii. Sending offer letters to the successful candidates to their respective home address via the post.
- b. In the context of information management, Vollman (2017) included waste into the additional actions and inactivity as a result of not providing the customer with an adequate amount of information. This is proven when:
 - i. The administrator of the relevant department did not prepare the class timetable and list of subjects in advance prior to the first-year subjects of studies before the registration day.
 - ii. Students came to register at the same time as they are not being provided with specific or segregated time based on faculty to attend the registration.
- c. Information overflow

Based on point overflow of information, providing overproduction in resources is even less apparent because there is less flow of information. Generating more information than needed is a waste of effort and can lead to other forms of waste, including excess inventory and extra processing. Overproduction does not occur in the same way in administrative processes. This type of waste is therefore named “information overflow” since the major type of “overproduction” that can occur in administration is when too much information is generated. Overproduction is less visible in services since there is less material generated.

In USIM’s context, the registration for new student intake are as follows:

- i. Converting students’ data to hardcopy files where unnecessary storage of information is generated.

- ii. Dissatisfaction in terms of the duration taken to complete the registration process shows that unnecessary process flow exists.

d. Waiting

According to Thomas et al. (2016), when waiting happens, the upstream process does not take place on time, a normal phenomenon in services that affects consumer satisfaction; Matthews and Gheorghiu (2016) have added that waiting is the result of certain issues such as improper office layouts, data entry errors, lack of standardization, or poorly designed IT systems.

In USIM's context, it has been identified as the main waste and the major problem of registration process:

- i. The flow of the registration process itself needs to be improved as students had to go through lengthy process to complete the registration.
- ii. Majority of students spent more than sixty (60) minutes to complete the registration process as they need to move from one counter to another (transportation time), queues and waiting for their turns.

e. Extra Processing

In administration, extra processing has to be performed as a result of mistakes or missing information. Correcting and verifying information is time-consuming and can be prevented and may include generating new information and/or acquiring additional information.

- i. During the course registration and timetabling issuance whereby, the students need to show again their offer letter to the staff for the confirmation of subjects' registration and to print out the class timetable.

f. Excess Inventory

Inventory is less visible in services but has certain impact, occurring as unfinished work or customers waiting for service. Conversely, excessive inventory may mean storing so much information as Parsa and Rossetti (2018) termed this "flow excess" which he described as storing excessive amounts of information partly due to a poor understanding of its current and potential value.

The following are in the context of USIM 's registration for a new intake of students:

- i. In the *Dewan Tuanku Canselor* (DTC) Hall too many equipment, tools and stationeries have been placed at the same location.
- ii. Usage of the laptops to compile student data and convert it to hardcopy files during the registration day.
- iii. Preparation of the student data and information in hardcopy files.

g. In Motion

Ha et al. (2016) describes "motion" in information management as the time and resources spent trying to identify the information elements that need to flow named as "flow demand". In services, Hecklau et. al. (2016) reported that the layout of buildings can cause unnecessary movement by employees to reach certain equipment. Camboim et al. (2019) added that due to the configuration of the facilities, customers may need to move around unnecessarily due to the layout of facilities. Similar explanations for registration of new students in USIM are as follows:

- i. The flow of the registration method itself create waste, as it took ten (10) counters to complete the registration process. The process that requires a longer transportation time (moving from one counter to another).
- ii. Waste and cost incurred for travel from the DTC Hall to the residential colleges.

h. Defective Information

According to Peeters and Widlak (2018) stated that defects in administrative procedures are incomplete or insufficient details, including, though not limited to, data entry errors, inadequate information collected and poor-quality inputs from customers. O'Shea (2016) has named defective information as "flawed flow" and explains it as the resources and activities that are necessary to correct or verify information to ensure information completeness and accuracy.

In the context of USIM 's registration for new student intake this type of waste may not be much related.

i. Lack of Standardization

According to Paterakis et al. (2017), the companies are distinguished by a higher degree of variation of consumer demand. Nonetheless, specific operation procedures are repetitive and can be more effectively carried out by standardization. As reported by Agha Kasiri and Mansori (2016), the lack of standardization in routine procedures causes variation in lead times and waiting times, which are inconvenient for customers. There is standardization in terms of flow in the case of current student registration process, but the time required by the processes needs to be improved and more customer friendly.

j. Underutilization of People 's Talents and Systems Capabilities

Unused human potential leads to loss of motivation and creativity among the staff. It often refers to lost opportunities to carry out activities more effectively. In case of USIM, the issue in registration for new students' intake indicates: the satisfaction level towards staff is not at the satisfactory level.

4.9.1.1 Waste Removal Operations

After identifying Types of Waste according to Lean, it will then remove wastes according to categories set by Value Stream Mapping (VSM tools). Naslund (2008) identifies three types of operations for waste removal, namely:

- a. Non -Value Adding Operations (NVA)
- b. Necessary but Non-Value Adding (NNVA)
- c. Value Adding (VA)

i. **Non-Value Adding Operations (NVA)**

Logistic operations that should be eliminated. In this case, any practices, procedures and material that are considered waste and should be eliminated to improve the process:

- i. USIM shall pay overtime claims to staffs who are working during weekends.
- ii. Unsuitable location. Rather than have it at *Dewan Tuanku Canselor* (DTC) Hall, it is far easier to have it at the residential colleges which not only minimize the time travel from DTC Hall to residential colleges but also minimize the cost expenditure of the university.

- iii. Sending offer letters to successful candidates for admission via post to their respective home address.
- iv. Converting students' data to hardcopy files where unnecessary storage of information is generated.
- v. Majority of students spent more than sixty (60) minutes to complete the registration process.
- vi. Preparing the students' data in hardcopy files.
- vii. Waste incurred for the movement of the students moving from DTC Hall to residential colleges.
- viii. The satisfaction level towards staff is not at the satisfactory level.

ii. Necessary but Non-Value Adding (NNVA)

Actions which are wasteful but necessary under current operating procedures and in this case, for USIM's registration of new student intake.

- i. Students can register at the same time because they are not arranged specific or different time to attend the registration. Segregation of time for registration will create convenience in waiting time, space in waiting area, reduce time to complete the registration, thereby improving the satisfactory quality of service.
- ii. Too many equipment, tools and stationeries were positioned at the same location at *Dewan Tuanku Canselor* (DTC) Hall. Equipment are necessary even though it may not add value but reducing the number of equipment, tools and stationeries will minimize unnecessary waste and losses.
- iii. The usage of the laptops during the registration day to compile student's data and converting them to hardcopy files. The usage of laptop should be

minimized to registration of the courses only, not converting data to hardcopy files.

- iv. The flow of the registration process itself creates waste, as ten (10) counters were needed to carry out the process. The number of counters should be minimized, as it brings cost implication even though it is essential in registration process.
- v. The level of customer satisfaction is not at par. The stakeholders' degree of service satisfaction will be improved as USIM has invested extensively in hiring and training.

iii. Value Adding (VA)

In production terms, it is a conversion of processing of raw materials via manual labour. In services terms, by generating these items, it will produce service profit in terms of customer satisfaction.

- i. There is a standardization in terms of flow, but the processes need to be strengthened and customer friendly. That would help in the final product by having greater customer satisfaction. In this case, the students are the customers. The satisfaction for the duration taken for the registration is extremely low, showing that there is unnecessary process flow.

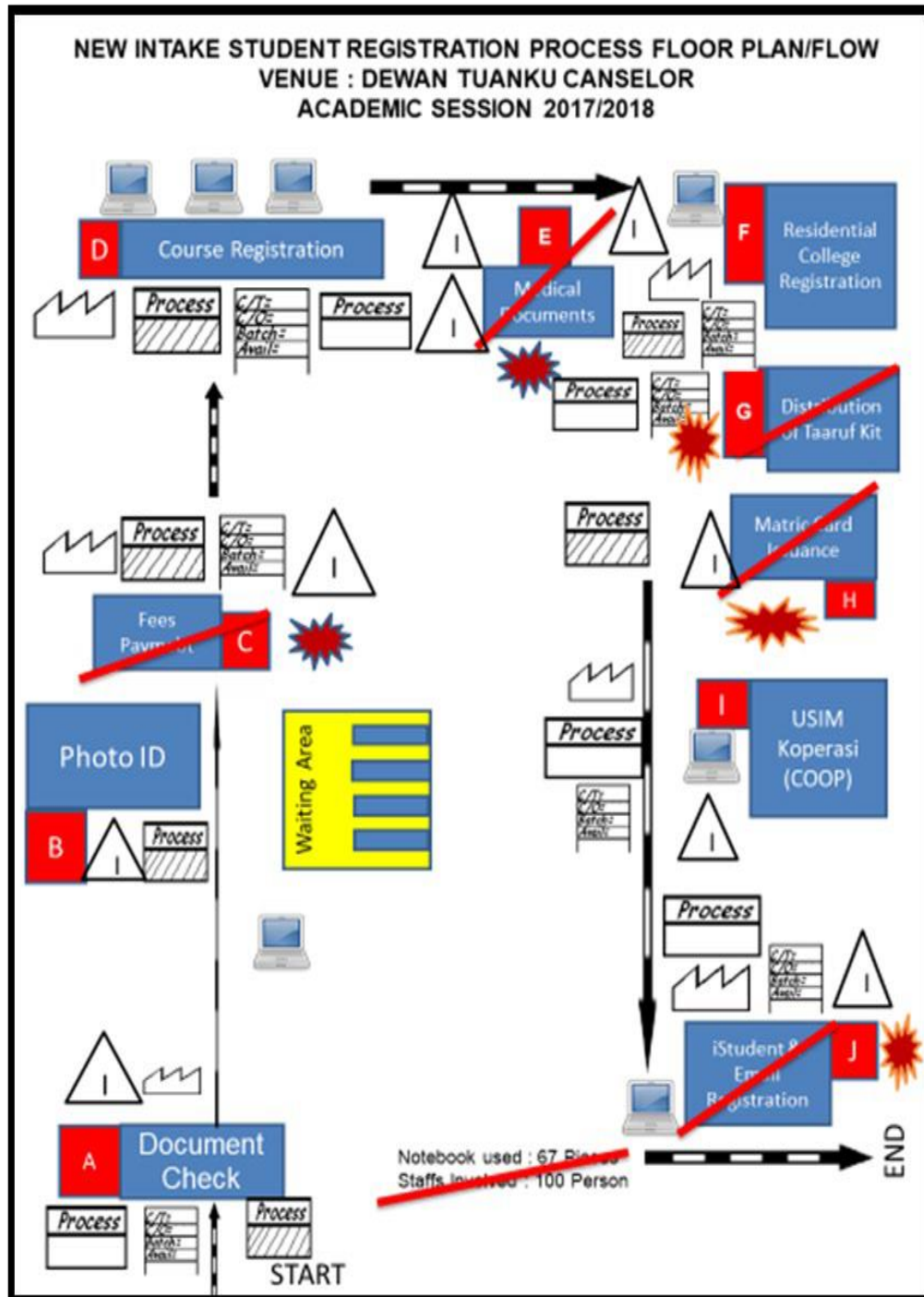
In this situation, the process flow is a must to maintain customer satisfaction, but needless the flow needs to be cut-off or eliminate totally to cut short the process.

- ii. The administrator of the relevant department did not set up in advance the timetable and subjects that will be taken by the students during their first year of studies. In fact, it is much easier for administrator to set up the

timetable and subjects earlier before the registration day which is based on courses and subjects to be taken during first semester. This small change will add value to USIM since it creates a user-friendly environment and higher students' satisfaction.

Value Stream Mapping has supporting methods that are often used in lean environment to analyse and design flows at the system level across multiple processes. It is also used in logistics, supply chain, service-related industries, healthcare including administrative and office processes. A map drawing of value stream, locating Non-Value Adding Operations (NVA), Necessary but Non-Value Adding (NNVA) and Value Adding (VA) steps to be located in certain position on the map. The activities become easily separated into the value stream where he calls the value stream "the process" and the non-value streams "the operations".

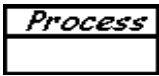
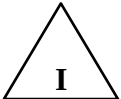
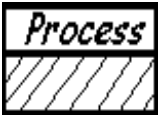
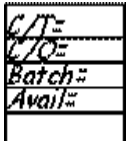
In the context of new student intake registration process, this can be applied by identifying all types of wastes in the process flow as illustrated in Table 4.11; eliminating all Non-Value-Added Wastes, improving the conditions or minimizing Necessity but Non-Value Added Wastes as well as maintaining Value Added but improving performance and minimizing productions. Suggested value stream mapping is illustrated in Figure 4.9 and Figure 4.10.



(Source: Developed for The Current Study)

Figure 4.9: Value Stream Mapping Through Registration Process Flow

Value Stream Mapping (VSM) symbols vary in different places, but they fall into the categories of process, material, information and general. Some of the symbols can be complicated, although some simply imply their meaning in a layman's term, depending on the industries related.

	Represents wastes that will be eliminated in the registration process. It will reduce time, eliminate excessive inventories, human resources, costs and will not be replaced by any other process or counter.
	It is called "Dedicated Process Flow". It is a fixed activity flow according to VSM symbols and with reference to the registration process. It is a fixed flow to smoothen the registration process.
	Represents customer or supplier in which they are located at. In terms of registration process, customer will be located at all places in accordance with the flow of the registration.
	Inventory icons represents inventory between processes. In this context, it represents computers, printers, cameras and others relevant important assets for registration. Inventory are reduced into 5 different locations after elimination of wastes instead of ten locations as per current registration process.
	Shared process icon represents process, operations shared by other departments/ parts that other value stream families share. In the context of registration process, other related departments including which involved in the registration process share the process flow; reaching to each of departments by turns through the process.
	Data Box is about the process step, such as cycle time, change over time and uptime. In the registration context, the location of the data box is a suggestion for administration to record the process step of the new flow to identify whether this new registration flow is improved or worsen compared to the current. Data box may also be at the start and end process which enable the administrator to record the time taken for the registration.
	Push Arrow Icon: represents the "pushing" of material from one process to the next process.
	Kaizen burst sign: represent dramatic improvement can be done in the process flow

Source: Karen Martin (2010)

Figure 4.10: Value Stream Mapping Process Symbols Meanings and Interpretation Based on The Registration Flow Diagram

Table 4.11: Value Stream Mapping: Waste Removal Operations and Actions to be Taken

TYPES OF OPERATION		ITEMS		ACTIONS TO BE TAKEN
1. NON-VALUE ADDING OPERATION	1.1	USIM pays overtime to staff working during weekends.	1.1.1	Organize the registration day during weekdays.
	1.2	Movement of the students moving from DTC Hall to residential colleges	1.2.1	Relocate venue to residential colleges
	1.3	Venue for registration day at <i>Dewan Tuanku Canselor</i> (DTC) Hall.	Eliminate item 1.3 to 1.7	
	1.4	Sending offer letters to successful candidate's respective home address via the post.		
	1.5	Converting students' data to hardcopy files		
	1.6	Majority of students spent more than 60 minutes to complete the registration process.		
	1.7	Preparing the hardcopy files of students' data		
2. NECESSARY BUT NON-VALUE ADDING	2.1	They are allowed to register at the same time as they are not provided with specific or segregated times to attend the registration.	2.1.1	Segregation of time for registration
	2.2	Too many equipment, tools and stationeries were positioned at the same location at <i>Dewan Tuanku Canselor</i> (DTC) Hall.	2.2.1	Reducing the number of equipment, tools and stationeries
	2.3	The usage of the laptops during the registration day to compile student's data and converting them to hardcopy files.	2.3.1	The usage of laptop should be minimized to registration purposes.
	2.4	The flow of the registration process itself creates waste, as ten counters were needed to carry out the registration procedures and transportation time (movement from one counter to another) took longer time.	2.4.1	The usage of counters should be minimized as well as the movement from one counter to another should be also minimized
	2.5	The satisfaction level of survey towards staff is just above the average	2.5.1	Satisfaction level of the students' needs to be increased

TYPES OF OPERATION	ITEMS	ACTIONS TO BE TAKEN
3. VALUE ADDING	3.1. There is a standardization in terms of flow.	3.1.1 The processes need to be improved and more customer friendly
	3.2. The satisfaction survey on the duration to complete the registration	3.2.1 Unnecessary flow must be cut off or totally will be eliminated
	3.3. The timetable and subjects that will be taken by the students during their first year of studies has to be done during the registration day	3.3.1. Administrator to set up the timetable and subjects according to the courses taken earlier before the registration day

Source: Developed for The Current Study

Students were dissatisfied with the registration process required for the new student intake and there are needs for improvement in the various aspects of the registration process. The dissatisfaction has been deduced from the findings derived from the survey. Dissatisfaction occurs was due to the time taken to complete the registration process, whereby majority of the students spent more than 60 minutes to complete the registration process.

Furthermore, feedbacks obtained from the discussion which involved the relevant departments for the registration process stated that there were many activities can be reduced such as sending offer letters to successful candidate's home address via the post was unnecessary and this incurred extra cost. There was also requirement to prepare the hardcopy files as it can be stored in the database. The usage of too many laptops during the registration day to compile student's data as well as converting them to hardcopy files is a waste of money, space, and time consuming. Moreover, the involvement of too many staffs and it was held during weekends caused the additional cost for the

university to pay extra wages to the staffs, too many equipment, stationeries needed, logistic issue and the venue was also not convenient to the students.

4.9.2 Solution Through Online Registration System (*eTasjil*)

From the feedbacks and based on observation, a recommended solution for the issues is by developing an online platform registration system for the new student intake. The invention and the implementation of the online electronic platform for the registration process is called *eTasjil*.

In *eTasjil*, students need to register their names using the web browser and needs to insert their username and password. They then need to click on the confirmation of acceptance, to agree to come for registration and proceed with the course registration. They also need to confirm the course registration where they can choose and view the courses that they have registered and click the confirmation button. If the registration failed, they can either start over again the registration or log out from the system. If successful, they can view and print the timetable and end the registration process by logging out from the system. *eTasjil* users will go through the personal information form where they can view and change necessary information. They also will go through terms and conditions to accept the offer form by ticking in the check box to register as USIM student and will attend the registration day as illustrate at Figure 4.11, Figure 4.12, and Figure 4.13 respectively.



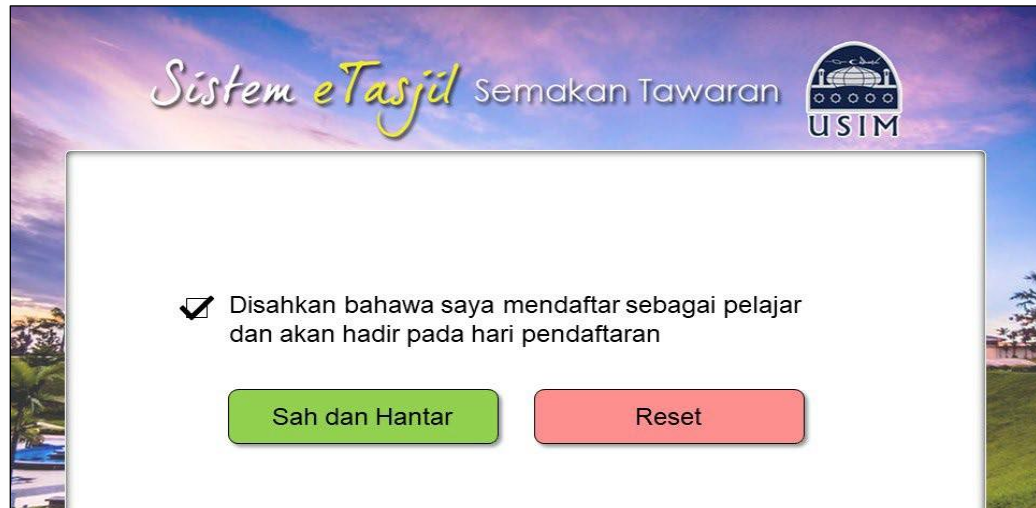
Source: *eTasjil* System, Goal-ITQAN (2018)

Figure 4.11: Online Registration System Interface (*eTasjil*)



Source: *eTasjil* System, Goal-ITQAN, (2018)

Figure 4.12: Offer Letter for Admission



Source: *eTasjil* System, Goal-ITQAN (2018)

Figure 4.13: Confirmation Acceptance of Offer and will Attend the Registration Day

The main focus of the online registration platform for new student intake (*eTasjil*) is to produce an easier platform for both the new students and USIM administrators for the registration process. The system also enables USIM's administrators to retrieve actual number of accepters that register as USIM students.

It also enables USIM's administrator to timely monitor who did or did not register online or reject the offer. The administrators need to instruct students being offered to register into the database. The barcode in the offer letter for each student is stored in the database. *eTasjil* is expected to help in improving the registration process and will facilitate the new students to easily register as compared to the manual system. In fact, it will reduce manpower, cost of the registration process, simplifies and shorten the period of the registration process.

Among the expected outcomes from this online platform are:

- a. The ability of administrators to log in into the system.
- b. The ability of administrators to access to database to add new students' information without using the conventional way by preparing individual file in hardcopy material.
- c. The ability of administrators to get the actual number of students' acceptance for the admission to USIM.
- d. The ability of administrators to upload the timetable for the students.
- e. The ability of students to access to the system and print out the offer letter.
- f. The ability of students to update their information (biodata), upload documents, certificates, medical report, academic transcripts, and photos.
- g. The ability of students to pay the university's registration and tuition fees earlier by uploading the bank transaction slip via the system.
- h. The ability of students to view and get their course and subject registered for their current semester and get the class timetable.

4.9.2.1 Pre-Registration Process

In order to avoid waiting and slow registration process, *eTasjil* allows students to pre-register via the system. It is designed to allow students to play a more active role in the registration process. Students will be able to put in all their details in the system prior to the registration day. This will reduce the process flow thus reducing the waiting time. The data uploaded by the students may include photos, original academic transcripts, particulars of guardians or parents, medical report and other relevant details.

In regard to the university sending offer letters to the students' home address using postage (*Poslaju*), it will no longer be practised. USIM will upload offer letters via the system (*eTasjil*) and the hardcopy offer letter will be issued during the registration day. The postage cost is RM 6.00 for each student. There are 2,600 prospective students and the total cost saving is approximately RM 15,600.00 (2,600 students x RM 6.00). With the development of Information Communication Technology (ICT), especially with the emergence of the system (*eTasjil*), university may put in all the data of each student in the database using the cloud technology without possessing hard copy files anymore. This is due to the high cost of preparing hardcopy files.

The Bursar Department and Division of Academic Management of USIM put in yearly operational budget for the files, whereby USIM spends about RM 5.50 for each student which amounted to RM14,300.00 for hard-bind files.

On the other hand, it will also reduce the number of laptops usage during the registration day as well as the storage area for the files to be stored. Students have already uploaded their information via the system before the registration day, thus fewer laptops will be used during the registration day. Hence, the cost of rental laptops will be reduced as approximately RM 15,000.00 was previously spent during the registration process.

As described earlier, before the registration day, the administrator of the Division of Academic Management and IT Division (*GOAL -ITQAN*) will set up in advance the new students' timetable and subjects during their first year of study. It is much easier to be pre-scheduled and pre-arranged by the administrator since the course curriculum structure in USIM is using the modular concept. Thus, it will reduce the time taken and expedite the registration process. The amount of reduced cost achieved by implementing the system (*eTasjil*) is shown in Table 4.12.

Table 4.12: Expenditure Cost and Cost Saving to the University

Expenditure (Cost) And Expenses Incurred	Cost Saving to The University
• Postage cost RM 6.00 per student (2,600 prospective students x RM 6.00)	RM 15,600.00
• Preparing hardcopy files (2,600 students x RM 5.50 per file)	RM 14,300.00
• Rental of laptops (100 pcs) (100 pcs x RM 150.00)	RM 15,000.00
• Staffs overtime during weekends (100 staffs involved x RM 12.80 per hour x 8 hours)	RM 10,240.00
• Refreshments for staffs on duties (100 staffs x RM 15.00 per pax)	RM 1,500.00
• Transportation rental (buses) (20 buses x RM 400.00)	RM 8,000.00
Total	RM 64,640.00 per-year
	Developed for the Current Study

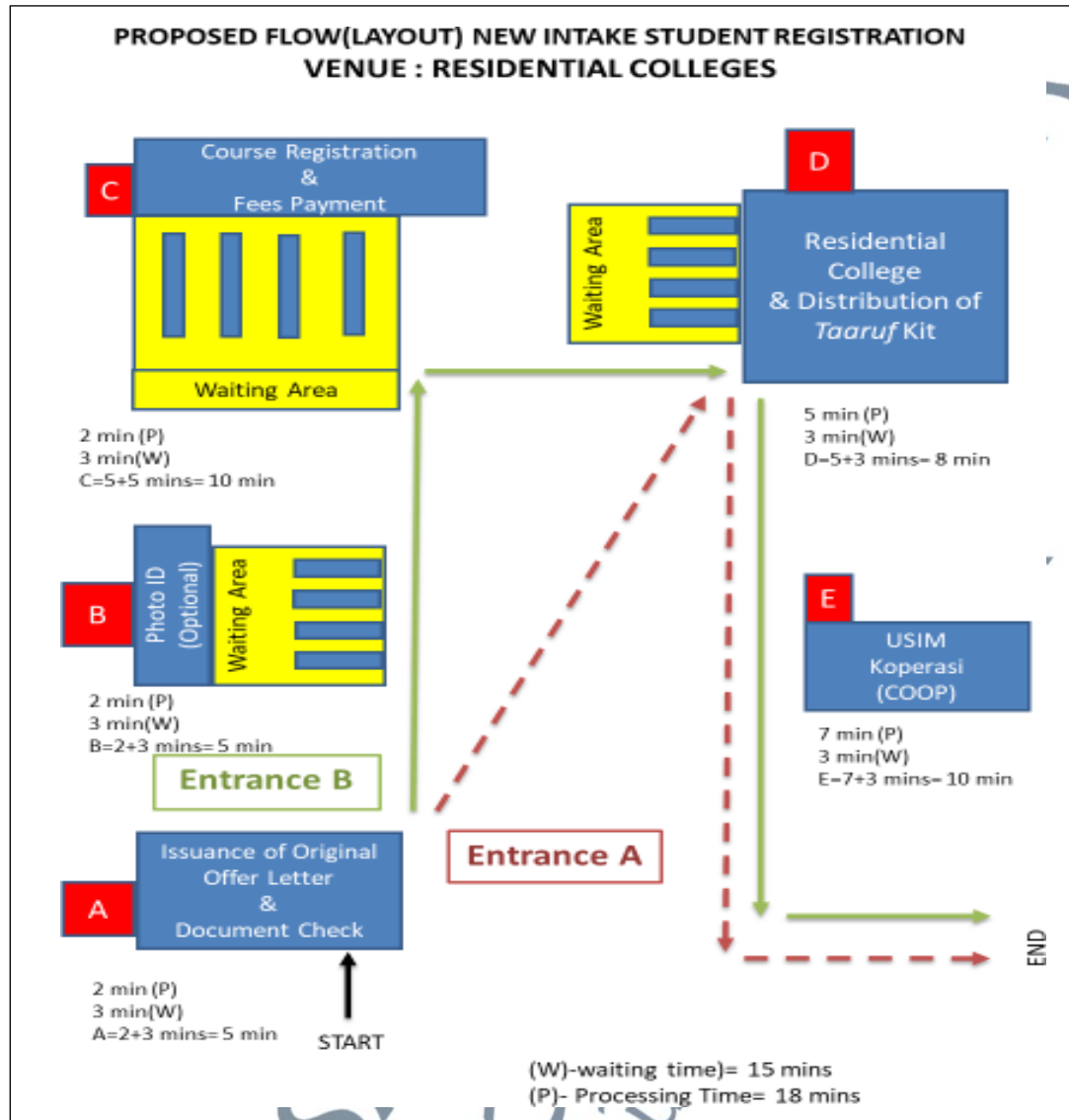
Throughout the years, the total administrative expenditure cost is approximately RM 64,640.00 yearly for new student registration process. This cost could rise higher if no cost saving actions are being taken. In fact, it could even jeopardise the university's budget.

4.9.2.2 Registration Process Flow

Prior to the registration day, students will be informed by the university on the date and time for the actual registration. It will be divided according to faculty thus eliminating time waste and queues, ensuring a smoother process during the registration day. In short, most of the registration process had been carried out in advance via the online method instead of during the registration day. In addition, USIM will be able to estimate the number of expected students to arrive on the registration day. The most vital part is the flow of the layout or the flow of the registration process that will be revised and redesigned as in Figure 4.14. Due to the amendment and improvements of

the registration process, it will be only five (5) counters are needed comparing to ten (10) counters previously.

Indeed, with the new registration flow, the process will take less time than before. The new efficient and effective proposed method will create a harmony environment thus increase students' satisfaction towards the registration process. With only five counters, students are expected to take approximately 10 to 20 minutes per student to complete the whole registration process depending on the documents upload in the registration system compared to the current time consumed which mostly was above 60 minutes per student to complete the registration process. This has been tested during the simulation stage on the usage of the system by the IT Department of USIM.



Source: Developed for the Current Study

Figure 4.14: Proposed Floor Plan (Layout) of New Student Intake Registration

There will be two entrances (**Entrance A**) and (**Entrance B**)

There will be only five (5) counters for the registration process and will only involves around twenty (20) staffs on duties. Five (5) staffs will be assigned and located at Counter A, another three (3) staffs at Counter B, three (3) staffs at Counter C, five (5) staffs at Counter D and four (4) staffs at Counter E.

All students will start the registration process by going to Counter A. At this point, the issuance of original offer letter to the students will take place and documents will be checked by the staff. After has been verified by the staff, those who have completed the online registration via the system (*eTasjil*), they will proceed to Entrance A, and proceed to Counter D for the registration of their residential college and getting the orientation (*Taaruf*) Kit. Finally, they will end up at Counter E to purchase USIM's corporate shirt and necktie. It is believed that the *transportation time* (movement from one counter to another) will be less time taken compared to before. Meanwhile, for those who have not completed or partially completed the online registration via the system, they still have the option to do it by following the Entrance B to complete their registration. This exercise will be implemented during this coming registration day for the new student intake for undergraduates and feedback for this new process flow will be compiled during the registration day which will be held in September 2018.

4.9.2.3 Solution through the Improvement of Resource Utilization: Manpower & Logistics

Feedbacks from various related department also reflected the unnecessary waste. From the logistics point of view, the use of *Dewan Tuanku Canselor* (DTC) Hall itself can be characterized as a waste, since the hall would be more useful if it is being used for other purposes by other parties that could generate revenues for the university. In fact, extra transportation cost has incurred to transport the students from the DTC Hall to respective residential colleges as well as time consuming.

i. Manpower

According to lean principles, the satisfaction level of service is the actual output in the administration. Thus, the management needs to identify factors affected the service of the staff. In terms of “Satisfaction level towards the services from the staff”, it is directly a “non-value adding operation” which should be eliminated under Value Stream Mapping. To materialize this, the management should take necessary actions in order to improve staff’s performance. For instance, conducting training. Related surveys should be continued every semester in order to constantly improve the staff’s quality as well as service performance. This is one of the suggested solutions for improvement of manpower resource utilization.

Another direct solution using the lean method is the involvement of staff during weekends where USIM must pay unnecessary overtime allowances for eligible staff. It is suggested that the registration day should be held during weekdays. Normally, one hundred (100) personnel are involved during the registration day during the weekends. Thus, USIM had to pay extra overtime allowances approximately RM 12.80 per hour for 100 staffs which totalled to RM 10,240.00 per day. The university also needs to spend on refreshment, including breakfast and lunch to the involved staffs which cost about RM 1,500.00. In short, a total sum of RM 10,740.00 could be saved and avoid should the registration were held during weekdays. In terms of staff involvement in the registration process, it will be reduced from one hundred (100) staffs to only twenty (20) staffs per venue which equals to forty (40) staffs with only with five counters will be operated at two different venues at the residential colleges.

ii. Logistics

As previously mentioned, the registration was held at *Dewan Tuanku Canselor* (DTC) Hall where the cost of rental is RM 30,000.00 per day. This should be changed because it is more useful if the hall is rented to other parties which will generate income to the university. Furthermore, during the previous registration day, the university needs to transport students from DTC Hall to the residential colleges by bus. The usage of buses cost approximately RM 400.00 per day x 20 buses which total up to RM 8000.00 which is not only costly to the university but also time consuming in terms of the movement from one place to another.

By changing the venue, the registration day for new student intake will be held at the respective residential colleges. There will be only two residential colleges as the venues for the registration process with no cost incurred. This will expedite the registration process, reduce the university's financial expenditure and minimize the students' logistics from one place to another. In addition, this will prevent students from feeling uncomfortable moving from one place to another and increase their satisfactory level towards the registration process.

To pre-conclude, the recommendations forwarded by this applied research are from the findings derived through some basic techniques from lean principles adopted from Value Stream Mapping (VSM). In short, Value Stream Mapping (VSM) technique leads this study to suggest three types of solution which are: the invention and introductory of the online registration system called *eTasjil*, improvement of registration process and improvement of resource utilization. Table 4.13 demonstrates those issues by identifying types of operations that are necessary but non-value adding and what are the value-added operations. It will also be suggesting what actions to be taken and proposed the recommended solutions.

Table 4.13: Types of Operation, Items, Actions to be Taken and Recommended Solutions

TYPES OF OPERATION		ITEMS	ACTIONS TO BE TAKEN	RECOMMENDED SOLUTIONS
1. NECESSARY BUT NON-VALUE ADDING	1.1	They are allowed to register at the same time as they are not provided with specific or segregated time to attend the registration day.	1.1.1. Segregation of time for registration by faculty and courses	1.1.1.1 Reduce the waiting time and improvement of registration process
	1.2	Too many equipment, tools and stationeries were positioned at the same location at <i>Dewan Tuanku Canselor</i> (DTC) Hall	1.2.1 Reducing the number of equipment, tools and stationeries	1.2.1.1 <i>eTasjil</i>
	1.3	The usage of the laptops during the registration day to compile student's data and converting them to hardcopy files.	1.3.1 The usage of counters should be minimized to five counters only	1.3.1.1 <i>eTasjil</i>
	1.4	The flow of the registration process itself creates waste, as ten counters were needed carry out the registration exercise.	1.4.1 Level of students' satisfaction to be improved	1.4.1.1 Improvement of Registration Process (Flow)
	1.5	The satisfaction level of students towards staff is not at the satisfactory level		1.5.1.1 Improvement of resource utilization

TYPES OF OPERATION		ITEMS		ACTIONS TO BE TAKEN		RECOMMENDED SOLUTIONS
2. VALUE ADDING	2.1	There is a standardization in terms of flow	2.1.1	The processes need to be improved and more customer friendly	2.1.1.1	<i>eTasjil</i>
	2.2	The satisfaction survey on the duration to complete the registration	2.2.1	Unnecessary flow must be cut-off or totally eliminate	2.2.1.1	Improvement of registration process
	2.3	The timetable and subjects that will be taken by the students during their first year of studies has to be done during the registration day	2.3.1	Administrator to set up the timetable and subjects according to the courses taken earlier before the registration day	2.3.1.1	Improvement of registration process

Source: Developed for the Current Study

The total number of respondents derived from the survey were from different faculties which represents majority of the students. The results illustrated that the students were dissatisfied with the overall registration process for new student intake and there are needs for improvements in various aspects of new student intake registration process. Thus, it will give more value to the students. This case research had identified several areas of waste in the registration process. Feedbacks obtained from the identified problem has allowed the researcher to look at the entire registration process. In order to initiate the application of the Value Stream Mapping towards new students' intake registration process, the researcher managed to identify types of wastes according to lean principles and be able to identify waste removal operations before deriving to the findings by suggesting a map drawing of value stream and identifying actions through waste removal operations and actions before suggesting solutions.

As a result, types of waste identified in new students' intake registration of USIM according to lean principles are characterised as: Expenditure of Resources that Does Not Add Value for the Customer, Information Overflow, Waiting, Excess Inventory, Motion and Underutilization of People's Talents and Systems' Capabilities. Table 4.14 describes types of wastes in USIM's new student registration by each item.

Table 4.14: Types of Waste in USIM's New Student Intake Registration Process Identified Through Lean Principles

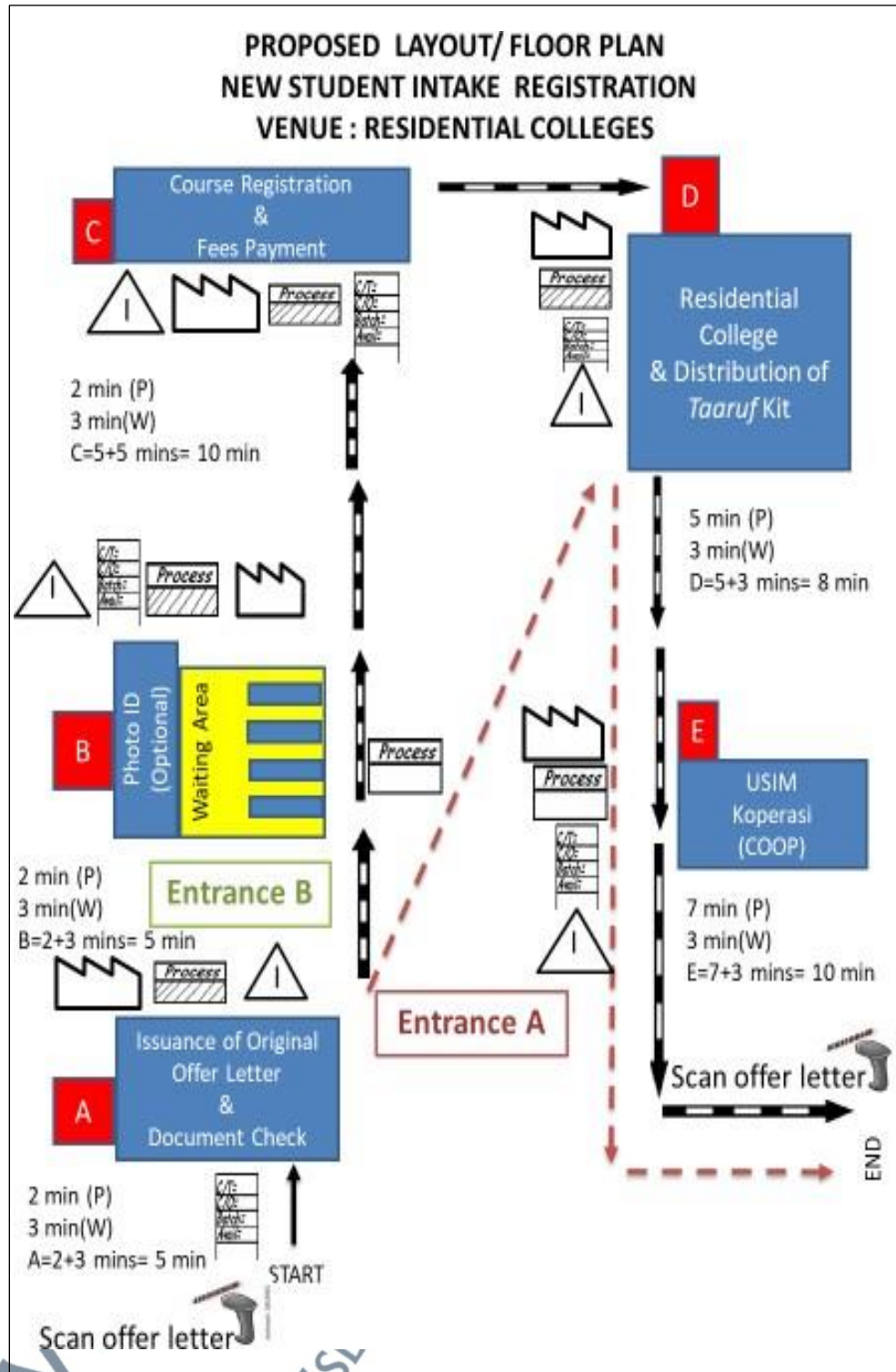
Type of Wastes According To Lean		Wastes Identified in USIM	
1 Expenditure of Resources That Does Not Add Value for The Customer	1.1	USIM has to pay overtime to staff who are eligible to claim when working during weekends.	
	1.2	Venue at USIM's <i>Dewan Tuanku Canselor</i> (DTC) Hall for registration.	
	1.3	Sending offer letters to the successful candidates to their respective home address via the post.	
	1.4	Administrator of the relevant Division did not set up the timetable and subjects earlier that will be taken by the students during their first year of studies before the registration day.	
	1.5	Students were called to register at the same time as they are not provided with specific or segregated times to attend the registration.	
2 Information Overflow	2.1	Converting students' data to hardcopy files where unnecessary storage of information is generated. The satisfaction level on duration to complete the registration is inadequately low showing that unnecessary process flow exists.	
	2.2		
3 Waiting	3.1	Flow of the registration process itself needs to be improved as students had to go through lengthy process to complete the registration, <i>transportation time</i> need to reduce.	
	3.2	Majority of students spent more than 60 minutes to complete the registration process.	
4 Extra Processing	4.1	Students need to show their offer letter again to the staff for course registration and getting the class timetable.	
5 Excess Inventory	5.1	Too many equipment, tools and stationeries were positioned at the same location at <i>Dewan Tuanku Canselor</i> (DTC) Hall.	
	5.2	Usage of the laptops during the registration day to compile student's data and converting them to hardcopy files.	
	5.3	Preparing the hardcopy files of students' details.	

Type of Wastes According To Lean		Wastes Identified in USIM	
6	Motion	6.1	The flow of the registration process itself creates waste, as ten (10) counters were needed carry out the registration exercise.
		6.2	Waste incurred for the movement of the students moving from residential college to DTC Hall.
7	Defective Information		None
8	Lack of Standardization		None

Source: Developed for The Current Study

After identifying the types of wastes according to Lean principles, the waste removal operations by categorizing wastes into types of operations which are Non-Value Adding Operations (NVA), Necessary but Non-Value Adding (NNVA) and Value-Adding (VA). To apply in the context of student's registration, the researcher has identified all types of wastes in the VSM's process flow by eliminating all Non-Value Added Wastes, improving the conditions or minimizing Necessity but Non Value Added Wastes as well as maintaining Value Added but improving performance and minimizing productions. The actions for each item of the operations are listed in Table 4.12 (Actions and recommended solutions under Value Stream Mapping) while the Value Stream Mapping in the registration process is illustrates in Figure 4.15.

Once the redesigning of the process using the Lean Techniques is carried out, the suggested solutions has been proposed, guided by these waste removal operations. Three ultimate suggestions of solution are the invention and the development of the students' registration system *eTasjil*, improvement of registration process and improvement of resource utilization.



Source: Developed for The Current Study

Figure 4.15: Suggested Registration Flow with Value Stream Symbols

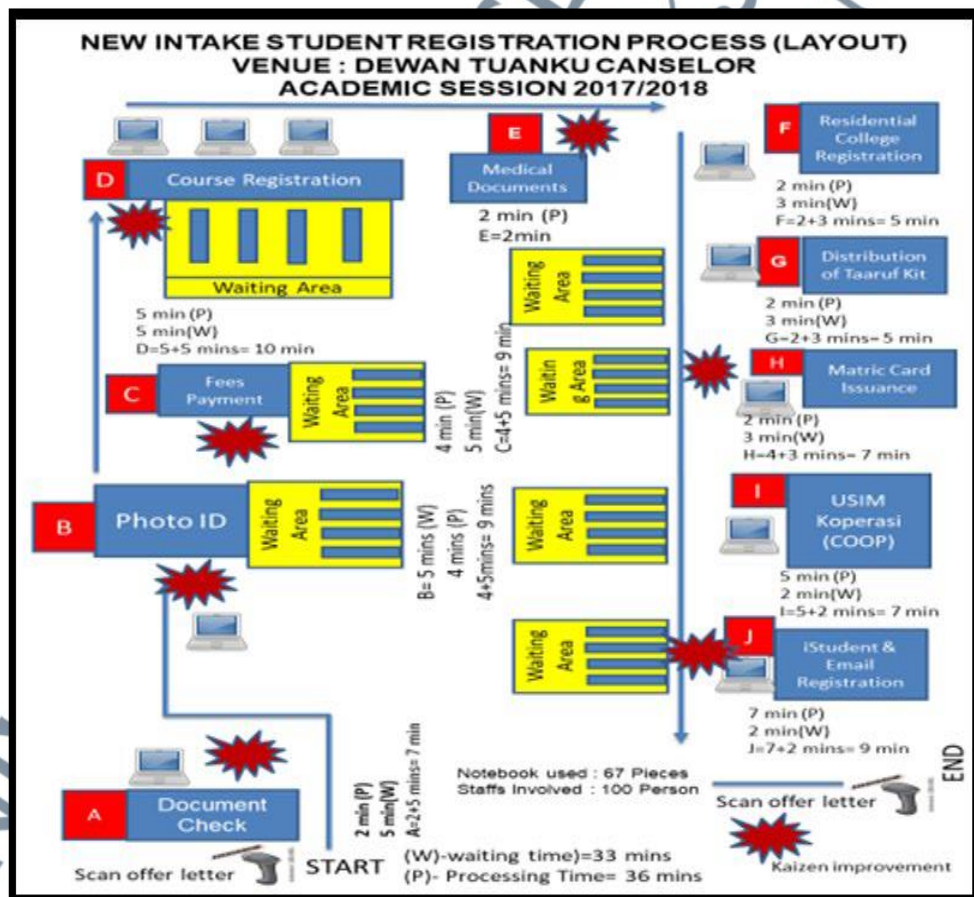
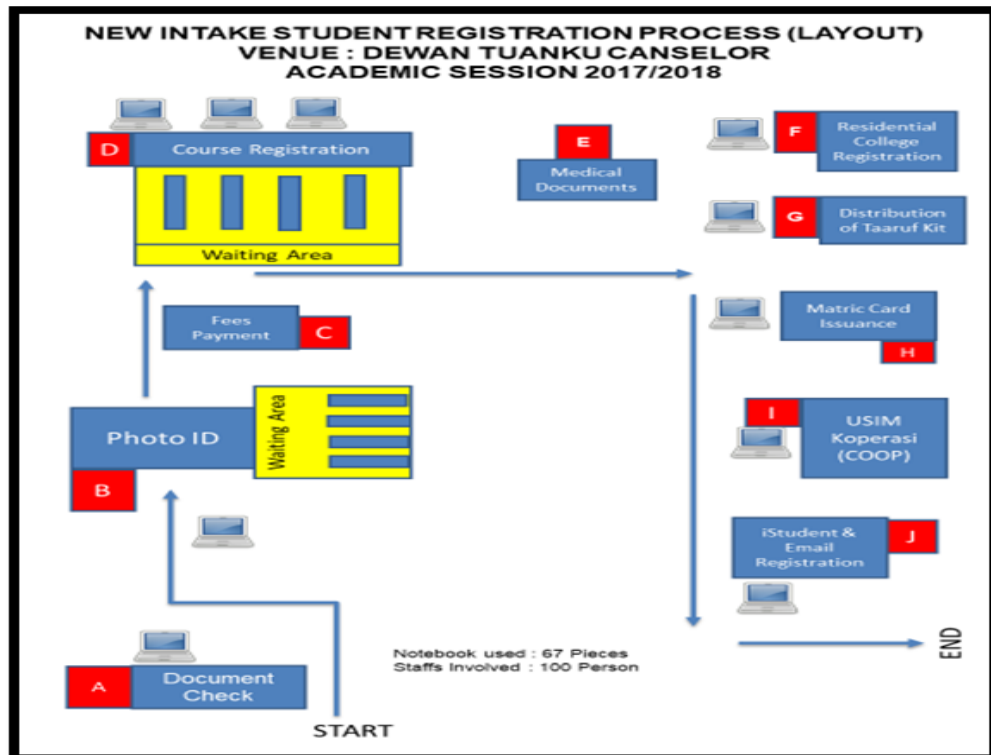
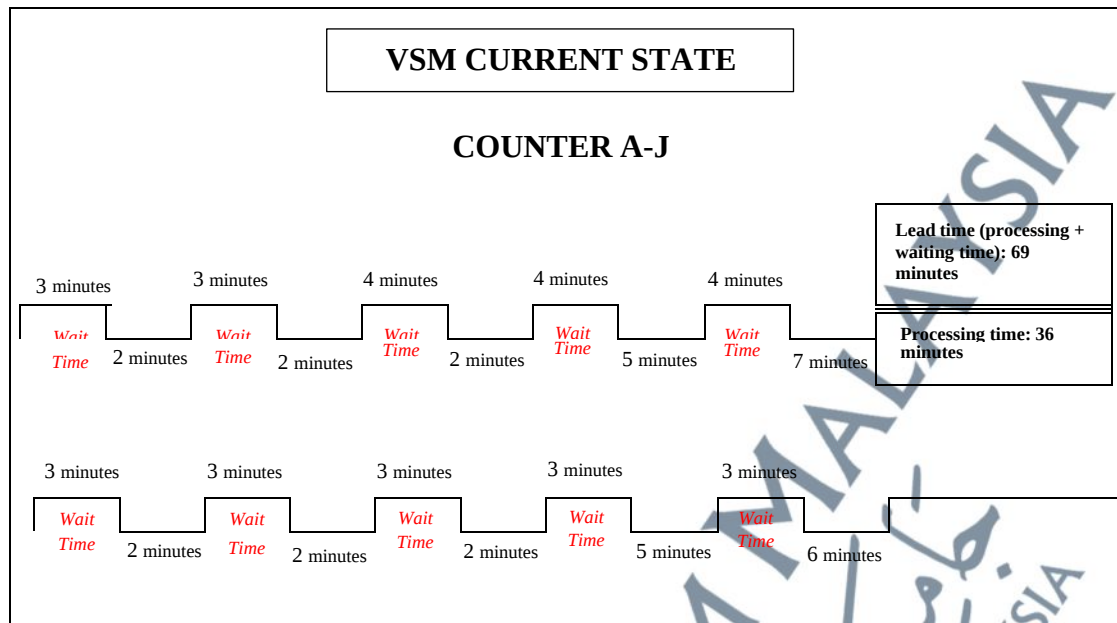


Figure 4.16: Current New Student Registration Process Layout



Source: Developed for the Current Study

Figure 4.16: continue

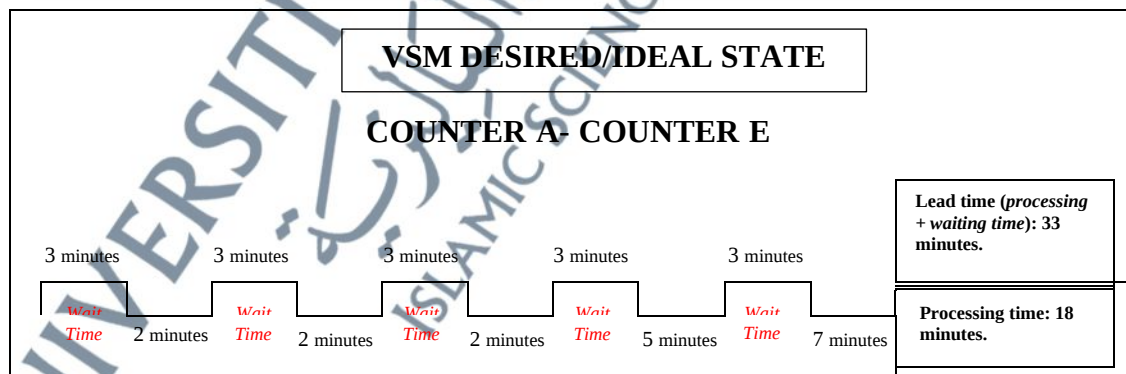
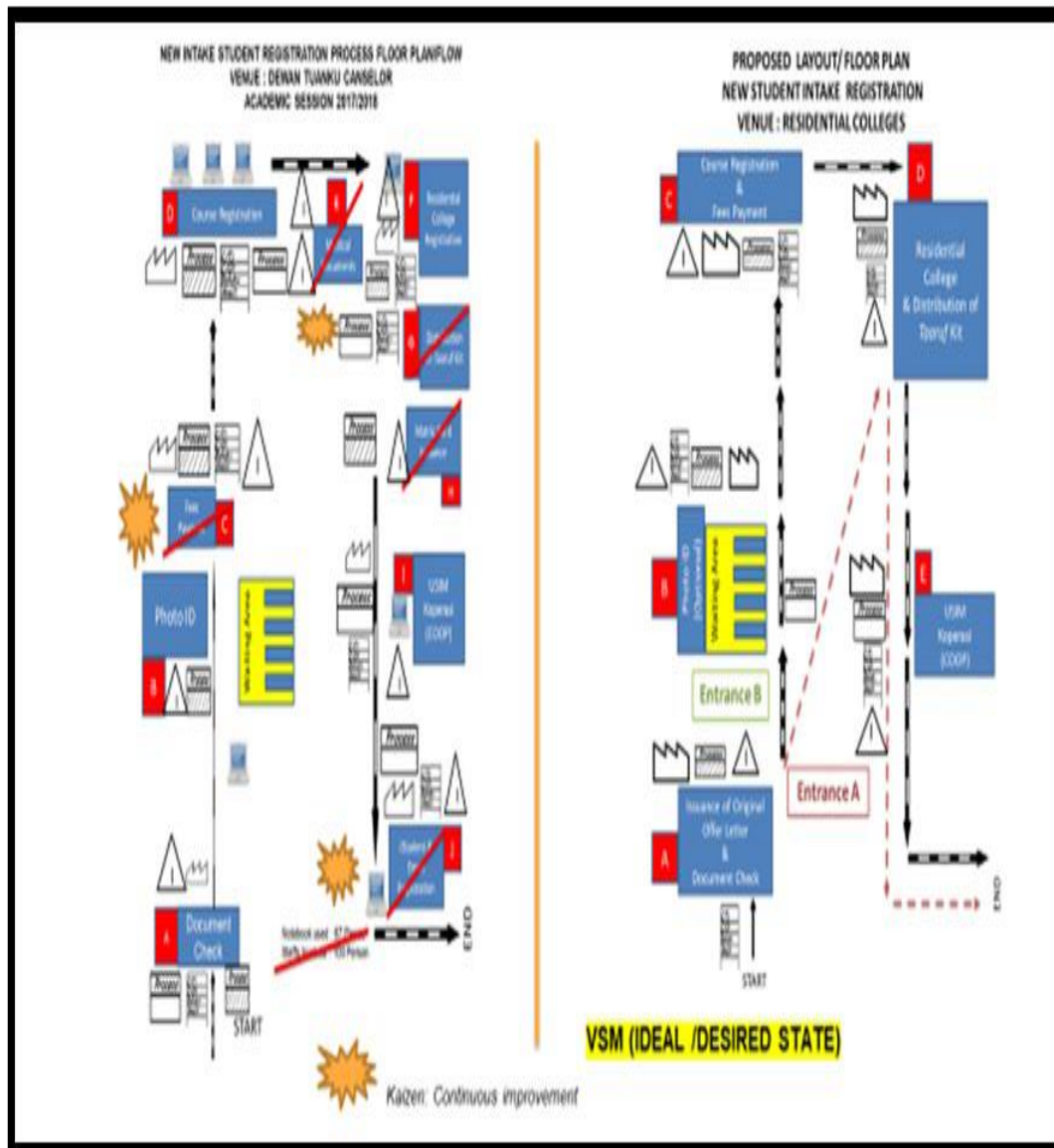
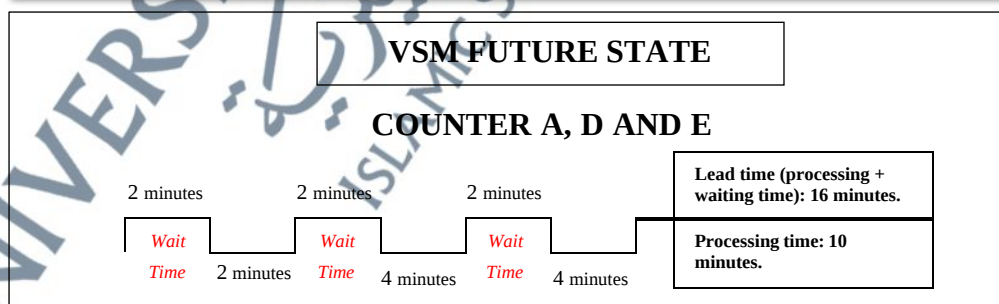
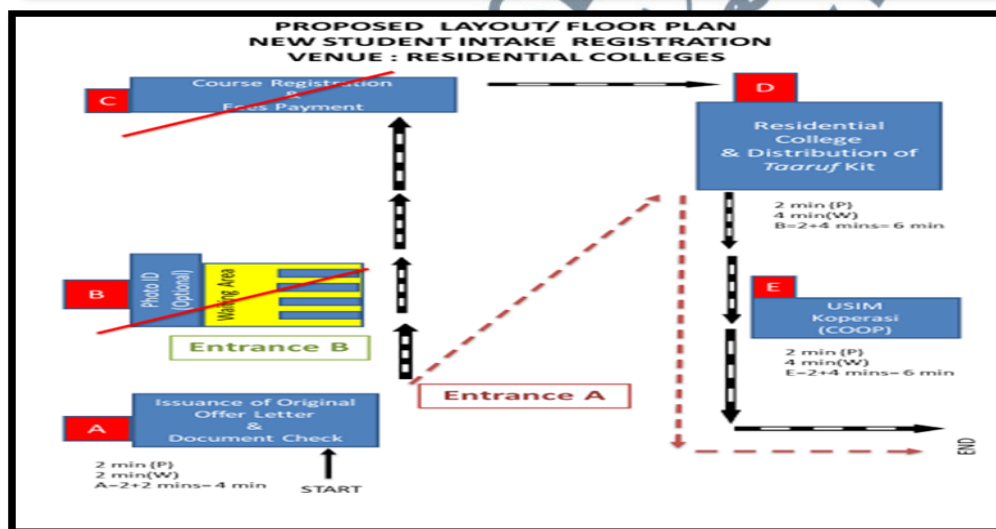
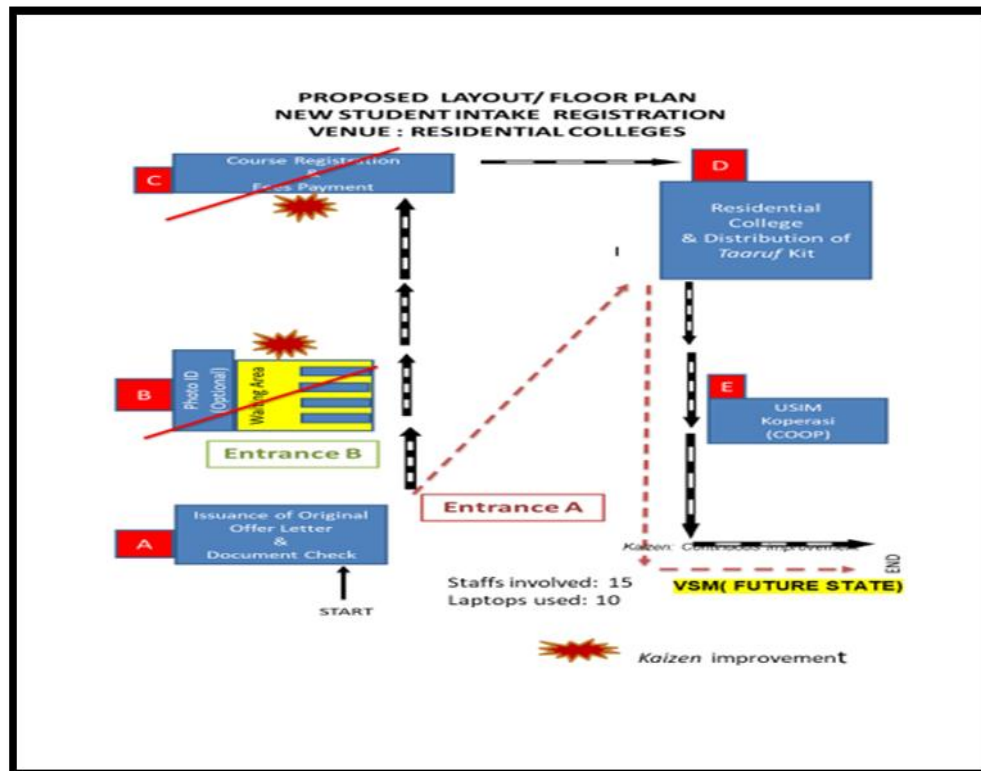
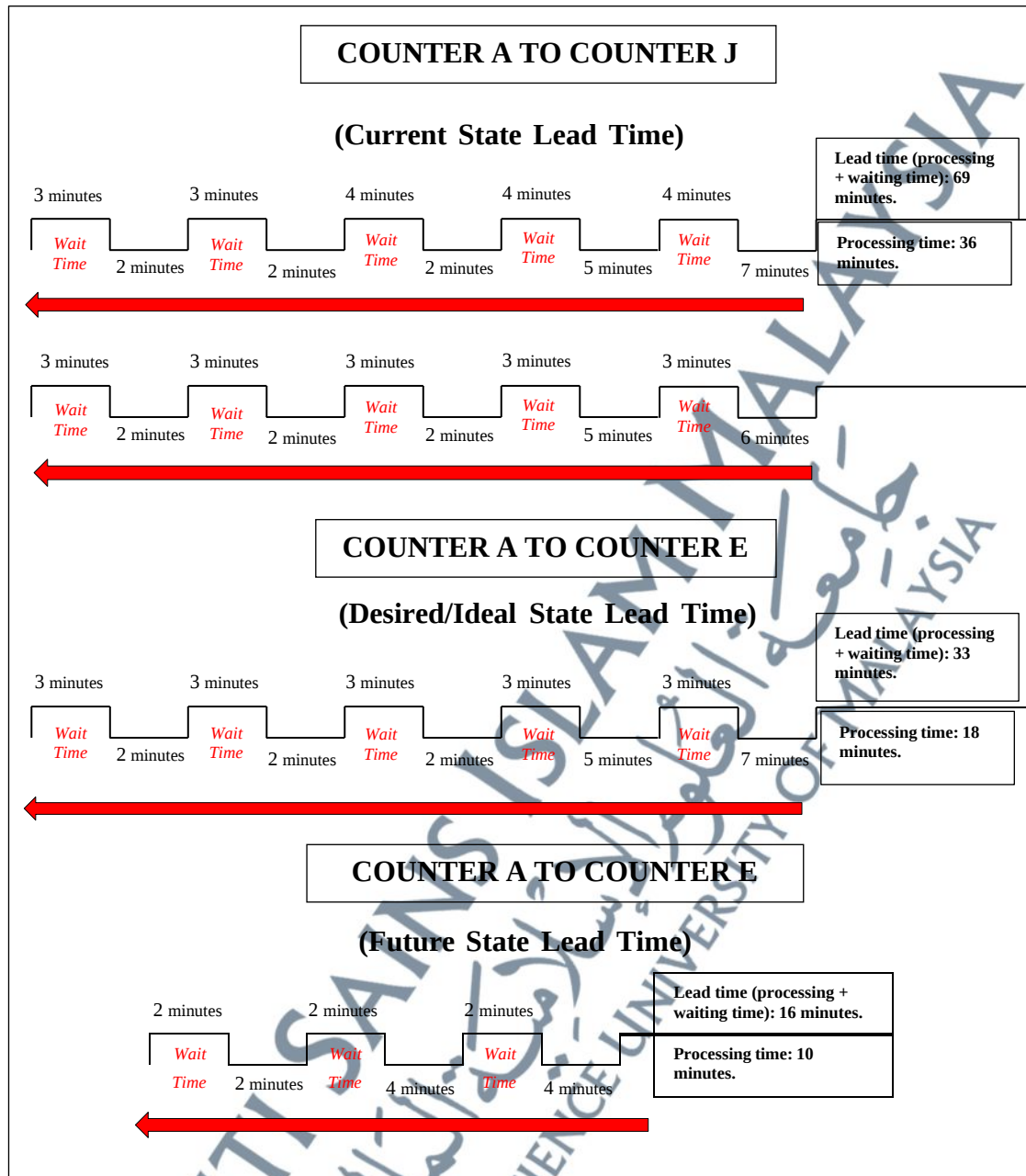


Figure 4.17: Proposed New Student Registration Process Layout After the Implementation of Value Stream Mapping (in Desired/Ideal State)



Source: Developed for the Current Study

Figure 4.18: Proposed New Student Registration Process Layout After the Implementation of Value Stream Mapping (in Future State)



Source: Developed for the Current Study

Figure 4.19: The Current State, Desired, Ideal State and Future State

i. Registration Process (Current State)

In the current registration process, new students are required to start their registration from Counter A to Counter J, as shown in Figure 4.16. The time taken to complete each process (*takt time*) per student at each counter has been recorded by the administrators.

From the recorded data, the administrators have concluded that each student should take approximately 36 minutes without considering the *transportation time* (moving from one counter to another) which considered as a bottleneck in the process to complete the entire registration process. As mentioned earlier, the waiting time for each process took about 1 to 5 minutes per student, which means the total lead time to complete the registration process will be in the range of 56 to 71 minutes per student.

ii. Registration Process (Ideal State)

By applying the Value Stream Mapping (VSM) method, the time duration in the current process, the ideal time required and the expected time for the future process will be mapped out. In order to achieve this, all non-value adding operation for the customers (students) as identified in Figure 4.17 need to be eliminated. Upon the elimination, the expected and ideal time per student is estimated to be at 18 minutes and the waiting time is about 13 minutes throughout the process.

iii. Registration Process (Future State)

For the future state of the process, by identifying the root cause of the bottleneck problem during registration process, unnecessary process will be eliminated, and multiple servers will be provided at counters to avoid the bottleneck problem as shown in Figure 4.18.

This will further reduce the duration time taken and is expected to take less than 10 minutes per student to complete the registration while the waiting time is expected to be around 6 minutes. The study managed to identify the process that need to be eliminated by putting in the '*kaizen*' symbol in the map for a continuous improvement in the process. As for a contingency plan or as an alternative for those who have not uploaded their documents in advance prior to the registration process, the university

will also provide counters and workstations for the students to do so online. Furthermore, if there is a system breakdown during the registration day, such as internet failure or other technical issues the system is still accessible as it is available both web-based and through the local network. Figure 4.19 illustrates the time taken in the current/ desired and future state.

4.10 Conclusion

The main objectives of this applied research are to analyse the current registration process of new students and to evaluate the cause and effect on USIM's resources, to identify the key activities in the process that need to be revamped, and to look for alternatives so that there will be a drastic improvement on the outcome.

From the administrative perspective, the case research manages to identify weaknesses and redundancies in the registration flow process, waste in terms of time, discrepancies in managing workforce, waste in terms of space/ area and expenditure waste. After the issues have been identified, the concept is designed to identify waste or redundancies in order to save cost and develop an efficient process for new students' intake registration exercise. After identifying waste, and all inefficient flow in the current process, lean tools and techniques are applied.

Relevant tools and techniques to reduce and eliminate waste for the new student intake registration process has been applied. The researcher has identified the Value Stream Mapping that are often used in manufacturing industry which had supporting methods to analyses and design flows at the system level across multiple processes. With its symbols to represent items and processes, it is intended to increase productivity by creating leaner operations which in turn make waste and quality problems easier to identify. As a result, the lean techniques have been applied in the registration process

by eliminating unnecessary process (waste) and implementing the new flow of the registration process by exercising the lean theories and principles. Continually improving the registration process using the tools introduced with the goal to achieve perfection for the student's satisfaction is a good move to maintain the stakeholder's satisfaction as they are the product from the university.

Indeed, this applied research managed to come out with solutions, by identifying all unwanted and unnecessary activities in the registration process by adopting the lean principles techniques through value stream mapping. It will simplify the process of registering new students to replace the manual registration process to an online registration which will reduce the cost for the university and ease the problem to the students. This exercise will be implemented for the new student intake registration process in September 2018, and it is hoped that with the innovation of the electronic platform for the registration process, both parties; the university and the students will be benefited from it.

The details outcome, overall benefit gained and contribution of this case research towards the organisation will be presented in Chapter 7 respectively. In this regard, Allah Al-Mighty has revealed *Surah Al-Asr*, Verse 103 which brings the message to the humankind to appreciate the time given by Him to appreciate the time given by performing good deeds to others for the betterment of ummah.

"By the time, verily! Man is in loss, except those who believe (in Islamic Monotheism) and do righteous good deeds and recommend one another to the truth".

(Al Qur'an. Al-Asr:103)

REFERENCES

- Abutabenjeh, S., & Jaradat, R. (2018). Clarification of Research Design, Research Methods, and Research Methodology: A Guide for Public Administration Researchers and Practitioners. *Teaching Public Administration*, 36(3), 237-258.
- Agha Kasiri, L. & Mansori, S. (2016). Standardization, Customization, and Customer Loyalty in Service Industry. *Journal of Marketing Analytics*. 4(2-3), 66-76.
- Al-Khalil, E. A. (2017). The Role of English in Present Day Higher Education. (2017). *International Journal of Social Sciences & Educational Studies*. 4(2), 123-128
- Azyan, Z. H., Venkateswarlu P. A., & Dirk P. (2017). Success Factors and Barriers to Implementing Lean in the Printing Industry: A Case Study and Theoretical Framework. *Journal of Manufacturing Technology Management*. 28 (4): 458–484
- Becker, H., Henneghan, A.M., Volker, D.L., & Mikan, S.Q. (2017). A Pilot Study of a Cognitive-Behavioral Intervention for Breast Cancer Survivors. *Oncology In Nursing Forum*. 44(2), 255
- Boley, M., Goldsmith, B. R., Ghiringhelli, L. M., & Vreeken, J (2017). Identifying Consistent Statements About Numerical Data with Dispersion-Corrected Subgroup Discovery. *Data Mining and Knowledge Discovery*. 31(5), 1391-1418.
- Bougies, U. S. (2013). Research Methods for Business. In U. S. Bougies, *Data Collection Methods*. Wiley.
- Camboim, G. F., Zawislak, P. A., & Pufal, N. A. (2019). Driving Elements to Make Cities Smarter: Evidences From European Projects. *Technological Forecasting and Social Change*. 142, 154-167.
- Castaldi, M., Sugano, D., Kreps, K., Cassidy, A., & Kaban, J. (2016). Lean Philosophy and the Public Hospital. *Perioperative Care and Operating Room Management*, 3, 25-28.
- Creswell, J. W. (2008). Methodological Issues in Conducting Mixed Methods Research Designs. *Advances in Mixed Methods Research*. 1(1) 66-83.
- Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. (4th ed.). Boston, MA. Pearson.
- Creswell, J. W., & Clark, V. L. P. (2011). Choosing a mixed methods design. *Designing and conducting mixed methods research*, 2, 53-106.
- Devlieger, I., Mayer, A., & Rosseel, Y (2016). Hypothesis Testing Using Factor Score Regression: A Comparison of Four Methods. *Educational and Psychological Measurement*. 76(5), 741-770.

Einspruch, E. L. (2005). *An Introductory Guide to SPSS? for Windows?* Sage.

eTasjil System. (2018) Goal-ITQAN, USIM.

Gay, G., Pollak, J. P., Adams, P., & Leonard, J. P. (2011). Pilot Study of Aurora, A Social, Mobile-Phone-Based Emotion Sharing and Recording System. *Journal of Diabetes Science and Technology*. 5(2), 325-332.

Gill, J., Johnson, P. & Clark, M. (2010). *Research Methods for Managers*. SAGE Publications

Gopinath, S., (2019). A Waste Relationship Model and Center Point Tracking Metric for Lean Manufacturing Systems. *IIE Transactions*, 44(2), 136-154.

Gupta, S., Pansari, A., & Kumar, V. (2018). Global Customer Engagement. *Journal of International Marketing*. 26(1), 4-29.

Ha, S. T., Lo, M. C., & Wang, Y. C.. (2016). Relationship Between Knowledge Management and Organisational Performance: A Test On Smes In Malaysia. *Procedia - Social and Behavioral Sciences*. 224, 184-189.

Hammer, M. (1990). Reengineering Work: Don't Automate, Obliterate. *Harvard Business Review*. 68(4), 104-112.

Heaton, J., Day, J., & Britten, N. (2016). Collaborative Research and The Co-Production of Knowledge for Practice: An Illustrative Case Study. *Implementation Science*. 11(1), 20.

Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic Approach for Human Resource Management in Industry 4.0. *Procedia Cirp*, 54(1), 1-6.

In, J. (2017). Introduction of a Pilot Study. *Korean Journal of Anaesthesiology*. 70(6), 601.

Johnston, S., Coyer, F., & Nash, R. (2017). Simulation Debriefing Based on Principles of Transfer of Learning: A Pilot Study. *Nurse Education in Practice*. 26, 102-108.

Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396.

Karen M. (2010). *The Kaizen Event Planner: Achieving Rapid Improvement in Office, Service and Technical Environments*. CrC Press.

Kim, H., Sefcik, J. S., & Bradway, C. (2017). Characteristics of Qualitative Descriptive Studies: A Systematic Review. *Research in Nursing and Health*. 40(1), 23-42.

Lee, Y., & Seomun, G. (2016). Development and Validation of an Instrument to Measure Nurses' Compassion Competence. *Applied Nursing Research*. 30, pp. 76-82.

- Li, T., Hu, X., Zheng, J., Su, N., Liu, Z., & Luo, L. (2017). The Influence of Visual Mental Imagery Size on Metamemory Accuracy in Judgment of Learning. *Memory*. 25(2), 244-253.
- Liker, J. K., (2018). The Toyota Way in Services: The Case of Lean Product Development. *The Academy of Management Perspectives*. 20(2), 5–20
- Martín, J.C., Román, C. and Gonzaga, C. (2018). How Different N-Point Likert Scales Affect the Measurement of Satisfaction in Academic Conferences. *International Journal for Quality Research*. 12(2). 421 – 44.
- Matthews, W. J. & Gheorghiu, I. (2016). Repetition, Expectation, and the Perception of Time. *Current Opinion in Behavioral Sciences*. 8, 110-116.
- Muijs, D., (2004). *Assessing Teacher Effectiveness: Developing a Differentiated Model*. Psychology Press.
- Naslund, D. (2008). Lean, Six Sigma and Lean Sigma: Fads or Real Process Improvement Methods? *Business Process Management Journal*. 14(3), 269-287
- Noraziah, A., Johari, M. S., Herawan, T., Sidek, R. M., Lee, H. C., & Abdalla, A. N. (2011). Managing Registration of New Student Intake using ORNSIS-Integrated Barcode Technology. *Procedia-Social and Behavioral Sciences*, 28, 144-150.
- O'Shea. S. (2016). Avoiding the Manufacture of 'Sameness': First-In-Family Students, Cultural Capital and The Higher Education Environment. *Higher Education*. 72(1), 59-78.
- Parsa, P. & Rossetti, M. (2018). *A Multi-Functional Metric for Monitoring Inventory and Transportation Efficiency In Collaborative Supply Chains*. in *IISE Annual Conference and Expo 2018*. Institute of Industrial and Systems Engineers (IISE).
- Paterakis, N. G., Erdinç, O., & Catalão, J. P. (2017). An Overview of Demand Response: Key-Elements and International Experience. *Renewable and Sustainable Energy Reviews*. 69, 871-891.
- Pearce, A., & Pons, D., (2013). Implementing lean practices: managing the transformation risks. *Journal of industrial engineering*, 2013, 1-19
- Pedder, H., Sarri, G., Keeney, E., Nunes, V., & Dias, S (2016). Data Extraction for Complex Meta-Analysis (Decimal) Guide. *Systematic Reviews*. 5(1), 1-6.
- Peeters, R., & Widlak, A. (2018). The Digital Cage: Administrative Exclusion Through Information Architecture – The Case of The Dutch Civil Registry's Master Data Management System. *Government Information Quarterly*. 35(2), 175-183.
- Prakash Y., Nepal, M., Rahaman, M.M. & Lal, V. (2017). Engineering Management Journal Lean Implementation and Organisational Transformation: A Literature Review. *Engineering Management Journal*. 29(1), 2-16.

- Rahman, T. F. A., & Bakar, Z. A. (2019). Exploring Users' Perspectives on Co-Curricular Registration System using TAM Model. *Journal of Advanced Research in Computing and Applications*. 16(1), 24-33.
- Ruiz-Lozano, De Los Ríos-Berjillos, & Millán-Lara. (2019). Characteristics and Management of Ethical Codes. an Exploratory Study in Andalusia. *CIRIEC-Espana Revista De Economía Publica, Social Y Cooperativa*. 215-251.
- Samar, R. (2017). Research Design and Methods: A Systematic Review of Research Paradigms, Sampling Issues and Instruments Development. *International Journal of Economics & Management Sciences*. 6(2). 4.
- Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill Building Approach*. John Wiley & Sons.
- Taherdoost, H. (2017). Determining Sample Size; How to Calculate Survey Sample Size. *International Journal of Economics and Management System*. 2, 237- 239
- The Office of Institutional Effectiveness Survey, & Effectiveness. (2003). *Registration Survey Report*. 1–14.
- Thomas, A. J., Francis, M., Fisher, R., & Byard, P. (2016). Implementing Lean Six Sigma to Overcome The Production Challenges in An Aerospace Company. *Production Planning and Control*. 27(7-8), 591-603.
- USIM Departments. (2018). Bursar Department, Division of Academic Management, Goal-ITQAN Department.
- Van der Linden, W. J. (2016). *Handbook of Item Response Theory, Volume Three: Applications*. (Chapman & Hall/CRC Statistics in the Social and Behavioral Sciences). Chapman and Hall/CRC.
- Vollman, B. J., (2017). Lean Information Management: Understanding and Eliminating Waste. *International Journal of Information Management*. 7(4), 33–49.
- Womack, J.P. & Jones, D.T. (2003). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. Free Press, New York, NY.

APPENDICES

Appendix 12: Students' Satisfaction Survey on Registration Process (Undergraduate Level)

Kajian Kepuasan Pelanggan Pendaftaran Pelajar Baru Sesi Akademik Semester I 2017/2018
Customer Satisfaction survey on New Student Registration Semester I Academic Session 2017/2018

* Required

1. Fakulti / Faculty *

Select your answer

2. Adakah anda berpuas hati dengan dengan proses pendaftaran pelajar ? / Are you satisfied with the student registration process? *

☐ Ya / Yes

☐ Tidak / No

3. Adakah anda berpuas hati dengan masa yang diambil untuk mendaftar / Are you satisfied with the duration taken to complete the registration? *

☐ Ya / Yes

☐ Tidak / No

4. Berapa lama masa yang diambil untuk mendaftar? How long does it takes to complete the registration? *

☐ 0-20 minutes

☐ 20-40 minutes

☐ 40-60 minutes

☐ more than 60 minutes

STUDENTS' SATISFACTION SURVEY ON REGISTRATION PROCESS (UNDERGRADUATE LEVEL)

Thank you for participating in this survey.

This survey is designed to get feedbacks from the students and their level of satisfaction on the registration process for new student intake. In this survey, there are two sections (A) and (B). Section A is the demographic profile and Section B consist of questions pertaining to the student's satisfaction level in the registration process.

Our survey is anonymous, and all data collected will be used solely for the purpose of this study and will be kept confidential for the sake of your privacy. Our survey should take 5-10 minutes of your valuable time.

SECTION A

Instructions: Tick (/) and fill in the blank space provided.

DESCRIPTION		Tick (/)
Gender	Female	
	Male	
Age	18-20	
	21-23	
	24-26	
Faculty	Faculty of Science and Technology (FST)	
	Faculty of Quranic and Sunnah Studies (FPQS)	
	Faculty of Leadership and Management (FKP)	
	Faculty of Economics and Muamalat (FEM)	
	Faculty of Medicine and Health Sciences (FPSK)	
	Faculty of Major Language Studies (FPBU)	
	Faculty of Engineering and Built Environment (FKAB)	
	Faculty of Dentistry (FPG)	
	Faculty of Syariah and Law (FSU)	

SECTION B

Instructions: Choose one of the five answers given. Tick (/) your answer on the provided number.

1- Strongly Not Satisfied 2- Not Satisfied 3- Neutral 4-Satisfied 5- Strongly Satisfied

DESCRIPTION	1	2	3	4	5
1. I am satisfied with the registration process					
2. I am satisfied with the duration taken to complete the registration					
3. I am satisfied with the service from the staff					
4. The registration process for new student intake is efficient					

5. The duration taken to complete the registration process

DESCRIPTION	TICK (/)
20- 40 Minutes	
40-60 Minutes	
More than 60 Minutes	

Appendix 13: Result Findings Operations Management Case Study (CASE 3)

Reliability

Students' Level of Satisfaction

Cronbach's Alpha	N of Items
.954	5

Frequencies

Statistics

	Gender	Age	Faculty	I am satisfied with the student registration process	I am satisfied with the duration taken to complete the registration	I am satisfied with the service from the staff	The registration process for new student intake is efficient	The duration taken to complete the registration process
N	Valid	1980	1980	1980	1980	1980	1980	1980
	Missing	0	0	0	0	0	0	0

Frequency Table

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	837	42.3	42.3	42.3
Valid Female	1143	57.7	57.7	100.0
Total	1980	100.0	100.0	

Age

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-20 Years Old	1567	79.1	79.1	79.1
Valid 21-23 Years Old	386	19.5	19.5	98.6
Valid 24-26 Years Old	27	1.4	1.4	100.0
Total	1980	100.0	100.0	

Faculty

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Faculty of Science and Technology (FST)	457	23.1	23.1	23.1
Faculty of Quranic and Sunnah Studies (FPQS)	410	20.7	20.7	43.8
Faculty of Leadership and Management (FKP)	362	18.3	18.3	62.1
Faculty of Economics and Muamalat (FEM)	64	3.2	3.2	65.3
Faculty of Medicine and Health Sciences (FPSK)	97	4.9	4.9	70.2
Faculty of Major Language Studies (FPBU)	248	12.5	12.5	82.7
Faculty of Dentistry (FPG)	35	1.8	1.8	84.5
Faculty of Syariah and Law (FSU)	307	15.5	15.5	100.0
Total	1980	100.0	100.0	

I am satisfied with the registration process

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Satisfied	1584	80.0	80.0	80.0
Satisfied	396	20.0	20.0	20.0
Total	1980	100.0	100.0	

I am satisfied with the duration taken to complete the registration

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Satisfied	1624	82.0	82.0	82.0
Satisfied	356	18.0	18.0	18.0
Total	1980	100.0	100.0	

I am satisfied with the service from the staff

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Satisfied	1103	55.7	55.7	55.7
Satisfied	877	44.3	44.3	44.3
Total	1980	100.0	100.0	

The registration process for new student intake is efficient

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Satisfied	1884	95.2	95.2	95.2
Satisfied	96	4.8	4.8	4.8
Total	1980	100.0	100.0	100.0

The duration taken to complete the registration process					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-40 Minutes	36	1.8	1.8	1.8
	40-60 Minutes	380	19.2	19.2	19.2
	More than 60 Minutes	1564	79.0	79.0	79.0
	Total	1980	100.0	100.0	100.0

Descriptive

Descriptive Statistic

	N	Minimum	Maximum	Mean	Std. Deviation
I am satisfied with the registration process	1980	1	3	1.87	.834
I am satisfied with the duration taken to complete the registration	1980	1	4	1.84	.852
I am satisfied with the service from the staff	1980	1	4	1.86	.826
The registration process for new student intake is efficient	1980	1	4	1.93	.807
The duration taken to complete the registration process	1980	1	3	2.41	.723
Valid N (listwise)	1980				

Appendix 14: Table for Determining Sample Size Based on Desired Accuracy with Confidence Level of 95%

Population Size	Variance of the population P=50%					
	Confidence level=95% Margin of error			Confidence level=99% Margin of error		
	5	3	1	5	3	1
50	44	48	50	46	49	50
75	63	70	74	67	72	75
100	79	91	99	87	95	99
150	108	132	148	122	139	149
200	132	168	196	154	180	198
250	151	203	244	181	220	246
300	168	234	291	206	258	295
400	196	291	384	249	328	391
500	217	340	475	285	393	485
600	234	384	565	314	452	579
700	248	423	652	340	507	672
800	260	457	738	362	557	763
1000	278	516	906	398	647	943
1500	306	624	1297	459	825	1375
2000	322	696	1655	497	957	1784
3000	341	787	2286	541	1138	2539
5000	357	879	3288	583	1342	3838
10000	370	964	4899	620	1550	6228
25000	378	1023	6939	643	1709	9944
50000	381	1045	8057	652	1770	12413
100000	383	1056	8762	656	1802	14172
250000	384	1063	9249	659	1821	15489
500000	384	1065	9423	660	1828	15984
1000000	384	1066	9513	660	1831	16244

Source: (Taherdoost, 2017)

Appendix 16: New Student Intake Registration Day



Source: Division of Academic Management, USIM

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**Appendix 17: Meeting on Issue Regarding the Registration Process for New
Student Intake with Relevant Departments Involved in the Registration
Process**

- Bursar Office
 - Division of Academic Management
 - Student Affairs Department
 - IT Department (*Goal-ITQAN*)
 - **ISSUES DISCUSSED**
1. Complaints from the students, parents / guardians regarding the registration process.
Inefficiency of the registration process.
 2. What do the preparation need to be done before the registration day?
 3. Process that will be carried out at each counter.
 4. How long does it take for the registration process (by counter) to be completed per student? Based on time recorded by IT Department every year registration process.
 5. What are the expenses incurred in the registration process?
 6. What is the equipment/devices needed in the registration process?
 7. How many staffs involved in the registration process?
- By Department:
- Bursar Office
 - Division of Academic Management
 - Student Affairs Department
 - IT Department (*Goal-ITQAN*)
8. How many buses were required to transport/ transfer the students from *Dewan Tuanku Canselor Hall* (DTC) to residential colleges?
 9. Discuss on method to simplify the registration process, especially on the duration time taken?