

Lean Utilisation for Streamlining Processes in the Higher Education Sector in South Africa

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Abstract—The utilisation of lean within the manufacturing sector has been well documented. Principally it has been utilised as an instrument for improvement of processes and the resultant savings achieved. Consequently, lean can be utilised as a process restructuring method for underperforming processes. The main principle of lean is the eradication of waste within a process. Of late lean found fertile ground in the services sector too. It is especially true in the health care industry. The South African Higher Education sector experiences a shortage of funding from government. Subsequently, Higher Education Institutions (HEI's) must source funding from elsewhere. Lean implementation is seen as a possible solution. The researched institution has a large cohort of students requiring one or two modules to complete their studies. These modules are usually ones students' struggle passing. The university plans to institute a process where students would be afforded an extra examination opportunity to pass outstanding modules. The researcher was tasked to develop the process. Lean has not been utilised in these circumstances. The paper investigates the applicability of lean in HEI's. In particular the methodologies of critical to quality (CTQ), Voice of the customer (VOC), Ishikawa diagram, 5S and kaizen will be examined developing the new process.

I. INTRODUCTION

Recently, competitiveness ability in the service sector plays an ever increasing role in the success and survival of service sector organisations. The competitive ability refers to the issue of concrete or recognized competitiveness as a strong suit in relation to the principal players in the intended market. In the service sector it is referred to as order winning and order quantifying decisive factors. It is essential for successful institutions to satisfy all explicit wants known as customer needs. It is highly valued by the customer. Lately a change has taken place from the traditional scope described as low cost, high quality as well as prompt and consistent deliverance of the services rendered.

The new scope has been identified as being groundbreaking and top-quality service levels. A further extension of the theme regarding customer needs is the focus on improved levels of customer service. Coupled with it is the quality of the service rendered. Hence, service uniqueness is acclaimed to be an essential tactical precedence. It will assist service providers in generating and set up customer value. In the manufacturing sector lean has been a recognised technique to improve operation for decades [2, 9, 29 and 36]. In recent times manufacturing and services are facing unprecedented challenges.

Accordingly, Higher Education Institutions (HEI's) as service providers cannot be excluded. It has become necessary to implement austerity measures to assure the survival of the institutions. Meeting the austerity targets envisaged, the HEI's must focus on the cost effectiveness of their operations [29]. Lately; rivalry within the service sector has increased significantly. It has necessitated a thorough investigation into productivity issues within the sector. The main issue under investigation is the manner in which a service is produced. Investigating the relevance of lean as a tool enhancing productivity and service quality delivers a beneficial input to the debate currently underway.

Furthermore, process administrative insights regarding the harmonization and supervision of productivity and service quality endeavours can be attained [3, 10 and 24]. Recently, lean has become a popular methodology enhancing service quality and productivity. Due to the novelty of lean in the service sector, questions surface once adopting it. Experts in the service sector require confirmation the methodology is viable before they would embrace it. The major focal point of lean is the elimination or reduction of waste and non-value adding activities or operations.

Embedding the methodology as acceptable requires continuous improvement to processes and systems [3, 4 and 29]. It is now the turn of services. Two major areas of concern have been identified. Firstly, the service sector should steer clear of the mistake made in the manufacturing sector. The mistake was manufacturing obsessed about lean tools and techniques whilst ignoring the systems aspect to improvements. Secondly, the deployment of the tools and techniques which were successful in the manufacturing sector should be avoided without it being adapted for the service sector.

The lean practitioner must not be fixated with optimization of functions in the service environment. The focus should be the delivery of an end to end value stream in which all the functions will be combined. The umbilical cord in all instances is the management of information. The purpose of lean is not the achievement of cost reduction but it is rather an outcome of implementing the lean philosophy. The purpose of the philosophy can be described as building competence through a well-conceived system which would satisfy customer wants.

For that reason, lean in service should concentrate on the absorption of diversity and limiting disparity in the system [9, 10 and 29]. A service process must deliver the greatest possible value to the customer it serves. Optimisation of value does not imply service quality can be neglected. Hence,

The HEI's have to adopt a variety of lean tools and techniques to achieve their goals. Accordingly, the development of lean in the service sector is an attractive way of improving services rendered [3 and 10]. An important issue needing attention is the sustainability of the implementations undertaken.

The sustainability of the improvements as well as the service provider will increase in importance as time goes by. The focal point of sustainability is the preservation of scarce resources available to the service provider. The scarce resources should never be over extended in the quest to augment productivity and quality [24, 29 and 36]. The attractiveness of lean is manifested principally through the realization of improvements in a cost-effective manner. Secondly, lean focuses on eliminating or reducing Muda or waste in processes and systems.

Lean cannot be applied successfully without the cooperation of management and employees. Both entities must concentrate on generating value which the customer would be willing to pay for. Available literature [add all authors here] deliver overwhelming evidence that lean is a valuable methodology for implementation in the service sector. Successful implementation cannot be achieved by hastily concocted solutions. It would result in the loss of money instead of reducing cost. No value would be added to the processes and systems. Consequently, the service sector lags behind their counterparts in the manufacturing sector [3, 9 and 10].

II. BACKGROUND

Higher Education (HE) institutions in South Africa are publicly funded. It allude to the fact that these institutions are funded by the Department of Higher Education and Training (DHET). Public funds are limited and can be classified as a scarce resource which must be managed prudently. Another characteristic of being publicly funded is that money available to the Treasury must be shared with other public institutions. The DHET funds universities by means of a subsidy system payable on a yearly basis. Subsidy is paid only for students that graduate and not the cohort in the system completing their studies.

The subsidy system did not keep up with the increases in managing the HE institutions. Subsequently, HE, institutions must find alternative sources of funding to cover the shortfall. It result in a percentage of students that could not graduate since they had a maximum of two modules outstanding would not be subsidised. The researched institution currently has a student cohort of 350 000 students. If a small percentage of these students are unable to complete their studies due to the fact they require no more than two outstanding modules, the strain on the funding model of the institution is huge.

The result will be that the scarce resources would be thinly spread. The possibility of an increase in the subsidy is non-existent. Alleviating the problem became a priority.

Currently students are afforded two opportunities to pass a module. The first examination and if they fail that a supplementary examination is available. If a student fails this he or she must enrol for the module again in the next academic year. Many of the students in this kind of situation have 2 modules outstanding which are not core modules for their qualification. The result is many students are clogging the system and no subsidy is earned.

A process was instituted that would allow these students an extra opportunity to complete their studies. The process is known as the Final Year or FI concession process. The student must be identified as qualifying by the appropriate department. Thereafter the student will be informed that he or she qualify for the additional opportunity. Problems arose in identifying eligible students, informing them of the opportunity, rendering the necessary academic support to succeed and capturing the final mark. The process is and remain cumbersome and not customer friendly.

The stakeholders in the process operated in silo's resulting in students being sent from pillar to post. Many deserving students were omitted from the process as a result. A committee was established to investigate and improve the process and the researcher was member of it. Upon investigation a large number of wastes were identified. A decision was taken by the committee to determine whether Lean principles can be utilised in the service sector and the HE sector in particular. In the discussion that follows the appropriate methodologies will be discussed.

III. METHODOLOGY

Action or case research has countless applications with the proviso it is utilised correctly. The innovative methods and information revealed during action research can be applied universally to attain pioneering improvements to processes or systems. A fallacy perpetrated in academia undertaking action research is the method would be the preferred method in undertaking research. Whilst the majority of processes are developed by administrative staff members, they are unaware of the benefits of action research. In reality a division in understanding endure.

The division develop as a consequence of not being appreciative of the rationale that research is embarked on to acquire information. In general, academics and administrative staff members have separate objectives whilst designing new processes or improving existing processes. [1, 8, 12, 15, 21, 25 and 26]

An assortment of researchers has acknowledged the following vital characteristics must be present for action research to be successful:

- a. It is important for both participants in the research, Academic and administrative staff member, has to acquire the necessary research skills. It is particularly factual during the scrutiny of information obtained, clarification and the deliberation of results arrived at. It would be obligatory for administrative staff members to submit to

training in the methodology of action research. Without the training, they would be incapable to comprehend the details of the methodology. Moreover it would lend support to the administrative staff members in comprehending the rationale for applying specific lean methodologies.

- b. A foremost prerequisite for utilising action research correctly, rely on a mutual comprehension of the appropriate lean methodologies applicable in the service sector.
- c. The most important prerequisite in harnessing action research is the ability to jointly delineate research questions.
- d. Team members must play an active role individually during the crucial reflection on the specifics affecting the research questions.
- e. Stakeholders must actively contribute to the examination of remedies identified which is appropriate in the existing state of affairs. [11, 12, 16, 26 and 35]

It is postulated by [11, 18 and 34] a permutation line of attack is appropriate where dissimilar strategies are employed discovering practical end results. Moreover action research is accepted as a contradictory, collective, qualified and layered methodology unearthing suitable resolutions to existing problems. Subsequently, the consequence is researchers embark on frank and honest research in the service sector. It is feasible given that action research is known for dealing with complex problems. The methodology present the researcher with an informative and critical conception of the combined and established exploitation of the methodologies explored.

The authors [1, 12, 26 and 35] postulates on the meditative and advanced articulation of the research embarked on which could show the way to a powerful conceptualisation of outcomes. The outcomes could have been up till now unfeasible. The methodology promises interactions would occur involving the researcher and researched organisation resultant in the original hypothetical perspective. Furthermore, the result would be supplementary research of the observable facts presently being explored. Action research improves and generates an unequivocal representation of literature applicable to the subject being analysed. Additional to the accentuation and fundamental classes of information exposed, the conclusion of the research would be advantageous to all concerned.

Action research directs attention to the essential topics of accepted wisdom on practical and premeditated levels to support problem solving. Subsequently, the effect is a practical foundation leading to results where promotion of novel and enhanced actions and processes can occur. In addition, action research authorizes a researcher to describe original, unique and inspired conclusions. The effects embrace the essentials of concepts researched and understanding thereof. Equally, action research advances the research process to a fruitful conclusion.

It appraises and investigates the conventional attitudes prevailing in the existing state of affairs under scrutiny. Previously, outcomes attained owing to the deployment of action research were unanticipated tactical projections which were uncovered for upcoming exploitation [34, 42 and 45]. The precept of action research is strongly located to shape a transformation of research inferences into pragmatic strategies. Decision makers and senior managers will be capable of acknowledge outcomes and promptly execute the conclusions attained during action research.

Appropriately, an improvement which has a foundation in the findings of action research will represent a studier starting point for prospective implementation of improvement projects. In conclusion, action research relate to the individual and shared sphere biased towards the fiscal growth attainable owing to fresh and pioneering philosophies. Due to action research, researchers grow to be flexible in probing and modify processes and procedures to an elevated level which was possible in the past [11, 12, 21, 34 and 45].

IV. LITERATURE REVIEW

Quality in the manufacturing sector is easier to define than service quality. An assumption is made that manufacturing quality remains stable. Conversely, service quality is a perception of the customer and is deemed not to be stable. Each individual customer has his or her own perception of what good service quality is. Hence, customer quality will fluctuate. In the service sector a trade-off must be achieved concerning customer fulfilment and effectiveness. It would result in setting up an appropriate metrics to quantify customer satisfaction. Compared to a customer in manufacturing, the customer in the service sector plays a more significant role in quality. Included in the service quality can be issues such as time, information and expertise.

It can be argued the customer in the service sector performs a crucial function in contributing inputs and in due course augmenting their personal fulfilment. Whether lean will be successfully implemented will be reliant on two well-defined elements. The first element can be defined as the variety in the need for the service. The second is the willingness of the customer to contribute. If service sector demand were said to be homogenous, the exploitation of the lean methodology would be undoubtedly be made easier. The reason being specific deviations in demand would be minor.

The customer's spirit towards contributing is decidedly germane since their contributing is a major distinction concerning the service and product-orientated milieus [5, 9 and 28]. The improvement of processes and systems within the HE sector demands a methodical method to be successful. Hence, the PDCA or DMAIC methodologies could be applied to ascertain the characteristic which are critical to quality (CTQ). A selection of crucial components will be vital if lean is to be a success in the service sector which can be defined as critical success factors. If the factors are

neglected by the institution, it could suffer negative consequences.

The ultimate failure would be an unsuccessful implementation of lean. The lean methodology can be a multifaceted methodology to exploit and hence adherence to the aforementioned factors becomes very important. Six important CTQ factors have been identified. They are:

- a. Executive participation and devotion – It has been acknowledged generally as the factor of greatest consequence for a successful lean implementation. The factor utilises a top-down technique. The significance of it is every improvement commences with the decision-makers and therefore insists on involvement of management at every juncture during the execution.
- b. Suitable tuition and learning – if lean is to be implemented successfully, suitable and uninterrupted schooling of staff members engaged in the execution phase must be embarked on.
- c. Cultural modification – It would determine the effortlessness with which the institution would embrace and execute without difficulty, novel data, theories and techniques.
- d. Attributing accomplishments to fiscal pay offs – The success of can be measured by the monetary value of savings achieved through the implementation of lean.
- e. Exploit information examination – methods and procedures to investigate information gathered and scrutinized is thus extremely crucial.
- f. Relate execution to company stratagem – Lean execution must be related to the stratagem of the institution [2, 4, 14, 22, 28, 30, 31, 38 and 46].

A major determining factor of CTQ is the length of time a student would waste in the processes of the HE institution. The length of time can be governed by a multitude of factor. Certain of the factors might be external and cannot be controlled by the institution. Inordinate time squandered in a process might be indicative of non-standardised processes and systems. It would create an untenable variability in the performance of the process or system. Variability in a process or system introduces waste and it should be addressed as a matter of urgency. Root cause analysis should be undertaken through the introduction of an Ishikawa diagram [28, 30, 31, and 38].

Variation is known by many different names. The most often substitute to variation is variability. Variation is a great contributor to waste and hence become the nemesis of the lean process. Lean practitioners must recognise queue length or lead-time is defined as a value of the arrival variation, process variation and capacity consumption. This phenomenon can be defined as the Mura, Muri and Muda which will be discussed in detail later. Both Mura and Muri contribute towards Muda. A clear distinction must be made between variation and variety.

Variety is a fact of life for the service sector. It is because customers are individuals and as such they will have unique

needs and wants. Consequently, when the process is designed variety should be designed into the process. Doing so would allow the process to deal with variety in the future. Conversely, any instances of variation or variability should be minimised during process design or during process improvement. Having copious or negligible amounts of variation in a process creates its own problems. Large disparities in variation can cause failure demand [6, 9, 22, 39 and 43].

This occurrence is known as the loss function. The loss function postulate the further a process digress from the optimum, the larger the loss will be. Variability has two important components. They are customer initiated variability and in-house process variability. The phenomenon can be described by Kingman's equation below:

$$AQT = \left(\frac{Ca^2 + Cp^2}{2} \right) \left(\frac{\rho}{1 - \rho} \right) tp$$

Where:

AQT = Average Queue Time

ρ = Utilisation factor, stated as a decimal

$\therefore \rho$ = arrival rate/service rate

Ca^2 = Arrival variation coefficient

Cp^2 = Process variation coefficient

tp = process time

Equation 1 adopted form [9]

Equation 1 highlight the fact three variables will influence the cycle time of a process. They are arrival variation, process variation and the utilisation factor of the process. Therefore, the length of the queue and time spend waiting in the queue is proportional to the mean time of the process. The equation integrates three important factors which represent a queue. It is the philosophies Of Muda, Muri and Mura, The reduction of variation and the eradication of failure demand. Through the eradication of these principles, value added time will be achieved in the process.

All three of the above will illustrate tendencies of arrival and process variation. Two types of variation have been isolated. They are common cause variation and special cause variation. The latter of is straightforward to recognise and eradicate. Towards the objective of diminishing the influence of common cause variation, the remodelling of the entire system could become an issue. In the service sector three types of demand can be identified. They are value demand which can be described as demand that was generated for the first-time. Failure demand which can be described as recurring demand created external to the process and is a result of doing nothing or do work incorrectly the first time [6, 9, 22, 39 and 43].

Rework demand which can be described as a demand that was created internally within the process and is caused by errors of staff members and was rectified before the customer became aware of it. Hence, the reduction of two of the three types of demand namely failure demand and internal rework demand should become a priority since it is the biggest

contributor to waste. Variability in the process will introduce queues or waiting lines in the service sector. A comprehensive understanding of queues is essential due to the influence on service processes.

Queues usually introduce an upsurge in lead-time, diminished competitiveness; irritate customers and a decrease in service quality. A major difference between the manufacturing and service sector is the composition of queues. In the manufacturing sector queues comprise of work in process waiting for a machine, operator or operation. Conversely, in the service sector queues comprise of people waiting to be served. Consequently, a service queue is defined by an extended wait time for a service to be rendered. Thus, the management of queues in the service sector is very important [2, 9, 14, 29 and 41].

The basic tenet of lean, in manufacturing or the service sector, is to eradicate or at least lessen waste in processes. A twofold line of attack would be appropriate namely a customer and process-focused methodology. The methodology can be divided into 5 distinct steps. They are:

- a. Describe value commencing with the customers prospective.
- b. Distinguish the value stream for every service offering the value and confront every one of the wasted action.
- c. Ensure an uninterrupted supply of work.
- d. Initiate pull system relating to all actions where uninterrupted supply of work is impractical.
- e. Manage towards perfection ensuring non value adding activities will be removed resulting in a reduction in the number of steps. Furthermore, the time period spend in the process by the customer in addition to decreasing the magnitude of information necessary must be controlled [37].

Successful execution of lean in the service sector requires the decision-makers to reflect on five fundamental traits of the service sector. If the fundamental traits are neglected, the effectiveness of the HE institution will not improve and the lean execution will fail. The five traits referred to is immateriality, elements can decay, items are unable to be separated, variability and deficiency in control [6, 9 and 46]. Further lean philosophies identified which is related to the service sector is understanding the final customer, characterise the value stream for every single product line, initiate movement in the process by means of value generating actions, draw value commencing with ensuing upstream actions, pursue excellence and eradicate waste.

The primary function of lean is defined as pursuing excellence by means of waste reduction or eradication [6, 14, 22, and 43]. The assumption that the same lean paradigm created for the manufacturing sector can be forced on the service sector is a myth. Consequently, lean practitioners would adapt the lean methodology to fit the service sector. The result is something completely new that is not

recognisable as the existing inferred lean models. Lean practitioners often attempt to apply the wastes which have been identified for the manufacturing sector to the service sector [6, 9 and 46].

Understanding waste occurring in a process or system within the service sector is of cardinal importance. Waste can be grouped into three very distinct categories namely:

- a. Muri also known as overburden – in this instance, the service provider determines which activities can be circumvented by taking the initiative through improved design of the process or system.
- b. Mura also known as unevenness – in this instance, the focal point is the execution of improvements which in turn would eradicate variations at the source.
- c. Muda – Components that are unearthed subsequent to the process being in position and which address deviation in yield.

The three principles are interwoven. Thus, they have to be understood in its totality for a successful lean implementation in the service sector [9, 39, 41 and 43] The Japanese term for waste is Muda. The major concern of the lean methodology is the eradication of waste. Waste eradication is harnessed to attain lean status but cannot be described as the alpha and omega of the methodology. Conversely, it can be argued the avoidance of waste is of equal importance to that of waste eradication. There are a clear distinction between the 2 most important types of muda and should be fully comprehended.

A distinction can be made between type I and type II Muda. In the instance of type I Muda, it includes those operations which do not create value in the process. The waste identified in Type I Muda is needed if the process is to behave appropriately. The customers within the process could well do without the waste. In contrast, it assists decision-makers to manage the operations within the process. The decrease of waste in this instance can be achieved through streamlining of operations. Type II Muda can be defined as generating no value whatsoever. It can be postulated that this type of Muda in reality ruin value [2, 4, 6, 9 and 39].

Consequently, the reduction or elimination of this type of waste must be an overriding priority. A distinction must be made between waste elimination and waste reduction. It is the duty of every staff members to eliminate waste wherever it is encountered. Waste prevention is of equal importance. The seven service wastes have been developed for this purpose. The service wastes can be defined as an inappropriate service which is created impeccably. In preventing the situation of occurring, staff members must have thorough understanding of operations. The following are the service wastes that have been identified:

- a. Delay – it occurs when where the customer must wait for the service to occur. An example is where a patient has to wait to see a doctor after the appointed time. Another example is where a student wants to change personal

detail but has to wait for the computer system to go live. A misconception exists that a customer’s time is free. Unfortunately, it is a fallacy. Customers within a process or system have to take time off from their place of employment to complete the service. Customers do not appreciate waiting in queues.

- b. Duplication – it occurs where the same data has to be recaptured numerous times in a particular process. An example is when a student enrolls for a course at a HE institution. Biographical information is duplicated numerous times during the enrolment process. In many instances the same questions must be answered by the student as he or she progresses through the process.
- c. Unnecessary movement – customers must move along the process on the completion of the previous operation. The result is waiting in a queue at the next operation. It usually results from a poor layout of the facility or poor training of the staff members manning the operations in the process.
- d. Unclear communications – customers are baffled concerning the next step in the process. Hence, the customer must endlessly request elucidation where to proceed to subsequently. If the process dispersed over a number of sites, it could represent finding the subsequent locale where the service would continue.
- e. Incorrect inventory – the advertised service is not available at the present time.
- f. Opportunity lost – the organisation is unable to hold on to their current customers and conversely they are incapable to win new customers. It occurs when the service provider is pay no heed to the customer, is aloof or is discourteous to the customer.
- g. Errors – it occurs when mistakes are made during the provision of the service. A further waste occurs if the result of the service is impaired [6, 9, 14, 39, 41 and 43].

Table 1 on the following page; depict the distinctions between manufacturing wastes and service wastes.

It is not uncommon for different wastes to be interpreted in different ways in the manufacturing and service sectors. An example is the waste of inventory. In the manufacturing sector too much inventory or unnecessary inventory is categorised as waste. In contrast, if no inventory is available in the service sector, the so called stock-out, it is categorised as a waste. The reason the stock-out in the service sector is so important is the customer demand instantaneous satisfaction of a need when consuming the service. The type of variations described, triggers confusion with customers.

Can it then be argued the service sector should endeavour for higher inventory holding? If that is the case, could lean be seen as applicable in the service sector? Hence, the main concern is the service sector seems incapable of accepting there are differences relating to the manufacturing and service sector [6, 9, 14, 39, 41 and 43]. Successful service providers are those who incorporate the customer as a committed contributor to the value creation process. Ensuring every customer is heard, customers can be separated into two groupings. They are:

- a. External customers – the grouping is defined by the people outside the institution. In the case of a HE institution, it is the students utilising the processes of the institution.
- b. Internal customers – the grouping is defined by the people populating the processes within the HE institution. It would represent the staff members doing the actual work.

It is achieved through the following means:

- a. Sustained association – the service provider utilise the conversion of all inputs in the process into services required by the customer.
- b. Facilitating – the service provider couple customers to the existing process or system.
- c. Exhaustive – specialists will be utilised by the service provider to address customer problems.

TABLE 1 – DISTINCTIONS BETWEEN MANUFACTURING AND SERVICE WASTES ADAPTED FROM [9]

| Manufacturing wastes | Service wastes |
|---|---|
| Waiting – Work in process is waiting for next operator, machine or operation | Delay - customer must wait for the service to occur |
| Overproduction – Product is not required by the customer | Duplication – same data recaptured numerous times in a particular process |
| Movement – staff members are moved between operations without adding value to the final product | Unnecessary movement – customers move along process on the completion of the previous operation |
| Processing – Unnecessary operations are added to the process | Unclear communications – customers are baffled concerning the next step in the process |
| Inventory – work in process is waiting in a queue at next operation | Incorrect inventory – the advertised service is not available at the present time |
| Transportation – work in process is moved between operations which do not create value | Opportunity lost – organisation unable to hold on to current customers or incapable winning new customers |
| Scrap – products must be reworked before sale to customer | Errors – mistakes occur during provision of service |

The abovementioned would assist a service provider in isolating customer wishes and wants. As a result, the most appropriate service can be developed and rendered to the customer. The crucial factor to effectively compete is in establishing customer wants and translates it into an honest attempt in relation to satisfying customer expectancies [2, 4, 9 and 29].

Managing and improving processes in the service sector is never easy. The process in the service sector is not as visible as is the case in the manufacturing sector. The never-ending question asked during improvements in the service sector is: "How do I find what is wrong in the process?" Lean utilises Gemba to facilitate feedback. Gemba is a word of Japanese origin meaning go to the location wherever the activity of work is taking place. It can also be translated as meaning the physical location. It means the lean practitioner must go to the process where customer value is created.

An argument often espoused in the service sector, is it is not always possible to measure the customer's encounters with a service process. In the majority of cases the argument is not true. The practitioner must walk the process to gather facts regarding customer experiences within the process. Traditionally, staff members in the process or system would be interviewed to determine customer experiences within the process or system. The answer thus obtained, will always be skewed to portray the customer not following the correct procedure. Consequently, possible improvements are based on opinions and not facts [9, 14, 20, 22 and 46].

An even worse case scenario is where improvements will be based upon a Key Performance Indicator (KPI). If the practitioner is reliant on questionnaires from the customer to hear the customer's voice, the data would be skewed. Customers would depict their experiences as far worse than it really was. In the cases as described, the practitioner often if not always neglects Gemba visits. Gemba visits and the consequences must always be based on four concrete cornerstones. The first is visiting the real place of work. The second is examining the explicit process in action.

The third is to scrutinise what is in reality occurring in the process. This is known as Genbutsu. Lastly the practitioner must gather real facts. This is known as Genjitsu. The application Gemba as a technique is characterised as gaining knowledge through observation. The practitioner must constantly interrogate every action observed during the Gemba walk. It is impossible to ask the questions if the practitioner never leaves the office. A mind-set change is required from the current mid-set of the situation has nothing to do with me. It is not recommended staff members wait for decision-makers to unearth and highlight problems in the process.

Carrying out a Gemba walk, the decision-maker experience exactly what the customer would. It is known as the voice of the customer [9, 14, 20, 22 and 46]. The voice of the customer is a well-established technique to ascertain

customer needs and wants. It is widely applied in market research as well as the improvement of service processes. It will assist decision-makers in establishing the inequalities that exist in what they thought are happening in the process to what is really happening in the process. The voice of the customer has been acknowledged as an extremely valuable technique to cultivate awareness of customer's unfulfilled and implicit wants and struggles.

A major benefit of the technique is providing a logical means of isolating customer needs. It would include real needs, anticipated needs, anticipated and unanticipated needs. Consequently, the technique has the capability to deliver evidence centred information which could assist lean practitioners to improving the process. To effectively and efficiently utilise the voice of the customer technique, the practitioner must ascertain what is critical to quality in the process [5, 14, 20, 23, 27, 37 and 44].

The Kaizen technique is a fundamental part of the lean methodology. The technique is utilised to involve staff members in a brainstorming exercise to identify wastes. A major benefit of undertaking a Kaizen event is a continuous process of improvement to a process. A successful Kaizen event is characterised by small changes to a process. A major contributing factor to a Kaizen failure is the expectations of decision-makers of achieving extensive, audacious, and impressive as well as management directed transformation. The following is some of the reasons why the small change approach is successful:

- a. Small changes are less intimidating to participants than big sudden changes.
- b. The results can be observed without delay.
- c. It becomes the new routine. The change turns into the innovative approach of undertaking work.
- d. As the result of the measurable success of previous Kaizen events, participants become more confident in the knowledge they have garnered and the implementation thereof.
- e. An accumulation of small changes will ultimately lead to large changes.
- f. The previous successful implementation makes staff members less fearful of failure [7, 9, 17, 19, 33, and 46].

Although Kaizen has been developed for the manufacturing sector, it is ably suited to function in the service sector too. Through the application of the Kaizen technique, improvements are achieved to processes, staff members working experience and in some instances even their personal spaces. The word Kaizen is a Japanese word consisting of two separate terms namely KAI meaning change and ZEN meaning better. The closest English translation available is change is better. The question to be answered is why are the technique so successful?

It relates to the fact that a Kaizen event is a motivational technique assisting staff members to prevail over wastes

within processes and systems. With the eradication or cutback of waste, scarce resources can be utilised in a more effective manner. Thus, it would enhance the productivity of staff members. Resulting from the versatility of the Kaizen event, it can be utilised in combination with other lean techniques. Kaizen utilises a team consisting of a group of people where members represent every department functioning within the process. In the sphere of HE the purpose is the expansion of customer service [7, 9, 17, 19, 33, and 46].

The expansion can only be achieved through the empowerment of staff members which would enable them to perform their task more diligent. Three tenets had been identified if a Kaizen event is to be successful. They are:

Tenet 1 – The technique must be utilised in a sociable manner. Staff members should not be excluded from participation. Decision-makers and staff members must have equal standing during the Kaizen event. The belief that the technique can make a difference in the working environment of all concerned is motivational factor. Consequently, every Kaizen event has three well-defined actions. The actions can be described as each having an individual emphasis and interpretation of the manner in which improvements to the process can be achieved. The first action revolves around management and the manner in which they make judgements, carry out organising and monitoring outcomes of the improvement process. The second action is the cross-functional group undertaking the improvement to the process. The third action is where the focus will be on each individual in the process to propose improvements.

Tenet 2 – The concern at this stage is one of incessant enhancement of the process and sustaining specifications. During this phase staff members must be innovative in their way of thinking. Any improvement must become the new criterion to which every staff member adheres. The size of the improvement is irrelevant since jointly staff members can have a tangible impact on outcomes. In this regard it is important for decision-makers to constantly scan the process to determine whether staff members abide by the new criterions.

Tenet 3 – Kaizen as a methodology is a process focused on system. Improvements must be embarked on to guarantee the process performance is superior to the process before the improvement was embarked on. Decision-makers are responsible for an instigating force to commence the project. Subsequently, to upgrade the process, relationships with other actions within the process should correspondingly be lent significance. Decision-makers must guarantee every staff member in the affected process participate in the Kaizen event. Hence, appropriate training for staff members should be available [2, 3, 7, 17, 19 and 33].

A Kaizen event would enhance the core office functioning and lessen the queuing time a student will waste whilst interacting with the process. The principal intentions of the Kaizen event in the researched institution were:

- a. Guaranteeing avenues of communications is completely assimilated. The three avenues referred to are walk-ins, telephone calls and e-mails.
- b. Reduce the queuing time for students
- c. Improving the contentment intensity for staff members and students
- d. Decrease the activities which is non value adding for students
- e. Augment the process which in turn would facilitate a decrease movement within the process [17, 19, 22 and 33]

The Ishikawa or fishbone diagram forms a vital element identifying root causes for process failure. Internal customers brainstorm possible causes for failure and the identified causes are depicted by means of a cause and effect diagram also known as an Ishikawa or fishbone diagram. The possible root causes is separated into 4 types. These are known as the 4M's and symbolise machines, methods, men and material which are utilised in the process. During the brainstorming exercise, staff members will classify each root cause identified as either being machine, methods, men or material.

It is paramount that each of the root causes isolated during the brainstorming exercise, is tested thoroughly before any of them can be accepted as a true root cause. If the root cause identified cannot be substantiated, it must be rejected. If it is not rejected, time would be wasted on improving a non-critical root cause. An appropriate tool that can be utilised for this purpose is the 5Why technique. It is known as the 5Why's since the reason for the failure in the process is incessantly questioned. Usually by the fifth iteration the true reason for the failure will become apparent [13, 14, 22, 32 and 40].

A thorough interrogation of the data collected utilising this method is required. The analysis would prove or disprove the veracity of the proposed root cause. Furthermore, the analysis would assist the team in determining the forces at work that would cause variation in the process. Utilising the brainstorming technique discussed earlier, staff members would attempt to identify as many forces as possible which would have a direct influence on the process. The forces that were accepted as valid root causes would be depicted on an Ishikawa diagram describing the relationships between the root cause or influence and the probable cause. Figure 1 depicts the Ishikawa diagram generated of the root causes that was most prominent in the process investigated. The root causes identified were thoroughly analysed and an improved FI Concession process was developed. It would be elucidated in the next section.

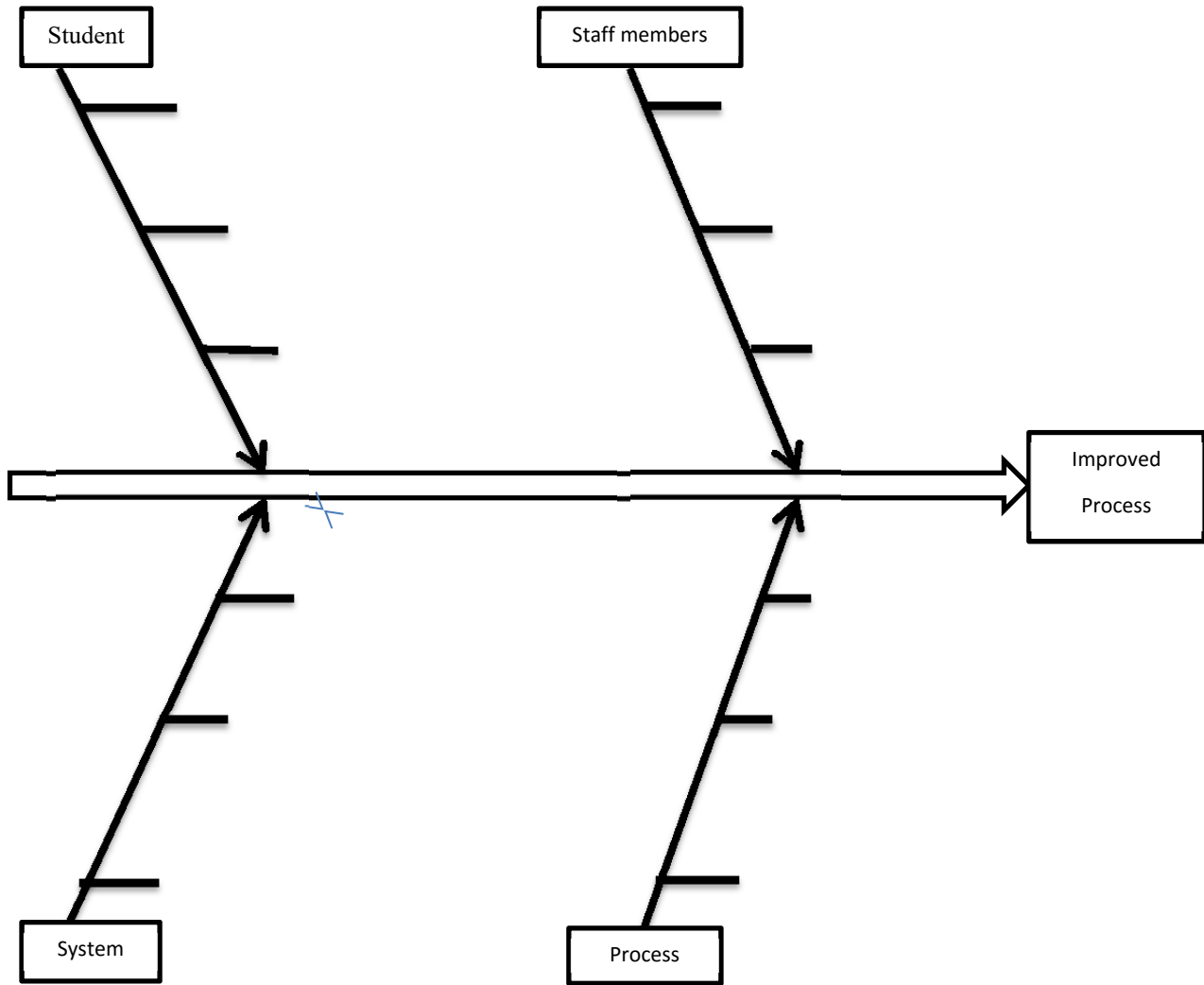


Figure 1 – Ishikawa diagram for FI Concession process

V. RESULTS AND CONCLUSIONS

The Higher Education (HE) institution need to focus scarce assets and the intellectual capital of staff members on key primacies permitting the HE institution to satisfy the needs and wants of students. The HE institution cannot exist in a vacuum. There must be cooperation between the institution and students. Consequently, the voice of the customer is becoming more important if service processes is to fulfil the customer expectations. The continued existence of the HE institution is reliant on processes being lean. Towards this goal, the philosophy of Kaizen was introduced to improve the existing FI Concession process.

The Kaizen event was instrumental in identifying root causes in the previous cumbersome process as illustrated by the Ishikawa diagram in figure 1. Furthermore, a standard operating procedure was developed to ensure the process functioning as intended. The standard operating procedure is included below.

Standard Operating Procedure for: Final Year (FI) Concession

This document describes the process to be followed which would assist students with no more than two modules outstanding to complete a qualification to be afforded another opportunity to complete the requisite modules and be able to graduate according to the FI Policy Document. The steps in the process are as follows:

- i. **DSAR** identifies students 10 working days after examination marks finalised.
- ii. **DSAR** assists students to change their current status on student system.
- iii. **DSAA** informs students that MyUnisa sites for FI concessions will be available for their use and for support.
- iv. **ICT** activates access to sites for identified students.
- v. **DSAA** informs students that they qualify for FI concession.

- vi. **ICT** ensures that all approved methods of alternative assessment are available to academics for FI concessions.
- vii. **DSAA** furnishes a list of identified students to academics through MyUnisa within a week of notification by DSAR.
- viii. **DSAA** forwards examination scripts of identified students to academics for perusal and support.
- ix. **Academics** contact students to determine their needs after studying examination scripts.
- x. **Academics** determine generalised needs of students once steps viii and ix have been completed and render required assistance **via MyUnisa**
- xi. **Academics** inform student of type, date and time of assessment.
- xii. **Academics** administer assessment taking into consideration all the usual examination rules and quality assurance.
- xiii. **Academics** mark examination and upload marks onto MyUnisa.
- xiv. **ICT** to harvest marks from MyUnisa and transfer to XMO.
- xv. Normal sign-off procedure takes place.

The paper illustrated the manner in which a kaizen event can assist in the service sector to improve processes. It would be achieved through the elimination and reduction of waste. The importance of understanding the different types of waste has been illustrated thoroughly. The contributing factors towards Muda have been exemplified. The manner in which the variation in a process contributed towards Muda has been investigated. The discussion in the paper has illustrated the consequences if this is not managed. Kingman's equation has been introduced as a means to measure the impact of the different types of variation.

The process has never been investigated to this extent and therefore the impact of Kingman's equation cannot be substantiated at this point. The data to populate the equation is in the process of being collected. The new FI concession process will be instituted during the 2016 academic year. The paper further elucidates the fact that Kaizen had an explicit result on the institution's capacity to increase operations and customer fulfilment. The systematic methodology presented a beneficial influence permitting the institution to enhance existing operations.

The methodologies utilised corroborated it to be straightforward and cost effective methods to maximise benefits. Further research is needed because the research is based on a single case study. Consequently, researchers, practitioners and decision-makers in other HE institutions with comparable processes should explore in more detail the outcome of lean in their environment.

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