International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 9s, 2025
https://www.theaspd.com/ijes.php

Antecedence of Switching Intention to Design for Material Value Conservation: A Case Study of Flexible Plastic Packaging Purchasers in Indonesia

Wulandini [1*], Fitria Indah Astari [2] and Djoko Sihono Gabriel [3]
[1, 3] Faculty of Economy and Business, Universitas Pelita Harapan, Jakarta, Indonesia
[2]Department of Industrial Engineering, Faculty of Engineering, Kota Depok, Universitas Indonesia
[1]wulangouvara@gmail.com, [2] haifa.alkautsar@yahoo.com and [3]dsihono@gmail.com

ABSTRACT
This study investigates the willingness of 525 Micro Small Medium Enterprises (MSMEs) in Jakarta to adopt recycle-friendly packaging based on the Material Value Conservation (MVC) paradigm. Using Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis, perceived informational value emerged as the strongest driver of switching intention, followed by functional, promotional, environmental values, and MVC knowledge.

Keywords: *Switching intention, Material Value Conservation, Flexible plastic packaging purchaser.*

1) INTRODUCTION

Flexible plastic packaging is widely used across industries due to its lightweight, durable, cost-effective, and moisture-resistant properties, which help extend product shelf life [1,2]. However, it had led to serious environmental issues [3,4].

Sustainable plastic waste management is a global concern [5], in achieving circular material flows [3,6,7]. However, recycling feasibility depends on the input quality [8], however high impurities make it unviable [9]. The MVC promote a robust-design-criteria - that avoiding pigments, printing inks, adhesives, and multilayers - to conserve the material quality [12] and extend life cycles [10] and support sustainability [11]. Plastic purchaser companies, especially MSMEs, play a pivotal role in shifting toward recycle-friendly packaging designs [13,14]. With about 658,365 MSMEs in Jakarta [15], their integration into circular economy models is essential.

Material Value Conservation for sustainable development. MVC practices by applying design principles [16], will improve recyclability and maintain high-quality plastic materials for mechanical recycling [17] by minimizing impurities, enable to maintain mechanical [18,19] and optical properties [20,21] and to reduce reliance on virgin plastic [22], but need stakeholder alignment [23].

Plastic Packaging Purchasers as important stakeholder. Plastic packaging purchasers are key stakeholders in MVC implementation [24,25]. To support sustainability [26,27], purchasers should adopt designs that conserve the quality of materials [13] for secondary recycling [5].

Switching Intention. Switching intention refers to an individual's tendency to shift from one option to another, as explained by the Theory of Planned Behavior (TPB), which links behavior to intention influenced by attitude, norms, and control [28]. While TPB assumes decisions are based solely on information, it overlooks personal motives [29]. Previous studies have expanded TPB to include factors like emotional value [30], perceived influence, and environmental concern to predict green behaviour [31,32,33,34]. Perceived value, though influential, is often generalized [34,35].

HYPOTHESIS DEVELOPMENT

1.1. Environmental concern. Environmental concern reflects awareness and willingness to address environmental issues [36]. Prior studies show it influences consumers' green behavior and product choices [37].

H1: Environmental concern directly influences switching intention to design for MVC.

1.2. Perceived Sustainability Value. This refers to how companies evaluate their commitment to economic, environmental, and social sustainability [38] as the three pillars of sustainability [40].

Perceived economic value. It plays a key role in decision-making toward green products [41].

H2: Perceived economic value directly influences switching intention to design for MVC.

Perceived environmental value. It emphasizes environmental [42] and supports sustainability [43].

H3: Perceived environmental value directly influences switching intention to design for MVC.

Perceived social value. Social value relates to sustainability [42] and societal commitments [44].

H4: Perceived social value directly influences switching intention to design for MVC.

1.3 Perceived packaging value. Functional, promotional, and informational purposes [45,46].

Perceived functional value. Convenience, transport, protection, and usage [47].

H5: Perceived functional value directly influences switching intention to design for MVC.

Perceived promotion and marketing value. Branding and directing consumer attention [48].

H6: Perceived promotion and marketing value directly influences switching intention to design for MVC.

Perceived informational value. Informational design affects buyer confidence and satisfaction [49].

H7: Perceived informational value directly influences switching intention to design for MVC.

1.4 Knowledge about benefits of design for MVC

Knowledge guides company evaluation of new designs of packaging [34].

H8: Knowledge about MVC benefits directly influences switching intention to design for MVC.

2) METHODS AND METHODOLOGY

This study used a set of questionnaires to collect primary data directly from respondents. The conceptual model (Figure 1) includes one dependent variable—switching intention to design for MVC—and several independent variables: environmental concern (EC), MVC benefit knowledge (KB), perceived sustainability value (economic or PEV, environmental or EV, social or PSV), and perceived packaging value (functional or PFV, promotional or PPV, informational or PIV).

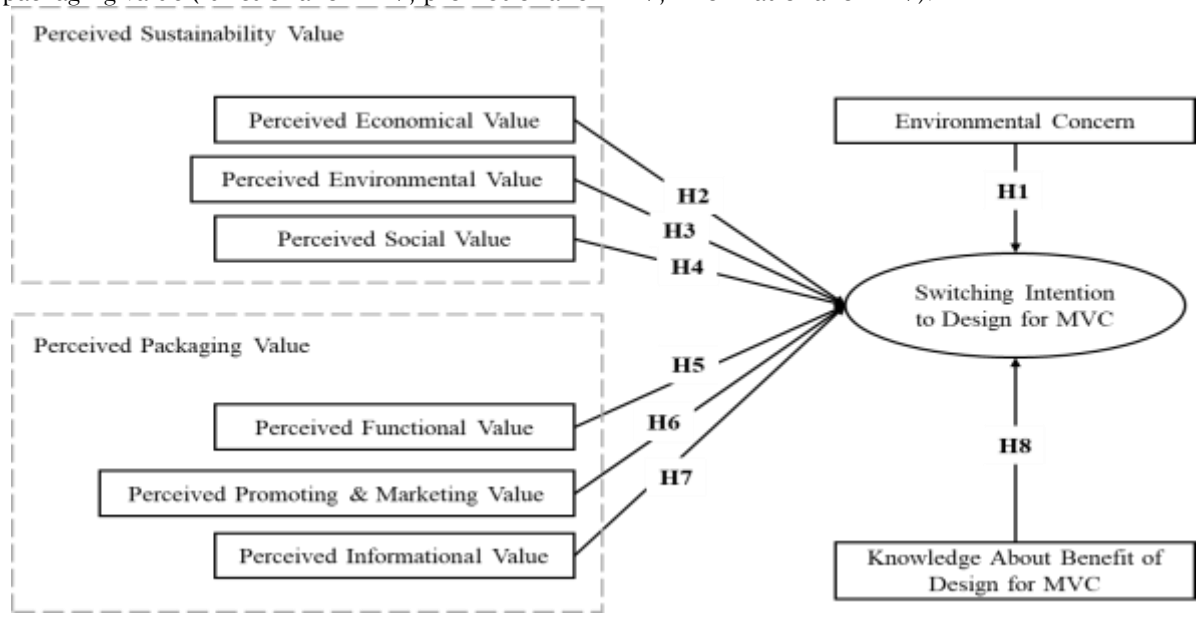

Figure 1 Conceptual Model

The questionnaire used in this study consisted of three parts: (1) an introductory explanation highlighting the negative impacts of conventional packaging designs and the potential benefits of adopting MVC-based designs, (2) a series of statements measured using a 5-point Likert scale based on the study's variables (see Table 2), and (3) questions capturing the MSME business profile.

A pilot test with 100 respondents confirmed the questionnaire's validity, with all outer loading values exceeding 0.708, allowing the instrument to be distributed to a broader sample. The research targeted MSME owners in Jakarta who use flexible plastic packaging, with a screening question ensuring respondents' relevance. A total of 525 valid responses were obtained. Most respondents were 17–30 years old (54%), female (54%), represented medium-sized businesses (35%), and were engaged in the sale of fresh products (34%). The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via Smart PLS 4.0, following three stages: model specification, outer model evaluation for reliability and validity, and inner model evaluation to assess the relationship between constructs [50,51].

3) RESULT

The measurement model evaluation includes reliability and validity testing. Indicator reliability was assessed using outer loadings, all of which exceeded the acceptable threshold of 0.708. Construct reliability was confirmed with Cronbach's alpha and composite reliability values above 0.70, while convergent validity was supported by AVE values above 0.50. These results indicate that all constructs in the study are both valid and reliable. The mean values exceeding 3.41 suggest respondents generally agreed with the statements, and the standard deviation reflects the variability of responses. Outer loadings, when compared with cross-loadings, further confirm indicator validity.

Table 1. Hypothesis Testing Results

	Path	Path Coefficient	T statistics	P values	Hypothesis Results
H1	EC -> SI	0.024	0.415	0.3392584	Rejected
H2	PEV -> SI	-0.047	0.837	0.2013437	Rejected
H3	EV -> SI	0.117	2.215	0.0133987	Accepted
H4	PSV -> SI	0.083	1.164	0.1221427	Rejected
H5	PFV -> SI	0.236	4.158	0.0000163	Accepted
H6	PPV -> SI	0.162	2.344	0.0095713	Accepted
H7	PIV -> SI	0.289	5.280	0.0000001	Accepted
H8	KB -> SI	0.104	1.735	0.0414217	Accepted

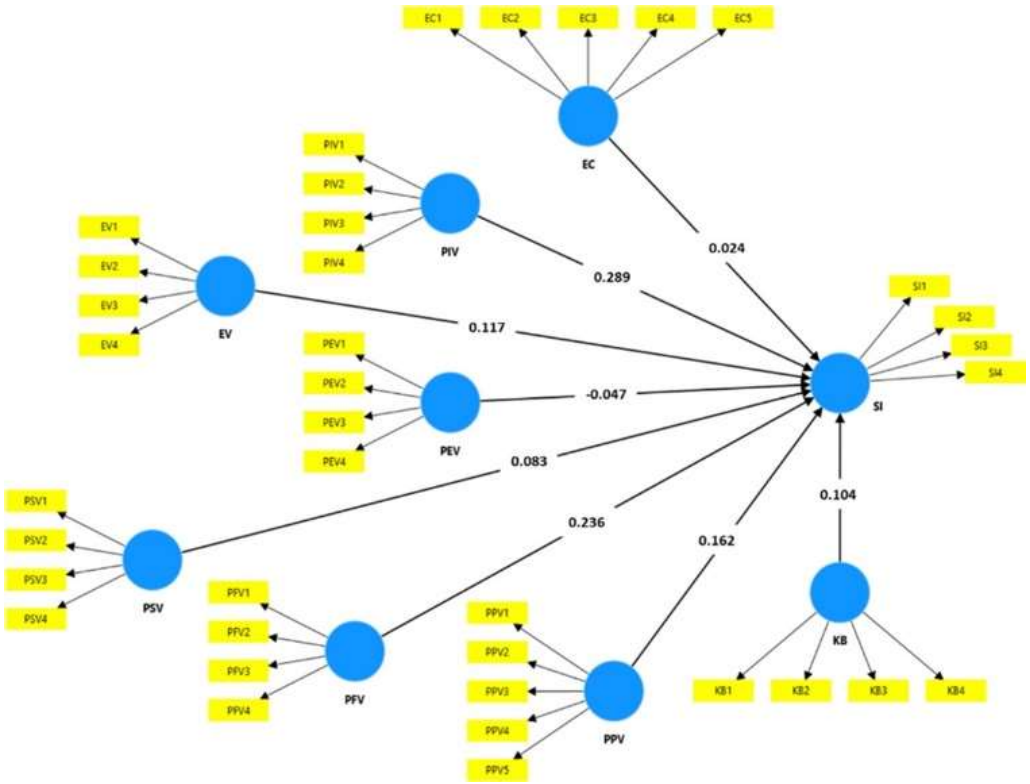

Figure 2. Path coefficient Results

The structural model evaluation was conducted using bootstrapping in Smart PLS, with the T-statistics and P-values calculated for each hypothesized path. R^2 was found to be 0.808, indicating strong explanatory power, and Q^2 was 0.796, showing strong predictive relevance. Cross-loading tests confirmed indicator validity. Hypothesis testing used a one-tailed test, with significance determined by T-statistics > 1.645, P-value < 0.05, and positive path coefficients as shown in Figure 2. Of the eight hypotheses tested, five (H3, H5, H6, H7, H8) were supported, showing significant positive effects of perceived environmental value, functional value, promotion and marketing value, informational value, and MVC knowledge on switching intention as shown in Table 1. Hypotheses H1, H2, and H4 (environmental concern, economic value, and social value) were rejected due to low T-statistics and high P-values, with hypothesis 2 showing a negative coefficient. Model fit indicators showed SRMR = 0.042 and NFI = 0.840, confirming good model fit [52].

4) DISCUSSION

The study confirms that perceived informational value has the strongest influence on MSMEs' switching intention to MVC packaging design, especially for businesses like fresh products and clothing, where product quality is visually evident. Functional and promotional value also significantly contribute, aligning with packaging's role in protection and marketing [53]. Environmental value [54] and knowledge of MVC benefits [55] further drive switching intention. However, environmental concern [56], social value, and economic value do not show a significant effect—possibly due to indirect benefits or prior framing in the questionnaire [57].

5) REFERENCES

MSMEs show a clear intention to adopt MVC paradigm with key drivers include informational, functional, promotional, environmental values, and MVC knowledge.

[1] Chen, C., Yang, F. ., Lu, L., Xie, J., & Li, L. Experimental Research on Mechanical Properties of Polypropylene Flexible Intermediate Bulk Container Base Materials. *Advanced Materials Research*, *811* (2013). 146–151. https://doi.org/10.4028/www.scientific.net/AMR.811.146.

[2] Fusetto, R., & Simovich, T. *Science and Regulation Co-Evolve to Combat Plastic Packaging Failures* (2022).://www.semanticscholar.org/paper/Science-and-Regulation-Co-Evolve-to-Combat-Plastic-Fusetto-Simovich/b4ea0d44f18504ac010069ab4f665351501d9477

[3] Ahamed, A., Veksha, A., Giannis, A., & Lisak, G. Flexible packaging plastic waste – environmental implications, management solutions, and the way forward. *Current Opinion in Chemical Engineering*, *32* (2021). 100684. https://doi.org/10.1016/j.coche.2021.100684

[4] Babaremu, K. O., Okoya, S. A., Hughes, E., Tijani, B., Teidi, D., Akpan, A., Igwe, J., Karera,S., Oyinlola, M., & Akinlabi, E. T. Sustainable plastic waste management in a circular economy. *Heliyon*, *8*(7) (2022). e09984. https://doi.org/10.1016/j.heliyon.2022.e09984

[5] Horodytska, O., Valdés, F. J., & Fullana, A. Plastic flexible films waste management – A state of art review. *Waste Management*, *77* (2018). 413–425. https://doi.org/10.1016/j.wasman.2018.04.023

[6] Leal Filho, W., Saari, U., Fedoruk, M., Iital, A., Moora, H., Klöga, M., & Voronova, V. An overview of the problems posed by plastic products and the role of extended producer responsibility in Europe. *Journal of Cleaner Production 214*, (2019). 550–558. https://doi.org/10.1016/j.jclepro.2018.12.256

[7] Shamsuyeva, M., & Endres, H. J. (2021). Plastics in the context of the circular economy and sustainable plastics recycling: Comprehensive review on research development, standardization and market. *Composites Part C: Open Access*, *6* (2018). 100168. https://doi.org/10.1016/j.jcomc.2021.100168

[8] Lazarevic, D., Aoustin, E., Buclet, N., & Brandt, N. (2010). Plastic waste management in the context of a European recycling society: Comparing results and uncertainties in a life cycle perspective. *Resources, Conservation and Recycling*, *55*(2) (2018), 246–259. https://doi.org/10.1016/j.resconrec.2010.09.014

[9] Alexander, I., Putri, M. M. W., Simatupang, R., & Soepardjo, T. *Plastic and Recycling Industry Outlook in Indonesia : An Assessment on Capacity and Capability Economic Growth Support Activity* (2022).

[10] Gabriel, D. S. How to increase plastic waste acceptance for mechanical recycling: An introduction to material value conservation and its phenomenon. *Key Engineering Materials*, *705*(24) (2016), 362–367. https://doi.org/10.4028/www.scientific.net/KEM.705.362

[11] Borman, M. R., Gabriel, D. S., & Nurcahyo, R. Impact of Plastic Packaging Design on the Sustainability of Plastic Recyclers. *International Journal of Applied Science and Engineering*, *16*(May) (2019), 25–33. https://doi.org/10.6703/IJASE.201906

[12] Ridlo, A. G. F., & Gabriel, D. S. Desıgn Crıterıa For Materıal Value Conservatıon Of Flexıble Plastıc. *International Journal of Advanced Science and Technology*, *29* (2020), 88–97.

[13]. Gabriel, D. S., Pratama, B. A. J., & Hapsari, C. Plastic packaging material value conservation and the structure of stakeholder role. *Key Engineering Materials*, *773 KEM* (2018), 396–404. https://doi.org/10.4028/www.scientific.net/KEM.773.396

[14] Tambunan, C.R. Kontribusi UMKM dalam Perekonomian Indonesia (2023). https://djpb.kemenkeu.go.id/kppn/lubuksikaping/id/data-publikasi/artikel/3134-kontribusi-umkm-dalam-perekonomianindonesia.html.

[15] Putri, A.M.H. 'Jumlah UMKM Capai 8,71 Juta, Bisa Jadi 'Tameng' Resesi?,' CNBC Indonesia, 1 January (2023). https://www.cnbcindonesia.com/research/20230207115843-128-411724/jumlah-umkm-capai-871-juta-bisa-jadi-tameng-resesi#:~:text=Jakarta%2C.

[16] Kazancoglu, Y., Ada, E., Ozbiltekin-Pala, M., & Aşkın Uzel, R. In the nexus of sustainability, circular economy and food industry: Circular food package design. *Journal of Cleaner Production*, *415* (June 2023). https://doi.org/10.1016/j.jclepro.2023.137778

[17] Nurcahyo, R., Gabriel, D. S., & Ikhsan, W. L. Repetitive implementation of material value conservation and its effects on the mechanical properties of plastic recycling products. *Materials Science Forum*, *936 MSF* (2018), 116–120. https://doi.org/10.4028/www.scientific.net/MSF.936.116

[18] Gabriel, D. S., & Anandito, A. Effect of repetitive recycling on the mechanical properties of polypropylene blends based on material value conservation paradigm. *Materials Science Forum*, *1015 MSF* (2020), 70–75. https://doi.org/10.4028/www.scientific.net/MSF.1015.70

[19] Gabriel, D. S., & Tiana, A. N. Mechanical properties improvement of recycled polypropylene with material value conservation schemes using virgin plastic blends. *Materials Science Forum*, *1015 MSF* (2020),76–81. https://doi.org/10.4028/www.scientific.net/MSF.1015.76

[20] Yastica, T. V., & Gabriel, D. S. Effect of repetitive recycling on the optical properties of polypropylene based on material value conservation paradigm. *Materials Science Forum*, *1032 MSF* (2021), 23–28. https://doi.org/10.4028/www.scientific.net/MSF.1032.23

[21] Gabriel, D. S., & Putra Saragih, R. H. Impact of repetitive recycling on optical properties of virgin and recycled polypropylene blends based on material value conservation paradigm. *Materials Science Forum*, *1020 MSF* (2021), 192–198. https://doi.org/10.4028/www.scientific.net/MSF.1020.192

[22] Gabriel, D. S., & Maulana, J. Impact of plastic labelling, coloring and printing on material value conservation in the products of secondary recycling. *Key Engineering Materials*, *773 KEM* (2018), 384–389. https://doi.org/10.4028/www.scientific.net/KEM.773.384

[23] Gabriel, D. S., & Anindityo, A. W. Development of stakeholder roles in supporting material value conservation of plastic packaging using brain-writing and interpretive process. *International Journal of Technology*, *8*(7) (2017), 1361–1370. https://doi.org/10.14716/ijtech.v8i7.722

[24] Grodzińska-Jurczak, M., Krawczyk, A., Akhshik, A., Dedyk, Z., & Strzelecka, M. Contradictory or complementary? Stakeholders' perceptions of a circular economy for single-use plastics. *Waste Management*, *142* (August 2021), 1–8. https://doi.org/10.1016/j.wasman.2022.01.036

[25] Heiges, J., Neill, K. O., & O'Neill, K. A Recycling Reckoning: How Operation National Sword catalyzed a transition in the U.S. plastics recycling system. *Journal of Cleaner Production*, *378* (June2022), 134367. https://doi.org/10.1016/j.jclepro.2022.134367

[26] Tavares, A. C. S., Vanalle, R. M., & Camarotto, J. A. Influence of green initiatives on environmental, economic and operational outcomes: The case of the Brazilian packaging supply chain. *Sustainability (Switzerland)*, *11*(2) (2019). https://doi.org/10.3390/su11020430

[27] Wandosell, G., Parra-Meroño, M. C., Alcayde, A., & Baños, R. Green packaging from consumer and business perspectives. *Sustainability (Switzerland)*, *13*(3) (2021). 1–19. https://doi.org/10.3390/su13031356

[28] Ajzen, I. 'The theory of planned behavior,' Organizational Behavior and Human Decision Processes, 50(2) (1991), pp. 179–211. https://doi.org/10.1016/0749-5978(91)90020-t.

[29]. Marangunić, N. & Granić, A. 'Technology acceptance model: a literature review from 1986 to 2013,' Universal Access in the Information Society, 14(1) (2014), pp. 81–95. https://doi.org/10.1007/s10209-014-0348-1.

[30] Joshi, Y., Uniyal, D.P. & Sangroya, D. 'Investigating consumers' green purchase intention:

Examining the role of economic value, emotional value and perceived marketplace influence,' Journal of Cleaner Production, 328 (2021), p. 129638. https://doi.org/10.1016/j.jclepro.2021.129638.

[31] Zhang, W., Wang, L., Zhou, J., Zhu, K., & Sun, S. Degradability of biodegradable plastic films and its mulching effects on soil temperature and maize yield in northeastern China. *International Journal of Agricultural and Biological Engineering*, *13 No. 2* (2020), https://doi.org/10.25165/j.ijabe.20201302.5360

[32]. Hwang, J.S., Rho, J.J. & Hwang, Y.M. 'Influence of cognitive and social change factors on E-vehicle switching intention: Evidence from Korea,' Technology in Society, 74 (2023), p. 102286. https://doi.org/10.1016/j.techsoc.2023.102286.

[33] Klein, F., Emberger-Klein, A., Menrad, K., Möhring, W., & Blesin, J. Influencing factors for the purchase intention of consumers choosing bioplastic products in Germany. Sustainable Production and Consumption, 19 (2014), 33–43. https://doi.org/10.1016/j.spc.2019.01.004.

[34] Moshood, T. D., & Hanafiah, M. The plastic of the future : determinants for switching intention from synthetic to biodegradable plastics among the young consumers. *Journal of Social Marketing*, *13*(1) (2022), 121–148. https://doi.org/10.1108/JSOCM-05-2022-0097

[35] Pandey, M. & Yadav, P.S. 'Understanding the role of individual concerns, attitude, and perceived value in green apparel purchase intention; the mediating effect of consumer involvement and moderating role of generation Z&Y,' Cleaner and Responsible Consumption, 9, (2023), p. 100120. https://doi.org/10.1016/j.clrc.2023.100120.

[36] Gomes, S. *What Role Does Sustainable Behavior and Environmental Awareness from Civil Society Play in the Planet ' s Sustainable Transition* (2023).

[37] Calvo-Porral, C., & Lévy-Mangin, J. P. The circular economy business model: Examining consumers' acceptance of recycled goods. *Administrative Sciences*, *10*(2) (2020). https://doi.org/10.3390/admsci10020028

[38] Kim, B., & Kim, S. Effects of managers' communication and satisfaction on their perceived importance of value chain sustainability. *International Journal of Services and Operations Management* (2016). https://doi.org/https://doi.org/10.1504/IJSOM.2016.078069

[39] Hariram, N. P., Mekha, K. B., Suganthan, V., & Sudhakar, K. Sustainalism: an integrated Socio-Economic-Environmental model to address sustainable development and sustainability. Sustainability, 15(13) (2023), 10682. https://doi.org/10.3390/su151310682.

[40] Hristov, I., Chirico, A., & Appolloni, A. Sustainability value creation, survival, and growth of the company: A critical perspective in the sustainability Balanced Scorecard (SBSC). *Sustainability (Switzerland)*, *11*(7) (2019), 1–20. https://doi.org/10.3390/su11072119

[41] Kumar, H., & Walia, S. B. Impact of perceived quality, perceived value and perceived price on satisfaction and purchase intention towards eco-friendly products. *International Journal of Green Economics* (2022). https://api.semanticscholar.org/CorpusID:254429713

[42] Pérez-Castillo, D., Ornelas, S., & Martínez, J. V. *Switching intention towards the purchase of remanufactured cellphones: development of a scale in the Mexican context* (2020), https://api.semanticscholar.org/CorpusID:235078765

[43] Mensah, J. Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences*, *5*(1) (2019), https://doi.org/10.1080/23311886.2019.1653531

[44] Slack, N., Brandon-Jones, A., & Johnston, R. (2013). *Operations Management* (7th ed.). Pearson

Education, Inc.

[45]. Steenis, N. D., van Herpen, E., van der Lans, I. A., Ligthart, T. N., & van Trijp, H. C. M. Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production*, *162*, (2017). 286–298. https://doi.org/10.1016/j.jclepro.2017.06.036

[46] Brennan, L., Langley, S., Verghese, K., Lockrey, S., Ryder, M., Francis, C., Phan-Le, N. T., & Hill, A. The role of packaging in fighting food waste: A systematised review of consumer perceptions of packaging. *Journal of Cleaner Production*, *281* (2021), 125276. https://doi.org/10.1016/j.jclepro.2020.125276

[47] Alavi, S., Thomas, S., Sandeep, K. P., Kalarikkal, N., Vargese, J., & Yaragalla, S. *Polymers for Packaging Applications* (Issue JANUARY). Apple Academic Press Inc (2015).

[48] Simmonds, L., Mccann, J. R., Chapple, C. I., Woods, J., Russell, C. G., & Russell, C. G. *Visual communication design : a neglected factor in nutrition promotion via packaged food labels*. *February*, 1–9 (2024). https://doi.org/10.3389/fpubh.2024.1296704

[49] Gabriel, D. S., Isnandar, D., & Jeremia, A. Plastic packaging material value conservation and evident of the consumers' acceptance. *Key Engineering Materials*, *773 KEM* (2018), 390–395. https://doi.org/10.4028/www.scientific.net/KEM.773.390

[50] Hair, Joe F., Ringle, C. M., & Sarstedt, M. PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2) (2011), 139–152. https://doi.org/10.2753/MTP1069-6679190202

[51] Hair, Joe F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2) (2014), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

[51] Tan, Y., Ying, X., Gao, W., Wang, S., & Liu, Z. Applying an extended theory of planned behavior to predict willingness to pay for green and low-carbon energy transition. Journal of Cleaner Production (2023), 387, 135893. https://doi.org/10.1016/j.jclepro.2023.135893

[53] Lan, B. T. H., Phuong, T. T. L., Dat, T. T., & Truong, D. D. Factors Affecting the Purchase Intention of Products with Environmentally Friendly Packaging of Urban Residents in Ho Chi Minh City, Vietnam. Sustainability, 15(9) (2023), 7726. https://doi.org/10.3390/su15097726.

[54] Queiroz, F. C. B. P., Lima, N. C., Da Silva, C. L., Queiroz, J. V., & De Souza, G. H. S. Purchase intentions for Brazilian recycled PET Products—Circular economy opportunities. Recycling, 6(4) (2021), 75 https://doi.org/10.3390/recycling6040075.

[55] Wang, H., Ma, B. & Bai, R. 'How does green product knowledge effectively promote green purchase intention?,' Sustainability, 11(4) (2019), p. 1193. https://doi.org/10.3390/su11041193.

[56] Zhang, Y., Xiao, C. & Zhou, G. 'Willingness to pay a price premium for energy-saving appliances: Role of perceived value and energy efficiency labeling,' Journal of Cleaner Production, 242 (2020), p. 118555. https://doi.org/10.1016/j.jclepro.2019.118555

[57] Ray, S., Kim, S.S. & Morris, J.G. 'Research NOTE—Online Users' switching Costs: Their Nature and Formation,' Information Systems Research, 23(1) (2012), pp. 197–213. https://doi.org/10.1287/isre.1100.0340.