Effect of Preventive Maintenance on Coffee Shop Operations and Performance

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Abstract

The coffee shop and coffee beverage business in Indonesia is booming in recent years. Indonesia's domestic coffee consumption also continues to rise. Indonesian coffee shops grew 8% in 2018 and forecasted growth 15% until 20% until the end of 2019 (Zuhriyah 2019). Modern and forward-thinking enterprises treat maintenance as a profit center rather than a cost center. Scheduled preventive maintenance will reduce the likelihood of machine downtime that can interfere with production (Rachman and Nurcahyo 2016). This study was conducted to determine the effect of preventive maintenance on the operations and performance of restaurants or coffee shops in Jakarta. The methodology used is taking primary data with questionnaires. A total of 30 respondents from various coffee shop businesses with a working period profile is one to two years. The author divides the characteristics of preventive maintenance into 7 (seven) characters and correlates it with the operational performance of the coffee shop. The SPSS was used to see the opinions of the respondents whether the proposed criteria and sub-criteria deemed suitable or not with this study.

Keywords
Preventive maintenance, Coffee shop, Small Business, Performance.

1. Introduction

Based on International Coffee Organization data Indonesia's coffee consumption in the 2018-2019 period reached 4,800 million sacks of coffee (in thousand 60kg). This consumption has continued to rise since 2010 which is 44 percent against the 2018-2019 period. Indonesian coffee shops grew 8% in 2018 and forecasted growth 15% until 20% until the end of 2019 (Zuhriyah 2019). The coffee industry can be considered as a promising business that continues to increase coffee consumption data. According to the fact that coffee consumption increases every year, small business entrepreneurs choose to make coffee shops a small business to cultivate. Many coffee shop business owners initially rent their property and become accustomed to a landlord conducting regular inspections and completing most repairs. However, a growing number of coffee shop entrepreneurs, especially those in the retail industry, must sign a triple net lease. This makes the coffee shop business owner liable for all of the costs associated with maintenance. Most small-business owners understand the importance of building maintenance, but few can spare the time and energy required to focus on it.

Maintenance plays a major role in the success of organizations in various sectors (Al-Turki, U. M. et al 2014). Maintenance should be actions taken to prevent a device or component from failing or to repair normal equipment degradation experienced with the operation of the device to keep it in proper working order (Trojan and Marcal 2017). Scheduled preventive maintenance will reduce the likelihood of machine downtime that can interfere with production (Amar and Nurcahyo 2016). Effective planning ensures a company remains operational and guards against the loss of business because of property disrepair and inconvenient closures. Any downtime is going to take away from

productivity. Preventive maintenance is an effective approach to enhance the reliability and quality of a system and its components. In order to prevent failure from occurring, preventive maintenance practice should be able to indicate when a maintenance work needs to be performed (Yang, S.K. 2004). Maintenance includes activities related to spare parts inventory maintenance, human resources and risk management. It includes all decisions at all levels of the organization related to obtaining and maintaining a high level of availability and reliability of its assets (Al-Turki, U. M. et al 2014). Therefore, this study was conducted to determine which characteristics of preventive maintenance affect the operational performance of the coffee shop. Data processing carried out by the author is with SPSS we can find out the correlation between each characteristic of preventive maintenance and performance. The results of this study can be used as a priority reference for preventive maintenance criteria that can be applied in the coffee shop business.

1.1 Objectives

The purpose of this study is to determine the relationship between preventive maintenance and the coffee shop operational and performance.

2. Literature Review

2.1 Characteristic of Preventive maintenance

Maintenance is identified into three basic strategies, namely scheduled maintenance, corrective maintenance, and condition-based maintenance. Schedule maintenance is preventive maintenance carried out in accordance with predetermined time intervals, number of operations, distance traveled, etc. to ensure these components work in good condition (Leo and Scott 2019). According to time-based, preventive maintenance can be divided into time-based preventive maintenance and condition-based maintenance (Kwak et al. 2004). To achieve optimal maintenance performance it is highly recommended to implement and prioritize both maintenance strategies over corrective maintenance.

Scheduled maintenance may result in unnecessary replacement parts costs, as those parts are occasionally fit to use (Au-Yong et al. 2014). In addition, routine inspections or scheduled maintenance can ignore invasive attempts that massively destabilize the system (Moubray 2007). The performance of the scheduled maintenance relies on criteria such as skilled labor, spare parts and materials, predetermined intervals for maintenance, and cost allocation for failure or downtime. From this description, we can get the characteristics of PM which consist of maintenance labour, inspection, materials and spare parts maintenance, failure and maintenance downtime, financial aspect, planning and schedule maintenance, and maintenance policy.

2.2 Coffee Shop business performance

In terms of technology, the company has good supporting tools for coffee processors as main products (Aditia P. and Harimukti W. 2021). Company's technology development is focused on providing the necessary facility to fulfill consumer values and also for the food processor. Companies need to improve their food processor in order to develop various menus especially for food which currently still lack options. In terms of coffee and tea processors, the company already has enough tools to fulfill consumers' needs. Procurement function is responsible for ensuring the availability of the materials in the outlets including the incremental equipment. All the spare parts. All the spare part performance will be recorded and changed periodically based on the depreciation time.

2.3 Correlation Analysis with SPSS

The Statistical Package for the Social Sciences (SPSS) is a package of programs for manipulating, analyzing, and presenting data; the package is widely used in the social and behavioral sciences (Brian and Landau 2004). Relation between two or more variables can be studied by using Correlation and Regression. Two variables are said to be related if change in the value of one variable changes the value of another variable. Correlation analysis refers to the degree of relationship between variables (Kafle 2020). The mathematical method to study the degree of association

between two variables. It is used to study the correlation between two quantitative variables and denoted by r. Formula to calculate Karl Pearson's correlation coefficient is as follows (Kafle 2020).

$$r = \frac{cov\,(X,Y)}{\sigma_x \sigma_y}$$

$$\text{or, } r = \frac{n\Sigma XY - n\Sigma X\Sigma Y}{\sqrt{n\Sigma X^2 - (\Sigma X)^2}\sqrt{n\Sigma Y^2 - (\Sigma Y)^2}}$$

3. Methods

Surveys involve identifying a particular group or category of people and gathering some information from them to gain insight into what the whole group is doing or thinking (de Leeuw et al. 2008). Based on the existing problems and constraints, the first stage of the research methodology is to collect the data needed in the research. Data in the form of primary data (questionnaire), as well as secondary supporting data. The primary data in this study is the respondent's data. Respondent data is needed to find out the preventive maintenance characteristics that have been implemented in the coffee shop where the respondent works. Respondents in this study had criteria for at least 6 months of working as staff at a coffee shop. The collected data will be scored using a Likert scale for each preventive maintenance characteristic. Furthermore, the score will be analyzed by correlation analysis using SPSS.

4. Data Collection

This study collects answers from 31 respondents to 31 coffee shops. There are 3 (three) questions for each Preventive Maintenance characteristics and 3 (three) questions to measure operational performance.
The data that has been collected will be scored using the Likert scale method (1-6), the details of score are 1 (one) is for "very disagree", 2 (two) is for "disagree", 3 (three) is for "somewhat disagree", 4 (four) is for "somewhat agree", 5 (five) is for "agree" and 6 (six) is for "very agree". Table 1. represents the total answers for 3 questions of maintenance labour, whereas the table 2. To table 8. displays the three questions of maintenance policy, inspection, spare part and materials, failure and maintenance downtime, financial aspect, planning and schedule, performance.

Table 1. Total answers respondents for 3 (three) questions of maintenance labour

Maintenance Labour						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
28	35	13	8	8	1	93

Table 2. Total answers respondents for 3 (three) questions of maintenance policy

Maintenance Policy						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
29	38	16	10	0	0	93

Table 3. Total answers respondents for 3 (three) questions of inspection

Inspection						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
36	38	16	1	1	1	93

Table 4. Total answers respondents for spare part and materials

Spare parts and Materials						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
39	30	21	2	1	0	93

Table 5. Total answers respondents for 3 (three) questions of failure and maintenance downtime

Failure and Maintenance Downtime						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
34	34	14	2	4	5	93

Table 6. Total answers respondents for 3 (three) questions of financial aspect

Financial Aspect						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
27	46	14	2	4	0	93

Table 7. Total answers respondents for 3 (three) questions of planning and schedule

Planning and Schedule						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**

32	48	12	1	0	0	93

Table 8. Total answers respondents for 3 (three) questions of performance

Performance						
Very Agree	***Agree***	***Somewhat Agree***	***Somewhat Disagree***	***Disagree***	***Very Disagree***	**TOTAL**
40	41	12	0	0	0	93

5. Results and Discussion

5.1 Numerical Results

Table 9 is correlation analysis output table for correlation between maintenance labour and performance of respondents. Table 10 is correlation analysis output table for correlation between maintenance policy and performance of respondents. Table 11 is correlation analysis output table for correlation between inspection and performance of respondents. Table 12 is correlation analysis output table for correlation spare part and material and performance of respondents. Table 13 is correlation analysis output table for correlation between failure and downtime and performance of respondents. Table 14 is correlation analysis output table for correlation between financial aspect and performance of respondents. Table 15 is correlation analysis output table for correlation between planning and schedule and performance of respondents.

From the SPSS results table, if the Pearson correlation is more than 0.5 then there is a very high relationship, but if it is less than 0.5 then the relationship is very weak. From the SPSS results table, if the Pearson correlation is more than 0.5 then there is a very high relationship, but if it is less than 0.5 then the relationship is very weak.

Table 9. SPSS Correlations of Maintenance Labour and Performance

		Maintenance labour	Performance
Maintenance labour	Pearson Correlation	1	.472**
	Sig. (2-tailed)		.007
	N	31	31
Performance	Pearson Correlation	.472**	1
	Sig. (2-tailed)	.007	
	N	31	31

Table 10. SPSS Correlations of Maintenance Policy and Performance

		Maintenance Policy	Performance
Maintenance Policy	Pearson Correlation	1	.348
	Sig. (2-tailed)		.055

	N	31	31
Performance	Pearson Correlation	.348	1
	Sig. (2-tailed)	.055	
	N	31	31

Table 11. SPSS Correlations of Inspection and Performance

		Inspection	Performance
Inspection	Pearson Correlation	1	.197
	Sig. (2-tailed)		.287
	N	31	31
Performance	Pearson Correlation	.197	1
	Sig. (2-tailed)	.287	
	N	31	31

Table 12. SPSS Correlations of Spare Part and Material and Performance

		Spare part and material	Performance
Spare part and material	Pearson Correlation	1	.391*
	Sig. (2-tailed)		.030
	N	31	31
Performance	Pearson Correlation	.391*	1
	Sig. (2-tailed)	.030	
	N	31	31

Table 13. SPSS Correlations of Failure and downtime and Performance

		Failure and Downtime	Performance
Failure and Downtime	Pearson Correlation	1	.120
	Sig. (2-tailed)		.521
	N	31	31
Performance	Pearson Correlation	.120	1
	Sig. (2-tailed)	.521	
	N	31	31

Table 14. SPSS Correlations of Financial Aspect and Performance

		Financial Aspect	Performance
Financial Aspect	Pearson Correlation	1	.441*
	Sig. (2-tailed)		.013
	N	31	31
Performance	Pearson Correlation	.441*	1
	Sig. (2-tailed)	.013	
	N	31	31

Table 15. SPSS Correlations of Planning and Schedule and Performance

		Planning and schedule	Performance
Planning and schedule	Pearson Correlation	1	.195
	Sig. (2-tailed)		.294
	N	31	31
Performance	Pearson Correlation	.195	1
	Sig. (2-tailed)	.294	

N	31	31

6. Conclusion

Maintenance scheduling is a process in which jobs are matched against resources (crafts) and given time slots for execution. (Duffuaa et al. 2019) divides maintenance scheduling into three stages based on the planning and execution time horizon. The stages are: (1) Long term or master schedule for a period of 3 months-1 year; (2) weekly schedule, i.e. maintenance work covering one week; and (3) a daily schedule that includes work to be completed each day. The elaboration at this stage is introduced below following (Duffuaa et al. 2019).

The maintenance policy also has a significant correlation to performance. From the results of correlation analysis with SPSS, inspection, spare parts and materials, failure and downtime and planning and schedule have no correlation to performance. Performance in question is the performance of the coffee maker. The results of this study can be used to make maintenance labor and maintenance policy a PM characteristic as a priority to implement in a business coffee shop.

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Biographies

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