CARBON-RELATED MANAGEMENT STRATEGIES AMONG MALAYSIAN SMALL AND MEDIUM ENTERPRISES

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ABSTRACT

Climate change and global warming are complex phenomena and are the most challenging environmental issues facing in the world today. The main contributor to the global climate stems from the effects of company operations, not to mention the operations of small and medium enterprises (SMEs). Therefore, the carbon-related management of SME companies needs to be understood in depth to ensure that the systems used are in line with the standards. Thus, the objective of this study is to understand the system of carbon-related waste management among SME companies. In addition, this study also wants to examine the practice of carbon-related management accounting approach among SME companies. Data gathered from in-depth interviews with 4 informants by using qualitative approach. The findings show that SMEs have implemented the right and environmentally friendly systems in their carbon-related waste management such as; 3R method (reduce, reuse, recycle), Rubber Reservoir Method or Rubber Waterwaste Treatment and also Fukuoka Method. Findings also reveal that SMEs commitment toward practices of carbon-related management accounting approach such as; carbon-related cost, carbon-related physical information and sustainability report are still menimal. Therefore, it is proposed that a legislation and standards related to carbon management accounting approach be introduced and this initiative should be given emphasis to SME companies in Malaysia.

Keywords: Carbon-Related Waste Management, Carbon-Related Management Accounting, Small and Medium Enterprise (SME)

INTRODUCTION

Carbon emissions contribute up to 82% to global warming and climate change, mostly caused by carbon dioxide or also known as CO_2 (Center for Climate Change and Health, 2016). It explains the role of CO^2 in increasing global warming and climate change (SINO et al., 2020). More alarmingly, 40% of these Carbon Dioxides (CO_2) can remain in the atmosphere for up to 100 years (The Fifth Assessment Report for Carbon Management, 2014) Therefore, climate change and global warming must be addressed accordingly despite the challenges (Johar, 2013). Without efforts to curb this problem, it will be a catastrophe inherited by future generations.

The world today is looking for initiatives to ensure that global warming and climate change can be minimized. One of the measures is to intensify effective carbon-related management strategies or approaches. Several past studies have also stated that business organizations should consider some strategies in curbing climate change since many dramatic effects contributed by business operations (Busch & Schwarzkopf, 2013). Effective carbon-related management strategies can contribute to minimizing carbon liabilities while further increasing environmental awareness (Tang & Luo, 2014). Among the strategies that can be done by the company is to focus on carbon reduction internally (Bui & De Villiers, 2017).

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Therefore, one of the strategies to reduce carbon emissions is to ensure proper waste management (Syed Ali, 2010). Proper waste management is seen as a positive step for a country like Malaysia to move towards a low carbon economy (Ali et al., 2017). In waste management, there are various strategies such as; Reduce, Reuse, Recycle (3R) Method, Rubber Reservoir Method or Wastewater Treatment and Semi Aerobic Landfill or Fukuoka Method (Ahmed et al., 2007). The strategies or methods mentioned can be considered as alternative methods to prevent waste generation. Waste Minimization Strategy or 3R (Reuse, Reduce and Recycle) refers to the strategies that minimize the amount of generated waste and reduce the toxicity of waste water (Ahmed et al., 2007). This method not just preserves resources but also saves significant manufacturing related costs (Padilla-Rivera et al., 2018).

Meanwhile, Rubber Reservoir or Wastewater Treatment promotes water conservation by preventing water pollution and reducing the volume of pollutants. Various technologies are used for rubber wastewater treatment, but the most common is known as pond technology (Mohammadi et al., 2010). Then, Fukuoka Method is a landfill with semi aerobic design and proven to be less carbon emitted compared to other landfill structure design (Theng et al., 2005; Japan International Cooperation Agency, 2018). All of these methods are carbon-related management strategies that used by many companies including Small and Medium Enterprise (SME) companies.

Whereas, in the accounting approach, Jamil et al., (2015) found that Environmental Management Accouting (EMA) as an environmentally-related management strategic through the development, implementation and practice of environmental accounting including auditing and reporting. EMA is an instrument that plays an important role in supporting the implementation of environmental strategy decisions (Gunarathne & Lee, 2015). This is mentioned from a study conducted by Schaltegger & Csutora (2012) who found that EMA can provide an overview for distinguishes physical and monetary (financial) approaches in carbon accounting. Both physical and monetary (financial) of EMA approaches can play an important role in addressing carbon accounting problems. For example, carbon reduction commitments require investment (either in terms of technology or education and training), so emissions reductions are usually directly related to the amount of resources invested, where these resources are usually expressed in monetary units (Burritt et al., 2011).

In addition to EMA, there is another approach called Carbon Management Accounting (CMA). CMA is a more specific approach related to carbon and is quite different from the broader concept of EMA that touches various aspects (Schaltegger et al., 2015; Ahmad, 2016). However, CMA itself is part of the EMA application (Naranjo Tuesta et al., 2021; Ascui, 2014). In other words, these two approaches in fact have a similar goal which is to contribute to good and transparent environmental accounting practice. CMA is a component of Carbon Accounting and it is designed to provide more information to managers to make short and long term decisions on carbon emissions problems, and it can also measure and manage the carbon performance required by stakeholders outside the organization (Stechemesser & Guenther, 2012; Burritt et al., 2011; Gibassier & Schaltegger, 2015). CMA is also a strategic approach in the management of carbon-related accounting. CMA has two characteristics, namely monetary carbon accounting and physical carbon accounting (RAKOS & ANTOHE, 2014; Stefan Schaltegger & Csutora, 2012; Burritt et al., 2011).

ISSUES ON CARBON-RELATED MANAGEMENT AMONG SMALL AND MEDIUM COMPANIES

Previous studies (such as Tang, 2016; Schaltegger & Csutora, 2012) have identified several approaches that help managing information on carbon-related performance of companies and one of them is through Environmental Management Accounting (EMA). Apart from being a strategy for

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decision-making related to environmental issues, EMA is also known to have a positive relationship with the top management of a company (Hassan et al., 2018). On the other hand, Carbon Management Accounting (CMA) approach is still be ignored and considered new by most companies. This is supported by the statement of Altaher (2013) who argues that most companies have knowledge in managing their company's carbon performance, but, this knowledge is not followed by proactive actions towards the environment such as practicing innovations in their environmental management.

In fact, CMA also is part of the EMA application and acts as a tool to support managers in utilizing carbon-related information (Burritt et al., 2011). However, for Small and Medium Enterprises (SMEs), there are some constraints in achieving effective carbon management as there is an emerging perception that green practices among SME companies are still low (Ahmad, 2016). Nevertheless, SME companies need to face the challenges as stakeholders such as consumers have started to move towards more environmentally friendly tendencies (Hosseini & Ziaei Bideh, 2014). They want companies' regardless large companies as well as SME companies moving towards more proactive in environmental management. In the broader ecological context, some researches suggested that SMEs can also earn benefits by implementing proactive environmental management strategies (Hendrichs & Busch, 2012). However, there are still limited studies that explicitly focus on the carbon management strategy framework among SMEs.

Therefore, this paper takes the responsibility to make SME companies as a focus due to their significant position and contribution to the global economy (Ibrahim et al., 2015). Despite the larger contribution of SMEs to the economy, unfortunately SME companies also contribute up to 60% -70% to industrial pollution (Revell et al., 2009; Yaacob, 2011). Thus, it is important to ensure that the business operations of SME companies always meet the standards and are in line with the goal of environmental sustainability. What needs to be understood is the extent to which SME companies are able to implement appropriate strategies and meet standards in minimizing carbon impact as it is well known that SME companies in Malaysia experience many constraints in terms of capital or cost, expertise and confidence (Yaacob, 2011).

In addition, when discussing about carbon management, it is also related to the discussion on waste management. According to Ali, et al., (2017), the issue of waste and solid waste management is an essential topic to be focused since it has been gaining global attention. Maalouf & El-Fadel (2018) pointed out; waste sector contributes several types of carbon emissions such as carbon dioxide (CO_2), Green House Gas (GHG) and others. Moreover, the amount of solid waste is increasing and growing (Mohmadisa Hashim et al., 2008). The increasing amount of solid waste requires efficient treatment and management as well as meeting all standards because waste dumping from the landfill remains potential to increase carbon production even though the landfill is equipped with gas recovery and anaerobic digestion systems (Malakahmad et al., 2017; Bui & De Villiers, 2017).

Based on that reality, this study would like to raise a specific question, what the extent of carbon-related waste management systems are implemented among SME companies? What the extent of carbon-related management accounting practices implemented among SME companies?

METHODOLOGY

This study is used a qualitative approach in exploring the existence of carbon management strategies in Malaysian Small and Medium Enterprises (SMEs). Data were collected using a semi-structured interview method. The population of this study is air polluter companies in Malaysia that prosecuted by the Department of Environment (DOE) for several carbon emission offenses. Informan were selected based on purposive sampling method. 4 informants were selected based on

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failure to install dust control equipment, open burning, black smoke, and failure to provide chimney, failure to install airflow control and paint spraying.

Before conducting the actual data collection, the researcher made a phone call for the purpose of obtaining face-to-face interview. After getting approval from the informants, a soft copy letter was sent to the informants' email. Upon receiving feedback agreeing to be face-to-face interviewed, and then a date is set between the informants and the researcher for a survey to their companies. The semi-structured questions were posed to the informants during the interviews. The time taken for an informant is between 30 minutes to 1 hour to be interviewed. The process of collecting this data is mostly done on the East Coast. The data of the interviews with the informants were transcribed in the form of soft copy. The transcribed interview data were analyzed manually using open coding, clustering, categorizing and thematic. The results of the study are presented based on related themes.

FINDINGS AND DISCUSSION

Carbon-Related Waste Management Systems

This part will discuss further on waste management methods among the Small and Medium Enterprise (SME) companies. The results of this study indicate that there are at least 3 strategies of waste management are practiced; Reduce, Reuse and Recycle (3R) Method, Special Reservoir Method or Rubber Wastewater Treatment and Semi-Aerobic Landfill or Fukuoka Method. 3R method often refers to the reduction of the quantity of waste generated, repeated use of parts of items which still have usable aspects and recycling unused waste by channeling it to organizations that reprocess it into new products. Then, Rubber Wastewater Treatment is providing a special reservoir pond or sewage pond to channel rubber wastewater. While, Fukuoka Method can be explained as ambient airflows into the waste body naturally through the leachate collection pipes.

Reuse, Recycle, Reduce (3R) Method

The concept of Reuse, Recycle, Reduce (3R) is one of the methods practiced by SME companies that are involved in ensuring that some waste can be used and renewed and not just wasted. Among the process applied is to segregate renewable and reusable waste while the rest will be discharged to landfills. The method is able to save costs because the some of waste materials are reusable for other operational purposes. This is represented by the statement of informant 1.

"Yes, we do (waste management). For example, used oil will not be thrown away but will be put into separate container so that we can recycle or reuse. Dry wood materials will be reused as a source of energy or fuel. Meanwhile, any kind of sawdust and shavings sometimes will be used to repair damaged plywood ". (Informant 1)

Waste like sawdust and waste oil recycling is an environmentally friendly method. Besides that, the use of dry wood waste instead of fossil fuel is a commendable approach. Drywood is not only producing less smoke but also less polluted compared to fossil fuel. Previously, humans did use biomass such as wood, timber and straw material as a source of fuel and energy. However, dependence on wood and straw resources alone is not enough to meet human needs from time to time. The high demand for wood and timber resources is not only used for energy production but also involves non-energy sources such as furniture and house construction (Arhamsyah, 2010). As

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time passed, humans then turned to fossil fuels to produce energy sources. The use of fossil fuels is generally not very good for the environment because it is able to produce higher carbon emissions than biomass resources (Haryana, 2019).

Therefore, the approach informed was a relatively proactive step as his company chose to minimize its dependence on fossil fuels by recycling the drywood waste as an energy source. 3R measures are not only able to reduce fossil dependence, but also able to save the increasingly limited use of natural resources while indirectly reducing the production of solid waste disposal to landfills (Musa et al., 2009; Karupiah & Iksan, 2012).

Special Reservoir Method or Rubber Wastewater Treatment

Special Reservoir Method or Rubber Wastewater Treatment is important for a company who involving in rubber industry to perform the process of technical waste management properly. There are several types of rubber wastewater treatments are used, one of them is by providing a special reservoir pond or sewage pond to channel rubber wastewater. This kind of strategy is also known as pond technology. Rubber wastewater can cause pollution to the environment as it contains acidic and alkaline that may harmful to the crops and agricultures. If left untreated, it will definitely invite various problems to the environment. This technique was among those reported by informants.

"Technically we do (waste management process). For example, like rubber wastewater produces alkaline acid which can damage crops and agriculture. So one of the ways for us to neutralize the rubber wastewater is by putting a custom part by making a pond and placed sand into the pond. We channel the rubber wastewater there so that it does not overflow to other places that it should not be. In the pond, the rubber wastewater will be neutralized again. It is important for it to be neutralized because otherwise the effect is not good for plantations, agriculture and plants". (Informant 2)

Such technique as informed is correct and able to treat rubber wastewater as well as able to prevent pollution of river water and air resources (Ismun & Mubarak, 2016). This pond technology is a widely used method for treatment of rubber wastewater in Malaysia. There are about more than 500 palm oil and rubber factories which have installed some type of primary wastewater treatment system like ponds in Malaysia (Mohammadi et al., 2010)

The method uses a combination of 3 elements, namely physical elements, chemical elements and biological elements. There are at least 4 pools that have their respective functions (Ismun & Mubarak, 2016). Rubber wastewater will be processed into the four ponds to remove the suspended waste contained to be neutralized before it can be discharged into drains or into nearby rivers. According to Mitra (2010), the ponds are effectively designed and optimally operated; it can remove over 95% Biological Oxygen Demand (BOD) from rubber wastewater. Such methods clearly reduce the impact on the environment as well as meet the requirements set by the Department of Environment (DOE).

Semi-Aerobic Landfill or Fukuoka Method

Fukuoka Method was first put into practical application in 1975 at the Shin-Kamata landfill site in Fukuoka City. It was adopted as the standard design for Japan's final landfill site guidelines. Today, Fukuoka Method or Semi Aerobic Landfill method is one of the waste management technologies used by many landfill operators in many countries including Malaysia. For a company

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involved in the waste management industry regardless of large or small and medium size, Fukuoka Method is a technology offering improved landfill sites simply and at low cost utilizing materials with installation of leachate drainage pipes and gas vents. This was among agreed and reported by informant representatives were also operating the same technology.

"We manage and operate our landfill based on 'Fukuoka Method'. For your information, our landfill also installs gas vents and leachate pipes" (Informant 3)

Landfills are located, designed, operated to protect the environment from contaminants, which may be present in the waste stream. However, landfill operation also must meet systematic operating procedures to manage sensitive waste. Without systematic operating procedures and proper standards, solid waste of the landfills are also capable of producing methane gas and potentially problematic and harmful to the environment as well as human health (Meegoda et al., 2016). Various approaches and technologies are used for waste management at the landfill there is also a method called Anaerobic Landfill Structure. This anaerobic landfill method is seen to be less environmentally friendly because it produces more methane gas which is contributing to the increasing of global temperature or global warming.

Anaerobic Landfill Structure is still be used in many developing countries but this method has some pitfalls and risks of its own. Unlike Anaerobic Landfill, Fukuoka or Semi Aerobic Landfill offers air naturally flows to the landfill layer through a leachate pipe. The production of methane gas and hydrogen sulfide is also suppressed by strong microbial activity. As a result, the effects of odors resulting from waste can be minimized (Semi-aerobic Landfill, 2020; Rahim & Jamaluddin, 2014). In addition, through this Fukuoka Method, more immediate removal can be done and makes clean leachate solution faster than the Anaerobic Method. The generation of Carbon Hydrogen (CH_4) in Fukuoka Method is also smaller and effective in preventing global warming. Meanwhile, its management and maintenance is much easier and more economical (Theng et al., 2005; Japan International Cooperation Agency, 2018).

Based on the statements from the informants involved, this study found that waste management has been done by following proper processes. Therefore, it can be concluded that the SME companies involved have a good waste management. This study is in line with the findings from (Weerasiri & Dissanayake, 2012; Ahmad, 2016; Jamil et al., 2015) who reported the same outcomes among SME companies. The driving factor of these SME companies to perform proper environmental-related waste management process is due to the emphasis required by the Department of Environment (DOE). The informants informed that the entire process carried out will always follow the guidelines contained in the Environmental Impact Assessment (EIA). Despite the feedback received from the informants that waste management has been implemented properly, it is somewhat surprising why the companies involved in this study are still being sued and summoned by DOE for several offenses. Therefore, in order to obtain further certainty, other questions related to Carbon Management Accounting (CMA) have been asked, among others, in terms of practice.

Carbon-Related Management Accounting Practices

In carbon-related management accounting, there are some practices such as; carbon-related cost, carbon-related physical information and sustainability report. Through those practices, environmental information along with the company's current financial information as well as information from the company's existing accounting system will be integrated. Carbon-related cost

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more focus on a measure of the economic harm or monetary aspects from the impacts of carbon. Meanwhile, carbon-physical related information is another measurement and orientation of carbon management accounting, as examples, in the forms of company carbon footprints, eco-balances, targets for reduction of carbon emissions. Both physical and monetary information are equally relevant to support corporate management decisions. In addition, carbon physical and monetary will then be disclosed in the sustainability report as a key platform to communicate of environmental performance and impacts. Carbon-related cost, carbon-physical information and sustainability reporting are all important to realize Carbon Management Accounting (CMA) implementation. However, this study found that the integration of all those practices mentioned is still low among Small and Medium Enterprise (SME) companies. Moreover, SME companies also do not acquainted with the category and the classification of CMA practices correctly.

Carbon-Related Cost

In conventional accounting system, environmental or carbon-related costs are misplaced into general overhead account, and as a result they are hidden from management accounting. Thus, this is often leads the management to ignore the extent of environmental costs and unaware about opportunities for cost savings. CMA attempts to make all significant costs appear and integrated into company's accounting system so that they can be considered before making business decisions. This study also found that SME companies among those who tend to stick with conventional accounting system and misplaced the environmental-related cost. This can be identified from the statement by informant 4.

"So far, the company's financial statements have no carbon-related elements. We are just practicing basic accounting, in asset liabilities also there are no environmental elements". (Informant 4)

The practice of carbon-related costs seems to be low among SME companies. It indicates that the disclosure of environmental-related costs in the financial statements of SME companies is still not encouraging. SMEs must be aware that the identification of environmental costs is actually assistance for companies in better decision making either in the short term or long term (Lee, 2012; Lee & Herold, 2018). Unfortunately, these companies do not consider its implementation as an opportunity but in other ways some of them consider it as unnecessary at the moment.

Carbon-Related Physical Information

Carbon-related physical aspects are like collecting information related to carbon. It also known as carbon impact measurements and information's related to carbon, especially those belonging to the Carbon Dioxide (CO_2) category or otherwise. Many SME companies still do not involve in the disclosure of carbon physical information. In their perspectives, there are some considerations that need to be considered first especially in terms of human resources, expertise and costs that may have to be incurred before starting to practice it.

"We haven't done any carbon-related treatment yet. The reason is that it will cost a lot. After all, we don't have a lot of equipment, such as machinery, equipment, manpower and so on…. Throughout my run of the job, there has never been a proposal towards that (integration between accounting and carbon information)". (Informant 2)

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SME companies seem to be more likely done something that is already enshrined or enforced by the Department of the Environment (DOE) as example Environmental Impact Assessment (EIA). These findings indicate a lack of interest among SME companies for exploring new innovations that are more progressive and in line with current challenges. They see lack of human resources and lack of costs as obstacles, but actually the matter can be overcome if they see it as an opportunity and not a burden. In addition, the informants also informed that the existing accounting system practiced by their companies do not interact with carbon-related exposures. Therefore, according to them, there is still no integration between the accounting system practiced and carbon-related information such as Carbon Dioxide (CO_2), Green House Gas (GHG) and others.

This study also revealed that out of the 4 informants interviewed, it appears that only one informant considered the interaction or integration of accounting systems and carbon-related information as a good idea or opportunity. Although, incorporating carbon-related information into the accounting system is a challenge as there are various issues that need to be faced and addressed, it must be realized that this method is capable of providing high quality information while assisting corporate management in decision making towards carbon neutrality (Schaltegger et al., 2015).

Sustainability Reporting

Sustainability reporting acts as a tool to provide information designed to meet accountability requirements as well as to reflect the company's concerns about environmental problems. Although environmental reporting practices are usually done voluntarily, but there are many benefits, especially in convincing stakeholders such as customers, shareholders, investors and others. SME companies were also asked about sustainability reporting. However, most of the informants in this study stated that their companies do not make any sustainability reporting through company annual report; instead the report is only provided to the Department of Environment (DOE).

"Actually, we do not make any environmental report. But we always go through SW Corp, the environmental division. In our company, we focus more on reports related to Environmental Impact Assessment (EIA) as required by the Department of Environment." (Informant 3)

The routine report provided by SMEs is mostly in the form of EIA report as required by the DOE, it is not a voluntary disclosure by the company through the annual report. So, it can be concluded that SME companies do not make proper environmental related reports through the company's annual report. This finding contradicts the studies from (Khalid, 2016; Ahmad, 2016) who claimed that environmental reporting among SMEs is improving.

According to Maldonado-Erazo, et al., (2020) environmental reporting usually practiced more widely by large companies than SME companies. The fact that environmental reporting is commonly practiced voluntarily may be a factor why there are still many SME companies choose to not get involved. Several previous studies have also claimed the lack of environmental reporting practices among SMEs not only because they are not responsible for the environment but more to the perception of the additional spending network that needs to be invested to succeed (Maldonado-Erazo et al., 2020). But, if SME companies see the practice as an opportunity and future marketing strategy, it is certain a different situation will be achieved.

Unfortunately, this study found that CMA practices still do not exist among the SME companies involved. In fact, the four informants interviewed also informed that there was no mission and vision set to move towards that, although some of them did not deny the practice was a

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good initiative. These findings simultaneously support the study of Jamil, et al., (2015) & Ahmad (2016) who stated that Environmental Accounting Practices among SME companies are still low. Although their study is more on Environmental Management Accounting Practices (EMA), it is still relevant because according to Ascui, et al., (2011), CMA is part of the EMA application.

Actually, the implementation of CMA practices is not so difficult if the company has the determination and awareness to move towards environmental sustainability. However, it was found that awareness alone is not the only factor, but rather because some of these SME companies have the perception that there is no profit value for them to do, so they less interested. Therefore, a new paradigm should be initiated to give the impression to them that there is no harm in switching to something new such as CMA practice. These SME companies are believed to be able to change towards a more sustainable because their environmental and waste management activities are proven to exist based on the interviews conducted. However, what is needed to be identified, the driving factors that can attract them to start changing in a more strategic direction in line with the changing risks to the environment. However, the internal accounting management of their company is still at a very low level. Therefore, it is not surprising why the companies involved in the study are still being sued by DOE for some carbon emission offenses as they have no transparent information in carbon management accounting even if their environmental management or waste management activities are positive. This is in line with previous studies (Khalid, 2016).

CONCLUSION

Although this study found that carbon-related waste management exist among Small and Medium Enterprise (SME) companies, however, their carbon-related management accounting doesn't exist, so it is recommended that they be given training and technical support towards carbon-related management accounting practices. This training may help them to be more aware of the benefits of new accounting practices. To realize this proposal, responsible parties such as the Malaysian Institute of Corporate Governance (MICG) can restore the importance of environmental performance in the code of corporate governance. Meanwhile, the Malaysian Accounting Standards Board (MASB) may introduce more specific standards for carbon-related accounting. In addition, the Department of Environment (DOE) is a party that plays an important role, so it is proposed that this party to hold courses or workshops related to the impact of a company's operations on the environment and the benefits of practicing it. One of the obstacles that will be faced by these three agencies is to get the right time because the SME companies involved have constraints in terms of their dense daily activities. However, it is expected to be overcome if the course or workshop is given demerit points and an obligation in the management of an SME company.

This study was carried out qualitatively to understand in depth the practices undertaken by SMEs. It is suggested that future studies need to be conducted in quantitative approach to explain whether the practices of SMEs actually implement carbon management and carbon accounting practice properly. It can conducted from various types of organizations such as SME companies itself, stakeholders such as customers, suppliers and legal parties like DOE, MICG and MASB. Carbon emission reduction is a key target of the government and SMEs are one of the target groups. This study has found that SME air polluter companies have good carbon-related waste management system; however, carbon-related management accounting approach is still not practiced. As expected, this study is in line with the study of Khalid (2016) who found that the environmental attitude of SMEs are exist but the awareness toward practices of environmental and carbon

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accounting management is still lacking, especially in SME companies. Obligations in corporate governance and standards in accounting are two things that can be seen to help improve environmental performance.

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