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GREEN SUPPLY CHAIN MANAGEMENT IN PRODUCTION SECTORS AND ITS IMPACT ON FIRM REPUTATION

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Abstract – The purpose of this paper is to investigate the effect of Green Supply Chain Management practice on firm reputation. To investigate this, data were collected from executives and managers of production companies of reputed industries. A descriptive, correlational methodology was adopted and data were analyzed using structural equation modeling by using exploratory analysis and linear multiple regression analysis. The results revealed that the green purchasing, green manufacturing/material management, green distribution/marketing of production companies have a positive and significant impact on firm reputation. Finally, the results suggest that strengthening green supply chain management practice in production sectors improves firm reputation, which in turn increases firm revenue.

Keywords **–** Green Supply Chain Management, Green Purchasing, Green Manufacturing/Material Management, Green Distribution/Marketing, Firm Reputation.

1 Introduction

In the last couple of decades, researchers have shown great interest on to investigate the effect of implementation of green supply chain management in firms. But the implementation of green supply chain in firms plays a significant role impact in the environmental and financial performances of any firm. Many firms are now showing more willingness to implement environmental-friendly practices in their businesses. This is mainly because of two factors. One factor is customer's pressure to implement green manufacturing and green distribution or marketing. Other factor is pressure from government using strict laws regarding environment to force enterprises to adopt green practices. Also there are some motivating factors to some firms to implement green practice to go towards sustainable development. Some firms believe that implementing green practice they can increase financial gains and reduce cost using recycling, reuse, and remanufacturing. On the other hand, some firms believe that green practices have negatively impact on overall firm performance and execution of green practices can be a waste of their resources. The proposal of Bansal (2005) supported the claim of these firms. A similar result was studied by Zhang and Yang (2016), where they found that show that

environmental-friendly practices have no positive effects on business' economic performance. Also in a survey with hundreds CEOs from around the world exposed that about more than half of them feel that implementing green sustainability programs may be critical to their businesses. But several researchers found that adapting green or ecological practices in the business would lead to overall improvement of company's performance and execution of green practices not only improves the environment but also creates competitive advantages(Christmann (2000) & Porter and Van der Linde (1995)). Freeman(1984) explained the stakeholder approach and according to him pressure on a company to implement to force something has a negative effect on manufacturing and business activities. Several researchers found that pressurization to implement green practices may have negative impact on the overall firm performance and heavy investment in green technology may reduce the overall profit. According to Christman(2000), company's lack of basic green capabilities may lead a financial burden on the firm. Hart(1995) suggested that incorporating green practice in an enterprise's strategic planning will improve its ability to overcome uncertainties and firm operations and help the enterprise to develop firm competitive advantage and consequently, increase its financial performance. Klassen and McLaughlin(1996) and Jacobs et al.(2010) also suggested that proper implementation of green practices in supply chain can enhance operational, environmental and financial performances. They also suggested that green practices will reduce the cost and create good image and reputation in the market. Many researchers conducted similar studies to investigate the relationship between enterprise green practice with economic performance of the firms and firm reputation. Although, their investigations found a mixed results on firm economic performance but they all agreed that implementation of green practice have a positive and significant impact on firm reputation. Our investigation in the proposed paper is to find the impacts of implementation of green supply chain management in firm on firm reputation. This study will find the impacts (positive or negative) of green purchasing, green manufacturing and green distribution/marketing on firm reputation.

The pressure to implement green practice in firms by the customers and the governmental laws are the driving forces of green purchasing, green manufacturing, green distribution and marketing. International companies always try to satisfy their customers by providing proper service and better quality products through the innovation and research carried out by the research and development(R&D) section of the companies. Sometimes this takes the form of improving green performance by observing environmental laws and standards, increasing customer knowledge in this area, and reducing the negative environmental effects of their products and services (Koplin, Seuring, & Mesterharm, 2007). Green performance involves assessing the relationship between trade and the environment (Olsthoorn, Tyteca, Wehrmeyer, & Wagner, 2001). Sustainable development is key to ensuring a company's survival and requires the commitment and participation of all employees and managers. Many industries are facing competitive pressure to coordinate and cooperate through the supply chain management practice to improve agility, flexibility and proper functioning of their product. On the other hand implementation of green supply chain management practice has a positive impact on firm reputation. Sigala (2008) suggested that concern about environmental issues and governmental policies drive the industries to adopt green supply chain management practice to maintain competitiveness.

Many researchers found several studies that the green practice of the organizations for environment-friendly business operations have a significant and positive impact on firm reputation. From a macro perspective, attention to green issues is important in relation to

both the design of new green products and the creation of markets for products that are compatible with the environment. The creation of a green supply chain requires the development of opportunities for companies to invest in the design and manufacture of greener products and to meet the requirements of sustainability. It involves not only the production of green consumer goods, but also the involvement of suppliers in the creation of green markets (Sheu, Chou, & Hu, 2005).

This study sought to investigate the role of green purchasing, green manufacturing, green distribution/marketing of the firm on its reputation. Internal green practice of the company recognizes that different administrative areas within the company need to be integrated for optimum performance (Flynn, Huo, & Zhao, 2010). External green collaboration to use green distribution and marketing involves mutual understanding of environmental responsibilities and risks and shared decision-making to solve environmental problems and allocate resources, skills and knowledge between suppliers, partners and customers in the supply chain to achieve common environmental goals (Vachon, S., & Klassen, R. D. 2008). Our investigation is significantly different from the existing investigations. No statistical investigation has been carried out to investigate the impact of green supply chain management practices i.e. green purchasing, green manufacturing, green distribution/marketing on firm reputation. The rest of the paper is structured as follows. Section 2 covers hypothesis, Section 3 describes the methodology, Section 4 descries analysis and results and section 5 describes conclusion, managerial implications and future research directives.

2 Hypothesis

The study of the proposed conceptual model is shown in Figure 1, in which green supply chain management is understood as comprising green purchasing, green manufacturing/material management, green distribution/marketing and firm reputation. In the present study, green purchasing is identified as green raw materials, green shipping practices and green accumulation. Green manufacturing/material management is comprised

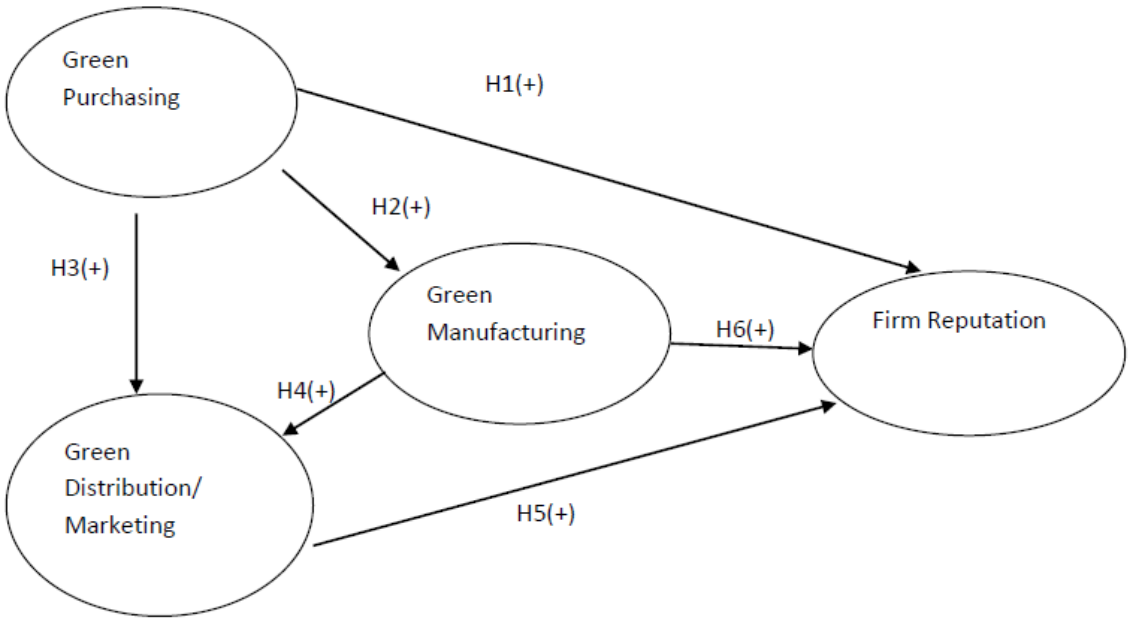

Figure 1: Research conceptual model.

as green processing, green packaging. Green distribution/marketing comprises of reduction in cost of transportation, reduction in pollutants. Firm reputation is identified by quality of services, productivity, and corporate Profit. Firm reputation may be assessed by the accelerated sales of goods which in turns increased profits.

The Figure 1 shows six testable hypotheses in which all of the direct associations indicated are hypothesised as positive. The theoretical structural model incorporates green manufacturing as the focal construct with green purchasing and green distribution/marketing as antecedents and firm reputation as a consequence. The above model is designed to assess the impact of green supply chain indicators on firm reputation. Our proposed investigation claims that the combination of green purchasing, green manufacturing and green distribution/marketing will enhance firm reputation which ultimately leads to increased revenues of the firm.

Some researchers found that green purchasing (GP) create significant improvement in the overall firm reputation. In studying the relationship between green practices in supply chain and firm reputation, it is found that there is a positive and significant impact of green purchasing and firm reputation. According to Allenby(1991) and Zailani et al.(2012) implementation of green purchasing practices improved the firm reputation and brand image. According to Mitra and Datta (2014) and Zhu and Sarkis(2004) also found that implementing green purchasing of the firm have a significant impact on firm reputation. According to Min and Galle(2001), green purchasing practices reduce the sources of waste and encourage recycling and reuse activities without any hindrance to the firm performance which in turns increases firm reputation. Zhu et al. (2008) found that there is a relationship between green procurement and company's financial performance. The result also shows that purchasing activities are connected with firm performance. In addition, they suggest that firms need to implement green purchasing to maximize resource utilization and reduce the harmful effect of manufacturing activities. Therefore, we suggest the following hypotheses for testing:

H1: *Green purchasing of raw materials have a positive and significant impact on firm reputations.*

It is expected that a firm can manufacture green product only if it purchases green raw materials. Many researchers investigated this phenomenon. Therefore the firm should be careful to buy only green raw materials to manufacture green products. Green procurement activities have viable environmental properties such as reusability and recyclability. Rao and Holt (2005) found green purchasing practices has a positive and significant impact on firm performance in the context of firm internal management and supplier selection which ultimately leads to firm reputation. These results also indicate that adoption of green purchasing not only reduces pollution and waste but also improves overall firm brand image and reputation. Therefore we propose the following hypothesis for testing:

H2: Green purchases of raw materials have a positive and significant impact in green manufacturing.

Min and Galle(2001) found that green purchasing practices reduce the sources of waste and encourage recycling and reuse activities without any hindrance to the firm distribution and marketing. Zhu et al. (2008) found that there is a relationship between green procurement and company's financial performance. The result also shows that green purchasing

activities are connected with firm internal and external distribution policies. The green procurement or green purchase of raw products also influences green marketing of the firm. In addition, researchers also suggest that firms need to implement green purchasing to maximize resource utilization and reduce the harmful effect of manufacturing activities. Therefore, we suggest the following hypotheses for testing:

H3: Green purchases of raw materials have a positive and significant impact in green distribution/marketing.

Porter and Van der Linde (1995) proposed that green manufacturing (GM) and green process can reduce the resource wastage and play a vital role in energy reduction, optimizing manufacturing steps, and to improve overall firm green distribution/marketing. Therefore, Green manufacturing has a positive and significant impact on green distribution and marketing. Therefore, we suggest the following hypotheses for testing:
H4: Green manufacturing has a positive and significant impact on a green distribution/ marketing.

Several researchers like Droge, Jayaram, & Vickery (2004), O'Leary-Kelly & Flores (2002), Rosenzweig, Roth, & Dean Jr, (2003), Swink & Nair (2007), Zailani & Rajagopal (2005) investigated the impact green distribution and green marketing on firm reputation. They also derived that there is a positive relationship between internal performance and operational performance. Stank, Keller & Daugherty (2001) and Ellinger et al. (2007) investigated that collaboration between marketing and logistics had a positive effect on distribution services performance. Zhu and Sarkis (2004) proposed that companies with high levels of adaptation of green activity achieve improved environmental performance. Hence there is considerable evidence to support the hypothesis that the implementation of i green distribution/marketing practices will lead to improved firm reputation. Based on these investigations we hypothesize that:

H5: Green distribution/marketing has a positive and significant impact on firm reputation.

The Increasing environmental concern from customers, buyers, communities, and government regulations force companies to implement Green Supply Chain Management (GSCM) and green innovation. Zhu, Sarkis, & Lai, 2008 suggested that GSCM and green innovation have strategic interconnection in developing new green product and this ultimately has a positive impact on firm reputation. Vachon and Klassen (2008) proposed that green cooperation between the organization and the members of its green supply chain enables the company to implement GSCM which ultimately have a very high impact on firm reputation. Rao & Holt (2005) claimed that green supply chain management using green manufacturing practice ultimately improves firm reputation and consequently, the following hypothesis follows:

H6: Green manufacturing has a positive and significant impact on firm reputation.

3 Methodology

Our aim is to investigate the impact of green supply chain management practice on firm reputation. This research paper is based on quantitative research approach since the objective of this paper is to compute the research variables namely green purchasing (GP),

green manufacturing(GM), green distribution/marketing and firm reputation(FR). After analyzing the content validity of the questionnaire by industrial experts, the final questionnaire was sent to 100 manufacturing firms. There were totally 30 questions in the questionnaire related to three variables such as GP, GM, GD/M and FR. The questionnaire is based on five point Likert scale (1: strongly disagree to 5: strong agree). A total of 78 questionnaire responses were received, in which 11 responses were excluded due to not being properly filled or unusable. Thus, the total sample size included for analysis is 67. We use the hierarchical multiple regression method on SPSS (version 22) to test the hypotheses. The research model is shown in Fig. 1.

4 Analysis and Results

We study the reliability analysis, exploratory factor analysis, and multiple regressions for dataset. The exploratory analysis was conducted to determine the underlying structure for the 30 items of the enterprise performance questionnaire. Based on the hypotheses and model shown before, three factors were requested. This is due to the fact that the items were designed to index four constructs: firm reputation is a dependent variable, while green purchasing, green manufacturing and green distribution/marketing were predictors. The value of KMO measure of sampling adequacy (0.743) indicates that the sample has fulfilled the requirement to run factor analysis. Moreover, a significant result of Bartlett's test ($p < 0:05$) shows that the matrix is not an identify matrix. In other words, these four components do relate enough to one another to further run a substantial factor analysis. Table 2 illustrates the results of KMO and Bartlett's test.

Also, the initial solution of exploratory factor analysis was rotated by using the orthogonal (varimax) rotation approach with Kaiser normalization which extracted the six required uncorrelated factors. We accounted for the variances of 19.725%, 18.276%, 17.753% and 27.348% respectively. However, these four components explained the cumulative 83.102% of the total variance. For the internal consistency of measuring scale, Cronbach's alpha of every variable also was calculated. The overall reliability of scale of the 30 items was 0.824 because, to enhance clarity, values less than 0.30 were omitted. Table 3 indicates the items and factor loading for the rotated factors. Since all of these 24 items were loaded onto their own components in the rotated solution, there were no cross-loadings as well, while both the discriminant and construct validity were ensured already.

4.1. Hypotheses testing

After satisfying the basic parametric assumptions, linear multiple regression was used to determine: the size of the association among variables of green purchasing (independent) and firm reputation (dependent variable); and to what extent every independent variable (i.e. green manufacturing and green design/marketing) individually contributed to predicting firm reputation. Table 3 illustrates the values of mean, standard deviation of enterprise performance, and its predictors. Table 4 illustrates the results of hypotheses testing through simultaneous multiple regression for predicting enterprise performance. The combination of variances significantly predicted 33.6% of the total variance in predicting enterprise performance.

Table 1. Results of KMO and Bartlett's test.

Kaiser–Meyer–Olkin measure of sampling adequacy	**0.743**
Bartlett's test of sphericity Approx. chi-square	**4321.621**
Degrees of freedom	**263**
Significance	**0.000**

Table 2. Rotated components matrix (extraction method: principal component analysis and rotation method: varimax with Kaiser normalization).

		Component			
	Alpha	**1**	**2**	**3**	**4**
Green Purchasing	0.811	0.782			
Green manufacturing	0.930		0.837		
Green Distribution/Marketing	0.814			0.852	
Firm Reputation	0.924				0.872
Eigenvalues		3.531	3.051	2.553	1.978
% of variance explained		13.221	12. 217	10.753	8.348
Cumulative % of variance explained		21.72	41.89	57.65	78.05

Table 3. Descriptive statistics

	N	Mean	Std. deviation
Firm Reputation	67	29.47	3.93
Green Purchasing	67	17.42	4.13
Green Manufacturing	67	21.33	4.21
Green Distribution/Marketing	67	18.91	3.42

The results of hypotheses testing through simultaneous multiple regression for predicting enterprise performance is shown in Table 4. . The combination of variances significantly predicted 32.7% of the total variance in predicting firm reputation (F =23.7, p < 0:001), with three independent variables that significantly predicted firm reputation. Moreover, the issue of multicollinearity is not found among independent variables because the variance \VIF" value for each independent variable is less than 10. The coefficients of parameter estimates suggest the green purchasing (0.217, p < 0.05), green manufacturing (0.237, p < 0.05) and green distribution/marketing (0.232, p < 0.05) reflect a statistically significant and positive impact on firm reputation.

Table 4. Hypotheses testing for firm reputation through standard regression analysis. Unstandardized coefficients

Hypothesis	B	Standard Error	VIT	T-Statistics	Significance	Accept or Reject the Hypothesis
Constant	8.273	1.432		5.231	0.00	
Green Purchasing → Firm Reputation (H1)	0.217	0.053	1.432	2.33	Sig<0.05	Not rejected
Green Purchasing → Green Manufacturing (H2)	0.227	0.042	1.263	2.19	Sig<0.05	Not rejected
Green Purchasing → Green Distribution/Marketing (H3)	0.206	0.039	1.124	2.11	Sig<0.05	Not rejected
Green Manufacturing → Green Distribution/Marketing (H4)	0.219	0.032	1.137	2.14	Sig<0.05	Not rejected
Green Distribution/Marketing → Firm Reputation (H5)	0.232	0.051	1.411	2.28	Sig<0.05	Not rejected
Green Manufacturing → Firm Reputation (H6)	0.237	0.054	1.672	2.44	Sig<0.05	Not rejected

When dependent variable: Firm Reputation ($F = 23.7$, $p < 0:001$, and adjusted $R^2 = 32.7\%$).

5. Conclusions

The simultaneous multiple regression analysis prove that green purchasing, green manufacturing and green distribution/marketing have a significant and positive impact with firm reputation. The statistical results found that green manufacturing is the most important predictor of firm reputation. This result is also supported by previous empirical studies. Then comes the green distribution/marketing next important predictor and then comes to green purchasing. All have a positive and significant impact on firm reputation. Green purchasing, green manufacturing and green distribution/marketing all reduces the resources and cost in terms of recycling, reuse, and remanufacturing and also improves the firm reputation. The following equation shows the regression equation to predict firm reputation M= 8.273+0.217 X Green Purchasing +0.232 X Green Distribution/Marketing +0.237 X Green Manufacturing.

This research examined the impact of green purchasing, green manufacturing and green distribution/marketing on firm reputation. Three dimensions of green purchasing, green manufacturing, green distribution/marketing were assessed and the result suggest that all these have a positive and significant impact on firm reputation. Therefore, it is recommended that the senior management of manufacturing firms should implement green practices to improve the overall environmental performance and also enhance the

operational and reputational performance which in turns leads to overall economic performances along with firm positive brand image. The main objective of senior management of having an optimum enterprise performance can also be reinforced by a \green awareness and training program" to their employees and distributors.

5.1. Managerial Implications

In terms of managerial implications, this research has verified the significance of green purchasing, green manufacturing, green distribution/marketing to firm reputation. Hence, when it comes to managing their respective manufacturing firms, the management should pay attention to these three aspects of green supply chain management practices to enhance firm reputation. In addition, this study has put forward some valuable insights to senior management of manufacturing firms in practice, to identify problematic areas in their own firms and devise corrective actions.

Another valuable result is that although green purchasing, green manufacturing green distribution/marketing has a significant and positive impact on firm reputation, this requires a long-term infrastructural requirements. There is no doubt that green manufacturing processes are long-term investments of firms in favor of the environment, firm's brand image, and firm's financial performance. The green manufacturing is very crucial for continuous improvement (CI) of enterprise in the long run. The green manufacturing processes will also help firms to achieve their financial targets through reduction of cost. The research results suggested that senior management should review firm's green practices, initiatives, and relevant policies, and conduct them in a way that supports high level of enterprise performance. Therefore, senior management should not ignore the importance of green purchasing, green manufacturing and green distribution/marketing for making a brand image and reputation of the enterprise.

Future research should include the additional measure of performance, such as the operational performance of the firm and the overall performance of the green supply chain. This study is limited to only the manufacturing firms, however, future researches may concentrate on comparative studies between manufacturing industry and other industries. Future researches can be conducted with other predictors, including green logistics, co-operation with customers and suppliers, and internal environmental management.

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