Sustainable Supply Chain Management Practices in Ethiopian Manufacturing Firms

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Abstract: The purpose of this study is to assess sustainable supply chain management (SSCM) practices in the selected large scale firms of Ethiopian manufacturing industries. To address this objective, descriptive type of research design has been used and primary data was collected through survey questionnaires. The sample firms included under this study was selected by proportional stratified sampling technique and from each sample firm's general/deputy manager, purchasing department head and production department head (3 respondents) where taken as a sample respondent and selected purposively. The collected data were analyzed using mean and standard deviation statistical tools. The major findings of this study revealed that: adoption of green purchasing to reduce negative impacts on SSCM, suppliers environmental management audit, designing products for reduced materials consumption, product life cycle assessment, and implementation of reverse logistics practices were found not well considered and practiced by sampled Ethiopian large scale manufacturing firms. But, regarding encouraging and creating relationship with suppliers who have controlled emission and low pollution, designing products: with eco-friendly materials, for reuse & recycling, design production process to minimize waste and Carbon emission, usage of recyclable/reusable packaging materials, elimination of hazardous materials from packaging, and full truck load transportation usage practices of SSCM were found highly considered and well adopted by Ethiopian large scale manufacturing firms. Finally based on grand mean value of each SSCM practices, only sustainable packaging practice were highly considered and well implemented by Ethiopian large scale manufacturing firms whereas, Green purchasing practices, Sustainable product and Production process design and Sustainable Logistics practices were moderately implemented.

Key words: sustainability, sustainable supply chain management, logistics, green purchasing, green supply chain management.

I. INTRODUCTION

The supply chain sustainability topic has been of great interest for the last decades both in academia and the practitioners' world. Sustainability's origin bases on the often quoted definition of the World Commission on Environment and Development (Brundtland Commission), which defined sustainable development (SD) as development that meets the needs of the present without compromising the ability of future generations to meet their needs [1]. This definition was later extended to the common concept of the triple bottom line, which balances the economic, environmental and social dimension [2]. According to [3], for the last two decades better attention was given to sustainability as it is an essential condition for the long lasting profitability and for being competitive enough for firms in their business environment. Further to this [4] stated that because of high pressures from various stakeholders, particularly government regulators, community activists, non-governmental organizations (NGOs), and global competition itself, many firms have adopted a certain level of dedication for sustainability practices. They also stated that, most firms are still in

different to commit sustainability if they are not forced to do it by the law.

As stated by [5], most countries in the world are interested in environmental issues and on the other hand large-scale industries are developed to increase their production capacity in order to respond to free markets. The development of these industries also results in causes of pollution emissions which affects the environment and the community who are living around the plants. Due to globalization, global supply chain commonly extends its linkage between industrialized and developing countries. But due to differences in economy, legislations, regulations and standards among developed and developing countries numerous difficulties have been posed in managing such supply chains, and developing countries encounter a number of challenges since their economic benefit relies on the exploitation of natural resources [6]. The intention of the researcher is to answer how does the sustainable supply chain management being practiced in selected Ethiopian large scale manufacturing industries of large scale firms?

II. LITERATURE VIEW

2.1 Definition of supply chain management (SCM) and sustainable supply chain management (SSCM)

According to [7] SCM is defined as the systemic, strategic coordination of the traditional business activities and the plans across these business activities within a firm and across the supply chain in order to enhance the long-term performance of individual companies and the supply chain as a whole.

Sustainability is a multi-dimensional combination that enlarges the economic bottom line notion which focuses on the efficient use of resources and realizing a return on investments, by adding social considerations and promoting greater ecological responsibility [2]. Therefore, business sustainability can be defined as the ability to conduct business with a long term goal of keeping the well-being of the economy, environment and society. SSCM refers to a firm's plans and activities that incorporate environmental and social related issues into SCM to improve the company's environmental and social performance and its suppliers and customers without compromising its economic performance [8].

Sustainable supply chain management (SSCM) Practices

Even though, some authors classify /put SSCM practices in to two broad categories such as sustainable purchasing practices, and sustainable manufacturing and logistics practices , as stated by many authors in many literatures reviewed under this study the main SSCM practices were classified /grouped in to four sub groups based on their function all the way throughout the supply chain. These are, practices related with purchasing management, production management, packaging management, and logistics/transportation management. Therefore, for this study the researcher preferred to use the four classified SSCM practices.

Green purchasing practices

Sourcing and transformation are critical functions in a sustainable supply chain. One of the key aspects of green and sustainable supply chain is the use of green procurement practices [9]. [10] in their empirical study conducted on sustainable supply chain management implementation in Pakistan textile firms, stated that as a large amount of industries will change/modify their traditional supply chain management practices in to environmentally sustainable supply chain through applying green procurement strategies due to, sustainable supply chain is affected by the purchase practices of raw materials that are either reusable or recycled.

As stated by [11] a firm is no more sustainable than its suppliers and because of this the purchasing function of any firms becomes fundamental in realization of their sustainability effort. Further, [12] found that about 87% of customers would blame the manufacturer when its suppliers are environmentally irresponsible for the environmental negligence. But an empirical study conducted by [13] on green supply chain management (GSCM): pressures, practices and performance within the Chinese automobile industry identified that; the external

relationship/cooperation focusing on environmental issues is poor in Chinese automobile industry.

As per an empirical study conducted by [14] on GSCM practices in Ethiopian tannery industry, green purchasing, an organizational commitment, and marketing practices are not well considered by the Ethiopian Tanneries to green the whole supply chain. Another empirical study conducted by [13] on GSCM: pressures, practices and performance within the Chinese automobile industry stated that, Chinese automotive supply chain mangers enforced to consider and start implementation of green supply chain management practices in order to enhance their environmental and economic performances due to high pressures/driving forces from different bodies at different levels in different direction and but their finding depicted that, all GSCM practice factors are lagged and poor especially green purchasing practices which scored the least mean score value.

Regarding customers concern about green product/ green purchasing practices different scholars conducted different studies and come up with their finding for instance: an empirical study conducted by [15] in USA depicted that 75% consumers purchasing decision was re-influenced by the reputation of the organizations' on environmental concerns and even 80% are willing to pay more for products that are environmentally friendly. In addition [16] stated that companies would change their technology and adopted innovative green products when the customers do have awareness about sustainability and demands green products.

Different studies [17], [12], [18] discussed that the manufacturer also maintain its suppliers implement an Environment Management System (EMS) and/or get ISO 14001 certified, which will give an assurance to the manufacturer that its suppliers are following environment-welcomed practices, as certified by an external agency.

1. Sustainable product and Production/process design

A focus on supply chains is a step towards the broader adoption and the development of sustainability, since the supply chain considers the product from initial processing of raw materials to delivery to the customer.

Products should be designed with environment-friendly raw materials, parts and components to reduce energy consumption, emissions, and generation of solid and liquid wastes during the supply chain operations i.e, production, transportation, storage and usage [19]. [20] Stated that, the main reason why we need a focus on product design is that as different types of products do have different environmental impacts at all stages of product life cycle. In an empirical study conducted by [21] on "Design of sustainable supply chains under the emission trading scheme" in Canada, they stated that, integrating principles of life cycle assessment at the supply chain/process design phase maximizes the long-term sustainability. According to [22] life–cycle assessment is a system oriented approach that determines or estimates the impact of the product throughout its life cycle. But different scholars also stated as there is a number of limitations for the application of life-cycle assessment. For instance, according to [23] high implementation costs, lack of standardization, subjectivity, poor quality and non availability of adequate data are some

of the factors that hiders' effective adoption of life-cycle assessment approach.

As it was presented by to [24] product disposition after its usage life highly depends on actions taken at its design stages. That means re-usage; remanufacturing, recycling and also disposition of products are highly influenced by their initial designs. According to [25] recycling is another production activity that helps in developing SSCM and which helps organizations to improve their environmental image in front of their customers. [26] Stated that, both environmental and economic benefits will be achieved from valuable resources of used products or/ and at the end of product–life cycle through recycling and recovering processes. In an imperial study conducted by [27] on SSCM practices in Indian manufacturing firms revealed that, regarding to product recovery management (PRM) majority of the sample firms has taken repair, remanufacturing and recycling as high level of strategic issue and also confirmed that firms those are focused on eliminating wastes in their business practices, compassionated about the environmental practices make them to earn more profit.

According to [28] sustainable supply chain includes using cleaner process technologies, quality and lean production technologies for the minimization and elimination of by-products, wastes and to improve efficiencies. [29] Stated that inefficiency is equivalent to pollution. Among pollutions created from manufacturing firms wastes are results from inefficient manufacturing process and inefficient material utilizations. [30] suggested that as firms instantly straggle to replace the usual forms of energy sources like oil, coal, natural gas and other non renewable by alternative renewable energy sources like wind and solar energy sources which are renewable and environmentally friendly. According to [31] lean production leads to improvements in environmental sustainability and it also help organizations in reducing the marginal cost of pollution. Lean production is also very helpful in improving manufacturers' environmental performance through waste reduction and minimizing hazardous wastes and related activities [32]. But an empirical study conducted by [14] on "green supply chain management practices in Ethiopian tannery industry" depicted that from product and process design management aspects, eco-design and environmental practices are not well considered by the manufacturing firms under Ethiopian tanneries industry groups to green the whole supply chain.

III.   SUSTAINABLE PACKAGING

Packaging materials may be in the form of wood, metal, glass, plastic and paper if they are not properly controlled they also add to the waste stream. Sustainable Packaging is defined by [33] as, packaging that adds real value to society by effectively containing and protecting products during movement across the supply chain, which is designed to use materials and energy efficiently, which is made up of materials that are recycled continuously and does not pose any risks to human health or ecosystems.

[34] Stated that the consumption of resources and packaging in large amount will generate a lot of waste. From solid wastes generated all over the world, that are generated from packaging materials such as plastic, metal, paper, glass and other ingredients will account a significant

amount which is about one third (1/3). For instance in China, the pollution due to bundling/packaging waste has ranked into the fourth-biggest wellspring, just pursued to water, lake and sea, and air pollution. They also further stated that these wastes does not only deal with materials, man power and financial resources issues but also results in threatened the human survivability through seriously polluting the natural environment. An empirical study conducted in India by [27], entitled on "Sustainable Supply Chain Management Practices in Indian Manufacturing Firms" stated that majorities of manufacturing firms in India are practicing elimination of waste in packaging.

Throughout the world many countries now question packaging directives to minimize the flow of packaging materials into the waste stream [35]. For instance, in Germany, there is a legislation that makes it mandatory for manufacturers to collect back all the packaging materials after use [36]. Promoting the advancement of green/sustainable bundling, fortification of the natural environment and economic improvement practices have turned into the agreement on the planet's bundling industry in many industrialized nations [34]. As it was stated by, [34] sustainable/green packaging management can be directly and indirectly advanced through institutional and different measures such as taxation, laws, rules and regulations. Different scholars for instance [12], [18] presented that as packaging materials should be minimal and light-in weight and be recyclable that means it has to be used as many times as possible before its disposal, and bio-degradable.

In an empirical study conducted by [37] on "sustainable supply chain management practices and operational performance" in Australia, majorities of the case studied companies was involved in improving packaging and increasing the contents of recyclable products. Further another empirical study conducted by [38] on the extent of SSCM practices implementation particularly green purchasing and sustainable packaging in Malaysia, in addition to the positive and significant effect of green purchasing on the three dimensions of sustainability, sustainable packaging practice also showed that, it has a positive effect on economic, social outcomes and significantly have positive effect on environment performance of sustainability.

IV.   SUSTAINABLE LOGISTICS

Sustainable logistics is another important element in developing effective SSCM. According to [39], "different factors including fuel sources, type of transport, infrastructure, operational and management practices should be considered in developing sustainable transportation systems". In the supply chain transportation part has many potential negative impacts on the environmental, economic and social aspects of SSCM and these impacts can be also presented in monetary values by estimating and calculating all direct, indirect and avoidance costs [40]. As cited by [40], according to a study conducted by [41] entitled on "Getting the Prices Right, A European Scheme for Making Transport Pay its True Costs" in Europe stated that external costs related to transportation such as, noise, accidents, and pollution are estimated and accounts from 3-5% GDP of Europe.

According to [42] reverse logistics (RL) is defined as, ''the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin in the purpose of recapturing value or proper disposal''. Due to an increasing agreement and different pressures from different bodies on environmental activates, significantly across a wide range of industries the flow of reverse logistics is growing [43]. The reverse logistics market is also worth more and more for instance according to [44] in 2004 in United States the reverse logistics market worth approximately about US$58 billion which contains about 10.7% of the US economy.

As stated by [45] different car manufacturing companies are a good examples by using different parts of auto from end-of- cars life and from recalled cars and also electronic companies by collecting lead and mercury from rejected products and scraped ones. According to [46] clearly depicted that due to high cost of the return which accounts from 5% to 50% from customers; retailers are not happy with such return or reverse logistics. [47] Stated that, in order to make reverse logistics more profitable network, modern companies are required to design their reverse supply chains in more efficient and effective manner. In addition as stated by [48] throughout the world, due to environmental protection and other related rules and regulations, return policies (reverse supply chain / reverse logistics practices) were adopted. For instance according to [49] different automotive industries found 'in Japan, Taiwan and also the European Union has approved relevant regulations' related with reverse supply chain on the collection and re processing/ re manufacturing vehicles at the end of product life cycle.

V.   RESEARCH METHODOLOGY

For this study descriptive type of research design was used. According to Ethiopian Central Statistic Agency (CSA, 2016 report), based on the nature of products produced the manufacturing industries in Ethiopia were stratified in to fifteen categories (strata). But this study focused only on four major manufacturing industry groups namely: (1) Food products and Beverage (2) Manufacturing of Textile (3) Tanning and dress of Leather, manufacture of Footwear, and Luggage and handbags, and (4) basic Iron and Steel manufacturing industries groups. The total number of firms in the aforementioned industrial categories throughout the country as a whole in the year 2014/15 is 405 (CSA, 2016 report). Sample size was determined by Yamane (1967)'s formula.

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size; N = population size; and e = precision level/sampling of error. Note: with a precision level (sampling error) of e = 5%, and N= 405 firms. Therefore, through proportional stratified simple random sampling technique 201 sample firms were selected and three respondents from each firm were selected by purposive sampling technique. Therefore, in total 603 questionnaires was distributed (i.e, 3*201 = 603) but only 146 firms filled and returned questionnaires. Finally qualified questionnaires actually used for analysis were 420, because about 18 questionnaires were invalid and rejected by the researcher. Primary data was collected through 5 point likert scale type survey questionnaire and analyzed by using mean and standard deviations.

VI.   RESULTS AND DISCUSSIONS

SSCM practices are grouped in to four major constructs and each was measured with different items as the researcher get through various literatures and previous research works. These main constructs/ SSCM practices are: green purchasing, sustainable product and process designs, sustainable packaging, and sustainable logistics functions. All of the items under this part were collected by 5 point liker type scale, and the scales refer to: 1= strongly disagree, 2= disagree, 3= moderately agree, 4= agree and 5= strongly agree. Reliability of each constructs were evaluated and presented in the table below

Table 4.1. Reliability

S. No	SSCM Practices	Number of items	Cronbach's Alpha (α)
1	Green purchasing	7	0.858
2	Sustainable product and process designs	7	0.835
3	Sustainable packaging	5	0.705
4	Sustainable logistics functions	5	0.722

In this part of study an items or variables that achieved a mean score value of 3.5 and above depicts that highly implementation of such SSCM practices, items or variables those score a mean value less than 3.5 to 2.5 indicates that moderately or to some extent implantation of such SSCM practices, were as items/constructs that score a mean score value less than / below 2.5 implies that there is poor implementation of such SSCM practices in selected Ethiopian manufacturing industries of large scale manufacturing firms. On the other hand, a standard deviation (SD) that show a value of >1.0 implies as there is a significant difference among the sample respondents on the issues raised. Therefore, the results and discussions of the four categories of SSCM practices are presented as follows:

Table 4.2. Green purchasing practice of SSCM

S.No	Items Related to Green Purchasing (GPr).	N	Mean	Std. Deviation
Gpr1	Our firm's purchasing strategy/policy integrates concern for natural environment.	420	3.65	.768

Gpr2	Our firm practices green purchasing by incorporating environmental sustainability issues.	420	3.49	.886
Gpr3	Our firm has adopted green purchasing to reduce negative environmental, social and economic impacts.	420	3.16	.879
Gpr4	Our consumers' green purchasing behavior is getting improved from year to year	420	3.31	.931
Gpr5	Our firm puts pressure on suppliers to implement environmental management system (EMS)	420	3.30	.912
Gpr6	Our firm encourages and create collaboration with suppliers who have controlled emissions and low pollution levels	420	3.62	.913
Gpr7	Our company regularly conducts Environmental management audit on its suppliers	420	2.59	.838
	Grand mean	420	3.30	
	Valid N (list wise)	420		

As it was depicted in the above table 4.2, there are about seven items raised by the researcher to address green purchasing practices of SSCM in Ethiopian large scale manufacturing firms. From items raised to address green purchasing practice of SSCM, the first item is about integrating concern for natural environment in purchasing strategies by manufacturing firms. The mean score value is (M=3.65) which implies that for greening the whole supply chain, on average the purchasing polices/strategies of Ethiopian manufacturing firms highly pay attention about the natural environment and incorporates/integrates natural environment issues in their purchasing polices/strategies. In the same table above the six item, which deals about encouraging and developing collaboration with suppliers who have controlled emissions and low pollution levels by large scale manufacturing firms in Ethiopia scored the mean value of (M= 3.62) which is the second highest mean and its standard deviation (SD= 0.913) among respondents from items developed to determine green purchasing practices. This mean value shows that, highly/widely large scale manufacturing firms in Ethiopia encourages suppliers who had controlled emission and low pollution level and develop collaboration than those do have high pollution and uncontrolled emission experienced suppliers. Various previous studies finding also supports this finding, for example [30], [18], [35], [17] findings were consistent with this finding.

Whereas, green purchasing practices by incorporating environmental sustainability issues, adopting green purchasing practices to reduce negative environmental, social and economic impacts, an improvements in green purchasing practices of the downstream/ customers of the manufacturing firms, and put pressures on suppliers to implement environmental management system (EMS) practices scores (M= 3.49, 3.16, 3.31, and 3.30) respectively which implies large scale manufacturing firms in Ethiopia moderately considered and practiced such aspects of green purchasing practices of SSCM. As it was depicted in the table above, the lowest mean score (M=2.59) was obtained on the practice of regularly conducting suppliers environmental management audit which implies that, relatively it is not well considered and practiced by large scale manufacturing firms of Ethiopia.

Finally the aggregate/ grand mean regarding green purchasing practices is (M=3.30.) This depicts that, there is an intention and encouragement by manufacturing firms in Ethiopia to implement green purchasing practices in order to sustain the whole supply chain and currently it is practiced to some extent/ its implementation is at moderate level which needs more and more efforts and commitment by firms to realize SSCM. Some previous research works are consistent with this finding such as [13], [14] and this reflects the green purchasing practice is at its infant stage in Ethiopian manufacturing industries.

Table 4.3. Sustainable Product and Process Design practice of SSCM

S.No	Items related to Product and Process Design:	N	Mean	Std. Deviation
PPD 1	Designs products with eco-friendly materials	420	4.00	.922
PPD 2	Designs product for reuse & recycles	420	3.62	1.113
PPD 3	Designs products for reduced material consumption	420	3.05	.914
PPD 4	Designs production process for reduced energy usage	420	3.33	1.102
PPD 5	Designs production process to minimize waste and Carbon emission (lean production process).	420	3.60	1.145
PPD 6	Considers the environmental impact of product design from extraction of row materials to its disposal (life cycle assessment).	420	3.10	.975
PPD 7	Examines the socio-economic impacts of its products from planning to disposal stages	420	3.28	.983
	Grand mean	420	3.43	
	Valid N (list wise)	420		

Among seven items raised by the researcher to address sustainable product and production/process design practices of SSCM in Ethiopian large scale manufacturing firms the first item which deals about designs products with eco-friendly materials on average scored the highest mean (M=4.00) which indicates that firms in the targeted manufacturing industries groups are highly concerned and well practiced/implemented designing their product with materials that are eco- friendly. Regarding to eco-friendly product design [19], [20] clearly stated that products should be designed with environment-friendly materials because many benefited will be realized through such practices. But an empirical study conducted by [14] on GSCM practices shows that, eco-design and environmental practices are not well considered by Ethiopian tanneries manufacturing industry groups to green the whole supply chain which is inconsistent with this research finding. In the same table 4.3 above, design products for reuse & recycles, and Design production process to minimize waste and Carbon emission on average scored mean

value (M= 3.62 and 3.60) with standard deviation of (SD= 1.113 and 1.145) respectively. So as per the sample respondents' mean and standard deviation response what can we understand from this is that, even if the standard deviation indicates as there is a significant difference among respondents, on average large scale manufacturing firms in Ethiopian were highly considered and well practiced design products for reuse & recycles, and design production process to minimize waste and Carbon emission. This finding is highly consistent /supported with the finding of [27], *[24], [31], and [32]* previous research works.

The rest of items such as: response regarding to designing products for reduced material consumption (M=3.05), designing production processes process for reduced energy usage/reduce energy consumption (M= 3.33), considering environmental impact of products from their extraction of row materials to disposal (life cycle assessment) (M= 3.10), and examination/investigation practices on the socio-economic impacts of products from their planning stage to disposal stage scored mean value (M= 3.28). These mean score values clearly indicate that large scale manufacturing firms in Ethiopia were considered and practiced such SSCM practices at very slightly / moderate extent. Especially designing products for reduced material consumption and product life cycle assessment aspects of sustainable product and process design practices of SSCM are relatively needs more efforts and concerns by Ethiopian manufacturing firms. And also the grand mean value of product and production/process design practice of SSCM score is (M=3.43) which implies that, on average sustainable product and production/process design practices of SSCM were moderately considered and practiced by Ethiopian large scale manufacturing firms. That means it needs more attention and engagement from the manufacturing firms on sustainable product and production/process design practices for achieving sustainability due to it has a significant impacts on the environment, society and economic aspects of SSCM management.

Table 4.4. Sustainable packaging practices of SSCM

S.No	Items related with sustainable packaging	N	Mean	Std. Deviation
PKG1	Utilizes environment-friendly packages	420	3.42	1.161
PKG2	Uses recyclable/ reusable packaging materials.	420	3.75	.679
PKG3	Integrates environmental thinking and innovation in packaging	420	3.44	1.001
PKG4	Focuses on elimination of hazardous materials from packaging	420	3.70	.978
PKG5	Focuses on reduction of packaging weight	420	3.40	.926
	Grand mean	**420**	**3.54**	
	Valid N (list wise)	420		

Among five items raised by the researcher to address sustainable packaging practices of SSCM in Ethiopian large scale manufacturing firms, the first item is about the practice of using environment-friendly packages. As it was presented in table 4.3 above, the mean score value on this practice is (M=3.42) with the highest standard deviation of (SD= 1.161). This implies that, the practice of using environmentally friendly packaging were considered and implemented to some extent by Ethiopian large scale manufacturing firms. But the standard deviation depicted that as there is a significant difference among firms regarding to usage of environmental friendly packaging which mean among the sample respondents some respondents are strongly disagreed with such practice.

The highest mean value among items raised under the sustainable packaging practices of SSCM was scored on recyclable/ reusable packaging materials usage practice which is (M=3.75) with the lowest standard deviation (SD=0.679). This depicted that, packaging materials used by Ethiopian Large scale manufacturing firms are highly recyclable/ reusable which enable them to realize sustainable packaging of SSCM practices. From previous research works of different scholars at different countries for example an empirical study finding by [37], [18], [35], [36] are highly consistent and support this finding. In the same table above the second highest mean score value (M= 3.70) with standard deviation (SD= .978) was obtained on the fourth item which deals about firms practices by focusing on elimination of hazardous materials from packaging. This result shows that, large scale manufacturing firms in Ethiopia are highly engaged in the elimination of hazardous materials from their packaging. Such practice is very appreciable to assist the social aspects of sustainability because it reduces/eliminates health related problems on consumers that resulted from such hazardous materials from packaging.

But, on average the sample respondents' response, on the remaining two items (third and fifth items) of integrating environmental thinking and innovation in packaging, and reduction of the packaging weight scored mean value of (M= 3.44, 3.40) with (SD=1.001, 0. 926) respectively. These mean score values implies that, both concerns were considered and been implemented to some extent/ at moderate level by large scale manufacturing firms in Ethiopia. That means there is a promising concern but that needs more and more commitment in order to achieve sustainable packaging practices of SSCM. Finally the aggregate mean score of sustainable packaging practice is (M =3.54). This aggregate mean score value implies that even if there is a difference among items raised to determine sustainable packaging practices on average, large scale manufacturing firms in Ethiopia pay more attention and highly implemented sustainable packaging practices of SSCM which enable them to achieve sustainability.

Table 4.5. Sustainable logistics practice of SSCM

S.No	Items related with Sustainable logistics	N	Mean	Std. Deviation
LOG1	Focuses on the use of green transport mechanisms	420	3.32	1.035
LOG2	Focuses on full truck load transportation usage	420	3.73	.948
LOG3	Applies reverse logistics programs	420	3.01	.902
LOG4	Undertakes return handling in collaboration with customers	420	3.53	1.062
LOG5	Has a centralized returns collection and inspection unit	420	3.38	1.087

		420	**3.39**	
Grand mean				
Valid N (list wise)		**420**		

Among five items used to address sustainable logistics practice of SSCM in Ethiopian large scale manufacturing firms, the first item deals about usage of green transportation it plays a very fundamental role in realization of sustainability for example in the book written by [40] on SSCM, accidents are a major negative impact of transportation from a social perspective, from economic aspects congestion has a huge impact on speed of delivery and reliability, finally from environmental perspective transportation contains many harmful gases and particles, and carbon dioxide emission. Further a study conducted by [41] placed the external costs of transport, such as pollution, noise, and accidents accounts at 3–5% of Europe GDP. On average a mean score value of respondents on usage of green transportation is (M=3.32) with (SD=1.035). This mean value indicates that as the focus of large scale manufacturing firms in Ethiopia on the usage of green transpiration mechanisms are not adequate enough but to some extent firms are considering and practicing green transportation. And the standard deviation implies that as there is significant difference among the sample respondents.

Regarding focuses on full truck load transportation usage practice the mean score value is (M=3.73) and (SD=0.948). The mean score value depicts that; large scale manufacturing firms in Ethiopia, at highly considerable/significant level focused and practiced the usage of full tack load transportation. In the same table above the practice of return handling in collaboration with customers is also the second highest mean score value (M= 3.53) with (SD=1.062) which implies that, even if there is a significant difference among the respondents, on average return handling in collaboration with customers practice is well considered and implemented by Ethiopian large scale manufacturing firms.

The least mean score value was obtained concerning to having reverse logistics implementation which is (M=3.01) with (SD=0.902), and regarding having centralized collection and inspection unit for returned items scored mean value of (M= 3.38) with (SD=1.087). These mean implies that both aspects of sustainable logistics practices are considered and implemented to some extent by Ethiopian large scale manufacturing firms. And lastly the grand mean score (M=3.39), which implies that, on average sustainable logistics practice of SSCM is considered and practiced to some extent by Firms of Ethiopian manufacturing industries.

VII.   CONCLUSION

Numerous theoretical and empirical literatures on SSCM practices have been reviewed and the major findings of an empirical research works of previous studies were corresponded with findings of this survey study. Therefore, based on the above analysis the major findings of this study was concluded as follows: from green purchasing practices of SSCM, the researcher found that both integrating concerns for natural environment in purchasing policy/strategy, and encouraging and creating relationship with suppliers who have controlled emission and low pollution were highly considered and well practiced by Ethiopian large scale manufacturing firms but, they are weak in adoptions of green purchasing practices to reduce negative impacts on SSCM, and in regularly conducting suppliers environmental management audit practices. From sustainable product and process design practices of SSCM, Ethiopian large scale manufacturing firms highly considered and well adopted practices of design products: with eco-friendly materials, for reuse & recycling, and design production process to minimize waste and Carbon emission. On the other hand designing products for reduced material consumption, and product life cycle assessment practices were not found well considered and adopted by Ethiopian large scale manufacturing firms. From sustainable packaging practices of SSCM: Ethiopian large scale manufacturing firms given high concern and well adopted usage of recyclable/reusable packaging materials, and elimination of hazardous materials from packaging to realize sustainability through their supply chain. Concerning sustainable logistics practices of SSCM: full truck load transportation, and return handling in collaboration with customers' were found as highly implemented by Ethiopian large scale manufacturing firms but they are somewhat weak in the adoption of reverse logistics practices. Based on the aggregate mean result from the four SSCM practices namely: Green purchasing, Sustainable product and Production process design, Sustainable Logistics, and sustainable packaging practices on average only sustainable packaging practice was found as highly considered and well practiced by the selected large scale Ethiopian manufacturing firms and the others were found implemented to some extent.

VIII.   LIMITATION AND FUTURE RESEARCH DIRECTION

The major limitations of this study were the scope of the study included only four major manufacturing groups of Ethiopian manufacturing industries out of fifteen groups which limits to generalize overall Ethiopian manufacturing industries SSCM practices. The data used under this study was collected by using likert-scale type which is perception based. The respondents where only from manufacturing firms, the study does not considered suppliers and customers. Therefore, the researcher suggests that, future researchers shall incorporate other manufacturing categories and also use secondary data for better determine the practices of SSCM throughout the supply chain, they also recommended that, if possible to incorporate the whole supply chain by including both suppliers and customers.

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