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MANAGEMENT OF GREEN PROCUREMENT IN SMALL AND MEDIUM-SIZED MANUFACTURING ENTERPRISES IN DEVELOPING ECONOMIES

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Abstract

This article explores the issue of managing green procurement at the level of small and medium-sized enterprises in developing countries. Green procurement remains a relatively new trend for small and medium-sized enterprises (SMEs). Therefore, a thorough analysis of this issue is a topic theme. In this perspective, the following hypotheses are highlighted: green procurement affects the competitiveness of an enterprise, its economic indicators, the environment and society. The data collected from SMEs in Kyiv and Kyiv region. As a result, we analysed the questionnaires provided by the managers of 181 companies operating in different industries and different forms of ownership. Factor analysis was conducted to evaluate the scales used in the study, and hypotheses were tested using structural equation modelling. The results show that green procurement has a positive impact on competitiveness, economic performance of SMEs, the environment and society. Therefore, small and medium-sized enterprises in developing countries should pay attention to the development and implementation of green supplies, as this will have a positive impact on their performance. The research conducted can serve as a benchmark for conducting similar studies on other enterprises.

Keywords: green procurement, green supply chain, enterprise competitiveness, economic performance, ecological environment, impact on society

JEL Classification: L60, O35, Q56

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Introduction

The implementation of green supply measures at the enterprise contributes to the development of social responsibility and increase the level of competitiveness. Green supply chain management, as a new model of modern management, aims to achieve the goal of sustainable development of the social economy and promote the basic competitiveness of enterprises. In particular, this is due to the fact that these measures reduce the impact of the enterprise on the environment and develop programs for the efficient use of natural resources.

The increasing level of industrialization in developed countries, coupled with globalization trends, is creating new challenges for supply chain management in enterprises (Nurjanni et al., 2017). The pressure on manufacturing and the development of environmentally friendly products has increased significantly over the last decade (Vachon, 2007). Due to the ever-increasing scarcity of natural resources and growing concern in the market for green products and processes, environmental issues are rapidly becoming one of the most important decision-makers of manufacturing organizations (Mudgal et al., 2010). Supply chains play an integral role in today's globalized economy, so in order to truly drive sustainable business development, one must understand the key dynamics and influential themes of sustainable supply chain development (Reefke and Sundaram, 2017; Cheng et al., 2018). As a result, businesses are becoming more interested in implementing the green supply chain to increase enterprise performance (Tseng et al., 2013; Shen et al., 2017). Because through green supply chain initiatives, businesses are trying to improve environmental performance across the supply chain (Lee, 2008).

The purpose of this study is to investigate the relationship between green procurement and activities of small and medium-sized enterprises. The aim is: (1) to determine the impact of green procurement on enterprise competitiveness, economic performance, and the ecological environment and society of SMEs in developing countries, particularly in Ukraine. Research conducted on the territory of Ukraine examined the issue of green procurement implementation only at the state level (Turchenko, 2016; Konashchuk, 2016; Khalina et al., 2019). Regarding research into the experience of large corporations in green procurement, they were conducted by Wu et al., 2012; Mefford, et al., 2016; Rasool et al., 2016. For small and medium-sized enterprises, in particular the implementation of green procurement for them, was studied by Frey et al., 2013; Rehman et al., 2017; Tihomir et al., 2018; Szegedi et al., 2017; Tachizawa et al., 2012; Mafini et al., 2018 and others. However, none of these studies has taken into account a comprehensive study of SME green procurement practices and its impact on enterprise competitiveness, economic performance, the environment and society. There has also been insufficient research on green procurement and green production in developing countries, including Ukraine. This study is important because it will allow the right management decisions to be made regarding the feasibility of developing and implementing green procurement strategies at the enterprise level in developing countries.

The other sections of this article are organized as follows. The next section is a review of the scientific literature on green procurement practices. The conceptual framework is then outlined and hypotheses formulated. Then comes the section on the methodology of the study. The following is a test of the hypotheses. The article concludes with discussions, also offers suggestions for future research, conclusions.

1. Green procurement in the economic literature

This section briefly reviews the scientific literature on the concepts used in this study. These are green enterprise purchases, their competitiveness, economic performance, and their impact on the environment and society.

The strategic position of manufacturing enterprises in improving their overall efficiency and competitive position requires joint coordination of internal and external green procurement practices (Zhu et al., 2012). In the scientific literature, such motives for the implementation of green supply chain management (GSCM) are identified as ethical and commercial (Testa and Iraldo, 2010). The implementation of GSCM practices helps to increase business efficiency, as well as the operational and relational effectiveness of vendor firms (Lee et al., 2012).

Green et al. (2012) in their paper argue that the development and implementation of GSCM production plants leads to an increase in environmental performance. Under pressure and stakeholder regulations, businesses are enhancing green supply chain management practices, which is reflected in increased green procurement, green design elements, recycling and conscious customer engagement (Kazancoglu et al., 2018).

Small and medium-sized enterprises are significantly influenced by legislation in place in a particular country regarding requirements for their activities (Testa et al., 2016; Cudanov et al., 2018). The concept of green procurement is a priority for each country as it contributes to environmental, social and economic benefits (Malatinec, 2017). Therefore, it is necessary to develop such a public green procurement policy to force suppliers to promote their social goals (Grandia and Voncken, 2019).

It is worth noting the influence of the culture of a particular country on the decision making of green procurement in the enterprise (Bag, 2017). By raising public awareness of responsible business practices and their positive impact on the economy as a whole, efficiency gains can be achieved from implementing green procurement measures (Khan, 2013).

Emissions have made a major contribution to recent climate change, which poses major challenges and threats to the entire human race in the form of global warming, earthquakes, hurricanes, tsunamis and floods (Dubey et al., 2017). Over the last few decades, companies have shown increasing concern about the environmental impact of their manufacturing activities (Vanalle et al., 2017). GSCM has been found to strongly complement other management best practices and to improve environmental performance (Testa and Iraldo, 2010). Therefore, choosing the right supplier is a key strategic direction for manufacturing companies to eliminate environmental impacts through the implementation of supply chain management (Tseng and Chiu, 2013). Producers with strong internal GSCM practices, combined with long-term environmental monitoring of suppliers, cope well with environmental issues (Laari et al., 2016).

Customer requirements are an important driver for implementing GSCM practices in the enterprise because, due to consumer pressure, manufacturers are able to respond appropriately to suppliers (Laari et al., 2016). Research has also found that GSCM practices help create new opportunities to attract customers in addition to meeting customer demand (Lee et al., 2012).

2. Conceptual framework and hypothesis development

2.1. Green procurement and enterprise competitiveness

As a result of research, Orsato (2006) indicates that investing in the environment, in particular in green procurement, enables it to be transformed into a competitive advantage. Investing in greening different phases of the supply chain leads to the development of an enterprise strategy for green procurement, which ultimately contributes to increasing competitiveness (Rao and Holt, 2005). As indicated by Tan et al. (2016), green procurement has a direct impact on the competitiveness of the enterprise. In light of these views, the following hypothesis is put forward:

H1: Green procurement has a positive impact on the competitiveness of manufacturing SMEs.

2.2. Green procurement and economic performance of the enterprise

Rao and Holt (2005) have shown that the introduction of green procurement management practices in an enterprise leads to an increase in economic performance. Research has also shown that green procurement has a direct impact on the cost-effectiveness of an enterprise, since such an enterprise pays more attention to developing its own capacity to increase efficiency (Song et al., 2017). Enterprise executives should develop short-term and long-term green procurement measures (Malviya, 2017). The results of Ananda et al. (2015) indicate that green supply chain management has a significant impact on the economic performance of businesses. This leads to the following hypothesis:

H2: Green procurement has a positive impact on the economic performance of manufacturing SMEs.

2.3. Green procurement and the ecological environmental impact of the enterprise

Zhu and Sarkis (2004) emphasize that in a globalized economy, businesses need to pay attention to green procurement, which contributes to improving their environmental performance. By designing and implementing green procurement, businesses have a positive impact on the environment (Eltayeb et al., 2011; Al-Sheyadi et al., 2019). To address the environmental problems facing modern society, Noor et al. (2018) propose to introduce eco-innovations in enterprises, such as green purchasing management. Baofeng et al. (2019) point out in their work that green procurement has a positive effect on the environmental performance of the enterprise. Thus, the following hypothesis is formulated:

H3: Green procurement has a positive effect on the ecological environmental situation of manufacturing SMEs.

2.4. Green procurement and the impact of the enterprise on society

Green procurement helps to save energy and reduce environmental pollution, so researchers propose to implement environmental modernization by raising public awareness of environmental issues (Zhu et al., 2011). Sezen and Çankaya (2013) suggest that green

production and green procurement have a significant positive impact on social performance. Chen et al. (2017) found that green purchasing businesses benefit from the environmental awareness of their customers. In view of these views, the following hypothesis is proposed:

H4: Green procurement has a positive impact on society.

3. Research methodology

3.1. Instrumentation

A structured survey questionnaire was used to collect data from respondents. A quantitative study was selected to test the relationships between the various hypotheses that were proposed.

The developed survey questionnaire was submitted for review to 3 academicians and 5 heads of enterprises. Thereafter, changes were made and a preliminary survey was conducted at ten random enterprises. Based on this, the questionnaire was re-examined and improved to make sure it was understood and can be used in Ukraine.

Previous surveys have been reviewed in detail to develop the survey questionnaire. Green purchasing was measured using six questions adapted from the studies of Zhu et al. (2008) and Yang et al. (2013). Enterprise competitiveness was measured using five questions adapted from Ganeshkumar and Mohan (2015) and Krajewski et al. (2010). The impact on the economic performance of an enterprise was measured using five questions adapted from Rao et al. (2005) and Solakivi et al. (2011). Environmental impact was measured using six questions adapted from Zhu et al. (2010) and Tan et al. (2016), and social impact was measured using five questions adapted from Tan et al. (2016) and De Giovanni et al. (2012). Respondents were asked to rate their answers on a five-point Likert-type scale (1932) (by (1) not at all and (5) significant).

3.2. Sample and data collection

The target audience for the research was selected by manufacturing SMEs operating in different industries in the city of Kyiv and Kyiv region, Ukraine. The total number of enterprises operating in this territory is 104 340 (information is taken from the State Statistics Service of Ukraine, 2019). For the survey, 400 questionnaires were sent to employees of small and medium-sized enterprises by e-mail. Of these, 218 were returned, of which 37 were rejected due to errors and missing data. Accordingly, 181 questionnaires were used in the final analysis. A response rate of 45% is considered satisfactory. The characteristics of the respondents are presented in table no. 1.

Table no. 1: Sample description

Characteristics of Firms	Frequency	Percentage
<i>Industry</i>		
Industry	16	9
Construction	16	9
Wholesale and retail trade	58	31
Information and Telecommunications	12	7
Financial and insurance activities	6	3
Real estate transactions	18	10
Repair of motor vehicles and motorcycles	9	5
Transport	7	4

Characteristics of Firms	Frequency	Percentage
Professional, scientific and technical activities	26	14
Administrative and support service activities	10	6
Others	3	2
<i>Number of Employees</i>		
1–49	42	23
50–99	31	17
100–299	27	15
300–999	29	16
1000–1999	27	15
2000–4999	16	9
Over 5000	9	5
<i>Ownership</i>		
State and collectively-owned	58	32
Privately-owned	78	43
Foreign invested	45	25
<i>Years after establishment</i>		
<5	94	52
10–20	65	36
>20	22	12
<i>Highly polluting</i>		
Yes	118	65
No	63	35
<i>Job Title</i>		
Vice-president and above	6	3
Director and assistant director	18	10
Manager and assistant manager	130	72
Non-management employee	27	15
<i>Department</i>		
Operations and Logistics	65	36
Procurement	38	21
Quality Improvement	20	11
Sales and Marketing	27	15
Others	31	17
<i>Years of Tenure</i>		
< 5 years	118	65
6–10 years	42	23
11–15 years	13	7
15 and above	8	5

These surveys have been collected between January and June 2019 by sending questionnaires to manufacturing SMEs via e-mail.

3.3. Data analysis

After checking the questionnaires received and rejecting the questionnaires with errors, all the resulting information is summarized in an Excel spreadsheet. The data collected was analysed using SPSS and AMOS software.

3.4. Ethics of research

The following considerations were observed when collecting information through questionnaires: the right to confidentiality of information provided, the right to anonymity, consent to the processing of information and its subsequent use, the right to refuse to interrogate, protection from harm in providing information.

4. Results and discussions

The analysis of psychometric properties of the measurement scales was conducted through a CFA to ascertain the reliability, validity and model fit of the constructs. The results of this analysis are presented in table no. 2.

Table no. 2: Psychometric properties of measurement scales

Research constructs or measures	Item-total correlations	Factor loadings	Cronbach's alpha	Average variance extracted	Mean	Standard deviation
<i>Green procurement</i>						
GP1	0.61	0.57	-	-	-	-
GP2	0.62	0.63	-	-	-	-
GP3	0.57	0.65	0.73	0.42	3.13	0.85
GP4	0.66	0.55	-	-	-	-
GP5	0.55	0.73	-	-	-	-
GP6	0.63	0.68	-	-	-	-
<i>Competitiveness of the enterprise</i>						
CE1	0.63	0.61	-	-	-	-
CE2	0.64	0.65	-	-	-	-
CE3	0.68	0.55	0.78	0.45	3.76	1.03
CE4	0.62	0.74	-	-	-	-
CE5	0.58	0.55	-	-	-	-
<i>Economic indicators of activity</i>						
EI1	0.67	0.72	-	-	-	-
EI2	0.65	0.53	-	-	-	-
EI3	0.54	0.62	0.82	0.43	3.84	0.98
EI4	0.58	0.69	-	-	-	-
EI5	0.63	0.73	-	-	-	-
<i>Impact on the ecological environment</i>						
EE1	0.57	0.62	-	-	-	-
EE2	0.53	0.58	-	-	-	-
EE3	0.62	0.71	0.71	0.47	3.01	0.63
EE4	0.66	0.65	-	-	-	-
EE5	0.58	0.68	-	-	-	-
EE6	0.61	0.72	-	-	-	-
<i>Impact on society</i>						
SC1	0.51	0.54	-	-	-	-
SC2	0.55	0.76	-	-	-	-
SC3	0.61	0.69	0.73	0.41	3.24	0.74
SC4	0.56	0.58	-	-	-	-
SC5	0.66	0.52	-	-	-	-

Since the Cronbach's alpha values were greater than the minimum threshold of 0.7 in the study, all five constructs considered in this study were reliable. Also, the element correlation coefficient values were larger than the recommended minimum value of 0.3, so this also indicates that the scale reliability was satisfactory. The standard deviation in the study exceeded the minimum threshold of 0.5, so the scale is considered satisfactory. Average variance extracted exceeded the minimum threshold of 0.4 and the five proposed designs can also be considered satisfactory.

The mean scores for all constructs (table no. 2) in the measurement scale ranged between 3.01 and 3.84. The average green procurement score (3.13) indicates that SMEs are currently considering implementing these measures. Average values of enterprise competitiveness (3.76) and economic indicators (3.84) indicate a relatively significant involvement of SMEs in this activity. To influence the environment, the average score was 3.01, indicating that SMEs are currently considering using these indicators. The standard deviations ranged between 0.63 and 1.03, meaning the indicators were correctly selected and the results of the study were authentic.

4.1. Discriminant validity

To measure the discriminant validity, the correlations between the proposed constructs were used. The results of the correlation analysis are shown in table no. 3.

Table no. 3: Pearson correlations between constructs

Constructs	GP	CE	EI	EE	SC
Green procurement (GP)	1.000	-	-	-	-
Competitiveness of the enterprise (CE)	0.619	1.000	-	-	-
Economic indicators of activity (EI)	0.561	0.759	1.000	-	-
Impact on the ecological environment (EE)	0.523	0.178	0.243	1.000	-
Impact on society (SC)	0.467	0.512	0.564	0.437	1.000

The obtained correlation values not exceeding 0.85 indicate that there is a discriminant validity between the scales, since these constructs do not intersect each other and therefore measure different things.

As shown in table no. 3, the ratios between all constructs were positive, varying between 0.178 and 0.759. The problem of multicollinearity arises in the study if Pearson's R-value exceeds 0.90 (Hinkle et al., 2003). The strongest dependence was observed between the competitiveness of the enterprise and economic indicators (0,759). Overall, the results after testing indicate that all measurement scales that were eventually used in the study were reliable and reliable.

4.2. Hypothesis testing

The hypotheses were tested using the SEM procedure. The results are reported in table no. 4.

Table no. 4: Hypotheses tests results

<i>Proposed relationships</i>	<i>Hypothesis</i>	<i>Beta coefficient</i>	<i>P</i>	<i>t</i>	<i>Decision</i>
Green procurement → Competitiveness of the enterprise	H ₁	0.512	0.008	3.592	Accepted
Green procurement → Economic indicators of activity	H ₂	0.714	0.004	2.454	Accepted
Green procurement → Impact on the ecological environment	H ₃	0.633	0.007	3.675	Accepted
Green procurement → Impact on society	H ₄	0.482	0.006	3.193	Accepted

Analysis of the results of hypothesis testing (table no. 4) shows that the beta coefficients for all hypotheses were statistically significant at least <0.01 . Thus, all five hypotheses put forward in this study were accepted.

The first hypothesis (H1) suggested that green procurement has a positive effect on the competitiveness of the enterprise. This hypothesis was accepted because there is a positive and significant relationship between green procurement and enterprise competitiveness (Beta coefficient = 0.512; $p = 0.008$; $t = 3.592$). This indicates that the introduction of green procurement practices has a positive impact on SMEs by increasing their competitiveness in the domestic and foreign markets. This result is confirmed by a previous study by Marhamati and Azizi (2017), which found that green procurement improves an enterprise's environmental performance, which in turn has a positive effect on its competitiveness. Therefore, this leads to a positive causal link between the work of manufacturing enterprises and their competitive advantages (Ganeshkumar and Mohan, 2015). Famiyeh et al. (2018) add that if businesses invest in green purchasing, it leads to lower production costs, improved product quality and production flexibility, which contributes to the enterprise's competitiveness. Therefore, SMEs will be able to increase their competitiveness by developing and implementing green procurement strategies.

The second hypothesis (H2) proposed a positive relationship between green procurement and the economic performance of SMEs. This relationship was accepted because a positive and significant relationship was observed between green procurement and economic indicators (Beta coefficient = 0.714; $p = 0.004$; $t = 2.454$). This result indicates that economic performance is likely to be higher for small and medium-sized enterprises that have introduced green production. This result is in agreement with the study of Agan et al. (2016), where the authors argue that collaboration with environmental suppliers has a positive effect on the economic performance of businesses. Another study also confirms that supplier integration, including green procurement, has a significant impact on the economic sustainability of the enterprise (Lee, 2013; Setyadi, 2019). In addition, Liu et al. (2012) add that green logistics and green production correlate with enterprise efficiency. Accordingly, environmental cooperation with suppliers affects the economic performance of SMEs.

The third hypothesis (H3) assumes a positive link between green procurement and the environmental impact of SMEs. This hypothesis was accepted because the relationship between green cooperation with the supplier and the environment was positive and significant (Beta coefficient = 0.633; $p = 0.007$; $t = 3.675$). This result demonstrates that the implementation of a green procurement strategy at the enterprise reduces the negative impact

on the environmental situation. This was confirmed by Chiou et al. (2011), who found that green collaboration with suppliers through the implementation of an innovative approach has a significant and positive impact on environmental performance. Pourjavad et al. (2017) indicate that green supply chain management contributes to improving environmental performance and reducing environmental impact. The results of another study also indicate a positive link between supplier collaboration on green innovation and enterprise environmental performance. Moreover, companies using preventive distribution practices with green procurement elements reduce gas and other greenhouse gas emissions, minimize downtime, and make better use of disposal sites (Jawaad and Zafar, 2019; Jaggernath and Khan, 2015). Thus, the implementation of green procurement at the SME level has a significant impact on the environmental performance of the environment.

The fourth hypothesis (H4) suggested a positive relationship between green procurement and impact on society. This hypothesis was accepted because there was a positive and significant relationship between the two constructs (Beta coefficient = 0.482; $p = 0.006$; $t = 3.193$). This result means that the implementation of green procurement practices by SMEs has a significant impact on public awareness and social responsibility. The results of this study are consistent with the study by Qorri et al. (2018), which concluded that the implementation of green procurement has a positive and significant impact on social performance of enterprises. In addition, Sangode and Meter (2019) argues that an enterprise should invest in customer awareness programs, and by introducing, for example, green product labelling can influence customer awareness and choice in favour of green products. In this way, green procurement and cooperation with buyers have a positive impact on the performance of SMEs.

Conclusions and agenda for future research

The purpose of this study was to investigate the relationship between green procurement and competitiveness, economic performance, environmental and social impact of small and medium-sized enterprises. All the hypotheses that were proposed at the beginning of the study were eventually accepted. The study confirms the opinion that the introduction of green procurement enterprise has a positive impact on its performance. Thus, this study provides confirmation of similar research findings and can serve as a benchmark for conducting similar studies on Ukrainian manufacturing enterprises.

The study has some limitations as the data are collected only from small and medium-sized enterprises located in the city of Kyiv and Kyiv region, Ukraine. For more accurate results, similar research should be conducted in other territories of Ukraine. Also, research has been conducted on businesses operating in different industries, perhaps if you can perform research within the same industry, you may find some additional dependencies.

Another limitation is that the relationship between green procurement and competitiveness, economic performance, environmental and social impacts is explored. Therefore, the following studies should investigate and identify patterns with other aspects of enterprise activity. In addition, the impact of legislation and culture on decision-making on the development and implementation of green procurement provisions at the enterprise needs to be explored.

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Appendix 1

The measurement scales used in the study

Green Procurement (adapted from scales of several authors: Zhu et al., 2010; Yang et al., 2013)

Please indicate how much you consider each of the following green procurement definitions to be implemented in your enterprises. (Five-point scale: 1 = not taken into account; 2 = scheduled to be considered; 3 = currently under review; 4 = implementation started; 5 = successful implementation).

- GP1: Eco-labelling of products
- GP2: Collaboration with suppliers for environmental purposes
- GP3: environmental audit of internal supplier management
- GP4: ISO 14001 certification (environmental management)
- GP5: assessment of environmentally friendly second-tier vendor practices
- GP6: Provide design specifications to suppliers that have environmental requirements for the product purchased

Competitiveness of the enterprise (adapted from scales of several authors: Ganeshkumar and Mohan, 2015; Krajewski et al., 2010)

Please indicate how green purchases affect the competitiveness of an enterprise. (Five-point scale: 1 = completely unaffected; 2 = slightly affected; 3 = to a certain extent; 4 = relatively strong; 5 = significantly affected).

- CE1: Improving product quality
- CE2: Increasing product innovation
- CE3: Increasing consumer appeal
- CE4: Delivery reliability
- CE5: Time to enter a new market

Economic indicators of enterprise activity (adapted from scales of several authors: Rao et al., 2005; Solakivi et al., 2011)

Please indicate the degree of achievement of the above mentioned indicators in your enterprise in the last year. (Five-point scale: 1 = not achieved at all; 2 = slightly positive changes; 3 = achieved to a certain extent; 4 = practically achieved; 5 = metric achieved).

- EI1: Increasing Enterprise Productivity
- EI2: Increasing Enterprise Profitability
- EI3: Reduction in the number of defective products, refinement of such products
- EI4: Increasing product competitiveness
- EI5: Improving Enterprise Product Quality

Impact on the environment (adapted from scales of several authors: Zhu et al., 2010; Tan et al., 2016)

Please indicate the extent of the impact of green procurement on the environment (Five-point scale: 1 = no impact at all; 2 = little impact; 3 = to a certain extent; 4 = relatively strong impact; 5 = significant impact).

- EE1: development of programs to reduce environmental impact
- EE2: implementation of programs to reduce environmental impact
- EE3: ISO14001 certification
- EE4: attracting international grants to address environmental issues
- EE5: implementation of environmental audits
- EE6: use of recycled materials or used / recovered components in new products

Impact on society (adapted from scales of several authors: Tan et al., 2016; De Giovanni et al., 2012)

Please indicate the extent of the impact of green procurement on society (Five-point scale: 1 = completely unaffected; 2 = negligible; 3 = to a certain extent; 4 = relatively strong; 5 = significantly affected).

- SC1: development of enterprise-wide programs that will contribute to greater environmental awareness of society
- SC2: deliver lectures and trainings aimed at communicating to the society the need for a responsible attitude to the environment
- SC3: developing incentives for society (promotions, discount programs) to use greener products
- SC4: Collaboration with consumers to develop eco-design products
- SC5: collection of post-consumer waste from customers for recycling or reuse.