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Analysis of Top Management Support and Its Impact towards Successful of Maintenance Management Task in Manufacturing Plant

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Abstract

This paper aimed at investigating the actual maintenance practices that are being used in Malaysian industry. Primary data were collected using a questionnaire survey approach with 63 companies located in PasirGudang industrial area. Companies approached for this survey limited to a companies that have at least 100 employees. The collection of data was in accordance with the perspective of six top critical success factors (CSFs) for managerial in maintenance management (MM), using a five-point Likert scale. Factor analysis and descriptive statistics were utilized for data analysis. In general, the findings show that a majority of the participants reported that they did not perceive that their respective management really concerns about the need of maintenance department and MM initiative. The role of maintenance in surveyed companies was not highly recognized as one of the important constituent under top management perception. The results show that top managerial commitment is crucial to the success of MM initiative. These results may encourage top management of manufacturing to focus on managerial commitment and implement systematically MM towards their business survival.

Keywords: *Maintenance management; critical success factors; top management role; descriptive statistics.*

1. Introduction

Efficient and effective maintenance management of production facilities and systems of has been recognized as one the critical function towards business survival of manufacturing companies (Adesta and Prabowo, 2018; Chen et al., 2015). Nowadays, particularly in the fourth industrial revolution, the maintenance tasks for industrial plants, machinery and equipment are becoming more complex and critical due to advancement in automation and mechanization. Technology advancementhave made

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production systems vulnerable to risks and consequential effectsdue to breakdowns. Due to such characteristic, manufacturing industry players are under enormous pressure to minimize downtime for their business survival (Dadashnejad andValmohammadi, 2019; Bakri, 2015).In the fourth quarter of 2019, the Gross Domestic Product (GDP) of Malaysia grew 3.6 per cent from 4.4 per cent in the previous quarter. The performance was anchored by Services, Manufacturing and Construction industry, see Figure 1. The Manufacturing sector continued as the second main impetus to the economic growth (NAP, 2020).

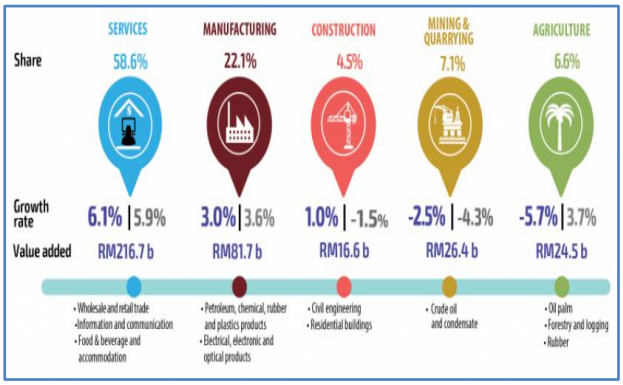

Figure 1: Gross Domestic Product (GDP) of Malaysia for Q4/2019

Economic contribution by the manufacturing industry to the overall Malaysian economy by providing employment and attracting capital investment cannot be neglected. Rapid growth in manufacturing industry has boosted and stimulated the development of related industry from materials supply to production, sales, service and other auto-related operations. Such development has also contributed to the skill development and advancement of technological and engineering capabilities in Malaysia (NAP, 2020). The continuous fascination of the manufacturing industry and its significant impact on the global industry growth has attracted many researchers to contribute the idea and explore potential opportunity for the continual improvement, particularly in maintenance management (MM).The number of research focuses specifically in manufacturing industry was increased from time to time. Apparently there is a lot of research opportunity related to implementation of MMin Malaysian manufacturing industry (Maideen et al,2017; Bakri , 2015; Ng et al., 2013; Chong, 2012; Salleh et al, 2012). The manufacturing industry has also gained the attention of this research since it is considered as one of the important impetus to support the vision of Malaysian government to be a developed nation. This research is expected to provide an insight of the actual practices on how a Malaysian manufacturing company adoptsMM methodology, particularly to analyses the role of top management in ensuring the success of this initiative.

2. Literature Review

2.1 Overview of maintenance management

The concepts of maintenance management (MM) have evolved over the last few decades. Based on the literature search (Adesta et al, 2018; Supriatna et al, 2017; Shen, 2015), the development of MM research can be classified into two major trends as illustrated in Figure 2.

2.1.1 Breakdown maintenance

Breakdown maintenance (BM) focuses on repair and restoration action performed on equipment once the failure occurred. The aim of BM is to bring failure equipment to at least at its minimum acceptable condition. It is the oldest practice of maintenance management and is executed at unpredictable period since the equipment or system's failure time is not known (Rani et al., 2015; Bakri, 2015).This concept has the drawback of unplanned breakdown, in which might resulted in excessive damage of parts, inventory problem on spare parts, increase in repairing and troubleshooting time and cost.

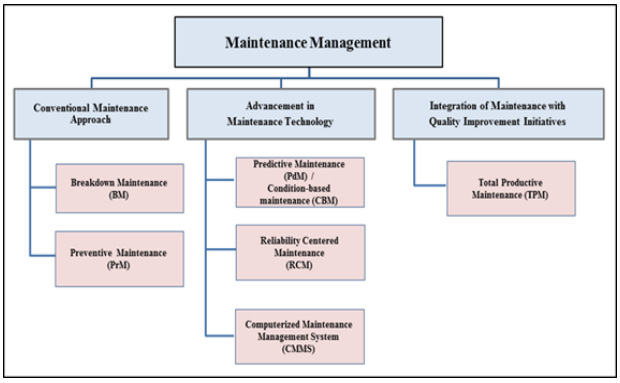

Figure 2: Trends of maintenance management

2.1.2 Preventive Maintenance

Preventive maintenance (PM) primary objective is to prevent the failure of equipment before it occurs. It is performed based on scheduled basis. This concept was introduced in 1950s (Nakajima, 1988). It relies on the prediction that the equipment will be subjected to deterioration in performance once it reached a specified usage time (Rani et al., 2015; Doostparast et al, 2014). The typical PM work may include inspection and minor refurbishment on equipment such as parts replacement, cleaning, lubrication, tightening, and adjustment (Prajapat et al, 2017, Bakri, 2015).

2.1.3 Predictive Maintenance

The aim of predictive maintenance (PdM) or often referred as condition-based maintenance (CBM) is to perform a scheduled maintenance before failure occurred on the equipment. PdM or CBM is carried out upon availability of validated and analyzed historical data on the performance and physical condition of equipment

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such as vibration, humidity, temperature, particle content in lubricant etc. The diagnostic techniques are used to prepare an appropriate maintenance plan. The typical CBM technologies used to diagnose equipment condition includes: infrared thermography, vibration analysis, acoustic level measurements, oil particle analysis, electrical current test and other designated tests (Parpala et al, 2017). This strategy, in the long term, allows reducing drastically the costs associated with maintenance, thereby minimizing the occurrence of serious faults and optimizing the available economic resources management(Langeron et al, 2015; Parpala et al, 2017).

2.1.4 Reliability Centered Maintenance

Reliability centered maintenance (RCM) approach will determine the appropriate maintenance tasks to be performed on equipment at specific interval. RCM methodology started in the aviation industry during the 1960s, aimed at optimizing maintenance costs, reducing safety risk and enhancing the reliability of airplane (Bloom, 2018). RCM focuses on preserving an equipment function by applying an appropriate PM tasks. However, it is different from conventional PM, since its focuses mainly on functionality rather than equipment. RCM uses a seven-step methodology to identify the functions, the source and effect of the failures on equipment (Gupta et al, 2016). RCM embedded other quality and safety improvement tools to enhance its approach. These includes: failure mode and effect analysis (FMEA); fault tree analysis (FTA) and; hazard and operability analysis (HAZOP). Generally, the RCM methodology is applicable to huge, complex and high risks systems, such as aircraft, oil rig and chemical processing plants(Piasson et al, 2016; Yssaad et al., 2014).

2.1.5 Computerized Maintenance Management System

Computerized maintenance management system (CMMS) is a computer program designed to organize the maintenance management function. It is capable to produce a status report by giving details or summaries of maintenance activities. CMMS has a significant impact on for spare parts management and maintenance budgeting which is significantly linked to a stronger contribution to lower production costs (Rastegari et al, 2016). There are a wide range of commercial CMMS packages available. A different CMMS package differs in capabilities. The more sophisticated package offers a more thorough analysis on maintenance activities (Wienker et al, 2016).

2.1.6 Total Productive Maintenance

Total productive maintenance (TPM) is a comprehensive maintenance management approach aimed to improve overall effectiveness of the equipment (Nakajima, 1996). It integrates the role of maintenance and production department of a company. TPM represents a radical shift from the conventional view about maintenance. It is considered as a strategic initiative for improving quality by focusing on maintenance activities (Adesta and Prabowo, 2018; Al–Refaie and Hanayneh, 2014).

2.2 Importance of efficient maintenance management

Maintenance management (MM) is an important constituent of a well-functioning manufacturing process. It helps companies maintain their resources while controlling time and costs to ensure maximum efficiency of the manufacturing process, the utilities and related facilities. It is a technique that helps to secure a reliable and satisfactory quality of the production, safety for employees and protection for the environment. Maintenance is an important factor in quality assurance and in some cases determines the long-term success of a company. Poorly maintained resources can cause instability and partially or completely pause the production. Malfunctioning machines or complete breakdowns can become a costly process for most companies. When breakdowns occur the labor cost per unit rises as time passes until the machines again run as normal. Before the machines again run as usual, there will be unexpected expenses to repair the problems, which includes extra costs for repair facilities, technician / repair crew, preventive maintenance inspections and spare parts (Ahmad et al., 2018).

Benefits of Effective Maintenance Management

In today's highly competitive business environment, quality emerges as an effective strategy for manufacturing companies towards the success, growth, and enhances their competitive position. In order to survive, every manufacturing company has to infuse quality improvement (QI) initiatives such as total quality management (TQM), lean manufacturing and just-in-time (JIT) in all aspects of their operations (Mishra et al., 2016; Jadhav et al, 2014; Agus and Iteng, 2013; Lee and Scott, 2009). The emergence of progressive QI initiatives has changed tremendously the nature of manufacturing environment. They are utilized with the aim at positioning ahead of competition in term of production efficiency, excellent product quality, meet customers' deadline and optimize the operational cost (Pandey et al, 2016; Chen et al., 2015). Under TQM philosophy, the quality control and assurance of product is moved to the production process instead of inspection at the final product (Juran, 2010). Defects and variation of product are eliminated at the production processes through adequate process control techniques (Kamble and Wankhade, 2018; Kumar and Kumar, 2014; Jain et al., 2014).

There is consensus among many authors that QI initiatives are influenced by equipment reliability and maintainability. The wastes generated in production have a strong relationship with the performance of production equipment. The malfunction and breakdown of equipment would results in poor quality product and as a

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consequence delayed delivery (Martomo and Laksono, 2018). Satisfying customers' requirement in timely manner means the equipment availability is required to be at its peak level (Mendez and Rodriguez, 2017). Through a systematic and strategic MM, defects and variations resulting from the poor equipment could be eliminated. Hence, equipment effectiveness is no longer restricted to availability, but involves other factors, such as quality and efficiency (Pai et al, 2018; Prabowo and Farida, 2015).

Ineffective MM will have significant impact on company's profitability. A huge amount on maintenance of inefficient production equipment would increase the company operational costs. Effective maintenance management of production equipment and system is one of the vital requirements towards achieving world-class manufacturing (Mwanza and Mbohwa, 2015). In this sense, reliable equipment is considered as the main elements towards performance as well as profitability of the organization (Patil et al, 2018; Modgil and Sharma, 2016).

2.3 Role of top management to ensure the success of maintenance management

Management is a set of principles relating to the functions of planning, organizing, leading and controlling, and the application of these principles in harnessing physical, financial, human and related resources efficiently and effectively to achieve organizational goals. Managers are the people in the organization responsible for developing and carrying out this management process. In the era of globalization, management process is dynamic by nature and evolves to meet needs and constraints in the organization's internal and external environments. Thus, flexibility and adaptability are crucial to the managerial process.The role of top management is more than making decisions that affect all employees (Hooi and Leong, 2017). It's also to set the bar for the way managers treat the staff and relate to each other, which also affect the success of the company. Top management need to know how they are perceived by the staff. Understanding the effects of their role and how they are perceived by staff would help the top management team to make changes as necessary (Mahzan et al., 2018; Bakri, 2015).From the MM perspective, the critical success factors (CSFs) formanagerial process can be summarized as shown in Table 1.

Table 1: CSFs for managerial process in MM

CSFs	Elements	Authors
Policy on MM	Clear company policy on MM; recognition of MM as vital constituent in management.	Mahzan et al., 2018; Pakrudin et al., 2017; Hooi and Leong, 2017; Mehralian, et al, 2016; Bakri, 2015; Kumar and Kumar, 2014; Zargun and Al-Ashaab, 2014.
Financial and resources support	Allocation of sufficient resources; offering rewards and incentives.	Kumar and Kumar, 2014
Education and training	Knowledge and competencies; development on employee competency	Mahzan et al., 2018; Pakrudin et al., 2017;Mehralian, et al, 2016; Bakri, 2015;
Equipment and facility upgrading	Continual improvement of equipment and facility; Inculcate the Kaizen culture	Pakrudin et al., 2017; Bakri, 2015
Communication	Open communication and exchange of information; feedback system; motivation.	Mahzan et al., 2018; Pakrudin et al., 2017; Bakri, 2015;
Performance measurement	Scheduled monitoring and follow-up; measurement of performance based on OEE; assessment on employee competency; enforcement by management.	Pakrudin et al., 2017;Mehralian, et al, 2016; Singh et al., 2014.

2.3.1 Policy on MM

Maintaining production equipment should be regarded as a strategic factor towards business survival of the organization (Zaharia and Bordeianu, 2018;Mehralian, et al, 2016). The top management should have an imperative role in determining the maintenance policies, objective, strategies, allocation of resources and align with company's business goals (Ahmad et al, 2018; Zargun and Al-Ashaab, 2014).

Maintenance policy is a written document, in which it provides a management framework to determine the choice of maintenance strategy, defining maintenance standard and allocation of maintenance resources. It also provides a guideline how the MM should be incorporated with other management framework of the company.MM activities could not be planned and implemented successfully without the establishment of such policy by the top management. The way the company is run day to

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day, based on the policy, helps establish the MM as part of important constituent of the overall management activities (Mahzan et al, 2018; Bakri, 2015).

2.3.2 Financial and resources support

An effective MM activities would require adequate resources allocation. One the vital resources is related to financial. A company's financial decisions typically come from the top level of management. This includes maintenance department's budget for the fiscal year. Other essential resources for maintenance department including staffing (both managerial and operations), materials, equipment and time (Kamble and Wankhade, 2018; Bakri, 2015).In many cases, all of these requirements must be approved by top management.

2.3.3 Education and training

Many previous studies have highlighted the importance of the education and training as one the most critical aspect of an implementation of MM. Effective MM strategies are needed in today's competitive business to meet the needs of specific business environments. Maintenance personnel, particularly managers, engineers and technicians could performed more effectively if they are equipped with sufficient education and training (Suzuki, 2016; Tajiri and Gotoh, 2014). The efficient performance of these key personnel in maintenance would resultin a dramatic reduction in breakdowns, optimization of maintenance costs and reduction of defects, whilst improved the availability and productivity of the company's equipment and facilities (Pakrudin et al., 2017; Mehralian, et al, 2016).

2.3.4Equipment and facility upgrading

There are thousands of equipment and facilities to be managed under jurisdiction of maintenance department. In order to achieve the greatest return and benefits from those important company's assets, a systematic MM is tremendously vital to maintain and upgrading of those assets. Upgrading of equipment and facilities will ensure prolong its useful lifetime (Mahzan et al, 2018).The concept of continuous improvement or Kaizen in the MM activities would guarantee that company are consistently positioned to adhere to the standard worldwide. Its adoption in the MM initiative enables it to be proactive rather than reactive as the reliance is on an ongoing evaluation of processes and outcomes. Kaizen culture encourages creativity, innovation and out-of-the-box thinking that is likely to promote a continual improvement in a company (Mehralian, et al, 2016; Imai, 2015; Bakri, 2015).

2.3.5 Communication

Top management needs to also make sure the line of communication and transparency continues throughout the company as well. It is deemed important for top managers to have a regularly meeting, discussion and forum with each of the maintenance staff(Yu et al., 2020; Rolfsen and Langeland, 2012).Such communication platform would provide a great opportunity for the maintenance staff to express their difficulty, issues and concerns in taking care the company's important asset, i.e. Equipment and facilities.

2.3.6 Performance measurement

This last CSFs provides information to be used in ongoing planning efforts, and thus the cycle of Plan-Do-Check-Act (PDCA) in MM starts over again. It is top management responsibility to review the results and to make any necessary action for further improvement in MM (Hooi and Leong, 2017;Mehralian, et al, 2016).The six CSFs in MM are highly interdependent, with all of them aimed at improving the availability and preventing failures of equipment and facilities of the company (Suzuki, 2016; Juran, 2010). Nevertheless, this cannot be achieved without top managerial support. MM concepts entail a long-term commitment to PDCA in MM from top management and usually initiates as a top-down exercise.

3. Methodology

An extensive literature review was carried out and a research framework was developed to gather data required for an empirical study to obtain information from the maintenance or production managers of a companies located in PasirGudang, a gigantic industrial area in southern Johor, Malaysia. Johor remains the country's top investment destination for the manufacturing sector and continues to attract strong interest from domestic and foreign investors. This industrial area is houses for about 2005 manufacturing companies.

3.1 Respondents

Due to restriction of resources for this study, the researchers managed to survey only 180 companies. Those surveyed companies representinga diverse industries in that industrial area. Thetotal number of respondents was 63 companies, which means that the response rate was 35% .This response rate appears to be adequate as this trend is prevalent in other survey study research, for example: Shah (2012) and Kumar (2014) obtained 17% and 28.8% response rate respectively. The respondents obtained from the following industries: 19%-automotive, 7.9%-bio-medical, 14.3%-chemical, 12.7%-electrical/electronics, 6.3%-wood/furniture, 15.9%-petrochemical, 12.7%-oleo-chemical, and 11.1%-rubber/plastics industry, see Figure3. The surveyed respondents included 38 machine maintenance managers (60.3% of the respondents) and 25 facilities maintenance managers (39.7% of the respondents), see Figure 4. The respondents were selected based on their seniority or position in maintenance department.

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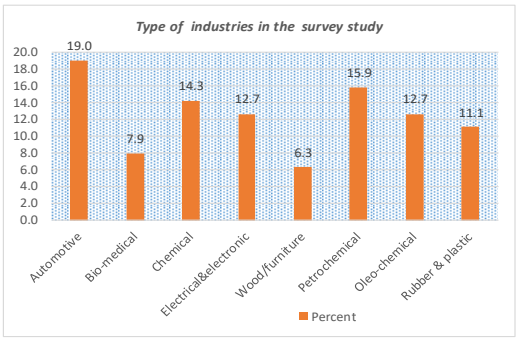
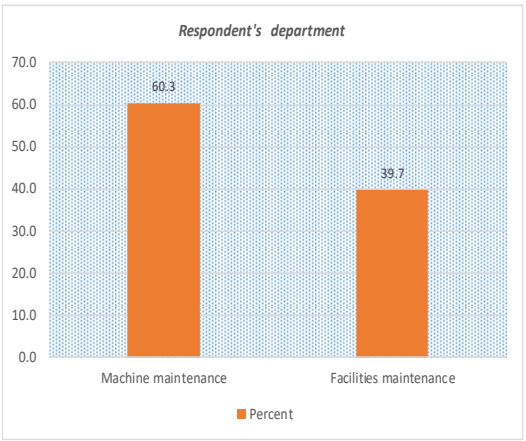


Type of industries	Frequency	Percent	Valid Percent	Cummulative Percent
Automotive	12	19.0	19.0	19.0
Bio-medical	5	7.9	7.9	27.0
Chemical	9	14.3	14.3	41.3
Electrical&electronic	8	12.7	12.7	54.0
Wood/furniture	4	6.3	6.3	60.3
Petrochemical	10	15.9	15.9	76.2
Oleo-chemical	8	12.7	12.7	88.9
Rubber & plastic	7	11.1	11.1	100.0
Total	63	100.0	100.0	

Figure 3: Type of industries in the survey study



Department	Frequency	Percent	Valid Percent	Cummulative Percent
Machine maintenance	38	60.3	60.3	60.3
Facilities maintenance	25	39.7	39.7	100.0
Total	63	100.0	100.0	

Figure 4: Respondent's department

3.2 Data collection tool

A short and easy-to-answer questionnaire was developed for this empirical study. The questionnaire consisted of two sections, in which one section was about the general information of the company, and the rest of the questionnaire contained the primary section, which to determine the role of top management in supporting the MM activity. To ensure that the questionnaire fulfilled the content and construct validity of the research, some academics and experienced academician and practitioner were consulted to ensure that all the used terms were relevant and clear. One of the most important criteria of questionnaire design is that the questions should be short, relevant, and easy to understand with no ambiguity question. The questionnaire was pre-tested and consequently, it was edited and the final one was prepared. These activities are established practices of survey data collection Generally, a 5-point Likert scales were used for this survey to determine how much emphasis was placed on a set of aspects, where 'strongly agree' is weighed with the highest value (5), ollowed by 'agree' (4), 'moderate' (3), 'disagree' (2) and 'strongly disagree' (1) respectively. However, due to nature of questions asked, there were other 2 types of five-point Likert scales that were used, for example in questions 3.2, 4.1., 4.2 and 5.1.

4. Results and Discussion

The main results and findings obtained as a consequence of processing the collected data by descriptive statistics or factor analysis using SPSS software.Nonparametric methods with frequency distribution is being used to find the frequency of respondent feedbacks.

4.1 Policy on MM

The following are the results concerning to the related aspects.

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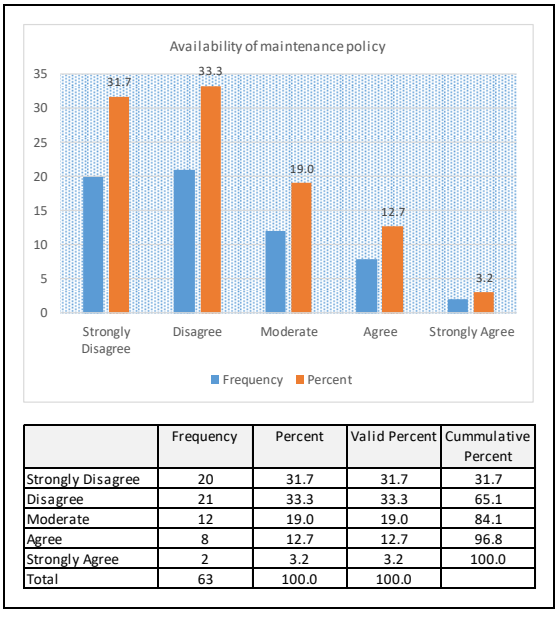
4.1.1 Availability of policy endorsing maintenance as one of the company's priority

The respondents were asked whether their respective company has a specific maintenance policy. A total of 31.7% had strongly disagreed and 33.3% disagreed thatthere is awritten policy to endorse maintenance as the company's priority. Only a small percentage of respondent, i.e.3.2% strongly agreed and 12.7% agreed on the availability of such policy in their company, see Figure 5.



	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	20	31.7	31.7	31.7
Disagree	21	33.3	33.3	65.1
Moderate	12	19.0	19.0	84.1
Agree	8	12.7	12.7	96.8
Strongly Agree	2	3.2	3.2	100.0
Total	63	100.0	100.0	

Figure 5: Response on question 1.1

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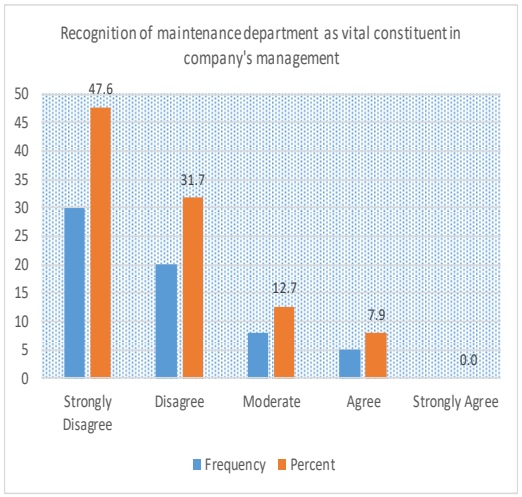
4.1.2 Recognition of maintenance department as vital constituent in company's management

The respondents were further asked on their view about the way the company treated maintenance department. It was found that about 47.6% of respondentsopined that they strongly disagreed that the top management of the companies had treated maintenance department as premier department with at least at the same par with other departments, see Figure 6. This results clearly indicated that their top management did not view maintenance management and maintenance department has an important role towards profitability of companies.

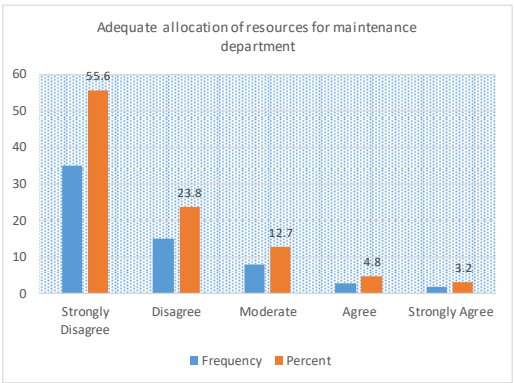


	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	30	47.6	47.6	47.6
Disagree	20	31.7	31.7	79.4
Moderate	8	12.7	12.7	92.1
Agree	5	7.9	7.9	100.0
Strongly Agree	0	0.0	0.0	100.0
Total	63	100.0	100.0	

Figure 6: Response on question 1.2

4.2 Financial and resources support

A company's financial decisions typically come from the top level of management.A top management should has a sense of what are the requirement and what to equip the maintenance staff to ensure the maintenance management initiative successful. On the contrary, the55.6 % of the respondents strongly disagreed and23.8% disagreed that they were allocated withadequate financial and resources, see Figure 7. Inadequate resources for maintenance department is an indicator that the company's top management did not accept maintenance management as a vital contributor towards producing superior product quality from well-maintained production equipment. Through a good maintenance management practices, the company is able to focus on quality improvement on a continuous and consistent basis to face fierce competition

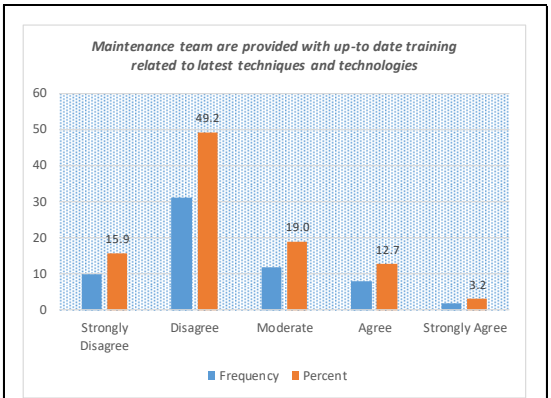


	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	35	55.6	55.6	55.6
Disagree	15	23.8	23.8	79.4
Moderate	8	12.7	12.7	92.1
Agree	3	4.8	4.8	96.8
Strongly Agree	2	3.2	3.2	100.0
Total	63	100.0	100.0	

Figure 7: Response on question 2

4.3 Education and training

Question 3.1aimed at assessing the availability of budget aimed at upgrading the education and training for maintenance personnel. Unfortunately49.2% of respondent disagreed and 15.9% strongly disagreed that their companies has allocated such budget, see Figure 8.Question 3.2 was asked to further confirm about the frequency of annual training attended by maintenance personnel. Most respondents (39.7%) show that the maintenance personnel of their companies having averagely of 3 times training per year, see Figure 9. A percentage of 28.6% answered 'Seldom', 20.6% of the respondents said 'Often', 7.9% chose 'Always' and only 3.2% opted for 'Never'.



	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	10	15.9	15.9	15.9
Disagree	31	49.2	49.2	65.1
Moderate	12	19.0	19.0	84.1
Agree	8	12.7	12.7	96.8
Strongly Agree	2	3.2	3.2	100.0
Total	63	100.0	100.0	

Figure 8: Response on question 3.1

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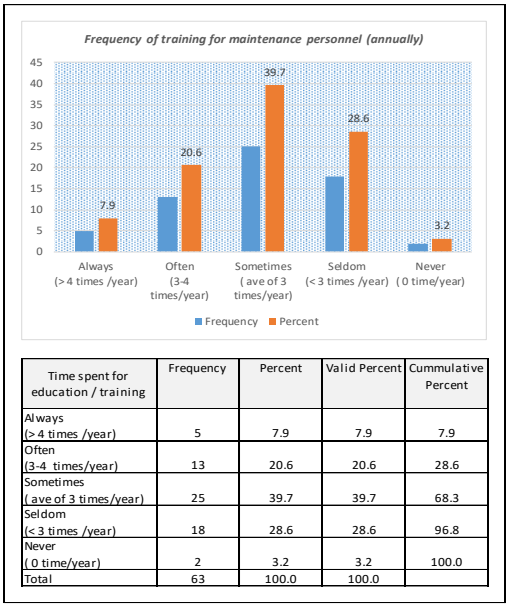


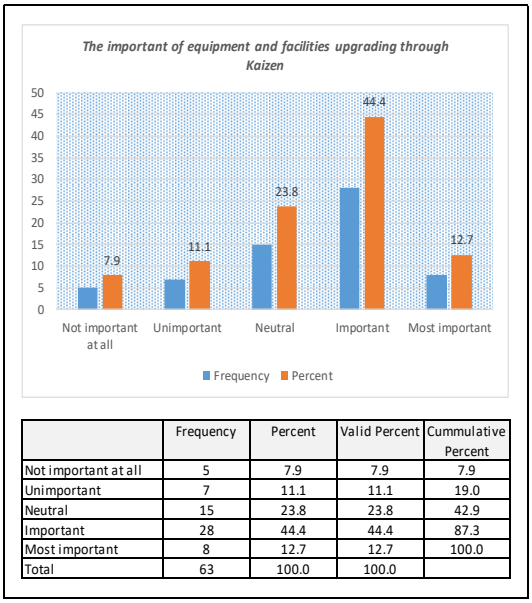
Time spent for education / training	Frequency	Percent	Valid Percent	Cummulative Percent
Always (> 4 times /year)	5	7.9	7.9	7.9
Often (3-4 times/year)	13	20.6	20.6	28.6
Sometimes (ave of 3 times/year)	25	39.7	39.7	68.3
Seldom (< 3 times /year)	18	28.6	28.6	96.8
Never (0 time/year)	2	3.2	3.2	100.0
Total	63	100.0	100.0	

Figure 9: Response on question 3.2

4.4 Equipment and facility upgrading

A question was asked about the respondents view on the importance of equipment and facilities upgrading. Theoretically, the upgrading of equipment and facilities through Kaizen activities will prolong it useful lifetime and ensures conveniently to the user.

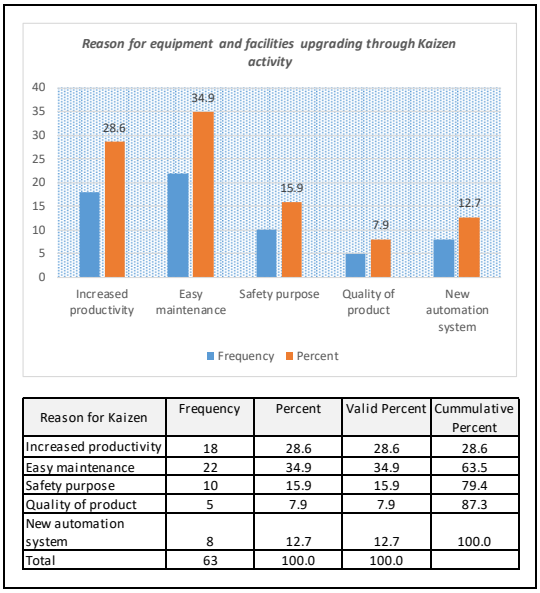
The concept particularly is well accepted by 44.4% respondent that pointed out the importance of equipment and facilities upgrading, see Figure 10.



	Frequency	Percent	Valid Percent	Cummulative Percent
Not important at all	5	7.9	7.9	7.9
Unimportant	7	11.1	11.1	19.0
Neutral	15	23.8	23.8	42.9
Important	28	44.4	44.4	87.3
Most important	8	12.7	12.7	100.0
Total	63	100.0	100.0	

Figure 10: Response on question 4.1

The concept of Kaizen or continuous improvement has gradually been incorporated into various area in manufacturing (see Figure 11), such as: to improve productivity; to improve safety of working place; to improve product quality, and; to automate the manual equipment or facilities. Its adoption in the MM initiative enables it to be proactive rather than reactive as Kaizen culture encourages creativity, innovation and out-of-the-box.

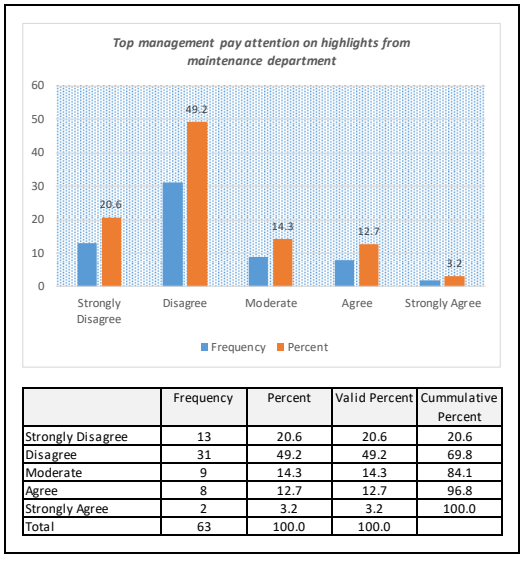


Reason for Kaizen	Frequency	Percent	Valid Percent	Cummulative Percent
Increased productivity	18	28.6	28.6	28.6
Easy maintenance	22	34.9	34.9	63.5
Safety purpose	10	15.9	15.9	79.4
Quality of product	5	7.9	7.9	87.3
New automation system	8	12.7	12.7	100.0
Total	63	100.0	100.0	

Figure 11: Response on question 4.2

4.5 Communication

Question 5 aimed at confirming whether the issue related to communication matter in surveyed companies are satisfactorily as per highlighted in literature. Based on response, obviously most of maintenance departmental manager (49.2%disagreed) thatthe top management paid attention about their feedback and highlight on maintenance issues. When further asked, they highlighted that in most cases, the top management did not handle the disagreement professionally, see Figure 13. Research indicates “great” managers listen well, motivate others, and consistently make good decisions.



	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	13	20.6	20.6	20.6
Disagree	31	49.2	49.2	69.8
Moderate	9	14.3	14.3	84.1
Agree	8	12.7	12.7	96.8
Strongly Agree	2	3.2	3.2	100.0
Total	63	100.0	100.0	

Figure 12: Response on question 5.1

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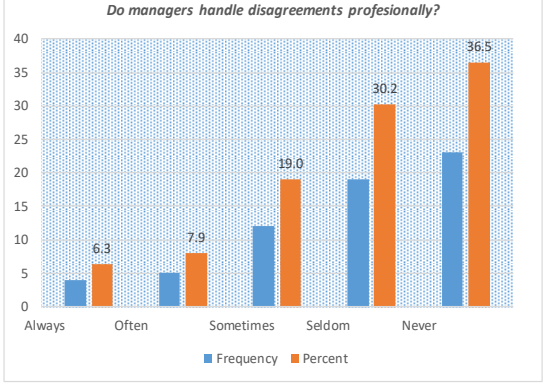
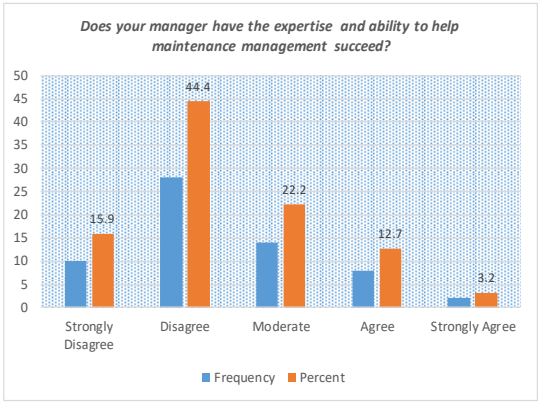


	Frequency	Percent	Valid Percent	Cummulative Percent
Always	4	6.3	6.3	6.3
Often	5	7.9	7.9	14.3
Sometimes	12	19.0	19.0	33.3
Seldom	19	30.2	30.2	63.5
Never	23	36.5	36.5	100.0
Total	63	100.0	100.0	

Figure 13: Response on question 5.2

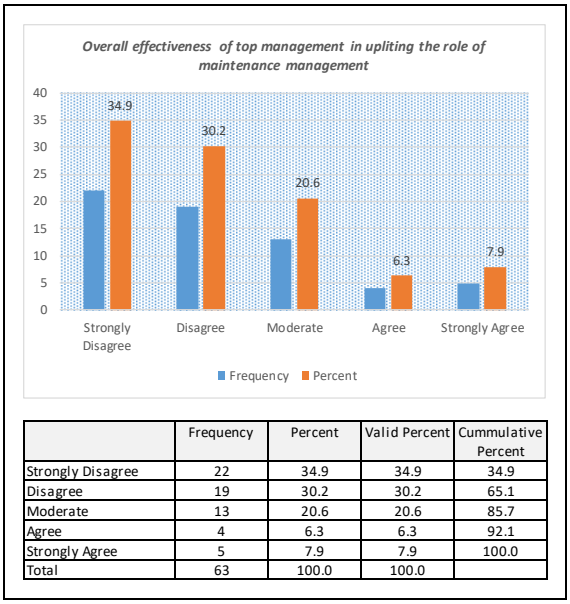
4.6 Performance measurement

This last stage provides information to be used in in future improvement efforts. A question was asked about the overall perception of respondents towards their top management expertise and ability to help maintenance management succeed. Majority of respondents seem disagreed (44.4%) that their respective top management have these traits, see Figure 14. Most of respondent strongly disagreed (333.3%) and 30.2% disagreed that they have confident with the overall effectiveness of top management in uplifting the role of maintenance management, see Figure 15.



	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	10	15.9	15.9	15.9
Disagree	28	44.4	44.4	60.3
Moderate	14	22.2	22.2	82.5
Agree	8	12.7	12.7	95.2
Strongly Agree	2	3.2	3.2	98.4
Total	62	98.4	98.4	

Figure 14: Response on question 6.1



	Frequency	Percent	Valid Percent	Cummulative Percent
Strongly Disagree	22	34.9	34.9	34.9
Disagree	19	30.2	30.2	65.1
Moderate	13	20.6	20.6	85.7
Agree	4	6.3	6.3	92.1
Strongly Agree	5	7.9	7.9	100.0
Total	63	100.0	100.0	

Figure 15: Response on question 6.2

5. Conclusion

The six functions in the survey study are highly interdepends, however, the very first things, the top management of the company need to appreciate and buy in the philosophy of MM to spur the company's performance, particularly as part of essential strategies to face the competition and cope up with increasing pressure of market globalization. The top management need to anticipate potential problems or opportunities and designing plans to ensure the success of MM activity. The top management of the company need to establish procedures and expectations through an endorsed MM policies. The way the company is run day to day, based on those policies, helps establish the MM as part of important constituent of the overall management activities. A company's financial decisions typically come from the top level of management. This includes each department's budget for the fiscal year. In many cases, the purchase of equipment and other assets must be approved by top management. It's important that top management has confidence in mid-level managers to know what their employees need, and to procure it while keeping within their departments' budgets. If the employees don't have access to the equipment and resources necessary to complete their jobs, the company's achievement suffers. A top management should supports the staff and has a sense of what they need is better equipped to lead the company to success. In particular, training is always important in health care facilities, but never more so than in new facilities or in newly expanded facilities where some would see changes as having to be understood. Employee training has always played a vital role in promoting the efficiency of the activities related to industrial maintenance. Training enables engineers and maintenance workers to increase skills and knowledge that help them improve and understand the way they

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conduct their maintenance activities. With regards, to the equipment and facility upgrading, there are thousands of equipment to be managed under jurisdiction of maintenance department. Equipment in manufacturing plant can be grouped into two main group, i.e. production equipment and facility equipment. In order to achieve the greatest return and benefits from those assets, a systematic MM is tremendously vital to maintain and upgrading of assets. Upgrading of equipment and facilities will prolong it useful lifetime.The continuous improvement in the MM process, guarantees that organizations are consistently positioned to adhere to the standard worldwide. The concept of Kaizen or continuous improvement has gradually been incorporated into various area not to restrict to manufacturing area only. Its adoption in the MM initiative enables it to be proactive rather than reactive as the reliance is on an ongoing evaluation of processes and outcomes.Kaizen is culture that encourages creativity, innovation and out-of-the-box thinking is likely to result in a company that is successful and continually comes up with new ideas. A stifling corporate culture limits the efforts of the employees, making it difficult for the company to advance.Top management needs to also make sure the line of communication and transparency continues throughout the company as well. Make it a company policy that managers meet regularly with each of their employees-weekly, for example-to discuss their progress. Weekly staff meetings are good for keeping everyone informed of coming activities, but they're not a substitute for meeting one-on-one, where each employee has the opportunity to express problems, issues and concerns. Performance measurement would provide information to be used in ongoing planning efforts, and thus the cycle starts over again. Reviewing results and making any necessary changes. The role of maintenance in surveyed companies was not highly recognized as one of the important constituent under top management perception. The results show that top managerial commitment is crucial to the success of MM initiative. These results may encourage top management of manufacturing to focus on managerial commitment and implement systematically MM towards their business survival.

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