



GREEN MANUFACTURING PRACTICES IN ETHIOPIAN CEMENT INDUSTRIES- CRITICAL BARRIERS

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Abstract

Recently industries have tried to implement measures geared to GM practices, though; the effort towards green agenda is not straightforward because of the obstacles facing the industries. The presence of these barriers makes the implementation of green issue complex to the industries. So that, the world should develop proper understanding of these barriers to smooth the practices of GM. This paper was aimed to identify critical barriers to GM practices of Ethiopian cement industries. To accomplish this objective; Questionnaires, interviews, and focus group discussions were used. The study found that low enforcement, low top management commitment, weak legislation, lack of awareness/information, and the like were critical barriers and proper measures to be taken are recommended.

Key words: *critical barriers, GM*

1. Introduction

Industrial growth is highly desirable in every economy provided that it doesn't harm the natural environment. Significant growth of industry since the later part of the 20th century though transformed many economies of the world, contributed significantly to environment pollution and driven the world to the highly alarming state of affairs in terms of environment. One of the vital measures to save the environment is to introduce green manufacturing processes in industries particularly in high pollution causing industries like cement industry. There is a consensus that Green Manufacturing practices should be the main assignment of the manufacturing industries to be improved for the brightness of the world's future quality of life on this earth (Madu, 2001)

GM practice is the processes which use inputs with relatively low environmental impacts, which are highly efficient, and which generate little or no waste or pollution (Florida, 1996); Rehman, et al., (2013) told the world that GM emphasizes the use of processes that do not pollute the environment or harm consumers, employees, or other members of the community. Mittal, (2014) defined it as designing, manufacturing, delivering, and disposing products that produce a minimum negative effect on environment and society, whereas (Ghinmine, 2015) explained it as a system that integrates product and process design issues with an issue of manufacturing, planning and control. Kothawade (2015) described GM shortly saying manufacturing practices that do not harm the environment during any part of the manufacturing process. Green manufacturing differs from traditional manufacturing. It focuses on environmental impact, environmental policies of governments, national and international environmental regulations (Digalwar, 2013). Govindan, et al.,(2014) described it as if GM is EMS that



should be part and parcel of corporate environmental policies of the industries. Sangwan, (2011) also described GM as the practice in which the role of Management bodies and employees are very vital. Hence, leadership aspects of the industries inevitably influence the greening of the industry practices.

Generally, GM practices are practices of the Green agenda from policy to operational practices. GM practices encompass; Green policy practices (government level policy and industry level policy), Green design practices, green process practices, leadership or internal EMS practices, and occupational safety and health hazards perspective practices. Hence all specific greening activities could be dealt under these five themes listed above.

The greening of industries has become a core determinant of economic competitiveness and sustainable growth. Since resource inputs represent an important production cost for industries, improving efficiency gives industries a competitive advantage. The greening of industries also plays a role in poverty alleviation, through promoting energy security, health and safety, jobs, and reducing costs through increased productivity.

The Industries have understood the importance of GM practices. However, they are finding many problems in implementing the same. The reasons such as lack of infrastructure, organizational factors, regional factors, political systems, legislative factors, *etc.* are cited by many companies for their failure to adopt GM practices. These factors, which act as a hindrance or inhibitors to the successful adoption of GM are termed as "barriers" to the implementation of GM. Proper understanding of these barriers is necessary to implement GM effectively (Mittal, 2013).

The cement industry is one of the growing industries in Ethiopia following the Ethiopia's commitment to have manufacturing industries to substitute imports with country products and the ambition of becoming the east African cement manufacturing country. Following the growth of industries; Ministry of Industry has been in operation since 2011 with the aim to promote environmentally friendly enterprises in the industrial sector which exercise social responsibility <http://www.scgchemicals.co.th/en/hilight/1523/> . But still the people living in and around cement industry plants claim the waste disposed in the environment, pollution of air, and the many negative externalities of cement industries.

The importance of GM practices in Ethiopian cement industries cannot be overemphasized. It is necessary to know the specific barriers of the industries to implement such desirable practices. Such findings may help finding solutions to the problems and help the industries to follow GM practices and then by contribute significantly in reducing pollution levels of the environment. Therefore, the study aimed to identify critical barriers hindering GM practices in Ethiopian cement industries.

2. Literature Review

GM is defined by different authors in different ways. According to (Eibel, 2014) Green Manufacturing is the production of the similar goods at the similar quality level with less or no harm to the environment, including nature, people, and society. While (Digalwar, 2013) defined as manufacturing that has center of attention on environmental impact, environmental policies of governments, environmental



regulations, stakeholder activism and environmentalism, and competitive pressures. And also, described as it was different from traditional manufacturing.

Ghinmine and *etal*, (2015) also defined GM as it is a system that amalgamates product and process design issues with a issues of manufacturing , planning and control in such a manner to identify , quantify , assess and manage the flow of environmental waste with the goal of reducing and ultimately reducing environmental impact while also trying to maximize the resource efficiency.

Industries are making efforts to implement measures geared to offer green substitutes for traditional products and services. However, the effort towards a Green agenda is not as straightforward since organization would face obstacles (Yuhanis., *et al*, 2015). The presence of various barriers makes the implementation of green issue complex to the industries (Govindan., 2014).

According to some few sources, lists of barriers were discussed in the following manner: As per Mittal, (2013) barriers identified were: Weak Legislation, Low Enforcement, Uncertain Future Legislation, Low Public Pressure, High Short-Term Costs, Uncertain Benefits, Low Customer Demand, Trade-Offs, Low Top Management Commitment, Lack of Organizational Resources, Technological Risk, and Lack of Awareness / Information, where as Financial problem, Lack of involvement and support, Technological problem, Outsourcing were lists of barriers by Govindan *et al*, (2014).

According to Ghazilla *et al*, 2015; Organizational influence, lack of environmental knowledge, Business environment pressure, societal influence, technology, Regulation/Government, Financial problem, Suppliers pressure were barriers identified while People problem, Strategic problem, Functional problem, Government, competitors' pressure, customers' pressure, media, sectoral problem, organization/policy and market problem, technology were identified as a barrier by Yuhanis *et al*, (2015). The lists of barriers by (Eibel, 2014) were Risk of business, technological development pressure, complexity, lack of top management commitment, high investment cost, lack of vision and knowledge where as Lack of resources, short term planning over long term planning, lack of market for recyclable products, lack of knowledge, lack of expertise, lack of information, lack of top management commitment, lack of middle management support, lack of effective communication, and lack of government legal enforcement were lists of barriers by Siddhanti, (2015). Finally, the following barriers like Market and policy failure, lack of resources, government and institutional failures, industry resistance and lobbying were described by Yumkella, (2011).

The researchers appreciated the move of promoting GM practices and also identified specific barriers in the implementation of such practices. The present study is an attempt to identify the critical barriers of GM practices in cement industry in Ethiopia and also to find a solution to get out of the barriers.

3. Methods

This study's paper's purpose was identifying critical barriers hindering GM practices. To accomplish this aim, 430 respondents were participated with the response rate of 87.2%. Accordingly, 378 employees were contacted by questionnaire, and 3 Federal office management bodies of the concerned office of Ethiopian government were interviewed. While 49 respondents were community leaders surrounding



the cement industry plants those participated through focus group discussion. Additionally, some literatures were used to strengthen the concepts of the study concern.

4. Results and discussion

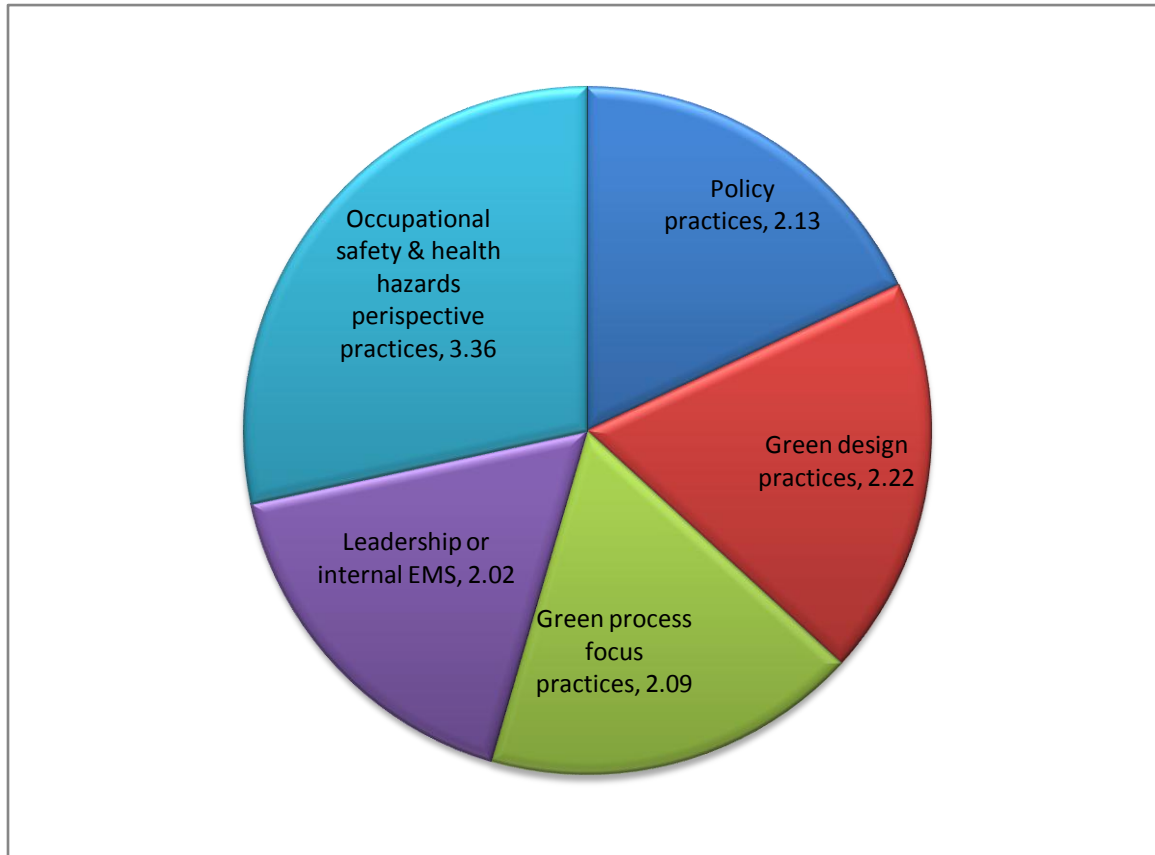
4.1. GM practices overview

The first part of the GM practices description presented the green policy practices in which it has been treated under two sub themes, namely; government level GM policy practices, and Industry level GM policy practices. Accordingly, the summary of the finding confirmed that there is lack of practices concerning government policy directions, government initiatives, emission and discharge standard setting, functioning of the GM committees, and technology acquisition and functioning of development funds at country level. Whereas weaknesses of practices were observed concerning having a sound GM future plan in the industries, having strong surveillances and control system, and undertaking significant campaigns to realize GM practices at industry level. This clearly implied that the Ethiopian government is demanding and attracting manufacturing industries to the country, especially of cement industry to satisfy demand of construction sector for cement and government policy is focusing on attracting number of manufacturing industries than having high concern for GM even though; the motto of the government at its face value is green economic development. As a result, industries are also not that much eager to take GM practice as priority in their practices and their policy frame.

The second part presented the summary of employees' and management bodies' opinions to practices of GM in the cement industries in which the frequently practiced items reveal the highest mean value. Five point likert scales is used on the questionnaire. Four main operational GM themes namely; Design practices, process focus dimensions, leadership or internal EMS, and occupational safety & health hazards perspectives were under survey study.

With respect to total practices, the primary data obtained concerning GM practices of Ethiopian cement industries confirmed that the practices were hampered. See the following Fig 1 showing GM practices were poor.

Figure 1 Mean average responses of GM practices of Ethiopian cement Industries



Source: Researcher’s Field survey Result (2016)

As it is vividly depicted in Fig. 1 above, Most of GM perspectives were not practiced that much. Hence, policy practice, design practice, process focus dimensions, and leadership or internal EMS scored 2.13, 2.22, 2.09, and 2.02 mean averages respectively as per survey data from Cement Industries in Ethiopia.

Based on this fact, one can conclude that there is hindering factors those made practices to be poor. For such issues, Mittal, 2013 recommends that proper understanding of these barriers is necessary to implement GM effectively.

4.2. Barriers

Table.1. Below presented responses of the respondents to barriers hindering GM. To this effect twelve possible barriers collected from the literature were presented to them. Accordingly, the majority of the respondents, 74.8% (19.23%, 33.83%, and 21.74%) with average mean value of 3.40 confirmed that all barriers presented to them exerted ‘very high impact’, ‘high impact’, and ‘middle impact’ to hinder their GM practices. This implies that these known barriers are also barriers to Ethiopian cement industries. However, based on their response rates and average mean value, the researchers tried to identify five critical barriers namely; low enforcement, low top management commitment, weak legislation, lack of



awareness/information, and low public pressure with an average mean value score of 4.50, 4.38, 4.04, 3.70, and 3.68 respectively.

Moreover, the detailed percentage, and mean responses of barriers to GM were displayed in table 1 below

Table .1: Percentage and mean responses of Barriers hindering GM

Barriers by descending order		VI	HI	MI	LI	NI	Mean
		5	4	3	2	1	
Low enforcement	%	57	37	5.5	0	0.6	4.5
Low top management commitment	%	53.3	32.7	13.3	0	0.6	4.38
Weak legislation	%	38.8	39.7	9.1	11.8	0.6	4.04
Lack of awareness/information	%	14.8	45.2	36.7	1.8	1.5	3.7
Low public pressure	%	7	67.9	12.4	12.1	0.6	3.68
Technology risk	%	18.8	47.3	17.3	14.8	1.8	3.66
High short-term costs	%	10	15.5	53.3	20.3	0.9	3.13
Uncertain future legislation	%	4.5	30.6	34.5	29.7	0.6	3.09
Lack of organizational resources	%	0	24.2	60.3	3	12.4	2.96
Uncertain benefits	%	8.5	23.6	7.9	54.8	5.2	2.75
Low customer demand	%	8.8	23.6	3.6	43.9	20	2.57
Trade-Offs	%	9.1	18.5	7	32.1	33.3	2.38
Total	%	19.23	33.83	21.74	18.69	6.51	3.40

Source: Researcher’s Field survey Result (2016)

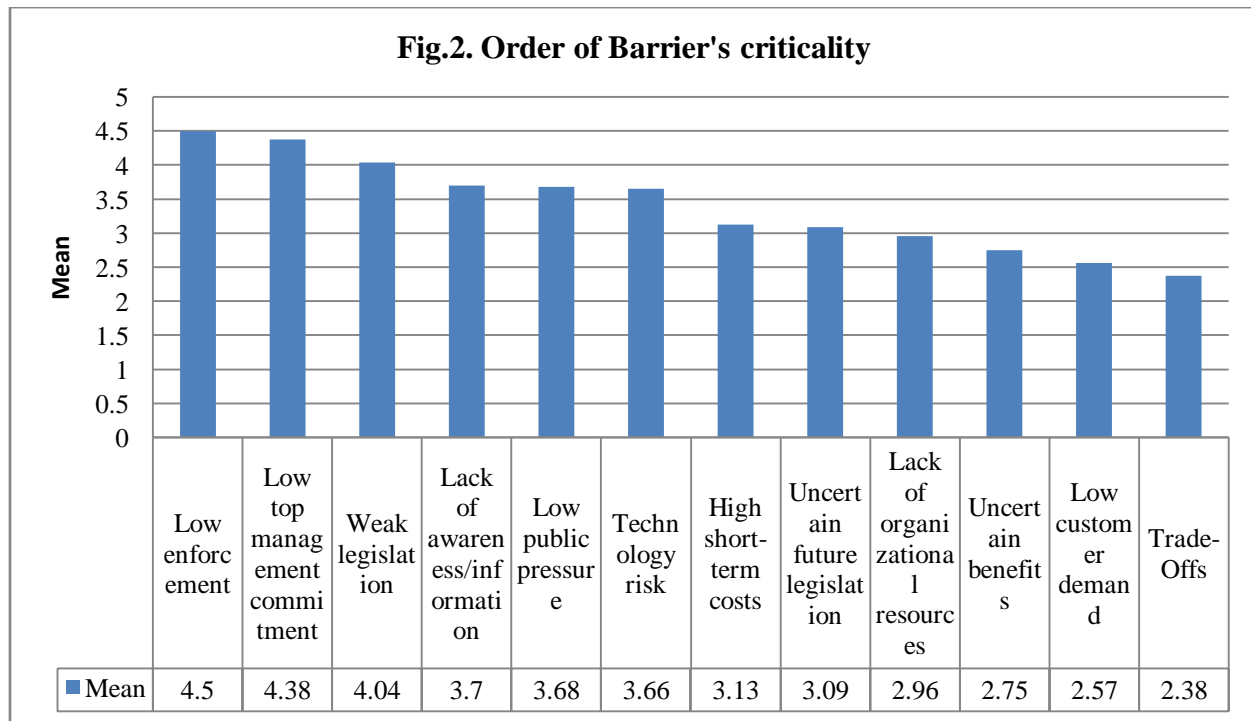


Even though the effort towards green agenda is not straightforward because of the obstacles facing the industries, recently industries are trying to implement measures geared to offer green (Yuhanis, 2015). However, as per Govindan, (2014) the presence of these barriers makes the implementation of green issue complex to the industries. So that, Mittal, (2013) recommended the world that proper understanding of these barriers is necessary to practice, whether it is other green agendas or GM effectively.

Depending on these above literature argument the researcher, undertook the study having this barrier agenda as the research title. Specifically, critical barriers hindering the practices of GM in Ethiopian cement industries were identified. So that it will help to improve the understanding of the area for the beneficiaries of the study, which is hoped to further facilitate effective GM practice in these cement industries.

Based on the above concept frame, the researcher presented twelve compiled barriers from literature and requested to add if any, and made analysis to identify critical barriers.

Accordingly, the analysis made of closed-ended questions confirmed that all twelve barriers presented to them exerted 'very high impact', 'high impact', and 'middle impact' to hinder their GM practices. This implies that these known barriers are also barriers to Ethiopian cement industries. However, based on their response rates the following five barriers namely; low enforcement, low top management commitment, weak legislation, lack of awareness/information, and low public pressure with an average mean value score of 4.50, 4.38, 4.04, 3.70, and 3.68 respectively were found to be critical barriers to their industries. See the following fig. 2. Those barriers listed one up to five.



Source: Researcher's Field survey Result (2016)



The analysis of interview information from Ethiopian government high officials proved that; absence of autonomous institution regulating GM practices, High emphasis of government policy on attracting manufacturing industries than the greening of it, absence of cement industry specific policy of GM and lack of enforcement, and low top management commitment and etc.

Additionally, the surrounding community forwarded their opinion in the focus group discussions concerning the critical barriers hindering cement industries not to act with a green manufacturing sense were namely; poor infrastructure, insufficient electric power provision, and low sense of ownership from community. So that, the industries were blamed for not acting in a socially responsible manner by the focus group participants.

5. Conclusion

GM practices in Ethiopian cement industries from green policy practices to operational GM practices were not practiced well. This is due to the barriers observed in the practices contributed for poor practices. According to this study, all twelve barriers compiled from literature are also barriers to Ethiopian cement industries and identified other critical barriers specific to Ethiopia, namely; High emphasis on policy on attracting industry than greening, absence of cement industry specific policy of GM, Poor infrastructure, Insufficient power provision, and Low sense of ownership from community.

Based on these findings the following were newly developed lists of barriers to GM; Weak Legislation, Low Enforcement, Uncertain Future Legislation, Low Public Pressure, High Short-Term Costs, Uncertain Benefits, Low Customer Demand, Trade-Offs, Low Top Management Commitment, Lack Of Organizational Resources, Technology Risk, Lack Of Awareness/Information, High emphasis of policy on attracting industry than greening, Absence of cement industry specific policy of GM, Poor infrastructure, Insufficient power provision, and Low sense of ownership from community.

Whereas; Low enforcement, Low top management commitment, Weak legislation, Lack of awareness/information, Low public pressure, High emphasis of policy on attracting industry than greening, Absence of cement industry specific policy of GM, Poor infrastructure, Insufficient power provision, and Low sense of ownership of community were found to be critical barriers to GM practices of Ethiopian cement industries.

6. Recommendation

Based on the above conclusion the following were recommended:

- Government, industries, and experts should come together and have consensus on the barriers and focusing to tackle the critical ones and create awareness.
- Policies and rules specific to cement industries should be designed by the government to enforce industries to implement GM principles.
- The government should establish an autonomous office that could monitor GM practices.
- Industries should engage surrounding communities to GM practices to create a sense of ownership.



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