Assessment of MSMEs' Preventive Maintenance: A Case Study of Coffee Shops at DKI Jakarta

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Abstract

The coffee shop industry relies heavily on coffee machines in its business processes. The machines used are physical assets that require maintenance so that the company continues to be productive. When an unplanned downtime occurs due to machines or equipment failure, this will disrupt the coffee shop operation. It would be costly to revise the production plan in an emergency and also causes lower product quality and variability in service level. The paper describes a case study of maintenance management in coffee shops, where the analysis used simple descriptive statistics. To investigate five maintenance variables, we issued a 17-question questionnaire to 30 coffee shops in Jakarta. After that, a descriptive analysis is carried out to determine the data's implications. From the survey result, most of the respondents were concerned about the financial aspects of maintenance. Furthermore, cleaning the coffee machine reveals the respondents' perceptions of maintenance activities.

Keywords
Maintenance Survey, Maintenance Management, Coffee Shops in Jakarta

1. Introduction

According to the International Coffee Organization Indonesia (2021), Indonesia is the second-largest coffee-consuming country after Brazil. Besides being a consumer, Indonesia is also the fourth largest coffee exporter in the world (Floresku, 2021). Several regions in Indonesia are known as the world's best coffee producers. Lampung is known as the largest coffee producer in Indonesia, which has a type of robusta coffee. On the island of Sumatra alone, for example, you can see many kinds of quality coffee which are also well known to foreign countries such as North Sumatra Sidikalang coffee, Mandailing coffee and Acehnese Gayo coffee, South Sumatra coffee, and so on. In Java, for example, Malang coffee is also known, similar to the one in Lampung, Bali coffee, and many other types of coffee. As an archipelagic country, Indonesia has the charm of a very diverse archipelago coffee taste. Therefore, Indonesia is one of the largest coffee producers globally. Coffee is the fourth largest foreign exchange earner for Indonesia after palm oil, rubber, and cocoa in terms of agricultural commodities.

The high coffee production becomes an opportunity for business actors to process it into a coffee-based processed drink because coffee drinks have become a habit or lifestyle for some people. The increasing level of coffee consumption is also inseparable from the style of urban society that likes to gather. The large consumption of coffee resulted in the rise of coffee shops. Based on independent research (Toffin, 2019), the number of coffee shops in Indonesia as of August 2019 reached more than 2,950 outlets, an increase of almost three times compared to 2016, which was only 1,000 outlets. The market value generated runs IDR 4.8 trillion markets. The actual number of coffee shops in the research conducted by Toffin and MIX MarComm SWA could be higher because the coffee shop census only covers networked outlets in big cities. Excluding modern and traditional independent coffee shops in various regions.

In addition to a place to enjoy coffee, many visitors use the coffee shop as a place to do lectures, meetings, or discussions because drinking coffee can increase one's concentration and focus. In addition, the distinctive aroma of coffee will make people calm so that many visitors linger at the coffee house to chat casually. The coffee shop not only offers unique and delicious coffee but also offers a beautiful interior design. Millennials very much love coffee shops that provide stunning layouts. Amid intense competition between coffee houses in Indonesia, especially in big cities like Jakarta, many international coffee house brands whose brands are well known to the public have opened branch stores in

big cities like Jakarta. So local businessmen who open a coffee shop business that sells Indonesian coffee with different themes must try hard to compete with international brands. With the rise of global and local coffee shops in Indonesia today, the choices for consumers to choose the coffee shop to be visited are very diverse.

The coffee shop industry relies heavily on coffee machines in its business processes. The machines used are physical assets that require maintenance so that the company continues to be productive. Since the industrial revolution era, industrial care has produced several treatment theories and treatment models. In the past, machine maintenance used a breakdown maintenance system, which machines carried out after a breakdown. Then machine maintenance used a preventive maintenance system. Preventive maintenance aims to prevent sudden engine damage, increase reliability, and reduce downtime (Assauri, 2008). According to Ebeling (1997), preventive maintenance is maintenance carried out on a scheduled basis, generally periodically, in which a set of maintenance tasks such as inspection and repair, replacement, and cleaning.

When an unplanned downtime occurs due to machines or equipment failure, this will disrupt the coffee shop operation. It would be costly to revise the production plan in an emergency and also causes lower product quality and variability in service level. Therefore, the maintenance system plays a crucial role in ensuring the whole system runs efficiently and effectively (Sharma et al, 2011). Maintenance is one of the main functions in the coffee shop industry. Even though maintenance is a non-value added process in the industry, it is undeniable that maintenance plays a significant role in the asset management process of the coffee shop. Maintenance has been primarily practiced in enterprises as it gives benefits in terms of profit to the coffee shop with customer satisfaction. Maintenance, also known as a profit generator activity, is a method to relate with other operation functions and ensure the availability, reliability, and safety of all equipment (Waeyenbergh and Pintelon, 2002). The coffee shop will gain higher profits through the safety of the equipment, which optimizes cost and quality. The performance of maintenance operations becomes a crucial issue in the coffee shop industry.

The author conducted a survey to identify how to maintain a coffee shop in Jakarta with a sample of 30 coffee shops. The survey method uses a structured questionnaire and is given to respondents to obtain specific information (Sekaran & Bougie, 2017). This method gets information based on questions posed to respondents. Respondents were asked various questions about their behavior, intentions, knowledge, motivation, demographic characteristics, and lifestyle. Questions can be requested verbally, in written form, or via a computer, and responses can obtain responses from one of these forms (Sugiyono, 2017). The survey method can choose the survey method because it has several advantages. First, the questionnaire is relatively easy to administer. Second, the data obtained can trust the data obtained because the responses are limited to the stated alternatives. The use of questions with answers can reduce the variability of results caused by different interviewers. Finally, the coding, analysis, and interpretation of the data are also relatively simple (Ferdinand, 2014). Until now, there is still minimal research that identifies maintenance in coffee shops. It can conclude that studying a structured and well-documented maintenance-related survey is currently crucial. Based on the description above, researchers are interested in studying maintenance at a coffee shop in Jakarta.

1.1 Objectives

This study aims to determine whether coffee shops in Jakarta carry out maintenance on their shops. Researchers analyzed the answers related to maintenance from coffee shop owners or workers in Indonesia with the survey method. We distributed a 17-questions questionnaire to 30 coffee shops in Jakarta in order to examine 5 variables of maintenance. After that, a descriptive analysis is performed to understand the implication from the data.

2. Literature Review

DKI Jakarta is the capital city of the Republic of Indonesia. According to DKI Jakarta official government website, The population of DKI Jakarta increases over the year. In 2020, the total population of Jakarta is 10,644,986. The working age population in February 2020 was recorded around 8 million people, of which 5 million people entered the workforce, so the work participation rate was 67.95 percent (BPS, 2020). There are more than 2 thousand Large and Medium Enterprises in DKI Jakarta that are registered in BPS. But Micro, small, and medium enterprises (MSMEs) in DKI Jakarta exceed that number to 1 million MSMEs (Ministry of Cooperatives and SMEs, 2021).

Micro, small, and medium enterprises (MSMEs) in Indonesia are one of the most important contributors in the Indonesian economy (Gandhi et al., 2021). The Micro, Small and Medium Enterprises (MSME) development program as an instrument to increase people's purchasing power will eventually become a safety valve from the monetary crisis

situation. The development of MSMEs is very strategic in driving the national economy, considering that its business activities cover almost all business fields so that the contribution of MSMEs is very large for increasing income for low-income groups (Anggraeni et al., 2013).

One of the most popular MSMEs in DKI Jakarta nowadays is Coffee Shop. In DKI Jakarta there are more than 3,000 coffee shops spread across various regions in Jakarta (Cakranegara, 2020). The coffee business in the downstream sector has recently tended to grow and develop in various ways. The downstream coffee industry can be managed as a MSMEs, adjusted to the ability to start. Small-scale businesses allow novice entrepreneurs to start pursuing this business (Ministry of Industry, 2017). According to data from the International Coffee Organization Indonesia (2017), Indonesia ranks fourth in producing coffee, this statement supports further development of coffee shops in Indonesia. This fenomena can be seen as an opportunity for business people to process it into a coffee-based processed drink, seeing that drinking coffee has also become a lifestyle for some people. This has also resulted in coffee consumption in Indonesia being one of the largest in the world. In addition to a place to enjoy coffee, coffee shops can be utilized as a place to do lectures, meetings, or discussions (Nurikhsan, 2019).

Broadly speaking, the coffee processing stages are also carried out to maintain excellent coffee quality, starting from roasting, grinding, to becoming coffee powder products that are ready to be packaged and sold. The stages of coffee processing can be an opportunity for business people. Business people can sell coffee in a form of powder, or just outsource the coffee powder to make coffee, or outsource roasted coffee beans, and make coffee from it (Ministry of Industry, 2017). This business process has advantages and disadvantages, but one of the crucial factors in coffee shops are its tools and machinery. The machinery facilities in the beverages industry itself generally include washer machine, filler machine, coding machine, labeling machine and packaging machine (Nurcahyo et al., 2016).

To be able to reach customer satisfaction and profit, maintenance must be considered, especially for businesses that require tools and machines for its everyday operations, this is because maintenance highly influences production quality and quantity and directly affects production cost and thus, customer satisfaction. Maintenance includes all activities related to maintaining a certain level of availability and reliability of the system and its components and its ability to perform at a standard level of quality (Al-Turki et al., 2014).

Maintenance has two major types, corrective or preventive maintenance. According to The British Standard EN 13306:2010, corrective maintenance is the maintenance that is carried out after fault recognition and intended to put an item into a state in which it can perform a required function, and preventive maintenance is the maintenance carried out at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item.

Preventive maintenance is further divided into two main categories, condition based preventive maintenance and scheduled preventive maintenance (Al-Turki et al., 2014). While the condition based preventive maintenance focuses on maintaining the correct equipment at the right time, the scheduled preventive maintenance is done to detect and prevent potential failures on fixed time. Condition based preventive includes vibration analysis, oil analysis, thermography, ultrasonics, and more. Meanwhile, scheduled preventive maintenance includes activities such as cleaning, lubricating, adjustment, and replacement of minor parts. While condition based preventive maintenance might decrease maintenance operations which will decrease cost spending, scheduled preventive maintenance can also minimize total costs because of the minimum defect detected. These cost components can be divided into three groups mainly, which are capital cost, operation cost, and maintenance cost (Nurcahyo, et al., 2020). By implementing condition based preventive maintenance or scheduled preventive maintenance, risks of failure can be reduced even more.

3. Methods

3.1 Research Methodology

This research adopted a case survey method that consists of two main activities: conceptual analysis and survey method (Azid et al, 2018). Figure 1 shows the sequence of research methodology. First, the authors look for different sorts of maintenance surveys in various literatures. Second, researchers chose the survey object. Third, several variables of preventive maintenance are selected through focus group discussion. Fourth, the researchers create a set of questions for each variable to be evaluated. Next, the researchers conducted the survey to 30 coffee shops in Jakarta, Indonesia. After that, the information was gathered and shown in the form of a graph or table. Finally, the authors draw some implications from the survey results.

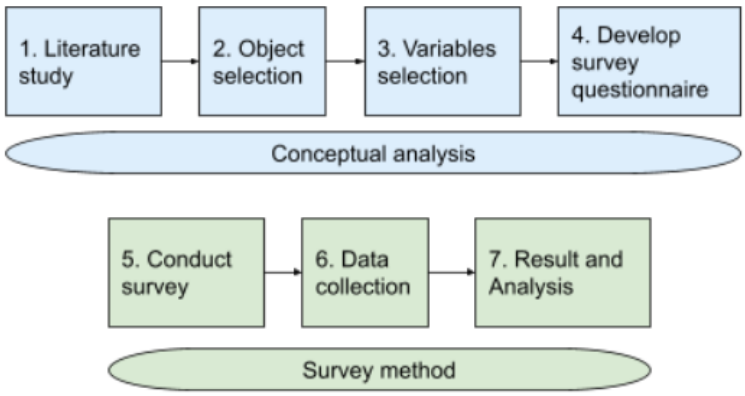

Figure 1. Research Methodology

3.2 Variables Selection

Each author offered several key variables for preventative maintenance management. After a focus discussion, there are five agreed variables that are selected. Those variables are financial aspect, condition-based maintenance, schedule based maintenance, physical check-up of the equipment and improved quality. The literature support for each variable is shown in Table 1.

Table 1. Variables Mapping on Literature Study

Agreed Variables	R1	R2	R3	R4	R5	R6	R7	R8	R9	R 10	R 11	R 12	R 13	R 14
Financial aspect		V				V		V		V	V	V	V	V
Condition based maintenance		V	V	V			V	V	V				V	V
Schedule based maintenance	V	V	V	V	V		V	V	V				V	V
Physical check-up of the equipment	V			V	V		V	V	V	V	V	V	V	V
Improved quality						V				V	V	V	V	V

Index explanation: R1 (Sun & Ye, 2018); R2 (Doyen & Gaudoin, 2011); R3 (Yang et al., 2018); R4 (Martins et al., 2020); R5 (Guariente et al., 2017); R6 (Rosimah et al., 2015); R7 (Dai et al., 2021); R8 (Khatab et al., 2017); R9 (Lin et al., 2015); R10 (Wang et al., 2018); R11 (Shafiee & Chukova, 2013); R12 (Wu et al., 2011); R13 (Bendaya et al., 2009); R14 (Al-Turki et al., 2014)

3.3 Questionnaire Development

The survey frame should include some or all of the following items such as identification data, contact data and classification data (Azid et al., 2018). The items on the frame that uniquely identify each sampling unit, such as the name, exact address, and a unique identification number, are known as identification data. The items needed to locate the sampling units during collection, such as location district, are known as contact data. Data on classification are useful for sample selection and perhaps estimation.

A questionnaire is a set of questions or a series of questions meant to elicit information on a certain topic from a specific respondent. Computerized questionnaires are available. The purpose is to collect data in such a way that survey

respondents understand the questions and can readily offer the proper responses in a format that can be processed and analyzed afterwards. The questionnaire design process starts with the formulation of survey objectives and information requirements and continues with consultation with data users and respondents. Then the questionnaire must be finalized.

4. Data Collection

After two weeks collecting respondent from the Coffee Shop owner or Coffee shop manager, the authors conducted a questionnaire survey. The main objective of this survey is to study the current maintenance strategies in the real Coffee shop industry mainly focused in DKI Jakarta. This survey involved all people from the top management data collection method. The survey has been answered electronically using the application of Google Forms. The target of respondents for this survey is 30 respondents.

5. Results and Discussion

5.1 Identified the Object

Maintenance survey involving 30 coffee shops, questions to coffee shop owners or employees. The maintenance respondent surveys are shown above with 2 coffee shops (See Figure 2) or 6,7% in the Central Jakarta Area, 8 coffee shops or 26,7% in the South Jakarta area, and 20 coffee shops or 66,7% in the East Jakarta Area.

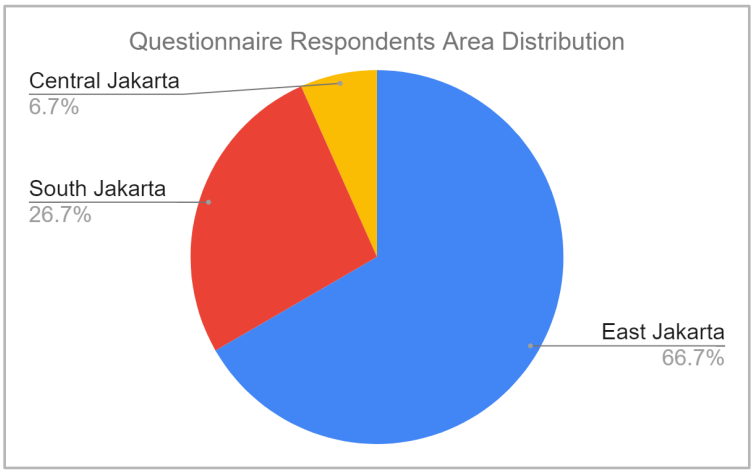

Figure 2. Respondents Area Distribution

5.2 Financial Aspects

According to a maintenance survey that classified financial aspects of maintenance, coffee shop owners or management are aware of the maintenance that influences their cost. with 70% of respondents are have their own budget to maintenance, the rest 30% even though not aware of maintenance budget but they're confidence with maintenance cost can reduce operational in the future. So maintenance is influenced to reduce operational cost in DKI Jakarta Coffee Shop. The result of the survey which related to financial aspects shown Figure 3.

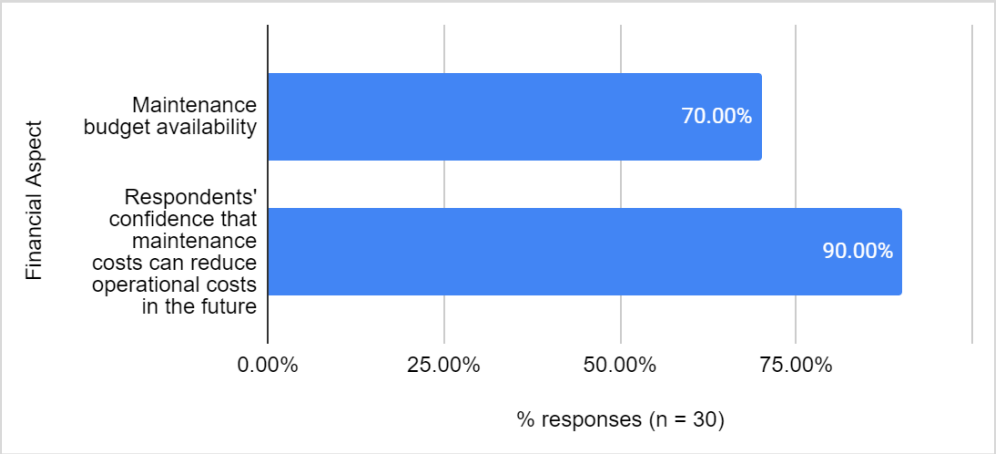

Figure 3. Responses to financial aspect of maintenance

5.3 Condition Based Maintenance

Simple method or implementation of Maintenance activities according to surveys are shown by Figure 4.

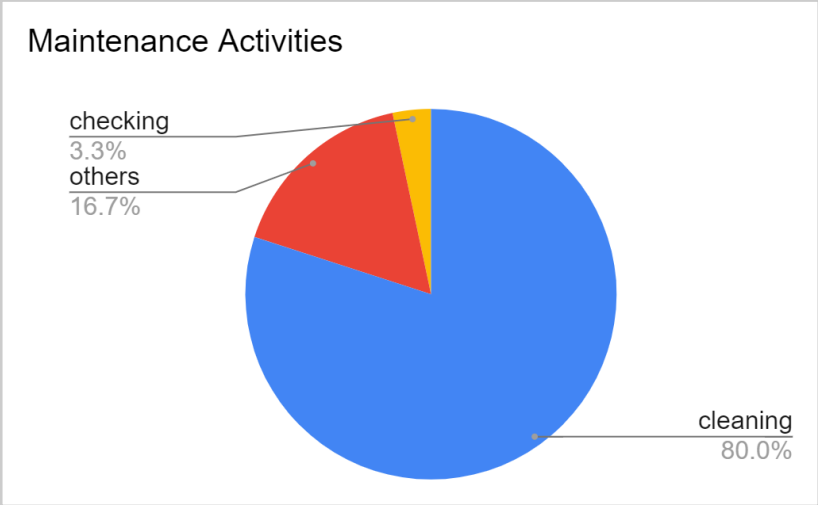

Figure 4. Responses to maintenance activities

Figure 4 shows that coffee shops in DKI Jakarta mainly rely on cleaning for their maintenance activities. Cleaning includes cleaning the body and parts of the machine, with rags or with chemicals. Checking that machines can generate proper temperature, no strange smell, or noises, is also conducted as maintenance activities, but not as many as cleaning. Other activities include following usage operations from turning the machine on to off, lubrication, replacing spare parts, and repairing. This shows that condition based maintenance, such as checking based on the current state of the machine is not that popular among coffee shops, even though this activities can directly find out what can be improved or repaired form the machine if it is not working properly.

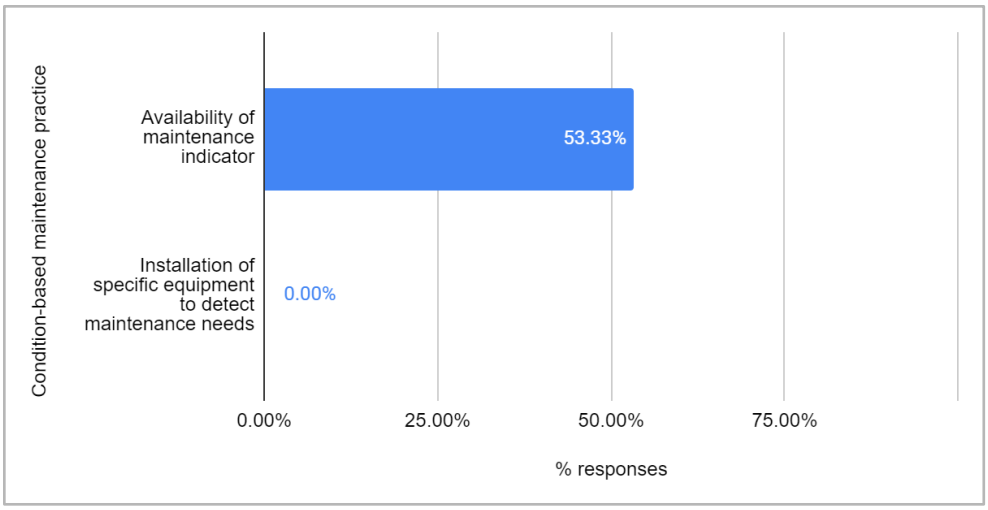

Figure 5. Responses to condition-based maintenance practice

Furthermore, condition-based maintenance can be done by having an indicator to properly review machine performance with some standard. From Figure 5, respondents that apply condition-based maintenance by 53.33% do have an indicator to supervise machines. Although indicator is present for condition-based maintenance, this is merely done manually. None of the respondents install specific equipment to detect errors, even though specific indicators such as thermometer, smoke detector, or vibrance sensor might tell the machine exact condition.

5.4 Schedule Based Maintenance

The availability of schedule-based maintenance practice is examined through questionnaires. Around 83% of respondents implement some schedule-based maintenance practice at their coffee shop. Furthermore, we take a look at the maintenance schedule for coffee machines and air conditioning. As it is shown by Figure 6, The majority of respondents engaged in some form of maintenance activity for the coffee machines, on a daily or monthly basis.

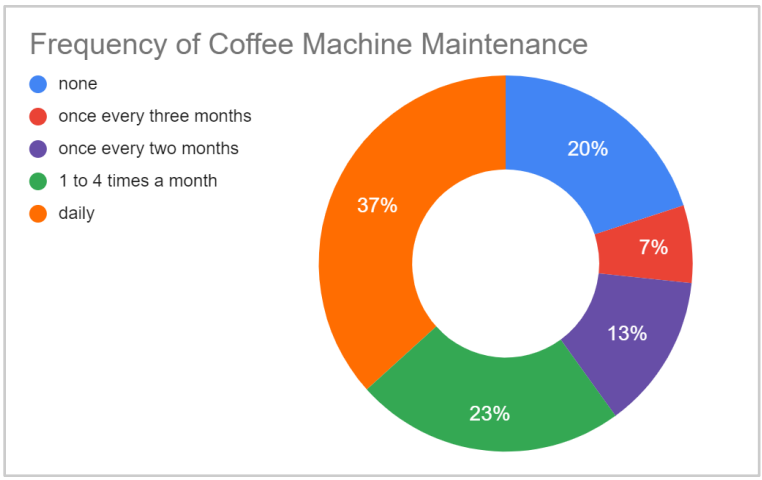

Figure 6. Frequency of maintenance activities for coffee machine

When it comes to air conditioner maintenance, most coffee shop owners are used to doing it once a month or every three months. Still, there is 3% of respondents that never planned its air maintenance activities. Figure 7 shows the variety of maintenance frequency for the air conditioning in a coffee shop.

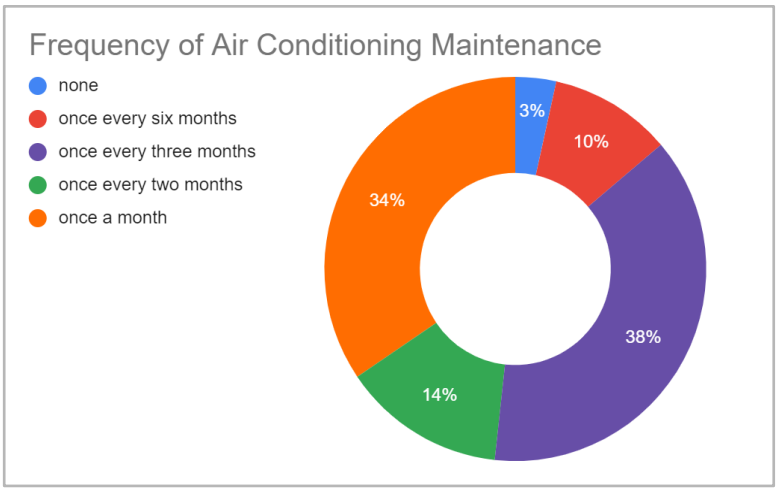

Figure 7. Frequency of maintenance activities for air conditioning

5.5 Improve Quality

Based on a survey of 30 coffee shops, 29 of them, or 96.67%, carried out quality control planning as shown in the below Figure 8. In addition, all coffee shops believe that maintenance can ensure a better quality of coffee drinks.

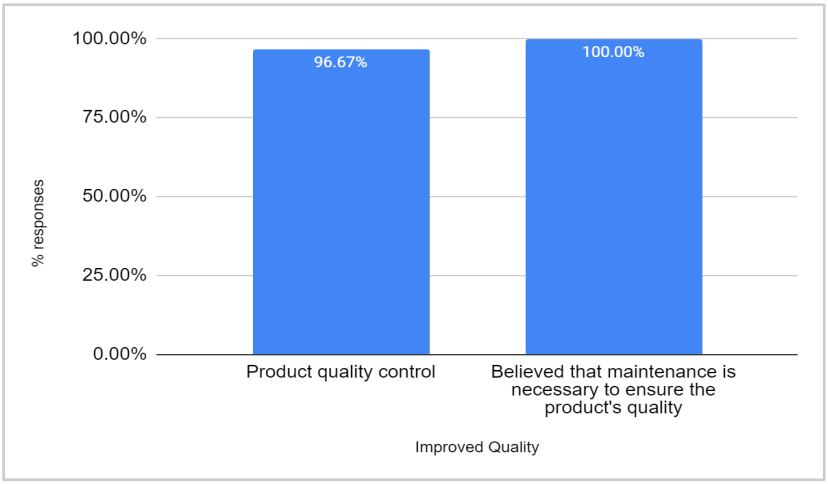

Figure 8. Responses to improve quality

6. Conclusion

Maintenance survey methods are used to identify five maintenance variables. This research issued a 17-question questionnaire to 30 coffee shops in DKI Jakarta based on 14 journal references. The result shows that owners or management Coffee shops in DKI Jakarta are aware of maintenance themself during their business. From Financial Aspects 90% of respondents agree that maintenance can reduce operational costs in the future. The simple implementation of Schedule based maintenance is by cleaning the coffee-maker machine every closing the shops. The result of condition-based maintenance is that the owner or management of coffee shops in DKI Jakarta are aware of the availability of maintenance indicators. The owners or management of a coffee shop in DKI Jakarta believe maintenance can produce better quality coffee.

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Biographies

Andi M. is a Master of Engineering candidate of Universitas Indonesia. He did not attend an undergraduate in industrial engineering, but he did do mathematics. During his undergraduate, Andi took a specialization in operations research. Andi continues to delve deeper into the world of industrial engineering. There are many branches of science in industrial engineering that he has never studied during his undergraduate studies in mathematics. He realized that he was a little behind compared to others who took degrees in industrial engineering. However, with high spirits, he continued to try to catch up.

Alif Faridalthaf is an local employee in Jakarta which active in Jewelry Industry. He has earned his bachelor's degree in industrial engineering of University of Indonesia. Alif also has certified in White-belt and Yellow-belt Six Sigma held by Experts Club Indonesia in 2020-2021

Yvana Sal Sabila is currently a master's degree student in the Industrial Engineering Department, Faculty of Engineering Universitas Indonesia. She holds a Bachelor of Engineering degree in Industrial Engineering from Institut Teknologi Sepuluh Nopember. Yvana Sal Sabila currently works as Strategy Management Specialist at a media conglomerate in Indonesia.

Zulfaa Z. Zulfaa Irbah Zain, also known as Zulfaa, is a Master of Engineering candidate of Universitas Indonesia, born in September 1997 in Jakarta, Indonesia. Having work experience in the operational area such as Supply Chain Associate and Pricing Controller, also background knowledge of business and industrial management, Zulfaa is quite passionate in developing resources with technology and innovation that gives great value both in agricultural and in industrial scope.