Sustainable Product Innovation and Consumer Demand in EU Market for Sustainable Products

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Abstract: The industry and consumers have a role toward the actualisation of sustainable economy; sustainable product innovation and consumer sustainable purchasing are important avenues. **Objective**: This paper examines the relationship between sustainable product innovation and consumer patronage of sustainable products. **Prior Work**: the paper is inclined on the concept of sustainable production. **Approach**: Data were collected from the index of European Union Market for Sustainable Products. The data on sustainable sourcing, sustainable production strategy and consumer purchase of sustainable products were analysed using the fixed and random effects panel regression. **Finding**: results from the analysis indicate a significant positive relationship between sustainable sourcing, sustainable production strategy and consumer purchase at a p-value of less than 0.001. **Implication**: Producers of can improve sales of sustainable products by improving sustainable sourcing and production strategy. The paper provides academic case study for sustainable business and further research agenda is suggested to explore aspects of sustainable products most preferred by consumers. **Value**: this paper provides first empirical link between the EU data on sustainable sourcing and consumer patronage and provides initial result, which indicates that random effect regression provides a better model for this analysis.

Keywords: sales revenue; sustainable product; sustainable innovation; sustainable consumer; sustainable economy

JEL Classification: E23; Q01; Q58; D20; D11; Q56

1. Introduction

The dawn of the 21st century has witnessed growing concern for environmental sustainability, yet, within this period, resource consumption has escalated to an unprecedented level and has worsened the state of environment with concomitant increase in loss of natural resources as humans consume more resources beyond the planet's regeneration capacity (Goworek, Land, Burt, Zundel, Saren, Parker & Lambe, 2018). Accordingly, consumption and technology are ranked as major drivers of environmental change (Princen, 1999), but it is doubtful if commensurate attention is being given to sustainable consumer purchasing as a

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vital tool for instilling environmental sustainability (Fuchs & Boll, 2018). Hence, weak sustainable consumption policy coupled with consumer sustainability behaviour has been blamed for low uptake of sustainable consumption (Annunziata, Mariani & Vecchio, 2019). Sustainable consumer behaviour is the behavioural disposition of consumers, which strives to strike a balance between consumers' satisfaction of their product needs and as well enhance environmental and social sustainability (Papista, Chrysochou, Krystallis & Dimitriadis, 2018). In addition, sustainable consumer behaviour assists in understanding the extent (how and why) consumers accommodate sustainability considerations in their consumption practices. It helps to unravel the sustainable products that consumers prefer, the manner with which consumers use the products and how the products are handled after using those (Peattie & Belz, 2013).

Many of the environmental problems in the planet has, to a greater extent been attributed to consumption behaviour (Martínez, Herrero & Gómez López, 2018). Humans are already consuming beyond the planet's eco-capacity by more than 20% of the resource regeneration ability of the planet (Kitzes, Wackernagel, Loh, Peller, Goldfinger, Cheng & Tea, 2007), which is estimated to escalate to 170% in 2040 (WBCSD, 2009). Consumables, such as food and drink is having the greatest ecological impact (WBCSD, 2009). There is therefore an urgent need to strive toward connecting sustainable consumer purchasing with sustainable production. But, to a large extent, this is contingent on the understanding of sustainable consumer behaviour, which can assist in sustainable product innovation and policy changes to channel consumer behaviour to sustainable choices (Cavaliere & Ventura, 2018). Accordingly, consumer sustainability behaviour is adding momentum to product sustainability innovation with anticipated attendant transformation in consumers' pro-sustainability behaviour (Tischner, Stø, Kjærnes & Tukker, 2017). This behaviour change, amongst others, may come through an interminable establishment of trust – wherein the consumer is guided to perceive beyond sustainability rhetoric around products and to perceive the products as environmentally credible. Hence, according to a renowned expert on innovation, trust is foremost in propelling customers' willingness to pay price premiums (Skard, 2017).

2. Problem Statement

Despite the acclaimed importance of corporate product sustainability, extant research thus far has been narrow in approach leaving producers and sustainability policy makers with skeletal and/or tilted information on how corporate product sustainability innovation may stimulate consumer sustainable product purchase. Recent research has attempted to uncover variables that affect consumer sustainable purchasing. These research include amongst others, variables that

affects consumers' organic food consumption (Azzurra, Massimiliano & Angela, 2019); factors affecting green consumption (Sun, Liu, & Zhao, 2019); justice and psychological distance as factors in sustainable food behaviour (Ibrahim & Al-Ajlouni, 2018); contextual and personal barriers to consumer choice of sustainable food (Tanner & Wölfing, 2003); disgust as a barrier to consumer appreciation of insect-based food and the attenuating effect of foreign language (Geipel, Hadjichristidis & Klesse, 2018); evaluation of barriers to sustainable production and consumption in food industry (Govindan, 2018). These research and more have focused on factors affecting sustainable consumer behavior based on narrowed variables – mainly either on endogenous or exogenous factors. Given the importance of sustainable consumption on sustainable product innovation and policy, a more in-depth research that considers an amalgam of variables - endogenous and exogenous is pertinent. Hence, unlike previous research, this research will look at barriers encompassing psychological, social, financial, policy, lifestyle/value, environmental and product sustainability attributes to isolate the strongest barrier variables to sustainable consumption and apply the isolated strong barriers to develop a new model and framework of sustainable consumer behaviour.

2.1. Objective of Paper

Based on the foregoing problem statement, the objective of this paper is to examine the link between sustainable product innovation and consumer purchase of sustainable products. It thus aims to analyse the extent to which sustainability innovation in products can attract customer patronage to the sustainable products.

3. Literature Review

Empirical research find that few consumers concur that they feel concerned for the environment but albeit pragmatic commitment for sustainable purchasing; it is not surprising therefore that the market share for environmentally friendly food is reported to be only about five percent (5%) of the food market (Young, Hwang, McDonald & Oates, 2010). This is worrying given the importance of consumption on sustainable environment. Accordingly, extant research has suggested varying barriers to sustainable consumer behaviour although without consensus in their conclusions (Rudolph, 2018; Gleim et al. 2013). Therefore, an in-depth research that would unravel implicit and explicit barriers to sustainable consumer behaviour becomes pertinent in the face of growing call for business and consumer participation in ensuring sustainable environment.

Understanding sustainable consumer behaviour is seen as important in boosting sustainable production, which is an important facet for driving sustainable economy through reduced environmental effect (Balderjahn et al. 2013). However,

consumers' acceptance of environmentally friendly products is still low because of intricate barriers (Gleim et al. 2013), yet as of 2018, research findings maintains that the barriers limiting the practice of sustainable consumption are still ambiguous, hence the need for more empirical studies on impediments to sustainable consumption (Rudolph, 2018). More studies are urgently important as consumer patronage of sustainable products constitutes a small proportion of total product demand in the market (Tate et al. 2014; Gleim et al. 2013). This proposed research would unravel intricate barriers that would assist corporate sustainability management through effective sustainable product innovation and consumer sustainability policies by relevant agencies. Enhancing positive consumer sustainable practice is a veritable catalyst for improving overall sustainable production and environmental conservation. This is apposite because consumption coupled with weak industrial policies has been widely recognized as a big contributor to greenhouse gas and toxic wastes in the environment (Jorgenson, 2003). Hence much acclaimed barriers to sustainable consumption is found to be ingrained in public policy limitations (Shove, 2005; Prothero, 2011; Aschemann-Witzel & Zielke, 2017). This is because lack of effective sustainable consumption policy hinders consumer motivation for pro-sustainable consumption behaviour especially as these policies narrowly captures human behaviour (Shove, 2005). Other barriers include availability and affordability of sustainable products, adequate and informative green labelling (Prothero, 2011). Yet others argue that culture, higher price of green products, inconvenience in looking for and using green products and legislation pose barriers (Robinson & Smith 2002).

In addition, other researchers have suggested other barriers such as lack of environmental knowledge and environmental concern (Jaiswal, & Kant, 2018), user friendliness of sustainable products (Chan & Lau, 2000) and inappropriate labelling of 'green' on products (Rudolph, 2018). In a recent study, which focused on endogenous barriers (subsisting within the consumer), findings show amongst others, that barriers to sustainable food habit include environmental impact not considered in making food choice, little knowledge about environmental impact of consumption behaviour and willingness to engage in sustainable food behaviour only if it promotes good health (Mann, Thornton, Crawford & Ball, 2018). Related to this is that in a busy world of the 21st century, many consumers think that they do not have enough time to think about green in consumption (Young, Hwang, McDonald & Oates, 2010). Another strand of research finds that gender, age and lifestyle values might pose apparent barriers to sustainable consumer practice (Kostadinova, 2016), but this requires some empirical testing; this research shall equally examine how gender, age and lifestyle values (such as egoistic values and socio-environmental values) may impact sustainable consumer behaviour.

It has equally been suggested that perhaps, consumer schema incongruity/congruity might impact sustainable consumer behaviour. For instance, the findings of Mann

et al. (2018) tends to suggest that, in terms of sustainable consumption, consumers appear to be fixated and controlled by their schemata – given more preference to their conventional consumption choices and/or habits. This calls for additional research to investigate the extent to which schema incongruity might pose a barrier to sustainable consumer behaviour. This proposed research will thus add additional tentacle to examine how endogenous variable (schema) could be a barrier to consumers' sustainable consumption behaviour and how this might be changed to the positive dimension. In their research, Chatterjee and Kay (2010) find that packaging and ingredient green claims results in increased green brand product assessments and that green brand product claims affects activation of persuasion knowledge. The later finding was corroborated by Rudolph (2018), however in both studies of Chatterjee and Kay (2010) and Rudolph (2018) schema incongruity was not found to be significantly associated with consumer patronage of environmentally friendly products. Hence, Rudolph (2018) recommends that a new study is pertinent to examine whether schema incongruity would have a significant effect on consumer acceptance of a more-often used home consumer products. Similarly, Vos (2017) did not find significant relationship between eco-packaging schema and consumer purchase decision, hence he recommends further research on whether multiple environmental messages could trigger consumer purchase intention of sustainable products.

The value that customers derive from sustainable products is another important factor to consider. Nysveen, Pedersen, Skard and Thorbjørnsen (2012) found that brand has a powerful effect of retaining customer loyalty and that brand satisfaction differs along the spectrum of assorted brands. One of the pertinent implications from Nysveen et al (2012) is that companies must therefore strive to decipher unique elements of sustainability that begets value for customers and what different category of customers require in terms of product sustainability. This would assist companies to engage in diverse product sustainability innovation and concomitant branding to appeal to diverse sustainable consumer needs. Furthermore, the traditional practice of sustainable product design is largely under the dictate of manufacturers, yet consumers have important influence on how products affect the environment through consumers' consumption and disposal practices, hence it is posited that producers would influence consumers' sustainability behaviour depending on how the product is designed (Wever, Van Kuijk & Boks, 2008). This current paper contributes to existing research by focussing on how sustainable sourcing of material and sustainable strategy in operations can influence sustainable purchasing. The method and results are presented in the following sections.

4. Method

The paper's design is positivism, hence to achieve the research objective, the research data were analysed quantitatively using the panel data regression analysis. Secondary data on sustainable product innovation and sales of sustainable products were collect from The European Union Market for Sustainable Products - the Retail Perspective on Sourcing Policies and Consumer Demand (EU, 2019). On the one hand, sustainable product innovation was proxied by two variables namely sustainable supply chain and sustainable product strategy; on the other hand, sustainable consumer patronage was represented by percentage of sustainable product sales. These data were already calculated and reported in the "The European Union Market for Sustainable Products - the Retail Perspective on Sourcing Policies and Consumer Demand" (EU, 2019). With these data, the paper examined the extent to which sustainable product innovation relates with the extent of consumer sustainable product purchase (represented by sustainable product sales). Hence the following regression model was used:

$$\gamma = \alpha + \beta_1\chi_1 + \beta_2\chi_2 + \varepsilon$$

Where: γ = sustainable consumer purchase; α = regression intercept; β_1 and β_2 = regression coefficients; χ_1 = sustainable sourcing; χ_2 = sustainable strategy; ε = error (representing unaccounted independent variables

4.1. Results

Table 1 and Table present the results of fixed effect panel regression results and random effect panel regression result respectively. Both models show a significant relationship between the two independent variables, which suggest that sustainable sourcing has a significant relationship with sustainable customer purchasing. In addition, the results also show that sustainable strategic production processes has a significant relationship with sustainable customer purchasing. However the random effect model in Table 2, shows an improved P-value for sustainable strategy in production processes from 0.00004 to 0.00001, which indicates that random effect model should be preferred in analysing the relationship between sustainable product innovation and sustainable consumer patronage. Furthermore, Table 3 show that the units have a homogenous error variable, hence absence of heteroskedasticity; it also show that errors are normally distributed. This findings can motivate producers of sustainable products that improved sustainable sourcing and sustainable strategy in production can attract more sustainable consumers to improve the turnover of the companies.

Table 1. Fixed-Effects, Using 15 Observations

Model 1: Fixed-effects, using 15 observations
Included 5 cross-sectional units
Time-series length = 3
Dependent variable: Sustainable Sales Volume

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	316,458	30,4913	10,3786	<0,00001	***
SusSource	1,46396	0,14506	10,0921	<0,00001	***
Sstrateg	2,73249	0,33236	8,2215	0,00004	***

Mean dependent var	57,93333	S.D. dependent var	8,795020
Sum squared resid	66,06887	S.E. of regression	2,873780
R-squared	0,938991	Adjusted R-squared	0,893234
F(6, 8)	20,52130	P-value(F)	0,000188
Log-likelihood	-32,40393	Akaike criterion	78,80787
Schwarz criterion	83,76422	Hannan-Quinn	78,75507
rho	-0,032098	Durbin-Watson	1,042678

Tabel 2. Random-Effects (GLS), Using 15 Observations

Included 5 cross-sectional units
Time-series length = 3
Dependent variable: Sustainable Sales Volume

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	319,226	32,4718	9,8309	<0,00001	***
SusSource	1,44732	0,152454	9,4935	<0,00001	***
Sstrateg	2,76857	0,354389	7,8122	<0,00001	***

Mean dependent var	57,93333	S.D. dependent var	8,795020
Sum squared resid	149,2266	S.E. of regression	3,388063
Log-likelihood	-38,51470	Akaike criterion	83,02939
Schwarz criterion	85,15354	Hannan-Quinn	83,00677

Table 3. Normality and Heteroskedasticity Test

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(4, 8) = 2,50549
with p-value = P(F(4, 8) > 2,50549) = 0,125199
Distribution free Wald test for heteroskedasticity -
Null hypothesis: the units have a common error variance
Asymptotic test statistic: Chi-square(5) = 3151,31
with p-value = 0,887373
Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 0,0254143
with p-value = 0,987373

4.2. Implication for Practice and Academia

The findings of this paper holds practical industry implications for improved production of sustainable products and relevant operational policies to retain consumers' sustainable product trust. Producers can improve their sales through sustainable sourcing of materials and through sustainable strategic manufacturing operations. Furthermore, the foregoing finding provide ample new insights for furthering academic engagement on sustainable consume behaviour and patronage about sustainable products and importantly open up new research agenda for future research activity on other aspects of consumer purchase behaviour on sustainable products. Such future areas of research include the impact of age difference on customer patronage of sustainable products. The paper also offers a good academic case study in sustainable business classes.

4.3. Value (Contribution)

This is the first empirical analysis of the European Union market for sustainable products - the retail perspective on sourcing policies and consumer demand, which has analysed linear relationship between industry adoption of sustainable sourcing and sustainable production and consumer penchant for patronizing sustainable product innovation. It has also contributed original value by adopting two panel regression models and has made a novel finding, which shows that the adoption of random effects panel regression produces the best analysis of this relationship.

5. Conclusion

This paper set out to analyse the association between sustainable product innovation and consumer purchase of sustainable products with data from the European Union Market for Sustainable Products - the Retail Perspective on Sourcing Policies and Consumer Demand countries. The paper makes new contribution by being the first empirical paper to apply the data from this index examine how consumers patronize sustainable products and the first to apply both fixed effect and random effect panel regression using this data. Results show that sustainable sourcing and sustainable production strategy are significantly related to sustainable sales volume. The practical implication is that producers are encouraged to improve upon their sustainable sourcing and sustainable production processes to attract more sustainable consumers. This paper provides are good academic case study for sustainable business classes in higher institutions. Further research is suggested to examine the effect of age differences on consumer purchase of sustainable products and to examine aspects of sustainable products most preferred by consumers.

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