

GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN ETHIOPIAN TANNERY INDUSTRY: AN EMPIRICAL STUDY

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Abstract - The purpose of this paper is to delineate performance of green supply chain management of Ethiopian Tannery Industry. To address the claims an explanatory research method has been used. The populations of the study were tanneries operating in Ethiopia. The respondents involved in this study were managers of tanneries, industry location development & environment protection directorate of the Ministry of Industry, Compliance & Monitoring Control and Environmental Law & Standards Directorates of the Ministry of Environments & Forest, and Leather & Leather Production Technology Institute. The quantitative data were analyzed using mean, standard deviation, correlation and regression analysis. The findings of the study revealed out that an organizational commitment, green purchasing, marketing practices, investment recovery, eco-design and environmental practices are not well considered by the Ethiopian Tanneries to green the whole supply chain. The study also showed that majority of tanneries didn't have separate environmental unit which is responsible for all emissions and due to this they emit wastes without proper treatments consequently this practice is seriously affecting the nearby dweller. The environmental proclamations, policies and regulations for tannery industry are stringent but nothing actions were taken by the concerned bodies. The study suggests government offices to devise appropriate monitoring scheme, capacity building program, and integrative supply chain thinking to curb the problems and to support sustainable economic development program of the country.

Key Words: Supply Chain, Green Supply Chain Management, Performance Measurement

1. INTRODUCTION

The emergence of modern tanning in Ethiopia dates back to 1918 and 1927 with the establishment of the then ASCO (currently Addis Tannery) and Darmar/Awash (currently ELICO) Tanneries, respectively. However, improvements in hides and skins did not keep pace with the beginning of modern tanning in the country. The Ethiopian Tannery Industry has shown important advancements; for example the number of tanning companies, that were limited ten years ago, have increased to 31 in 2014 (ELI, 2014). All of

them have the same considerable size with the smallest soaking capacity of 3000 skins per day (with one shift). The national plan 'Growth and Transformation' puts the tannery industry as one of the priority sector and expects export of USD millions at the end of the plan. All these things imply that the attention given by the government to scale up every aspects of the industry is significant. However, the tannery industry has been identified as a generator of air, liquid and solid waste emissions. The tanning sector in Ethiopia is currently growing fast and is becoming an increasingly significant cause of environmental pollution. Presently well-established standards for the discharge of tannery or other industrial effluents have been set by the Ethiopian Environmental Protection Authority (now Ministry of Environmental Protection and Forest), but almost all the tanneries do not comply with these national standards in particular and green supply chain management aspects in general.

2. THEORETICAL FRAMEWORK

There are many corporate and industrial environmental philosophies and practices that are closely linked to and support green supply chain management that have also been a focus of significant research, practice, and application. Green issues are a major concern for business decision makers. In this context, Green Supply Chain Management (GSCM) is defined as the incorporation of adequate environmental initiatives at each step of the supply chain. These initiatives cover purchases, product design and development, production, transportation, packaging, storage and end-of-life management after the sale. Environmental issues within corporate organizational boundaries have been a concern for decades. These issues have ranged from reactive concerns to legislation and regulatory pressures to more proactive concerns that include building organizational competitive advantage and developing a strong corporate environmental image. Greater importance of inter-organizational relationships has caused organizations to consider building competitive advantage by management of their supplier and customer partnerships and networks (Revilla, E., James Cordeiro, and Joseph Sarkis, 2011).

According to Wu, T., Jim Wu, Y.C., Chen, Y.J., & Goh, M. (2013), GSCM can be divided into intra- and inter-organizational environmental practices; the former represents the forms of casual ambiguous resources and the latter refers to socially complex resources. Intra-organizational environmental practices, such as total quality environmental management, waste management and environmental management systems are focused on energy usage, material consumption, emissions and waste in connection with in-house processes. On the contrary, for firms, the question of how to organize internal management mechanisms that promote extensive employee involvement and continuous learning is the key to reducing and preventing pollution. On the other hand, Wong, C.W.Y., K-H. Lai, K-C. Shang, C-S. Lu and T.K.P. Leung (2012) and (Vachon and Klassen, 2006) argued that inter-organizational environmental practices, such as design for the environment, life cycle analysis, green distribution and reverse logistics are typically referred to as product stewardship programs which emphasize alliances between suppliers and customers to mutually cope with cross-firm environmental issues. These practices provide an interactive platform between supply chain partners, and thus establish social networks embedded with trust and commitment which encourage knowledge exchange and reciprocity (Hart, 1995). As a result, inter-organizational environmental practices have socially complex characteristics and rely on close co-operation between firms and supply chain partners (Shi, Han Jinping Tian, Lujun Chen, 2012). These practices also stress the importance of taking appropriate steps to effectively integrate suppliers and customers. Supply chain integration represents co-operation among supply chain partners in both intra- and inter-organizational processes (Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K., Flynn, J., 1990). The explanations of the authors indicate that green supply chain integration is the collaboration of a firm and its supply chain partners to direct both intra- and inter-organizational environmental practices. To this end, Green Supply Chain helps to measure, analyze and improve performance among various members to ensure that companies are operating in environmentally friendly manner or not.

2.1. CHALLENGES OF GREEN SUPPLY CHAIN MANAGEMENT

In order to give a more detailed picture of the challenges, they are separated into internal and external ones. As internal barriers are important for the implementation of green concepts, but these do not explicitly refer to inter-organizational supply chain processes. Although internal barriers do not belong to the introduction of green supply chain management directly, they are of crucial importance for the success of such programs. Therefore, it is important to see what problems might occur and need to be taken care of in order to assure effective cooperation on

an inter-organizational basis. The analysis in terms of external barriers shows that the main problem is based on the fact that globally acting companies are confronted with different regulations and environmental acts in the different countries. This can impede streamlining an international supply chain. Luthra S, Vinod Kumar, Sanjay Kumar, Abid Haleem (2010) argued that barriers to implementation of GSCM encompasses: resistance to technology, advancement adoption; lack of organization encouragement; poor quality of human resources; market competition and uncertainty; lack of government support system; lack of implementing green practices; lack of top management commitment; cost implications; supplier reluctance to change towards GSCM and unawareness of customers.

2.2. IMPACT OF GREEN SUPPLY CHAIN PERSPECTIVES ON ORGANIZATIONAL PERFORMANCE

Wu et al (2013) confirmed that GSCM practices are the focal constructs in the theorized model with internal environmental management and green information systems as antecedents and environmental, economic, operational, and organizational performance as consequences. In addition, green information systems provide the information necessary to make decisions about green purchasing, the level of cooperation with customers, design of the product, and investment recovery. Changes made as a result of internal environmental management or green information systems impact the ability to implement green supply chain practices which will impact environmental performance, economic performance, operational performance, and organizational performance.

Previous studies show that external GSCM practices such as supplier and customer collaboration will facilitate the adoption of internal GSCM practices, with the explicit purpose of improving environmental performance in supply chain-wide context (Vachon and Klassen, 2006). Also, developing collaborative relationships with suppliers is favorable for the adoption and development of internal innovative environmental technologies (Geffen and Rothenberg, 2000). Similarly, externally focused GSCM practices (e.g., green design of process with suppliers for minimizing wastes and customer cooperation for eco-design of product) need internal coordination mechanisms (e.g., specialized staff training on environmental management issues and cross-functional cooperation) to cascade the task requirements through the organizational hierarchy for these external practices to be effectively carried out.

Whether GSCM and corporate socially responsible practices can improve economic performance is still an open question (Seuring and Muller, 2008). Some have shown that environmental management and GSCM have a

positive relationship with an organization’s economic performance (Rao and Holt, 2005). In general, inter-firm relations provide formal and informal mechanisms that promote trust, reduce risk and in turn increase cooperation, commitment and hence profitability. Others have suggested that economic performance is not being reaped in short-term profitability and sales performance when GSCM practices are implemented (Bowen et al. 2001). The literature over the past 15 years seems to have divided views on whether there are joint gains, “win-win’s”, or tradeoffs that must be managed for environmental and economic performance in sustainable supply chains (Seuring and Muller, 2008).

Among barriers to implement environmental management practices, the most critical aspect appears to be economic reasons and issues related to costs (Ambec and Lanoie 2008). Restrictions to firms’ behavior may arise from the enactment of internal procedures as well as from conformity with extant environmental regulations. Eco-control such as compliance with internal and external procedures posits considerable restrictions to opportunistic behavior of firms as well as increased operational costs, and this may not benefit the economic performance of the participating firms (Henri and Journeault, 2010). These mixed results in the relationships between economic and environmental performance leads to some possibilities of more complex mediations occurring between internal and external practices. For example, the lack of external GSCM programs may actually weaken the long term viability of operational advantages for internal profitability (Plambeck, 2007).

It is possible for well-executed external GSCM relationships failing to bring economic performance. The reason behind can be a lack of internal managerial support and resources to take financial advantage of these relationships. It remains unclear on whether either or both external or internal GSCM practices are mediators of this relationship.

Research indicates a positive relationship between external GSCM practices and operational performance. Through interaction with suppliers and customers, manufacturers can improve their operational performance (Ellram, L.M., Tate, W. and Carter, C.R., 2008, Yeung, A.H.W., Lo, V.H.Y., Yeung, A.C.L. and Cheng, T.C.E., 2008). Research has also shown that internal GSCM practices such as integrated environmental management systems and staff involvement can improve operational performance (Hanna M, WR, Newman, P. Johnson, 2000). It has been argued that producing an environmentally friendly product may create a final product that is safer and less costly, and which has higher, more consistent quality and greater scrap value (Porter and Van der Linde 1995, Sarkis, 2001). The ‘lean and green’ literature has

also argued that the level of customers’ involvement in improvements to the lean performance of a supplier firm is positively related to the environmental management practices (Simpson et al. 2007). Yet, coordination between internal and external practices has seen no conclusive findings. Using the argument that both internal and external GSCM practices have influenced operational performance.

2.3. CONCEPTUAL FRAMEWORK

The figure below describes the conceptual framework that guided this paper. Based on the research questions and hypothesis, the conceptual framework emphasizes on the effect of organizational commitment, eco-design, green supply chain process (green purchasing, green marketing, investment recovery, and environmental practices), on social, economic, environmental, operational and financial performances.

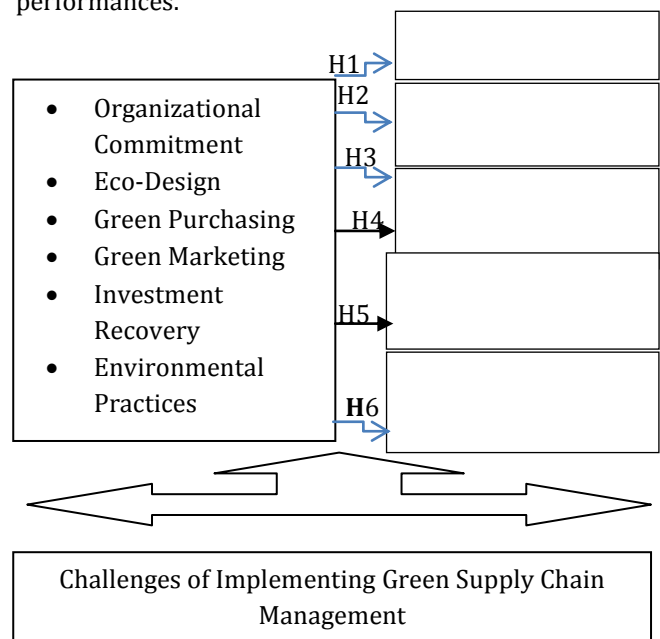


Figure 1. Model Adapted from Bhattacharya et al 2014

2.3.1. RESEARCH QUESTIONS

1. What does the current status of green supply chain practices of tanneries looks like?
2. How do tanneries meet interest of external stakeholders’ vis-à-vis constructs of green supply chain?
3. What is the effect of green supply chain perspectives on organizational performance?
4. What are challenges of implementing green supply chain management?

2.3.2. HYPOTHESIS

Hypothesis 1. Organizational commitment, green purchasing, green marketing, investment recovery, eco-

design, environmental practice will not positively affect social performance

Hypothesis 2. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect economic performance.

Hypothesis 3. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect environmental performance.

Hypothesis 4. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect operational performance.

Hypothesis 5. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect financial performance.

3. RESEARCH DESIGN

To address what is claimed by the research, triangulation explanatory strategy was employed. Both quantitative and qualitative data were used together to answer the research questions. Hence, explanatory research design was used to investigate performance of Ethiopian Tanneries. This study constitutes general manager of tanneries, Industry Location Development & Environment Protection Directorate of the Ministry of Industry, Compliance and Monitoring Control and Environmental Law and Standards Directorates of the Ministry of Environments & Forest, tannery nearby dwellers and Leather Production Development Institute as a population of the study.

The population size is determined based on data obtained from Leather Industry Development Institute data bases. According to the result obtained, there are 31 tanneries. The respondents were general manager in charge of the whole operations of tanneries who had an experience about the operation and management of supply chain practice in the organization. The researcher believed that these persons have enough knowledge to comprehend and respond to research questions concerning evaluation of performance of Ethiopian Tanneries using green supply chain constructs. Thus, the total population for this study was 31 since that 1 manager was taken as target population from each of 31 tanneries. Furthermore, 5 nearby community from "Sebeta", "Mojo" (nearby mojo river), "Kality" (Bochi area), "Akaki" (nearby Akaki river) were considered as an informants for this study in order to triangulate the views obtained from managers of tanneries. Totally, 20 respondents were approached using judgmental sampling. Experience and exposure of dwellers about the operations of tanneries was used as criteria to qualify the informants.

Questionnaires were distributed to 31 tannery managers. And interview was conducted with Industry Location Development & Environment Protection Directorate of the Ministry of Industry, Compliance and Monitoring Control and Environmental Law and Standards Directorates of the Ministry of Environments & Forest, tannery nearby dwellers and Leather Production Development Institute. Data analyses depend on both the objectives of the study and the nature of the variables in the data instruments. To address the claim made, both descriptive and inferential statistics were used. To analyze the data measures of central tendency (mean) and measures of variability (standard deviation), Pearson correlational and regression analysis were used. The statistical tests were employed with 95% confidence interval.

4. RESULTS AND DISCUSSIONS

The informants were asked to give their response on performance of green supply chain management using a five point likert scale. The range was 'carrying it out fully - (5)' to 'not considering it - (1)'. The scores of carrying it out fully / carrying out to some degree have been taken to present a variable which had a mean score of 3.5 to 5. The scores of 'considering it currently' have been taken to represent a variable with a mean score of 2.5 to 3.4) and the score of planning to consider/not considering have been taken to represent a variable which had a mean score of 0 to 2.4). A standard deviation of >1.0 implies a significant difference among respondents the issues raised.

4.1. Issues Related to Organizational Commitment

No.	Items	Mean	SD
1	Top Management Commitment	3.48	0.82
2	Middle Management Commitment	3.32	0.85
3	Cross Functional Cooperation for Environmental Improvement	3.52	0.82
4	Employee Involvement	3.20	0.82
5	Total Quality Environmental Management	3.28	0.79

Item one of table above shows that top management commitment towards "greening" the whole supply chain is carried out to some degree (Mean = 3.48) and also the value of standard deviation shows some degree of inconsistency among respondents (SD = 0.82). This value implies that there are some respondents who rated planning to consider and considering out fully. The obtained result confirmed as the commitment of top management in greening the whole supply chain is remarkable. Concerning middle management commitment about "greening" supply chain, the mean value is 3.32 and its standard deviation is 0.85. The value shows that middle management commitment in greening the whole supply

chain is considered currently in tannery industries; however, the value of standard deviation shows some degree of inconsistency among respondents. With regard to cross functional cooperation for environmental improvement, the mean value is 3.52 and the value of standard deviation is 0.88. The mean value implies existence of cooperation among functions with a deviation of 0.88. Concerning employee involvement in the supply chain the mean value is equal to 3.2. This implies that tanneries are considering employee involvement to green the supply chain. But still opinion differences are reflected on the issue of involving employees. With respect to total quality environment management the respondents indicated that tanneries are considering greening to assure total quality environment management with mean value of 3.28.

4.2. Issues Related to Eco-Design

No.	Items	Mean	SD
1	Design of Products for Reduced Materials and Energy Consumption	2.5	1.30
2	Design of Products for Reuse, Recycle, Recovery of Material, Component Parts	2.2	0.96
3	Design of Products to Avoid or Reduce Use of Hazardous of Products	2.8	1.29

Respondents were asked to give their responses on eco-design constructs, accordingly design of products for reduced materials and energy consumption mean score value is 2.5 and the value of standard deviation is 1.30. The mean value indicates that tanneries are considering reduction of materials and energy consumption during design of the product. On contrary to this, the value of standard deviation shows high level of inconsistency among respondents since there are some respondents who said not considering it. With regard to design of products for reuse, recycle, recovery of material and component parts the mean score is (2.2) and the standard deviation is 0.96. These scores indicate that there are some tanneries who are considering recycling and the rest are not considering it. The mean and standard deviation score of design of products to avoid or reduce use of hazardous of products is 2.8 and 1.29 respectively. These results imply that tanneries are considering reduction of hazardous products during design of products. However, the value of standard deviation shows high degree of inconsistency in responding to this scale. The grand mean score is 2.51. In relation to eco-design, authors stated that it is a critical factor governing the environmental impacts of a manufactured product since materials and processes are selected at the design stage.

4.3. Issues Related to Green Purchasing

No.	Items	Mean	SD
1	Cooperation with suppliers for environmental objectives	2.00	0.96
2	Providing design specification to suppliers with environmental requirements	2.04	0.98
3	Environmental audit for suppliers' internal management	2.04	1.06
4	Suppliers' ISO 14000 certification	1.88	0.93
5	Second-tier supplier environmentally friendly practice evaluation	2.12	1.13

The table above indicates green purchasing practices of Ethiopian tannery industries. With respect to cooperation with suppliers for environmental objectives (mean score is 2.00 and standard deviation score is 0.96), providing design specification to suppliers with environmental requirements mean score is 2.04 and standard deviation is 0.98, environmental audit for suppliers' internal management mean score is 2.04 and standard deviation of 1.06), suppliers ISO certification mean score is 1.88 and standard deviation is 0.93, second-tier supplier environmentally friendly practice evaluation mean score is 2.12 and standard deviation of 1.13. The grand mean concerning green purchasing is 2.02 which indicate that tanneries are planning to consider green purchasing in greening the whole supply chain.

4.4. Issues Related to Green Marketing

No.	Items	Mean	SD
1	Cooperation with customer for eco-design	1.72	1.18
2	Cooperation with customers for cleaner production	1.80	1.19
3	Cooperation with customers for green packaging	1.72	1.14
4	Cooperation with customer for least energy consumption for logistics	1.84	1.18

The table above shows sub-constructs related to green marketing. Cooperation with customer for eco-design mean-score is 1.72 and standard deviation is 1.18. Cooperation with customers for cleaner production mean score is 1.80 and the standard deviation score is 1.19, cooperation with customers for green packaging mean score is 1.72 and the value of standard deviation is 1.14,

and the cooperation with customer for least energy consumption for logistics mean score is 1.84 and the score of standard deviation is 1.18. And the grand mean for green marketing is 1.77. This indicates that tanneries in Ethiopia are planning to consider the green marketing as a typical element of green supply chain management in the future. In relation to green marketing the interview result obtained from experts of ministry of environment and forest most industries in Ethiopia including tanneries are not taking the advantage provided in the Africa Growth Act (AGOA) by the United States government because of poor green marketing from firms' side. To verify the ideas obtained from tanneries manager and interviewee, authors in the field cleared out that buyers are aware of the global environmental issues due to the impact of ever increasing environmental mishaps. Eventually, buyers will become more willing to purchase environment friendly products. Therefore, companies have been forced to change their behavior to comply with society's environment concerns.

4.5. Issues Related to Investment Recovery

No.	Items	Mean	SD
1	Investment recovery (sale) of excess inventories/materials	2.36	0.91
2	Sale of scrap and used materials	2.56	0.92
3	Sale of excess capital equipment	2.48	2.52

Table above indicates variables on investment recovery. The mean score for sales of excess inventories/materials is 2.36 and the value of standard deviation is 0.91. Concerning sales of scrap and used materials the mean score is 2.36 and the standard deviation is 0.91 and sales of excess capital equipment mean score is 2.48 and standard deviation is 2.52. The grand mean score for investment recovery is 2.33. This implies that tanneries are not implementing investment recovery rather they are planning to consider it in the future. But the idea of writers in the field quite differs than the experience that Ethiopian tanneries are practicing. Authors stated that investment recovery is put into practice "recouping" the asset value as long as the company's need, by reusing and recycling or selling extra properties. Corporation in every industry should have investment recovery division, depending on industry type.

4.6. Issues Related to Environmental Practice

No.	Items	Mean	SD
1	Environmental compliance and audit procedure	2.56	0.71
2	ISO 14000 certification	2.00	1.04
3	Environmental management system	2.72	1.02
4	Eco-labeling of products	1.48	0.87

This section sought to provide a description of the variables used in describing the determinants of environmental practices. Mean scores for environmental compliance and audit procedure, ISO 14000, environmental management system and eco - labeling of products were 2.56, 2.00, 2.72, and 1.48 respectively. And the values of standard deviation for environmental compliance and audit procedure, ISO 14000 certification, environmental management system and eco-labeling of products are 0.71, 1.04, 1.02 and 0.87 respectively. The grand mean for environmental practice is 2.19. This implies that tanneries in Ethiopia didn't implement the key indicators of environmental elements which enable to green the supply chain rather the tanneries are planning to implement the indicators.

4.7. ISSUES RELATED TO ORGANIZATIONAL PERFORMANCE

4.7.1. Social Performance

No.	Items	Mean	SD
1	Decrease in cost for energy consumption	2.68	1.52
2	Decrease in cost of materials purchasing	3.08	1.19
3	Decrease in fine for waste treatment	3.12	1.09
4	Decrease in fine for waste discharge	2.84	1.25
5	Decrease in fine for environmental authority	3.44	1.00

The results of this study showed that Ethiopian tanneries mean score of business ethics, corporate responsibility social activities, employment generation and positive image mean score of 3.92, 3.92, 3.68 and 3.96 respectively. And the grand mean for social performance is 3.87 as well. This figure implies that social performance of Ethiopian tanneries is relatively significant. However, the interview responses obtained from the community indicates that tanneries performances are not significant in all aspects of social performance. The community indicated that they are good in creating job opportunity and participating in different communities social activities. However, rural communities and urban dwellers alongside tanneries are

victimised of waste water and noise pollution emitted by the tanneries. And the nearby citizen complained that tanneries are printing money in the expense of demolishing the environment and polluting the public at large. This practice contradicts the rules and policies of environment, environment proclamation and green resilience policy of the country. In all documents including the climate resilience green economy strategy, companies were advised to make their products environmental friendly.

4.7.2. Environmental Performance

No.	Items	Mean	SD
1	Reduction of air emission	2.72	1.10
2	Reduction of waste water	3.00	0.41
3	Reduction of solid wastes	3.24	0.66
4	Reduction of accidents	3.36	0.70
5	Recycle of materials	3.40	0.87
6	State of art design of reverse logistics	1.00	0.00

The results of the study showed that Ethiopian tanneries were in some degree in reduction of air emission, reduction waste water, reduction solid wastes, reduction accidents and recycle of materials with mean score of 2.72, 3.00, 3.24, 3.36 & 3.40 respectively. Grand mean of environmental performance of Ethiopian tannery is 3.14. The result also indicated that there is no at all state of art of reverse logistics in Ethiopian Tanneries. This might be because of the nature of the industry, high cost, and other impediments involved in reverse logistics. Studies in the field indicated that environmental performance indicators serve companies to meet environmental policies and measures in order to reduce emission and waste disposal, improve community relations and corporate image. In connection to this, the interview held with officials at Ministry of Industry, Ministry Environment and Forest, and Leather Industry Institute stated majority of the tanneries didn't give concern about the environment and their commitment in reducing air emission, waste water and solid waste is very little. Furthermore, the responses obtained from the community favors the ideas of the officials.

4.7.3. Economic Performance

No.	Items	Mean	SD
1	Decrease in cost for energy consumption	2.68	1.52
2	Decrease in cost of materials purchasing	3.08	1.19
3	Decrease in free for waste treatment	3.12	1.09
4	Decrease in free for waste discharge	2.84	1.25
5	Decrease in fine for environmental authority	3.44	1.00

The table above shows economic performance of tanneries. The mean scores of decrease in cost for energy consumption, decrease in cost of materials purchasing, decrease in free for waste treatment, decrease for waste discharge and decrease in fine for environmentally authority are 2.68, 3.08, 3.12, 2.84 and 3.44 respectively. The values of standard deviation show high degree of inconsistency among respondents on issues indicated under economic performance. Besides, the obtained grand mean is 3.03. The results obtained showed that tanneries are to some degree in cost reduction and meeting economic performances. And the responses obtained from officials of ministry of environment and forest, and leather industry institute highlighted that majority of the tanneries are not meeting the criteria set by the concerned government body's.

4.7.4. Operational Performance

No.	Items	Mean	SD
1	Increase in the amount of goods delivered on time	3.44	1.12
2	Decrease in inventory level	3.04	0.89
3	Decrease in scrape rate	3.24	1.16
4	Increase in product quality	1.96	1.31
5	Effective reverse logistics	1.24	1.09
6	Reduction of time for recycling	2.52	1.16
7	Improved capacity utilization	2.80	1.35

The results of this study showed that Ethiopian tanneries operational performance; mean scores of increase in the amount of goods delivered on time, decrease in inventory level, decrease in scrape rate, increase in product quality, effective reverse logistics, reduction of time for recycling, and improved capacity utilization are 3.44, 3.04, 3.24, 1.96, 2.24, 2.52, 2.80 respectively. The score of standard deviation shows high degree of inconsistency in responding to the constructs given. The grand mean of

operational performance of tanneries is 2.70. Except for increasing product quality and effective reverse logistics, respondents' response showed that tanneries are addressing the factors to some degree.

4.7.5. Financial Performance

No.	Items	Mean	SD
1	Average returns investments over the past three years	2.96	1.31
2	Profit growth over the past three years	3.84	1.17
3	Average return on sales over the past three years	2.64	1.11
4	Average market share growth rate over the past three years	2.56	1.19
5	Average sales growth over the past three years	2.64	1.11

The table above discusses financial performance of Ethiopian tanneries. The mean and standard deviation scores over the past three years on average returns investments, profit growth, average return on sales, average market share growth rate and average sales growth are 2.96 & 1.31, 3.84 & 1.17, 2.64 & 1.11, 2.56 & 1.19 & 2.64 & 1.11 respectively. The grand mean for financial performance is 2.93. This implies that the financial performance of the tanneries is significant to some degree. However, the profit growth of tanneries over the past three years is relatively significant.

4.7.6. Challenges of Implementing Green Supply Chain Management

No.	Items	Mean	SD
1	Unawareness of customers	3.60	1.15
2	Supplier reluctance to change towards green supply chain management	3.20	0.58
3	Cost implications	4.28	0.89
4	Lack of top management commitment	2.60	1.08
5	Lack of government support policies	3.08	0.64
6	Weak market competition	2.80	1.19
7	Lack of quality of human resources	3.80	0.86
8	Resistance to technology advancement adoption	3.64	1.11

Table above reveals challenges of implementing green supply chain management. The table reflects that the firms

tend to agree that unawareness of customers is a challenge in implementing green supply chain management (mean = 3.60 & SD = 1.15). Furthermore, cost implications, lack of quality of human resources, and resistance to technology advancement adoption rated as major challenges in implementing green supply chain management.

HYPOTHESIS TESTING

This part of the paper discusses the correlation and the regressions analysis and thus the answers to RQ2 and RQ3. The correlation analyses shows tie between the independent variables (organizational commitment, eco-design, green purchasing, green marketing, investment recovery and environmental practices and dependent variables (social, economic, environmental, operational and financial performance). The constructs for each factor are aggregated using the mean scores. The correlation result of most of variables is above 0.3. This implies that there is some degree of relationship between dependent and independent variables.

	SP	EP	ERP	OP	FP
Independent variables					
Organizational commitment, green purchasing, green marketing, investment recovery, eco-design and environmental practice					
R ²	0.483	0.703	0.779	0.713	0.491
F-value	3.55	7.109	10.56	7.445	2.900
p value	0.020 ^b	0.001 ^b	0.000	0.000	.037 ^b

***Significant at 0.05**

Hypothesis 1. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect social performance

The F value in Table 15 is insignificant at p > 0.05 meaning that the influence of organizational commitment, green purchasing, green marketing, eco-design, environmental practice on social performance is less. Thus, this result confirms the null hypothesis.

Hypothesis 2. Organizational commitment, green purchasing, green marketing, investment recovery, eco-

design, environmental practice will not positively affect economic performance.

The F value in Table above is significant at $p < 0.05$ meaning that the influence of organizational commitment, green purchasing, green marketing, eco-design, environmental practice on economic performance is more. Thus, these results indicate that the higher organizational commitment, green purchasing, green marketing, investment, recovery, environmental practices the higher will be the economic performance.

Hypothesis 3. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect environmental performance.

The F value in Table above is significant at $p < 0.05$ meaning that the influence of organizational commitment, green purchasing, green marketing, eco-design, environmental practice on environmental performance is more. Thus, these results indicate that the higher organizational commitment, green purchasing, green marketing, investment, recovery, environmental practices the higher will be the environmental performance.

Hypothesis 4. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect operational performance.

The F value in Table above is significant at $p < 0.05$ meaning that the influence of organizational commitment, green purchasing, green marketing, eco-design, environmental practice on operational performance is more. Thus, these results indicate that the higher organizational commitment, green purchasing, green marketing, investment, recovery, environmental practices the higher will be the operational performance.

Hypothesis 5. Organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect financial performance.

The F value in Table above is insignificant at $p > 0.05$ meaning that the influence of organizational commitment, green purchasing, green marketing, eco-design, environmental practice on financial performance is less. Thus, these results indicate that the higher organizational commitment, green purchasing, green marketing, investment, recovery, environmental practices the lesser will be the financial performance.

5. CONCLUSIONS

It was mentioned by the tannery managers that the commitment of top management, middle management and cooperation among functions in greening the whole supply chain is remarkable. However, responses obtained from nearby communities and interviewee officials' tanneries commitment in greening the supply chain is not strong. Therefore, it is possible to conclude that the commitment of the organization is not to the level of the interest of the stakeholders. And this implies that the performance of tanneries in greening the whole supply chain management is not good. It was also found that eco-design, green purchasing, green marketing and investment recovery is not as such strong rather they are planning to consider in the future. Therefore, the green supply chain perspectives are not well addressed by the Ethiopian Tannery Industry.

The environmental proclamations, policies and regulations for tannery industry are stringent but the pollution coming from tanneries industry is heavy. It is creating a problem on nearby community and environment. Therefore, it is possible to deduce that tanneries commitment in assuring sustainable economic development is weak. And it affects the path to sustainable development and the Ethiopia's climate resilient green economy strategy. The findings of the study indicated that majority of tanneries didn't have a separate unit, well defined environment management system and manual, no safety package for the workers, and no strong relation among tanneries and pertinent government environment offices. Furthermore, most of the tanneries release waste such as chromium, salty, decomposable, dry skin without salt, chromium and sulfide acid to nearby community and harming the society dangerously. No environment audit has been made by the internal as well as external parties so far. Therefore, the effort of tanneries in meeting the interest of stakeholders is so weak.

The data obtained from tanneries manager, organizational commitment, green purchasing, green marketing, and investment recovery, eco-design, environmental practice will positively affect environmental, economic and operational performance. However, organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect social and financial performance. Thus, it is safe and sound to conclude that all these factors lead didn't contribution much in greening the whole supply chain.

It was mentioned by the tannery managers that the commitment of top management, middle management and cooperation among functions in greening the whole supply chain is remarkable. However, responses obtained from nearby communities and interviewee officials' tanneries commitment in greening the supply chain is not strong.

Moreover the interviewees said that there is some degree of inconsistency among tanneries in greening the supply chain. Concerning eco-design, tanneries are considering reduction of materials and energy consumption during design of the product. But there is also high degree of inconsistency of responses since there are some informants who said that they are not considering eco-design.

It was found that the green purchasing practice was not practiced by tanneries. The finding shows that cooperation with suppliers for environmental objectives, providing design specification to suppliers with environmental requirements, environmental audit for suppliers' internal management, suppliers ISO certification and second-tier supplier environmentally friendly will be considered in the future.

It was identified that green marketing was not practiced by the tanneries. Meaning that cooperation with customer for eco-design, cooperation with customers for cleaner production, cooperation with customers for green packaging, and the cooperation with customer for least energy consumption for logistics is not considered by tanneries. Furthermore, it was identified that tanneries are planning to consider sales of excess inventories/materials, sales of scrap and used materials and sales of excess capital equipment.

As per the data obtained from tanneries manager, organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will positively affect environmental, economic and operational performance. However, organizational commitment, green purchasing, green marketing, investment recovery, eco-design, environmental practice will not positively affect social and financial performance.

It was identified that cost implications, lack of quality of human resources, and resistance to technology advancement adoption rated as major challenges in implementing green supply chain management. Furthermore, respondents stated unawareness of customers, supplier reluctance to change towards green supply chain management, lack of government support policies also mentioned as challenges of implementing green supply chain management.

REFERENCES

- (1) Ambec, S., & Lanoie, P. (2008). When and why does it pay to be green? (Discussion Paper No. IEA-07-04). Montreal: HEC. Available at http://www.hec.ca/iea/cahiers/2007/iea0704_planoie.pdf Accessed on October 3, 2014,
- (2) Anbumozhi, V. & Kanada, Y., (2005) "Greening the production and supply chains in Asia: is there a role for voluntarily initiatives?" IGES Kansai Research Center Discussion Paper, KRC- 2005, No. 6E. Available online: <http://www.iges.or.jp> Accessed on September, 2014
- (3) Bacallan, J.J. (2000), "Greening the supply chain", Business and Environment, Vol. 6 No. 5, pp. 11-12.
- (4) Bajdor Paula and Janusz K. Grabara (2011) Implementing "Green" Elements into the Supply Chain - the Literature Review and Examples. Annales Universitatis Apulensis Series Oeconomica, 13(2) Available at <http://oeconomica.uab.ro/upload/lucrari/1320112/39.pdf> (application/pdf). Accessed on October, 2014
- (5) Bhattacharya, A., Priyabrata Mohapatra, Vikas Kumar, Prasanta Kumar Dey, Malcolm Brady, Manoj Kumar Tiwari & Sai S. Nudurupati. (2014) Green Supply Chain Performance Measurement Using Fuzzy ANP-based balanced score card: a collaborative decision making approach. Production Planning and Control: The Management of Operations, Vol. 25:8, pp. 698-714
- (6) Bowen, F.E., Cousins, P.D., Lamming, R.C. and Faruk, A.C. (2001), "Horses for courses: explaining the gap between the theory and practice of green supply", Greener Management International Autumn, pp. 41-60.
- (7) Carter, C.R. and Ellram, L.M. (1998), "Reverse logistics: a review of the literature and framework for future investigation", Journal of Business Logistics, Vol. 19 No. 1, pp. 85-102.
- (8) Creswell, W (200). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. New York: Sage Publication
- (9) Ellram, L.M., Tate, W. and Carter, C.R., 2008. Applying 3DCE to environmentally responsible manufacturing practices. Journal of Cleaner Production. Vol. 16(15), 1620-1631
- (10) Ethiopian Leather Institute (2014). "List of Tanneries". Unpublished Company Document
- (11) Ethiopian Leather Industries Association's (2012). "Sectoral Strategy for the Tanning Industry in Ethiopia". Unpublished Material
- (12) Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K., Flynn, J., (1990) Empirical research methods in operations management. Journal of Operations Management vol. 9(2), 250-284.
- (13) Gavronski, I., Klassen, R.D., Vachon, S., Machado do Nascimento, L.F., 2011. A resource-based view of green supply management. Transportation Research Part E Vol. 47, 872-885.
- (14) Green Kenneth W, Pamela J. Zelbst Jeramy Meacham and Vikram S. Bhadauria (2012) "Green supply chain management practices: impact on performance. Supply Chain Management": An

- International Journal. 290–305. Emerald Group Publishing.
- (15) Hajikhani, N.Wahiza Binti Abdul Wahat, 3K.Bin IDRIS (2012) Considering on Green Supply Chain Management Drivers, as a Strategic Organizational Development Approach, Malaysian perspective
- (16) Hanna MD, Newman WR, Johnson P (2000) Linking operational and environmental improvement through employee involvement. *International Journal of Operation & Production Management*. vol. 20(2) pp.148–165
- (17) Hart, S.L. (1995), "A natural-resource-based view of the firm", *Academy of Management Review*, Vol. 20 No. 4, pp. 986-1014.
- (18) Henri, Jean Francois and Journault, Marc (2010) Eco-control: The influence of management control systems on environmental and economic performance. *Accounting, Organizations and Society*. Volume 35, p.63–80
- (19) Hervani, A. A., Helms, M. M. & Sarkis, J. (2005). "Performance Measurement for Green Supply Chain Management," *Benchmarking: An International Journal*,12(4). 330-353.
- (20) Jain, S.K. and Kaur, G. (2004). Green marketing: An Indian perspective. *Decision*, Vol. 31, No. 2, pp. 168-209
- (21) Luthra S, Vinod Kumar¹, Sanjay Kumar, Abid Haleem (2010). Barriers to implement green supply chain management in automobile industry using interpretive structural modeling technique: An Indian perspective. *Journal of Industrial Engineering and Management*, 4(2), 231-257. doi:10.3926/jiem.2011.v4n2.p231-257
- (22) Olugu E.U, Wong K.Y and Shaharoun M.A (2011), Development of key performance measures for the automobile green supply chain, *Resources, Conservation and Recycling*, Vol. 6(55), pp. 567-579 (ISI-Cited Publication) available at <http://www.ncbi.nlm.nih.gov/pubmed/9342835> accessed on July 2014
- (23) Oral, Muhitten (2009). Green Supply Chain Management Research; Ontological and Epistemological Issues. https://www.google.com.et/?gws_rd=cr&ei=Y06hVO_BHIX7ywPuYKICw#q=green+supply+chain+ontology + Accessed on June 14, 2014
- (24) Plambeck, L.E. (2007). The greening of Wal-Mart's supply chain. *Supply Chain Management Review*, 18-25.
- (25) Porter, M.E., & Van Der Linde, C. 1995, Toward a new conception of the environment-competitiveness relationship, *Journal of Economic Perspectives*, Vol. 9(4), pp. 97-118
- (26) Rao, P., (2002) "Greening the supply chain: a new initiative in Sout East Asia", *International Journal of Operations and Production Management*, Vol. 22, No. 6, pp 632-655.
- (27) Journal of Operations and Production Management, Vol. 22, No. 6, pp 632-655.
- (28) Rao, P., and D. Holt (2005), "Do green supply chains lead to competitiveness and economic performance?", *International Journal of Operations & Production Management*, Vol. 25 No.9 and 10, pp.898-916.
- (29) Revilla, E., James Cordeiro, and Joseph Sarkis (2011) Transaction Cost Economics and the Resource Based View's Influences on Supplier Environmental Collaboration. "Working Paper". Clark University. George Perkins Marsh Institute
- (30) Sarkis, Joseph (2012). "A boundaries and flows perspective of green supply chain management". *Supply Chain Management: An International Journal*. Emerald Group Publishing Limited.
- (31) Sarkis, J., Zhu, Q., & Lai, K., 2011, An organizational theoretic review of green supply chain management literature, *International Journal of Production Economics*, 130, pp. 1-15
- (32) Sekaran U. (2003) *Research methods for business: a skill building approach*. Singapore: John Wiley & Sons, Inc;
- (33) Seuring, S. and Muer, M. (2008), "From a literature review to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production*, Vol. 16 No. 15, pp. 1699-710.
- (34) Shi, Han Jinping Tian, Lujun Chen (2012). China's quest for eco-industrial parks, Part II *J. Ind. Ecol.*, 16 (3), pp. 290-292
- (35) Simpson, Dayna (2014) *Developing Strategies for Green Supply Chain Management*. Available at http://www.researchgate.net/publication/238071264_Developing_Strategies_for_Green_Supply_Chain_Management. Accessed on October, 2014
- (36) Simpson, D., Power, D.J. and Samson, D., (2007) .Greening the automotive supply chain: a relationship perspective. *International Journal of Operations & Production Management*, 27(1),28-48.
- (37) Supply Chain OPZ (2011) *Green Supply Chain: Metrics, Analysis and Best Practices* Available at <http://www.supplychainopz.com/2011/12/green-supply-chain.html> accessed on September 2014
- (38) Sunil Luthra, Vinod Kumar, Sanjay Kumar, Abid Haleem (2011). "Barriers to implement green supply chain management in automobile industry using interpretive structural modeling technique-An Indian perspective". *Journal of Industrial Engineering and Management*. Vol. 4 no. 2
- (39) Vachon, S. and Klassen, R.D. (2006), "Extending green practices across the supply chain: the impact of upstream and downstream integration", *International Journal of Operations & Production Management*, Vol. 26 No. 7, pp. 795-821.
- (40) Van den Broek (2010). "Green Supply Chain Management, Marketing Tool or Revolution?"

Unpublished Document. Available at
www.crow.nldocumentskpvv-kennisdocumentengreen-supply-chain-management-marketing-tool-or-re.aspx

- (41) Wong, C.W.Y., K-H. Lai, K-C. Shang, C-S. Lu and T.K.P. Leung (2012), "Green Operations and the Moderating Role of Environmental Management Capability of Suppliers on Manufacturing Firm Performance", *International Journal of Production Economics*, Vol. 140, pp. 283-294.
- (42) Wu, T., Jim Wu, Y.C., Chen, Y.J., & Goh, M. (2013). *Aligning Supply Chain Strategy with Corporate Environmental Strategy: A Contingency Approach*. *International Journal of Production Economics* (In Press). <http://dx.doi.org/10.1016/j.ijpe.2013.02.027>
- (43) Yeung, A.H.W., Lo, V.H.Y., Yeung, A.C.L. and Cheng, T.C.E., (2008). Specific customer knowledge and operational performance in apparel manufacturing. *International Journal of Production Economics*, Vol. 114 (2), 520-533.