

The Role of Green Manufacturing in Development of Ecologically Conscious Consumer Behavior (ECCB) towards Green Products

Neetu Choudhary^{1*}, Shahid Ul Islam², P. J. Philip³ and Rajinder Kumar⁴

¹School of Business, Lovely Professional University, Phagwara - 144411, Punjab, India; neetu.18764@lpu.co.in

²School of Civil Engineering, Lovely Professional University, Phagwara - 144411, Punjab-144411, India; shahid.18550@lpu.co.in

³Department of Humanities and Social Sciences, NIT Kurukshetra - 136119, Haryana, India; pjphilip2002@yahoo.com

⁴Department of Management, NIT Kurukshetra - 136119, Haryana, India; rajinderdeswal@yahoo.com

Abstract

Background/Objectives: To explore the relationship between green manufacturing dimensions and ecologically conscious consumer behavior in electronics sector moreover to study the difference of demographic variables while exhibiting Ecologically Conscious Consumer Behavior (ECCB) towards purchase. **Methods/Analysis:** A sample comprised of 342 consumers from north India. Correlation and multiple regression are performed to find the significant relationship between green manufacturing dimensions and ECCB dimensions. Besides, to explore the association between demographic and carrier variables and ECCB while taking decision towards purchasing green electronics products. **Findings:** Results showed that there is significant relationship between green manufacturing and ECCB. Besides, age, education, income of the respondents are significant factors found across the sample which influence consumers' ECCB towards purchasing green electronics products. **Applications/Improvements:** The theoretical and operational implications of the results are discussed in the paper. The study is limited to the perception of electronics product consumers from north India.

Keywords: Consumer Decisions, Ecologically Conscious Consumer Behavior, Green Products

1. Introduction

The rapid global growth in the past decade have witnessed increasing customer's consumption raising concern for the environmental deterioration and over consumption of natural resources. A number of public surveys and polls show overwhelming concern for protecting environment in this decade^{1,2}. This shows a paradigmatic shift in the orientation from general consumer behavior to ECCB. ECCB considered to be the consumers' behavior concerned about the environment, the so called Ecologically Concerned Consumers (ECCs)^{3,4}. A number of authors suggested that consumers with a high level of environmental concern more likely to exhibit ECCB yet

there is large variation in such behavior^{5,6}. Furthermore, environmental concern is generally considered to be multifaceted⁷.

So, today environmental manufacturing is becoming a strategic approach in recent business endeavors. Furthermore, due to increase in social and political pressure now organizations are shifting from profit driven strategies to green manufacturing strategies which are also becoming a source of competitive advantage⁸. Internationally a number of research studies suggested that special category of consumers who are concerned with eco-friendly products and life styles tend to develop gradually⁶. But still Indian consumers are easy prey of high technology products⁹ and eco-friendly products yet

* Author for correspondence

to become main stream. So, now a day companies are also shifting their manufacturing strategies to attract and retain environmental conscious customers for the long time. And these green manufacturing is going to provide benefits to organization as well as environment also.

1.1 Green Manufacturing

Green manufacturing is a new concept involved in last decade in Germany. In fact, the Germans have established a “de facto” global manufacturing standard suggested that, “any company wishing to compete globally must start making products that will comply with the green dictates of the huge European market”. Green manufacturing can be defined as economically-driven, systematized and integrated approach which eliminates all waste streams associated with manufacturing, design and dispose of products and materials¹⁰. In green manufacturing standard one organization should reach zero environmental pollution, zero threat to health and safety of workers and consumers, waste recycling and disposal during manufacturing¹¹. Even European Union also passed two regulation named WEEE (waste electrical and electronics equipment) and RoHS (restriction of hazardous substance) for prohibiting the sales of hazardous products in market¹². Apart from this, business firms should upgrade their manufacturing system from older functional roles to new strategic green roles^{13–15}. Further suggested that a firm’s core capabilities and resources affect their competitive advantage at the marketplace. A number of research studies reported a positive association between firm’s capability, firm’s performance and effectiveness^{7,16}. Moreover the importance of green manufacturing strategies (Green Supply Chain Management) such as green manufacturing and packaging, environmental participation, green marketing, green suppliers, green stock, and green eco-design has been explored, which can affect the consumer behavior¹⁷. However little research has been done to examine these manufacturing strategies in the context of Indian electronics market. So, this research study contributes to the literature by focusing on the under-researched Indian electronics industry.

1.2 Ecologically Conscious Consumer Behavior (ECCB)

During the nineties, which were called the ‘earth decade’, there was a considerable increase in academic interest

towards the ecologically related consumer behaviour in relation to a broad variety of determining factors^{10, 18–20}. The term ECCB was used by Roberts for the first time (1996). ECCB - including pro-environmental purchase, pro-environmental post-purchase (recycling) and pro-environmental activities. The topic of ECCB has never been in the mainstream of the manufacturing organizations⁵. Geographically, research publications are more profuse in the U.S.A. than in Europe²¹. And in India ecologically oriented research has been almost absolutely neglected⁹. Furthermore, a study examined that the existence of environmentally conscious customers in food product packed with recycled material has created a demand in niche market for green products and services²². A survey also showed that European consumers are more interested in green featured products/services, and due to this European MNCs has adopted various environmental manufacturing strategies and programmes^{23,24}.

2. Objectives

After reviewing the above studies, the present study focuses on the following objectives:

- To study the relationship between green manufacturing dimensions and Ecologically Conscious Consumer Behavior (ECCB).
- To explore the association of demographic and carrier variables with Ecologically Conscious Consumer Behavior (ECCB).

3. Research Methodology

A sample of 342 electronics products consumers was selected through survey for administrating the questionnaires. The data were collected from the Haryana, Punjab, Chandigarh, Delhi and NCR region. Out of the 835 questionnaires, 342 were collected back, representing a response rate of 40.9 per cent. The profile of the respondents as per their demography is presented in Table 1. Furthermore, correlation and multiple regression were used to explore the relationship between green manufacturing and ECCB. Besides, independent t-test for demographic variables (gender and marital status) and one-way ANOVA for carrier variables (education and income) are performed to see, is there any significant difference between demographic and carrier variables while exhibiting ECCB.

3.1 Measures

3.1.1 Demographic and Carrier Variables

Demographic variables; gender, marital status and carrier variables; education, occupation and income are measured using different ordinal scales ranged between two points (gender and marital status) to three points (education, income). Job tenure was measured based on the records of the respondents about the years they worked in the organisation.

3.2.2 Green Manufacturing Scale

Green manufacturing was measured with thirty-seven items scale developed by¹⁷. Green manufacturing was measured with six multi-item behavioral variables: Green manufacturing & packaging (10 Items), environmental participation (9 Items), green marketing (8 Items), green stock (6 Items), green supplier (2 Items) and green eco-design (2 Items).

3.3.3 Ecologically Conscious Consumer Behavior (ECCB)

ECCB was measured with the scale developed by²⁵. ECCB was measured with three multi-item behavioral variables: pro-environmental purchasing behavior (11 items), Pro-environmental post-purchasing (recycling) behavior (5 items), Pro-environmental activity (11 items).

All behavioral variables measured on a seven point likert scale from 1 = Never to 7 = Always. Scoring was done as per the directions and the raw scores were tabulated accordingly.

Table 1. Demographic profile of respondents

Demographic factor	Category	Percentage
Gender	Male	54
	Female	46
Age	Upto 45 years	56
	Above 45 years	44
Education	Undergraduates	51
	Post graduates	41
	Others	8
Income	Rs.10001- 50000	58
	Rs.50001-100000	27
	Rs.100001 and above	16
Occupation	Businessman	42
	Serviceman	50
	Others	8

4. Results

Table 1 reports the mean, standard deviation, Pearson correlation and reliabilities of the variables. The correlation matrix shows significant and positive relationship between demographic and carrier variables – age, gender, income, education, green manufacturing dimensions and ECCBs three dimensions. Correlation relationship showed that ECCB dimensions; Pro-Environmental Purchasing Behavior and Pro-Environmental Activity are significantly related to the demographic and carrier variables except gender. Besides Pro-Environmental Post-Purchasing (Recycling) Behavior is not significantly related to any demographic variables. This is an unexpected finding. Moreover, Pro-Environmental Purchasing Behavior, Pro-Environmental Post-Purchasing (Recycling) Behavior and Pro-Environmental Activity are also showing positive and significant relationship with four out of six green manufacturing dimensions (Green manufacturing & packaging, environmental participation, green marketing and green eco-design). Findings of the multiple regression analysis are presented in Table 2. In general findings, partial support is found for objective one. Objective one predicted that green manufacturing dimensions would be related to Pro-Environmental Purchasing Behavior. The results showed that Pro-Environmental Purchasing Behavior and Pro-Environmental Activity are significantly related to all green manufacturing dimensions except green stock ($\beta=.16$, $p>.05$); ($\beta=.09$, $p>.05$) and green suppliers ($\beta=.12$, $p>.05$) ($\beta=.11$, $p>.05$). Moreover, all but green stock green manufacturing dimensions are also significantly found related to Pro-Environmental Post-Purchasing (Recycling) Behavior (green stock; $\beta=-.08$, $p>.01$).

Independent t test is conducted for exploring the difference of gender and age of respondents in the exhibition of ECCBs. Results show that there is no significant difference between male and female while exhibiting ECCBs ($t= 17.31$, $p>.05$). The difference is not significant although male respondents exhibit more ECCBs than female respondents. While there is significant difference in the display of ECCBs of consumers according to the age of the respondents ($t= 6.35$, $p<.05$). Which means younger consumers are ($\bar{X}= 88.75$) displaying higher ECCBs than aged consumers ($\bar{X}= 78.22$). A one-way ANOVA is conducted for examining the effects of income, occupation and education level on ECCB three

dimensions; Pro-Environmental Purchasing Behavior, Pro-Environmental Post-Purchasing (Recycling) Behavior and Pro-Environmental Activity. There is a non-significant effect of occupation on Pro-Environmental Purchasing Behavior [$F(2, 54) = 4.621, p = .74$] as well as on Pro-Environmental Activity [$F(2, 66) = 3.991, p = .59$]. Although, income and education are found to be significantly related to all the three ECCB dimensions. Further post-hoc analysis shows that respondents having more income and education are displaying more ECCB while purchasing any electronics goods as compared to respondents having lower income and education.

4. Discussion

This research paper showed a positive association between green manufacturing strategies and ECCB of Indian electronic consumers. Results revealed a positive and significant relationship between green packaging, green marketing, environmental participation and green eco-designing with all the three ECCB dimensions; Pro-Environmental Purchasing Behavior, Pro-Environmental Post-Purchasing (Recycling) Behavior and Pro-Environmental Activity. Marketers should highlight the green designed and other manufacturing attributes in marketing and advertisement activities. So, they can easily target the ECCB exhibiting customers and would be succeed in global competitive market. The results also confirmed that there is a positive and significant relationship between green manufacturing strategies and ECCB of respondents. Which means if organizations are

going to enhance their manufacturing strategies greener then it will enhance ECCB of the respondents. Besides results also showed that younger generation is showing high concern for the eco-system and green products. The reason could be high social media advertisement and promotional activities which create the appropriate brand positioning in the mind of the targeted customers. Another study stated similar results in their study that information and knowledge from media and reference group communication formed the positive attitude towards the green product or services²⁶. Moreover, more educated respondents are exhibiting higher ECCB for the consumptions of electronics goods. It may be due to that education creates knowledge and awareness about the green products and their role in environmental protection. So, respondents are found to be emotionally associated with green products and price is generally ignored at the cost of environment protection by them which show a positive ECCB.

Although in this study non significant relationship has been found between occupation, gender and ECCBs. Which shows that occupation and gender of respondents do not make any difference while displaying environmental concerned behavior during purchasing. Similar results were found by one other study²⁷. However other study indicated the opposite results. So, for more causality more studies should be conducted to investigate the relationship between demographic variables of respondents and ECCB. It is also important to note that respondents with higher monthly income are exhibiting significant and positive association with pre and post

Table 2. Means, Standard Deviation, Reliability and Correlations

Variables	Mean	S. D.	1	2	3	4	5	6	7	8	9	10	11	12	α
1. Age	40.4	0.89													--
2. Gender	.46	0.79	.56**												--
3. Income	25.6	0.82	.57**	.62**											--
4. Education	13.56	0.78	.61*	.66**	.59**										--
5. GMP	5.52	.91	.48*	.23	.34*	.55**									.93
6. Environmental Participation	4.48	1.15	.32*	.45**	.34**	.49**	.34*								.93
7. Green Marketing	4.23	1.10	.44*	.33*	.26*	.48**	.33*	.37**							.91
8. Green Suppliers	5.01	1.21	.33*	.13	.18	.51*	.39*	.38*	.45**						.90
9. Green Stock	4.88	1.25	.53*	.22	.16	.46**	.36**	.41*	.38*	.44*					.81
10. Green Eco-design	5.22	1.26	.55**	.62**	.63**	.59**	.39*	.40*	.39*	.23	.38*				.73
11. PEPB	3.41	0.85	.12	.08	.62**	.62**	.88***	.44*	.56*	.24	.22*	.45**			.76
12. PEPPB	3.83	0.77	.18	.12	.47	.33	.42**	.51**	.51*	.20	.21	.44**	.33*		.78
13. PEA	3.26	0.94	.09	.15	.46**	.38**	.38**	.45**	.49**	.24	.24	.39*	.31*	.38*	.77

* = $p < .05$, ** = $p < .01$, *** = $p < .001$, Reliability in last column. GMP = Green Manufacturing & Packaging; PEPB = Pro-Environmental Purchasing Behavior; PEPPB = Pro-Environmental Post-Purchasing (Recycling) Behavior; PEA = Pro-Environmental Activity

environmental behavior and activities. But other studies showed weak correlation between environmental concern and monthly income of consumers²⁸. In India, consumers are very sensitive to the price of the product. So, before taking any purchasing decision of electronic goods they prefer to compare the price over other attributes²⁹. Same results showed by this research study also.

5. Limitations

Like any other study, this one is also not without limitations. Firstly, we adopted particular green manufacturing scale consist of six dimensions, one should also consider the other strategies like eco-labeling, green technologies while exploring ECCB. Besides a number of research studies divided environmental activity behavior into further sub activities. Future research should also consider this point for further research. And finally the sample was chosen by using survey method from the electronic goods consumers of Haryana, Delhi and NCR region. So, this setting may not be unique enough to limit the external validity of the results. This study should be replicated in other cities of India and in other industries with different sampling methods for greater generalizability.

6. Conclusion

Marketing research may provide important information to manufacturing companies as well as societies, interested in adopting green manufacturing strategies and products in favor of environmental protection. As the key element of any manufacturing strategy is consumer retention. Our theoretical framework creates an awareness about ECCB dimensions in India with the help of that companies can target and retain consumers effectively. So, findings of this research paper suggest that ECCB could be better measured if other future studies can work upon findings others determinants of ECCB like environmental knowledge, recycling attitude etc.

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8. References

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