SIX SIGMA (DMAIC) PRACTICES IN SCHOOL DISCIPLINE MANAGEMENT SYSTEM

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Abstract: There are a few of weaknesses in the school discipline management system especially in terms of allocation of time, allocation of money, human resources and policy making because of the inefficiency in quality management procedures. The use of six sigma approach as a tool for process improvement can assist to overcome all these weaknesses through a process of reducing the error in the process. However, the use of six sigma is still not widely applied in the organizations especially in the educational service sector. In DMAIC approach are consists of define, measure, analyze, improve, and control is a systematic approach to improve the process by focusing on reducing the change process and also can deduct any error in the school discipline management process and increase customer satisfaction. The purpose of this research is to identify the implementation of DMAIC approach in the school discipline management system and also assist the researcher to identify the potential of consistent process improvement.

***Keywords**: Six Sigma, DMAIC, School Discipline Management*

1. Introduction

In the education system emphasis on fostering self-discipline comes first. Through the education system create the perfect generation based on the intellectual, spiritual, emotional and physical. Therefore, the strategic planning needs to be established to ensure that schools are able to produce students who have good personality and are willing to take responsibility for society and nation in the future. Nowadays, the discipline management is critical in developing quality character and personality of student whether in urban or rural areas. In other words, the goal of school discipline management is designed to produce students who always obey school rules, improving student achievement in the curriculum and co-curriculum, enhance and maintain the image of the school and the last goal is to maintain racial and religious harmony (Said, 2010).

Furthermore, most students today do not comply with the rules of discipline. They do a variety of offenses either moderate or serious offense. In addition, the type of minor offenses that are commonly done by the students at school such as non-compliance with the dress code, uncompleted homework, sleeping in classroom, and so on. In the category of serious offenses committed by the students such as theft, rape, bullying and so on. According to Internal Affair Ministry Of Home Affair (KDN), a total of 8704 students than 5.4 million students in primary and secondary school across the country are involved with a variety of disciplinary problems in 2013 (Zainol Abidin, 2017). This shows that discipline problems among students every year continues to increase and this show the weaknesses in school discipline management system in Malaysia.

Furthermore, the increase of student discipline problem is influenced by various factors. All these factors are usually categorized into two factors such as the school factor and outside the school environment factors (Liong, 2006). The factors of outside the school environment is very complex and difficult to solve and are beyond our control. Therefore, this study will propose to the practice of six sigma which researcher will emphasize the application of DMAIC approach in helping to improve the quality of school discipline management. At the end, the goal of our education system in creating our students with the balanced of spiritual and physical aspects can be achieved.

2. Literature Review

Six Sigma process whether in industry or in services sector is an approach that is continuous quality improvement. Six sigma project management is one of the new approach in solving organization and management problems to support a company in increasing the product quality toward zero defects by means decreasing and preventing the same error. In Six-Sigma, the main focus is about improvement process to increase capability and reduce variation. The Six-Sigma methodology aims to reduce the number of mistakes or defects in a manufacturing process and hence the manufacturing costs (Ahmad, 2008). Apart from that, in practice Six Sigma, it also very closely connected with approach DMAIC. DMAIC is consisting Define, Measure, Analyze, Improve and Control (DMAIC) and this approach possible to be implemented to improve production quality and quantity (Rizki, 2011).

There are many studies about the DMAIC practice that has been carried out. Most studies conducted in industry is concerned about producing a quality product and reduce errors in product manufacturing. For example, in the making of bread and cake products, cause and effect diagrams can be used to show the existence of a real relationship due to the cause. By using this diagram, the factors that lead to the production of quality cakes will be critically analyzed the effect in the process of producing a cake (Rizki, 2011). In addition, a cause and effect diagram is the DMAIC tools to determine the main factors affecting the quality of the final product.

In addition, the use of DMAIC practice primarily in the food manufacturing industry, the results obtained can help an industry in increasing total output, can decrease the level of product defects (non-standard forms) but also indirectly DMAIC practice can improve the efficiency of the work. In other case, the DMAIC approach can also be used to detect and identify defects in the final product. The DMAIC tools that can be applied is to use the Pareto Diagram. In DMAIC approach, Pareto Diagram is a diagram that can help an organization to identify the cause of the fault from 20 percent of the 80 percent who can influence other processes in the production of a product (Rizki, 2011). DMAIC approach is very important in ensuring continuous quality improvement and also it can be used in many ways.

For example, pump maintenance services at Pump Century Edible Oils Sdn Bhd have applied the DMAIC approach that can determine the outcome of inter-related to one process to another process. In this case, the performance of the pump be examined as a key indicator. With DMAIC approach, the frequency of pump failure function will be studied and analyzed. From the results of DMAIC approach, a standard system can be proposed on pump maintenance schedule (Tamin, 2009). Furthermore, this approach can also ensures that all data from the previous record will always be collected and then studied the causes of the critical functional

pump failure and compared with other factors. Thus, the DMAIC approach shows very successfully implemented solutions and can assist any company create a systematic plan to minimize the failure of a process.

In addition, the DMAIC approach was applied in the health services sector. In health care, it is more focused on quality improvement in hospitals or health clinics. In health services especially in hospitals, DMAIC is used extensively in improving the quality and increasing capacity utilization processes such as X-Ray room, providing the best service in emergency management, improve the efficiency and accuracy of clinical coding, ensuring customer satisfaction in the emergency room but also can reduce the waiting time in health reporting (Tolga *et.al*, 2007).

Furthermore, DMAIC approach is indispensable in health care because it can ensure error reduction, improves the efficiency of the health service and the most important is to ensure customer satisfaction in receiving treatment. DMAIC approach can be implemented efficiently in health services by setting up work team involved in the service process in a hospital or clinic. Work team consisting of the hospital staff should design a comprehensive quality improvement project using DMAIC approach (Celano *et.al*, 2010).

In addition, the DMAIC practice in non-manufacturing sector faces various challenges. For the services sector, the challenge can be categorized into three, namely the difficulty to create a measurement for a process, the difficulty of creating a cultural change as well as the formation of the head of Six Sigma and the third is the difficulty of the services sector continued to benefit from the application of DMAIC in their respective institutions (Sehwail *et.al*, 2003). For example, it is easier DMAIC approach was applied in the manufacturing sector than in the service sector. This is because the company that producing a product will be able to see clearly the damage and error in the production of the final product. Thus, the company can use a product defect rate as a form of measurement to maintain continuous quality.

However, the DMAIC practice in the service sector for example in health care is extremely difficult to identify a process that can be used as a form of measurement. Thus, the DMAIC practice in the health sector is difficult to get complete data particularly in the hospital. This is because hospitals always get the customer response varies between one another. In addition, the health services sector, hospitals and clinics have always faced the difficulty of identifying the exact behaviour of patients and this makes difficulty to apply the DMAIC approach in the services sector (Sehwail *et.al,* 2003).

Apart from the health services sector and industry, DMAIC approach has also been applied in providing library services. This is according to DMAIC approach that emphasizes a mechanism for controlling the quality of a process which seeks to reduce the errors in a process. At the end of the DMAIC approach, it is expected to increase the level of satisfaction to customers who receive the services. For example, the DMAIC approach has been used in improving the quality of library services at the University of Newcastle, particularly in the implementation of the 3M project (Kumi *et.al*, 2006).

In implementing the DMAIC approach to 3M project as planned by the library, the university has formed a work team in the early stages. Examples of the work force has been formed is a team of information systems, technical services team and so on. The next step is to identify the time of project implementation and the barriers faced by each work team. All this process is carried out through discussions with the working group and find ideas that can improve work

processes. Every issue that arises will be resolved through discussion working group composed of various staff. To improve the quality of each work process, the working group will be doing a lot of meetings to resolve the issues raised by each work unit. This is very important so that the library has always been able to maintain the level of customer satisfaction.

In DMAIC approach, the work team formed by the library may apply Flowchart in the measurement stage. This is to help the team to monitor and identify trends in early stages of the process to the last process. Work team is also encouraged to use the matrix of cause and effect in order to identify issues that may affect the implementation of the 3M projects that planned by the libraries (Kumi. S *et.al*, 2006). Therefore, the DMAIC approach is practical to implement and it is flexible for all industries, especially in the services sector. Use of DMAIC approach can help maintain the quality of the services and processes to improve customer satisfaction.

In managing discipline in schools, many schools use approaches such as impose penalty points, warning letter, make social services, contact the parent or guardian, spank, signed a letter of agreement, provide counselling and final alternative is throw school (Zainal *et.al*, 2007). The issue of student discipline problems in schools cannot be resolved properly. Furthermore, students throw action as a last decision is also seen as the way forward. However, students who are expelled eventually readmitted to the school of origin, and this shows the failure of discipline management system itself. Finally, teachers who cannot control his emotions and acting out of discipline management procedures. Lastly, the failure of discipline management has tarnished the image of the teaching profession. Therefore, the researcher looked at the approach of Six Sigma is a quality approach can be used in improving the discipline management system in schools.

3. Discussion

Discipline management system in schools is one of the critical aspects in the school administration. The ministry always see the quality of discipline management that can help to build the quality of human capital. In addition, school disciplinary body is acting to control student attitude but also enforce the school discipline regulations. Therefore, to improve the discipline management in schools, DMAIC approach can be applied to ensure discipline management unit is always relevant with the times. In DMAIC approach, it consists of five stages such as define, measure, analyze, improved and control. Every stage of this, there are several tools that can be used in every stage of DMAIC. Each of the proposed tools are able to improve the quality of discipline management so that it can operate more systematically.

In DMAIC approach, the first stage is define. Define stage is to identify the implementation of the project. The discipline management system must define the scope of the project to be implemented, reviewing the overall goals and objectives for each discipline plan. In the define stage also, management should develop work team or discipline management unit consisting of various backgrounds and skills of knowledge. This is to ensure that the unit can understand the issues of discipline and each discipline management process. In the define stage also, management can determine the scope of work discipline and use of all primary data were collected and analyzed. Furthermore, the discipline management unit can apply the SIPOC analysis consists of suppliers, inputs, process, outputs and customer. Through SIPOC analysis, Discipline Management Unit can also see the entire process required in handling the unit. In fact, it can help explore and identify the obstacles in implementing quality improvement in

school discipline. Here is the form of SIPOC analysis (refer table 1) that shows in detail the whole process of Discipline Management Unit

Table 1. The process required in handling Discipline Management Unit

Supplier	Input	Process	Output	Customer
School Administration	E-Discipline System Demerit Form Action Disciplinary Form	Monitoring Absenteeism Monitoring Vandalism & Bullying Activity Spot-check Operation Student pledge program	Students obey the rules Students were given a penalty	Student Parent Teacher

In the define stage, Discipline Management Unit should also build a timeline schedule for each process. This is important so that all the planning in discipline management can be implemented on schedule. Normally, discipline management also can use Gantt Charts to plan and carry out every discipline management process in schools. Furthermore, the Gantt Chart can help every member in the discipline management to perform the process in accordance with the planning schedule. Here is the example of the Gantt Chart (refer table 2) that shows the discipline management process.

Table 2. The discipline management process

No	Process/Activity	J	F	M	A	M	J	J	O
1	Monitoring Absenteeism								
2	Monitoring vandalism & Bullying activity								
3	Student pledge program								
4	Spot-check operation								

In the measure stage, the objectives of the measure stage include process definition at a detailed level to understand the decision point. The second objective for this level is about metric definition to verify a reliable means of process estimation and measure stage can develop a system analysis to quantify the errors associated with the metric (Keller, 2011). Therefore, Discipline Management unit need to build a Flowchart Diagram to help each unit see more clearly the whole process and help increase quality. By using the Flowchart Diagram, the Discipline Management Unit can plan for the implementation of the entire process in a more systematic system. This is due to Flowchart Diagram illustrate each process from the beginning of the process to last process. In addition, this diagram can assist the discipline management to make decisions about student misconduct action. For example, in the monitoring student absenteeism issues. Beginning of the process, the class teacher will monitor student attendance in their classes. Then, the class teacher will record student attendance in the attendance book and a list of absent students will reported to Discipline Management Unit. Students who are absent more than specified number of days will be sent a warning letter three times. If the student remains absent offense, the class teacher will send a final warning letter. Then, the

Discipline Management Unit will provide counselling to the student and discussion session with parents. If students still faced with truancy problem, the Discipline Management Unit will recommend to management that student should be expelled. All of this process is shown in detail by using the Flowchart Diagram and indirectly assist the Discipline Management Unit to enforce disciplinary action against students. Here is an example of Flowchart Diagram (refer figure 1) that shows the process in monitoring the student absenteeism issue.

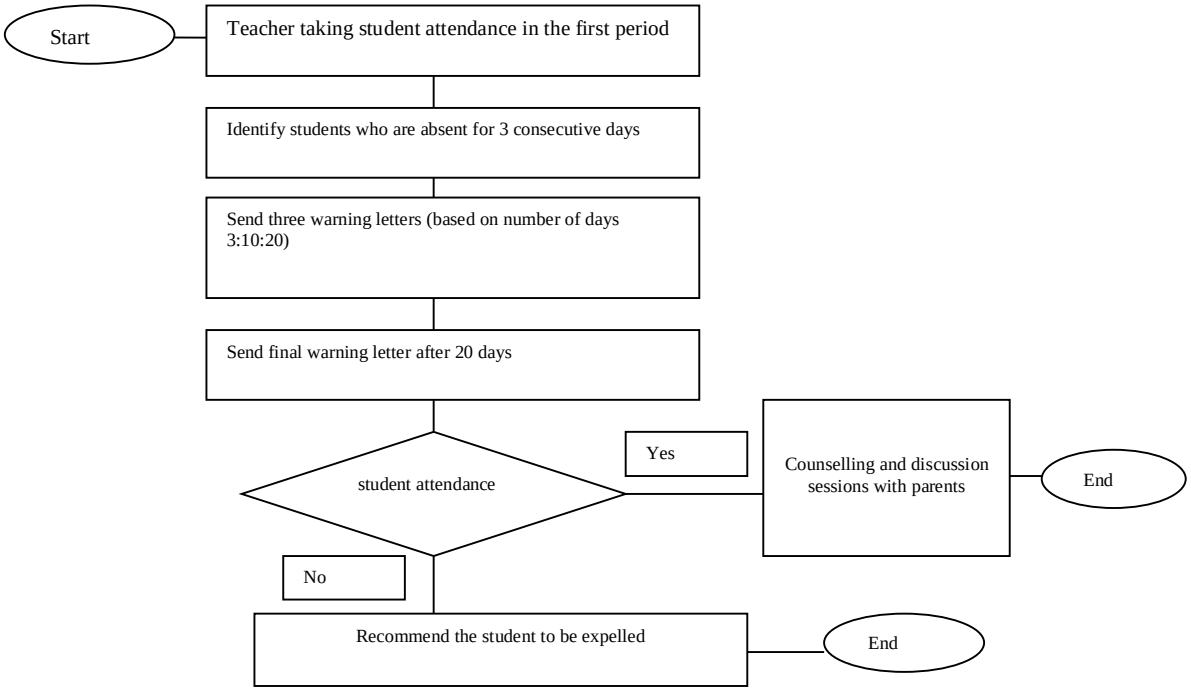

Figure 1. The process of monitoring the student absenteeism issue

The third stage in DMAIC approach is the analysis stage. The objective of the analysis stage is analysis of the value stream to produce value for the customer, analysis of the sources of variation and analysis step can determine the process driver that very significant for the process output (Keller, 2011). Value stream analysis is a key to DMAIC that borrowed from lean methodology. The value stream refers to the necessary activities that contribute value to the services that determined by the customer. To enhance customer satisfaction in the process of school discipline management, the Discipline Management Unit may apply Cause and Effect Diagram. This diagram is a tool in analysis stage that assist the Discipline Management Unit to get the ideas through the process of brainstorming with the group members. Each member in the Discipline Management Unit have compiled a list of possible disciplinary barriers that may affect the process of disciplinary actions. In this way, the Discipline Management Unit can identify any problems and facilitate team to solve problems. In this diagram, the Discipline Management Unit should look into four aspects such as individual, material, method of implementation and time range. This is an example that we can try to implement while monitoring student absenteeism process. In the individual aspects, teacher commitment may affect the implementation of monitoring student absenteeism process. Moreover, in terms of time range, teachers may not have enough time to follow all the procedures while produce warning letter to the absent student. All these obstacles are easily identified by using Cause and Effect Diagram. Here is an example of Cause and Effect Diagram (refer figure 2) that shows in detail all the aspects that influence the implementation of monitoring student absenteeism process

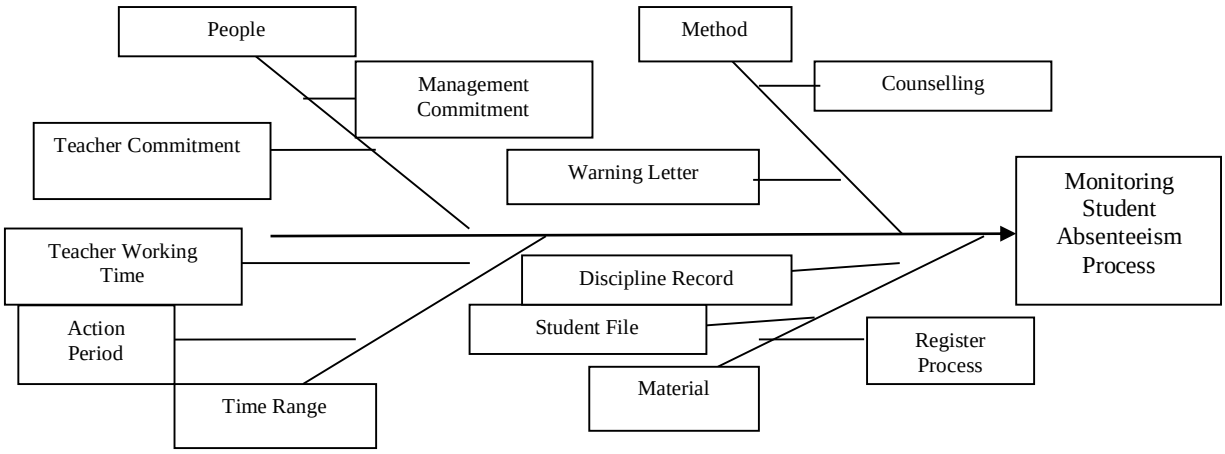

Figure 2. Aspects of student absenteeism monitoring process

The next stage in DMAIC is improve. In this stage, there are several issues that need to be addressed. Among the issues are new process operating conditions are determined, failure modes for the new process are investigated and addressed, benefits with the proposed solution are estimated by the team and improvement process will be implemented. In the improve stage, the results that obtained from each of the process will be influenced by the previous process. In term of continuous improvement, analysis of each process should be implemented to increase and retain the quality improvement. In addition, the improvement process can be achieved by forcing the Discipline Management Unit to switch to the higher performance and become agent of change. Therefore, the Discipline Management Unit should always be working more closely with top management and parents to ensure that each plan of discipline management process can be improved. Furthermore, the close relationship between the discipline unit and stakeholders can ensure the full support in the implementation of discipline regulation among students. To see the performance of each process that implemented in the discipline management, E-Downtime Diagram can be applied for maintain performance improvement process. E-Downtime are consisted of seven aspects such as overproduction, wait time, waste transportation, waste motion, defects, waste processing and waste inventory. For example, class teachers who want to issue a warning letter to the student, which may take a longer time to prepare and submit warning letters to students and also will exist potential error in the procedure. Other than that, the Discipline Management Unit may also have a lot of wasted in carrying out disciplinary actions. For example, the Discipline Management Unit take a longer time to enforce discipline action against students who are not comply with disciplinary procedures and so on. All these errors can affect the quality of discipline management in school. Therefore, applying the E-Downtime can assist the Discipline Management Unit to identify the weaknesses in the discipline management at school. Here is an example of E-downtime (refer figure 3) that can be implemented in the Discipline Management Unit.

Issue: Monitoring Student Absenteeism In School

0 No Waste
1 Very Little Waste
2 Little Waste
3 Considerable Waste
4 A Lot Of Waste

E Environmental I Inventory
D Defect M Movement
O Overproduction E Access Processing
W Waiting N No Utilizes People
T Transportation

PROCESS	**PIC**	**E**	**D**	**O**	**W**	**N**	**T**	**I**	**M**	**E**	**T**	**R**
Student Attendance	Class Teacher	0	2	0	3	4	0	0	4	1	14	4
Send warning letter	Class Teacher	0	3	0	4	3	4	0	4	3	21	1
Discussion with parent & Counselling	Discipline Unit	0	0	0	4	4	2	0	3	2	15	3
Disciplinary action	Discipline Unit	0	3	0	4	4	0	0	3	2	16	2
Total		0	8	0	15	15	6	0	14	8	66	

Figure 3. Identification of the weaknesses in the discipline management

The final stage of DMAIC methodology is the control stage. There are several objectives in control stage such as the new methods must become standardized in practice, the predict impact of improvements must be continually verify and lesson learned should be documented (Keller, 2011). In this stage, normally every change in old process will produce more new processes and every procedure need to be changed. In addition, the level of control requires the team work to change the old method by substituting with a new method that more effectively. There are two strategies to ensure success in the control stage. The first strategy is trying to prevent the errors in the process and the second strategy is try to detect any error in the process and correct the error immediately before it reaches to the consumer. In handling Discipline Management Unit, especially in monitoring student absenteeism issue, student attendance roster must be constantly updated by the class teacher. Classroom teachers need to constantly record the student absent profile in the attendance book. With this step, the class teacher will be able to track the students who are often absent and issued a warning letter in accordance with the procedures. If the data is not updated, teachers will face difficulty to issue a warning letter in accordance with the proper procedures. This will cause the parents to question the disciplinary action taken by the Discipline Management Unit. If the process of monitoring student absenteeism with the proper procedures, this can help the Discipline Management Unit to provide a full report to enforce disciplinary action against students. However, the Discipline Management Unit should monitor all the discipline management process from the early stage to ensure all team members comply with all the procedures. In addition, the proper process will make Discipline Management Unit can easily detect the error in the future. In the control stage also, the quality of each discipline management process should be improved constantly.

4. Recommendation

Discipline management in school should be constantly upgraded and improved from time to time. Applying DMAIC in this study is very important to ensure that the process in discipline management can be more effective in ensuring that students will comply with the disciplinary regulations. In DMAIC approach, researcher have discussed some tools that can be used in each stage to be applied in the discipline management system. In this study, the researcher had proposed a number of DMAIC tools such as SIPOC, Flowchart, Gantt Chart, Cause and Effect Diagram and E-downtime. However, it is the only part of the DMAIC approach. All the proposed approach may be appropriate practiced in discipline management process in term of quality management in the future.

However, the researcher saw that the DMAIC approach is widely approach and there are more tools that can be studied by other researchers in the future particularly in the service sector. In ensuring consistent quality improvement process, other researchers may be able to use other approach in Six Sigma other than DMAIC. Another approach that can be applied is the PDCA approach that consists of Plan, Do, Check and Act. PDCA and DMAIC are two approaches that have the same objective of ensuring quality improvement in every process. However, the difference within these two approaches is to prescribe the necessary tools and techniques for each stage particularly in the measure, analyze and improved stage. In addition, if other researchers would like to apply the DMAIC approach, they can still choose other tools for their research. For example, in the define stage, apart from using SIPOC Diagrams, researchers can also apply Affinity Diagram. This is because this diagram can help researcher compile all the ideas and thoughts in more systematic group. Furthermore, this diagram can help researcher to look all aspects and problems and relate to each other. In the measure stage, apart from using Flowchart Diagram, researcher can also apply C Charts at this stage. C Chart can help researcher to monitor the number of times a condition occurs relative to a constant sample size when each sample can have more than one instance of the condition.

In the stages of analyze and improve, apart from using the Cause and Effect Diagram, researcher also proposed to apply the Failure Modes And Effect Analysis (FMEA). These tools can help researcher to prioritize process activities that are prone to failure and to determine high risk activities in the proposed improvement. In the control stage, the researcher can apply Statistical Process Control Charts (SPC). This is because it can help researcher to monitor the process to ensure the stability of the revised process and the continued of the improvement. Therefore, DMAIC approach is very suitable methodology for applied in the process of quality improvement either in the service sector and industry. It is dependent the suitability of a study conducted by the researcher so that the research findings can help others to improve the quality in their respective institutions.

5. Conclusion

Therefore, the application of DMAIC approach in the school discipline management is relevant to the current situation. The DMAIC approach can help the school to improve the quality of the discipline management system. In addition, school Discipline Management Unit is a very important unit in implementing the rules of discipline and also can upgrade the image of the school. Through DMAIC approach, the process of discipline management can be implemented in a more structured and systematic. Thus, it can overcome the problem of procedural errors and slow in decision making process. In conclusion, this approach should be extended in all

levels of management units in the service sector so that can improve the quality of improvement process.

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