Application of Lean Management Tool to Improve Working Efficiency of Tay Do University's Units

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Abstract: *This study aims to apply lean management tools to identify types of waste existing in Tay Do University, thereby proposing action plans to save costs and improve working efficiency. The convenience sampling was used to interview 172 lecturers and employees of Tay Do University. The analysis results have shown that there are ten types of waste. They are facility and equipment waste, discrete information, not exploiting the creativity of employees, time waste, defect, excess of inventory, over-processing, labor waste, excess of inputs, and excess of operation. Based on the research results, the action plan is proposed by applying the 5S model for tangible waste (facility and equipment waste) and applying Kaizen - Continuous improvement for intangible waste (not exploiting the creativity of employees, discrete information, etc.).*

Key Words: *Lean management, working efficiency, Tay Do University.*

I. INTRODUCTION

Lean management is a management mindset and method that focuses on maintaining or sustainably increasing revenue, with a maximum focus on reducing cost waste. This is one of the modern management methods that are being applied effectively in many countries. Its main principles include waste identification, processes standardization, operation and continuous improvement.

Womack and Jones (1996) were one of the first scholars to study the possibility to apply lean management in the service sector. Education is considered as a service activity, between an educational service provider and a service user. Improving education quality is now one of the top concerns of managers and politicians because education is important for the future of human beings as well as the destiny of the country. However, there is still wastes that lead to inefficient management in schools. With the desire to contribute to improving education quality, many experts and scholars argue that the philosophy in "Lean Management" method is one of the appropriate options in the current context. Many countries in the world, especially developed countries, have successfully applied and achieved excellent results by using lean management in improving the quality of educational services. For example, the "Lean University" project of Cardiff University (UK) used several lean management tools and techniques such as Rapid Improvement Workshops-RIWs, Value Stream Mapping (value chain diagram), Visual Management, etc. The "Lean University" project of the University of Central Oklahoma (USA) used Value Stream Mapping (value chain diagram), Kaizen (Continuous Improvement), etc. These projects have brought some positive outcome such as reducing paper cost and increasing labor productivity for the University of Central Oklahoma, USA and improving the culture of change as well as raising employees' work interest for Cardiff University, UK.

Tay Do University is a non-public university, so it is financially autonomous. Therefore, researching and developing lean management for educational activities to reduce costs and improve labor productivity is always a great challenge to the University's units. The above facts show that the implementation of this research is essential.

II. LITERATURE SURVEY

Lean management is a management mindset and method that focuses on maintaining or increasing revenue, especially reducing cost waste (focus on the cost waste in mindset and working method) through some tools such as 5S, visual management, and TPM (Total productive maintenance). This helps businesses identify and eliminate the wastes that exist in the manufacturing process. Lean management is the mindset that aims to create added value and minimize cost watse for businesses by using human intelligence (Nguyen Dang Minh et al. (2013).

Lean management is considered valid if daily wastes are minimized, and it brings value to the organization. Waste exists in two forms, tangible and intangible waste. In the education sector, tangible waste can be identified as waste on facility and equipment. Invisible waste can be not exploiting the creativity of employees or discrete information.

2.1. Types of waste in lean management

To find and eliminate all wasteful factors in production, Taiichi Ohno (1988) introduced seven basic types of waste as follows:

- Overproduction: The production is more or earlier than what is required unnecessarily. This increases the risk of product obsolescence, producing the wrong product category, and the possibility to sell the product with the discounted price or discard it as scrap.

- Inventory: Excess of stock means over-storing of raw materials, semi-finished products, and finished products. The excess of inventory leads to high financial costs, storage costs, and defect rates.

- Defective products/services: The production of products that do not meet customers' requirements resulting in the reduction on prices, repair or replacement. Besides, defects include paper errors, misleading product information, late delivery, improper production, excessive use of raw materials or unnecessary scraps.

- Over-processing: this means conducting more processing work than customers' requirements in the form of the quality or performance of the product. For example, polishing some details of the products that customers do not require and are not interested in.

- Excess of operation: this includes any unnecessary physical movement of workers that not associated with processing the product. For example, traveling around the factory looking for work tools or even useless or inconvenient body movements due to poorly designed operating procedures slows down workers' working speed.

- Unnecessary motion: any change of materials that do not create added value for the product, such as the movement of materials between production stages. Movement between processing stages prolongs the production cycle time, resulting in inefficient labor use and space use, and production bottlenecks.

- Waiting: idle time of workers or machines due to bottlenecks or inefficient production flow in the factory. Waiting increases labor costs and the depreciation per unit.

2.2 5S Model

5S is derived from 5 Japanese words including: "Seiri, Seiton, Seiso, Seiketsu, and Shitsuke". In different countries, 5S is translated into different words, but basically, its meaning does not change. In English, 5S is translated into the corresponding words "Sort, Straighten, Shine, Systemise and Sustain". In Vietnamese, 5S includes "Sang Loc, Sap Xep, Sach Se, San soc, and San sang" (Nguyen Dang Minh et al., 2013; Phan Chi Anh, 2008).

Seiri (Sort): this means sorting, organizing items in an order. One of the most common ways to do "Sort" is to use a "red card". Any items that are not used for the job will be tagged. At the end of the process, the head of each department considers why reg-tagged items are still in their working space, then decides to remove or continue to keep them. Therefore, it helps reducing waste as well as creating a safer and more scientific working environment.

Seiton (Straighten): After removing unnecessary items, the next step is to organize the remaining items effectively according to the criteria of easy to find, easy to see, easy to take and easy to return. In this step, details need to be located most conveniently, according to the visual management principle, "one position for each item, each item has only one position". One thing to keep in mind when doing Seiton is that items should be numbered or labeled so that people can quickly identify and search them.

Seiso (Shine): Shine is done through the general hygiene and daily hygiene for machines, facilities, and work areas. Seiso aims to improve the working environment, minimize risks and accidents, as well as improve the accuracy of machinery and equipment. Seiso is not only to keep the working environment clean in the organization but also to inspect machinery and equipment, detect problems such as damage or dirt. As a result, it helps find solutions to problems and improve equipment productivity, thereby ensuring a safe working environment.

Seiketsu (Systemise): Seiketsu's goal is to maintain long-term 3S activities instead of a temporary movement. Therefore, identifying processes to ensure the accuracy is essential to maintain the efficiency of previous actions. A necessary point in Seiketsu is that the inspection and evaluation activities carried out by the

organization helps raise employees' awareness in 5S practice. By developing Seiketsu, 3S operations will be gradually improved based on the standards to enhance the 5S model in the organization.

Shitsuke (Sustain): Shitsuke is the last activity of 5S, which is known as training and creating habits, disciplines, and manners for employees. That an organization performs Seiri, Seiton, Seiso, Seiketsu activities regularly and conclusively shows that the organization is maintaining 5S well. However, the 5S system will go down and not valid without upgrading. For everyone to be ready to practice 5S, the organization needs to develop regular training and practice programs for employees. Besides, it is necessary to have policies to encourage and reward units or individuals that perform 5S effectively.

To successfully implement 5S, organizations ought to have a specific and suitable plan for their circumstances (Phan Chi Anh, 2008). This model requires a long-term run to see the effect. The process includes several steps such as preparation; official notice of the leader; daily Seiri (Sort), Seiton (Straighten), and Seiso (Shine) implementation, and 5S periodic assessment.

Implementing the 5S Model is not too difficult but maintaining and developing it in the long term is a problem for organizations in Vietnam. In most organizations, the discipline of employees is quite low. Therefore, regular evaluation in the early stages can help 5S implementation becomes a habit. Also, depending on the size of the organization, different scales of inspections can be set up to evaluate the 5S performance. Once 5S implementation becomes employees' habit, the evaluation needs to be done only twice a year to improve the model. Besides, the experience exchanges with units that have applied the model will contribute to promoting employees' morale in the long-term 5S model development.

III.   RESEARCH METHODS

3.1 Approach

The approach of the study was based on the situation analysis, refer to the types of waste of Ngo My Tran and Vo Minh Tri (2018). This study considered lean management tools and philosophy such as Seven wastes, 5S Model, and Kaizen. They are used to identify premises and scientific basis for the action plans which will be applied in Tay Do University's units.

3.2 Data collection and analysis method

The topic "Lean management" is quite sensitive, so it is difficult to reach the survey subjects. The survey was conducted using a questionnaire and used convenient sampling to interview 172 officials, lecturers, and employees of the faculties, departments, and centers of Tay Do University. According to Vo Thi Thanh Loc and Nguyen Huu Tho (2015), with small and medium-sized researches, a sample size greater than 40 can be considered as a large sample and can be extrapolated to the whole. Therefore, the study's sample size is suitable for further analysis.

Descriptive statistics with criteria such as frequency, ratio, mean, standard deviation, etc. were used to analyze and classify waste types. Besides, the principle of "extended 7 waste types" was applied to identify types of waste. After that, the 5S model was used to propose an action plan to eliminate intangible wastes.

IV.   RESULTS AND DISCUSSIONS

The survey was conducted on lecturers and employees working in faculties, departments, and centers in Tay Do University. The interview rate of lecturers at 9 faculties is 73.24%, employees at centers accounted for 6.40%, and officials at functional departments accounted for 20.36%. This shows that the research data is representative for Tay Do University employee.

4.1 Identify ten common types of waste at Tay Do University's units

The survey results on ten types of wastes existing at Tay Do University's units obtained are as follows:

- Facility and equipment waste: The whole university has only two halls used for conferences, seminars, forums, learning, etc. The capacity of the building is large while the number of staff and students using it is small. The analysis results showed that about 64.53% of the respondents claimed that employees and students using air conditioners, lights, fans ineffectively due to the large capacity and the small number of users. Also, the respondents said that opening computers without using them for the job but personal purposes, or using air conditioners with the doors opened are the causes of facility and equipment waste.

In school buildings, it is common that small groups of students use all electrical equipment in the classroom; about 85.47% of the respondents agreed with this waste type. Besides that, the preservation of the University's assets is limited due to the students' lack of awareness. On the other hand, sometimes one switch is used for many different electrical devices, and there is no specific usage instruction. This makes it difficult for students and lecturers to use.

In the laboratory area, the most common waste is learning management software for students is not exploited its full capacity; about 79.17% of respondents agree on this issue. Due to infrequent use, the software's capacity has not been well exploited. Also, the respondents indicated that there is no specialized cabinet to store the laboratory equipment. Most equipment is modern and high-priced, so it is necessary to have a dedicated office for them to avoid theft and damage which cause the equipment waste.

In the library area, that some software applications which are inaccessible or employees have difficulty in accessing is the most common waste (75.88%). Besides, about 73.53% of respondents agree on the waste of buying management and training software without using effectively. Moreover, the study and reading areas are large, while the number of students using them is still low. Also, broken computers have not been repaired is also a waste. Another waste is using public property for personal purposes such as watching movies or using the social network.

- Labor waste: This is reflected in the faculties of the university when there is an unequal teaching time assigned for lecturers in a whole school year. Besides, not exploiting the labor productivity is also a waste. It can be mentioned as administrators do not preserve the school's assets well and security guards do not ensure security in the campus.

- Time waste: Being late for work and leaving early, chatting with colleagues, spending time checking phones, and reading newspapers in working time are proof of wasting time. It becomes a habit, gradually they depend on it and do not follow the working time, leading to a decrease in work progress and productivity. Also, the information flow among units is not smooth enough. Assigning jobs or informing a notification from the manager takes a lot of time due to going through many different levels. Besides, that the staff do not spend time checking emails leads to the behindhand in their work. Another type of time waste identified is waiting for the manager to sign a project or research/budget plan as well as waiting for colleagues to complete the previous tasks.

- Excess of motions: Approximately 61.63% of the staff confirmed that they organized extracurricular and vocational activities, while not many students participated in. It is because the activities are not interesting to attract students; moreover, the marketing activity is not strong enough to approach a larger number of students, resulting in the excess of activities. Sending the staff for attending training and short-term courses without applying the knowledge into their job is also considered as a waste due to excess activities. It is time-consuming while the results are not as expected.

- Excess of inputs: About 53.85% of the respondents stated that using printed documents instead of scanned copies is a waste of redundant inputs. Using the scanned copies helps save the data easily, compared to paper ones. However, employees still use printed paper. It causes the input waste of paper and ink. Besides, unreasonable positions of lights and fans in the office/school buildings are also wastes.

- Excess of operation: Many respondents confirmed that this waste exists in the positions such as desks, drawers, or personal shelves. That papers and records are arranged untidily wastes time to seek in most cases. Employees leave unnecessary stuff at the workplace; fail to return documents to correct positions after use; arrange records or mutual documents unreasonably, etc. This type of waste can be completely reduced if employees are more aware of managing personal document and mutual assets of the unit.

- Not exploiting the creativity of employees: In the field of higher education, scientific research and curriculum development are featured activities. The majority of respondents (84.80%) claimed that there is a lack of policies to encourage the employee with ideas to improve teaching and administration methods. This type of waste is also acknowledged through scientific studies; there are few kinds of research published in prestigious journals (84.21% of respondents agreed on this issue). Prestigious journals accept that scientific researches motivates the lecturers and helps them feel that their attempt is recognized. This, on the other hand, enhances the university's prestige. The waste also shows that researches providing theories only but have not been applied much in reality (84.21%). Currently, some lecturers do not focus on doing scientific research and curriculum development, partly because they are not interested in this task. Besides, according to the university's rules, only lecturers with doctorate degrees can write textbooks or books, this partly limits the creativity of lecturers and staff.

- Discrete information: Inadequate information in the university results in ineffective coordination among affiliated units. About 76.61% of respondents said that employees lack an accurate source of information about processes and methods to solve problems between faculties, departments, and centers. In some cases, inconsistent processes and procedures lead to errors or redo. The dissemination of new working procedures is still limited is also one of the reasons leading to discrete information. Therefore, the management board needs to develop consistent procedures applied in the whole university. New processes need to be regularly notified and quickly updated.

- Defect: The respondents pointed out that this waste type is mainly due to the waste of wrong printed documents (69.01%); inadequate document management leads to the loss of records or documents (56.40%). Some employees do not know how to use printers, fax machines, air conditioners, etc. cause damage to machinery and equipment. However, this type of waste does not significantly affect the units in the university. It can be eliminated through training and improving the document management process.

- Excess of transportation: It is reflected through the repeatedly traveling between departments to exchange jobs, do the payments, and submit documents (57.31%). It takes time to move to school buildings because they are far away from the departments or faculties (52.94%). The campus is large so moving to the next class is time-consuming. However, the Training Department has tried to arrange teaching schedules to reduce the distance for students and lecturers.

4.2 The priority order to eliminate types of waste

The study's objective is to identify types of waste and their levels of impact in the university's units. Therefore, the priority order for eliminating types of waste is mentioned in the staff survey at the university's units. The results are presented in Table 1.

Table 1: The priority order to eliminate types of waste

No.	Types of waste	The ratio of the answer "Yes" (%)	The average level of agreement
1	Not exploiting the creativity of employees	99.42	3.67
2	Discrete information	99.42	3.60
3	Facility and equipment waste	99.42	3.58
4	Time waste	99.42	3.54
5	Defect	99.42	3.45
6	Excess of operation	98.83	3.31
7	Excess of transportation	98.83	3.19
8	Excess of motions	99.42	3.15
9	Excess of inputs	98.84	3.09
10	Labor waste	99.42	3.07

Source: Survey data, 2018

According to the survey results, wastefulness in the units of the university is quite common. Based on the above table, the order for eliminating types of waste is as follows: Not exploiting the creativity of employees, Time waste, Facility and equipment waste, Defect, etc. In particular, facility and equipment waste is a tangible waste. The study proposes to apply the 5S model of lean management method. Other types such as defect; time waste, and not exploiting the creativity of employees are considered intangible wastes. These wastes have great influences and last in the long run. It is recommended to apply the Kaizen method - Continuous improvement because this method helps bring out better ideas, suitable for eliminating invisible wastes.

4.3 Steps to eliminate types of waste according to the 5S model

To successfully practice 5S model to reduce wastes by the priority order, Tay Do University needs to have specific and appropriate plans for each unit. 5S is not a short-term program or a movement, so it cannot be implemented in a short time to get immediate results. The 5S model implementation can be conducted through 3 stages, including 5 steps. The first stage is Preparation, including Preparation and Official announcement from the leader. The second stage is Implementation, including Seiri (Sort), Seiton (Straighten) and Seiso (Shine). The final stage is the Periodic evaluation.

4.3.1 Step 1: Preparation

- The Management Board and the heads of units of Tay Do University need to have a thorough understanding of the philosophy and benefits of the 5S model through visits to typical universities that have applied this model. It is necessary to ask for a consultancy from the Japan International Cooperation Agency (JICA) or Vietnam - Japan Human Resource Cooperation Center. It helps propose 5S training plan for key staff and guide the whole organization. This is a practical approach to achieve success in 5S model implementation.

- The establishment of the steering committee and functional departments to ensure the participation of all employees in a consistent system, towards the 5S's goals. There should be an assignment for the person to be in charge of 5S activities, including developing plans and training staff.

4.3.2 Step 2: The official announcement from the Management Board of Tay Do University.

The Management Board, the School Board, officially announce the 5S program implementation expected in 2 years:

- University's policies and objectives: a safe and effective learning and working environment, and a high-quality teaching method.

- Make an organizational chart for 5S implementation.

- Make a step by step plan for 5S implementation.

- Make a group map for 5S implementation and assign tasks.

- Hang pictures about clean workplaces (visual goals).

- Issue reward and punishment policies (if any).

4.3.3 Step 3: Seiri (Sort) implementation

Total sanitation throughout the school

5S steering committee selects a day in the semester to be the Total Sanitation Day for all lecturers, staff, and students. In daily Seiri activities, employees try to eliminate unnecessary things and avoid the accumulation of waste. The steering committee evaluates the performance by checking the workplace and remind everyone to get rid of unnecessary items.

Next, the following objects should be considered to be removed:

- Papers and documents that are not used in 12 months; old or unused papers and documents; redundant documents, obsolete documents, and books; unusable stationery; unnecessary materials and packages.

- Experimental machinery, tools, and office equipment that have been damaged or unable to be repaired; expired experimental chemicals.

- Different types of bottles need to be classified; cartons can be reused as a dustbin; and one-sided papers can be made use of the other side for printing.

4.3.4 Step 4: Seiri (Sort), Seiton (Straighten), and Seiso (Shine) daily implementation

Essential things are kept instead of unnecessary ones, but those things will become useless without being arranged. Therefore, the 5S steering committee should encourage employees to improve storage methods to minimize searching time and create a favorable working environment.

After Seiri is Seiton implementation. Seiton means rearranging items according to the following principles:

+ One place for each item/file: files are placed in the right order with label tags to identify which unit the files belong to and the staff can return them to the correct position.

+ Arrange items so that they are easy to find to save time, avoid using same locks and keys for different drawers. Therefore, marking keys and locks with the same color helps unlock drawers easily and save time.

+ The letters on shelves and cabinets are large and clear enough to be read from a distance; eliminates unnecessary documents, rearrange necessary documents, store rarely used documents.

+ Spend 5 to 10 minutes doing total sanitation and checking every day. It is accepted when not seeing dust or smudges by naked eyes or touching objects; develop workplace hygiene rules before starting to work.

4.3.5 Step 5: Periodical 5S audit

Establish an audit committee that understands all rules, criteria, and methods of the university's 5S model. The audit committee observes the actual situation during the audit process, evaluate 5S performance according to established rules. After that, the auditors report the result, propose recommendations, and support the units' leaders.

Make an audit plan including the purposes and scopes of the audit, auditors' area of audit and responsibilities, time and place of the audit.

Conducting the audit: evaluate the level of performance, and the criteria have been done well. The auditors have to immediately explain inappropriate points so that the staff knows how to improve. It is recommended to use different color stickers such as Seiri (red), Seiton (green), Seiso (blue) to mark the items that need to be fixed.

Reporting audit results: The audit team prepares a summary report of audit results, scores, classification and recommendations for rewards or punishments.

Awarding: To achieve better results and psychological effect, the steering committee needs to encourage staff of faculties, departments, and centers with appropriate awards.

In general, the implementation of the 5S model at the University will reduce wastes existing in units, especially the tangible wastes such as facility and equipment waste by optimizing the use of equipment. The necessary documents, stationery, electrical equipment will be sorted and arranged reasonably. Also, unnecessary equipment will be eliminated or changed the purpose of use to exploit its capacity and gradually eliminate tangible wastes.

V.   CONCLUSION

The research results have shown that types of waste existing in Tay Do University's units are facility and equipment waste, discrete information, not exploiting the creativity of employees, time waste. The study has identified the priority order to eliminate types of waste by expert interviews and staff surveys. Therefore, action plans are proposed by applying the 5S model for tangible wastes (facility and equipment waste) and Kaizen - Continuous improvement for intangible wastes (not exploiting the creativity of employees, discrete information). Besides, the study also proposes several recommendations for personnel and lean management training to support action plans and contribute to cost savings, improve productivity at Tay Do University's units.

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