Journal of Consumer Studies and Applied Marketing
Volume 1 Number 2: 148-156
DOI: 10.58229/jcsam.v1i2.89
https://jurnal.integrasisainsmedia.co.id/index.php/JCSAM

The Effect of Overpackaging Solutions in E-Commerce Towards Consumer Preference

Abigail Gracia Soedibyo*[1], Nurrani Kusumawati[2]
School of Business and Management, Institut Teknologi Bandung, Bandung, Indonesia[1,2]
Email: abigail_gracia@sbm-itb.ac.id

Abstract

E-commerce has transformed business models, consumer purchasing behavior, and shopping experience. Despite offering many advantages, the rapid growth of e-commerce also raises a concern for the environment. Compared to the traditional retail system, the logistic system of e-commerce involves more touch points. Due to this, products purchased from e-commerce require additional packaging material to protect products from harm and damage during the distribution process, leading to overpackaging. Additionally, many researchers have suggested overpackaging solutions from the perspective of the government, e-commerce enterprises, and consumers. However, the effectiveness of those solutions is still unidentified. In order to close the gap that previous studies have not explored, this research was conducted to find recommendations for tackling the issue of overpackaging in e-commerce by examining the factors that influence consumer preferences towards e-commerce overpackaging solutions. In conducting the study, the researcher used a quantitative approach with purposive sampling by conducting an online survey to 400 e-commerce users from the age range of 17-26 years old (generation Z), domiciled in Bandung and Jabodetabek area, and have experienced overpackaging in e-commerce. The researcher uses descriptive, statistical, and PLS-SEM to analyze the survey result. The result indicates that innovating green packaging materials, the establishment of a recycling system, government policy, and increasing awareness towards the preservation of the environment have a positive influence on consumer preference, the establishment of a recycling system and consumer preference is mediated by government policy and increasing awareness towards the preservation of the environment, and government policy mediate innovating green packaging materials and consumer preference. The finding of this research will give insight and recommendations for the government, e-commerce enterprises, and consumers in tackling the issue of overpackaging in e-commerce.

Keywords: consumer preference; e-commerce; green packaging; environmental awareness; overpackaging;

A. INTRODUCTION

Electronic commerce, or e-commerce, is buying and selling physical goods through the internet or online platforms. The industry of e-commerce is getting more popular due to technology improvements. The estimated annual growth rate of e-commerce in Indonesia in 2020 was 37.4%, indicating a year-on-year increase (Statista, 2021). Despite that, the rapid growth of e-commerce and the express delivery sector also raises a concern for the environment. The logistic system of e-commerce involves more touch points than the traditional retail setting. Products are managed or processed four times more in the e-commerce network than in a conventional retail supply chain (Fisher K. et al., 2017). Due to this, products purchased from e-commerce require additional packaging material to protect the goods purchased from e-commerce during the distribution process, leading to overpackaging or excessive packaging (Wang, Fang, et al., 2016; Lu, Shan et al., 2020).

Regarding the previously discussed overpackaging problem, it is important to understand this problem from the perspective of e-commerce users. The author had already conducted a preliminary survey of 63 respondents that are considered e-commerce users. This preliminary survey explores users' behavior and actions after purchasing goods through e-commerce. Based on this preliminary survey, it is shown that

* Corresponding author

87.3% of respondents are aware of the environmental risk that is caused by packaging waste from e-commerce. Despite their awareness, 20% of respondents are not concerned about the issue, while 65.5% are still concerned about the issue but have not taken any action to address it. Moreover, 78.2% of respondents immediately throw the packages when they receive the goods from e-commerce.

Additionally, the preliminary result concluded that several stakeholders, such as consumers, enterprises, and the government, cause the overpackaging issue. Some consumers are unaware of the problem or are not concerned about the issue. Then, not many enterprises have provided the option to use eco-friendly packaging. In addition to that, the government does not make a clear policy regarding the waste management system or improve environmental awareness among consumers and enterprises. Several previous studies have suggested solutions from various perspectives. However, the effectiveness of those solutions is still unidentified. To close the gap that previous studies have not explored, the researcher wants to highlight the role of consumer preference in generating effective overpackaging solutions in e-commerce. Thus, this research is conducted to find recommendations for e-commerce overpackaging solutions by assessing how each stakeholder's role may influence consumers' preference towards e-commerce overpackaging solutions.

B. RESEARCH METHOD

The author conducted a literature review regarding the issue of overpackaging in e-commerce and suggested overpackaging solutions from the perspective of the government, e-commerce enterprises, and consumers. Based on that, the author determined seven variables: government policy, the establishment of a recycling system, innovative green packaging materials, packaging optimization strategy, integrated packaging for large-scale orders, increasing awareness towards the preservation of the environment, and consumer preference. With those variables, the author developed a framework that includes several variables that were primarily derived from previous studies that focus on similar objectives, such as from Xie et al. (2021), Lu et al. (2020), Kao et al. (2020), and Socaciu et al. (2022). The following hypothesis is used to build the research framework, which would be the basis for gathering data for this research.

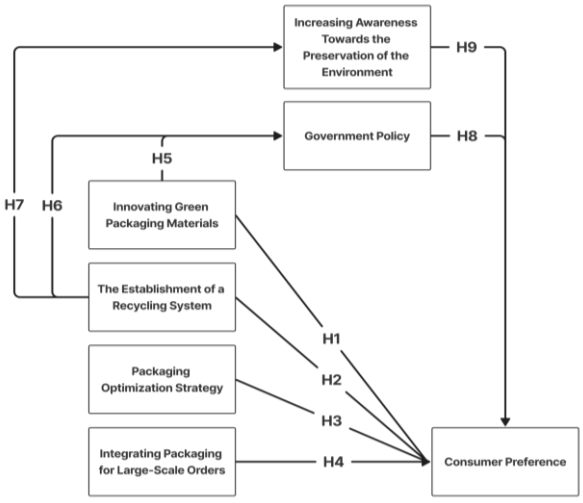

Figure 1. Proposed Model
Source: Xie et al. (2021), Lu et al. (2020), Kao et al. (2020), Socaciu et al. (2022)

H1: Innovating green packaging materials has a positive influence on consumer preference
H2: The establishment of a recycling system has a positive influence on consumer preference

H3: Packaging optimization strategy has a positive influence on consumer preference
H4: Integrating packaging for large-scale orders has a negative influence on consumer preference
H5: Government policy can have a positive mediating effect between innovating green packaging materials and consumer preference
H6: Government policy can have a positive mediating effect between the establishment of a recycling system and consumer preference
H7: Increasing awareness towards the preservation of the environment can have a positive mediating effect between the establishment of a recycling system and consumer preference
H8: Government policy has a positive influence on consumer preference
H9: Increasing awareness towards preserving the environment positively influences consumer preference.

The researcher is conducting a quantitative research approach. The researcher uses a 95% confidence level interval and a 5% error margin (Taherdoost, 2016). The minimum sample size used in this research is 385 e-commerce users in the Bandung and Jabodetabek area. Based on that, this research uses non-probability sampling, specifically purposive sampling, where the researcher needs to concentrate on respondents with similar viewpoints to have the required data and be willing to share it (Etikan and Bala, 2017). Therefore, the researcher chooses suitable respondents based on several criteria, such as e-commerce users from Bandung and Jabodetabek aged 17 to 26 years old who have experienced overpackaging in e-commerce.

Additionally, the researcher will use online surveys to conduct quantitative studies. Therefore, the researcher has designed a 7-point Likert scale questionnaire to measure the influence of overpackaging solutions from various stakeholders in e-commerce on consumer preferences. Before distributing the questionnaire, the researcher will do a pilot study or test to ensure the respondent's comprehension of the questions and test the questionnaire's prior validity and reliability.

After the questionnaire's validity and reliability have passed the pilot test, the researcher will process the data and conduct the hypothesis testing using the SmartPLS tool and the PLS-SEM method. The major purpose of PLS-SEM is to assess the predictive correlation between variables by determining whether there is a relationship or influence between these variables (Wong, 2013). In PLS-SEM testing, it is divided into two testing stages, which are testing the outer and inner models separately. In the outer model, the researcher will conduct indicator reliability tests, internal consistency reliability tests, convergent validity tests, discriminant validity tests, and collinearity tests. The researcher will conduct path analysis, hypothesis testing (T-test), R^2 (Coefficient of Determination), and mediation analysis in the inner model.

C. RESULTS AND ANALYSIS

After successfully gathering 400 questionnaire responses from respondents that fulfilled the criteria of this study, the author conducted a validity and reliability test using PLS-SEM.

Table 1. Reliability Analysis

Variable	Indicators	Outer Loadings	Variable	Indicators	Outer Loadings
Innovating Green Packaging Materials	IGPM1	0.791	Government Policy	GP1	0.827
	IGPM2	0.677		GP2	0.868
	IGPM3	0.678		GP3	0.867
The Establishment of a Recycling System	TEoaRS1	0.811		GP4	0.848
	TEoaRS2	0.683		GP5	0.798
	TEoaRS3	0.789	Increasing Awareness Of the Preservation of the Environment	IATtPotE1	0.714
Packaging Optimization Strategy	POS1	0.711		IATtPotE2	0.739
	POS2	0.725		IATtPotE3	0.798
	POS3	0.702		IATtPotE4	0.847
	POS4	0.716		CP1	0.772

Variable	Indicators	Outer Loadings	Variable	Indicators	Outer Loadings
	POS5	0.710	Consumer Preference	CP2	0.733
Integrating Packaging for Large-Scale Orders	IPfLSO1	0.643		CP7	0.735
	IPfLSO2	0.747			
	IPfLSO3	0.730			

Source: research data, 2023

In order to pass the indicator reliability test, the value of outer loading should preferably exceed 0.7. However, eliminating indicators with outer loadings between 0.4 and 0.7 is not mandatory and should be considered if the composite reliability and AVE are below the minimum threshold value (Hair et al., 2021). According to Wong (2013), 0.4 or above is an acceptable outer loading value to pass the indicator reliability test. Therefore, the researcher will use that threshold to test the indicator reliability and eliminate indicators with outer loadings below 0.4. The result has shown that all indicators have an outer loading score above 0.4. However, since the AVE of consumer preference is lower than 0.5, the author eliminated CP3, CP4, CP5, CP6, CP9, and CP10.

Table 2. Composite Reliability and Validity

Variable	Composite Reliability	AVE
Innovating Green Packaging Materials	0.760	0.515
The Establishment of a Recycling System	0.806	0.582
Packaging Optimization Strategy	0.838	0.508
Integrating Packaging for Large-Scale Orders	0.751	0.502
Government Policy	0.924	0.709
Increasing Awareness Towards Preservation of the Environment	0.858	0.602
Consumer Preference	0.893	0.501

Source: research data, 2023

All of the indicators used for this investigation produced valid results. This is proven by the values of AVE that are above 0.5. Furthermore, all of the indicators utilized in the research yielded valid results, proven through the values of Cronbach's Alpha that were higher than 0.7.

Table 3. Collinearity Test

Indicator's Label	Variance Inflation Factor (VIF)	Indicator's Label	Variance Inflation Factor (VIF)
CP1	1.861	IPfLSO1	1.172
CP2	1.820	IPfLSO2	1.216
CP7	1.340	IPfLSO3	1.069
GP1	2.277	POS1	1.456
GP2	2.763	POS2	1.532
GP3	2.648	POS3	1.386
GP4	2.548	POS4	1.447
GP5	2.180	POS5	1.395
IATtPotE1	1.374	TEoaRS1	1.331
IATtPotE2	1.520	TEoaRS2	1.225
IATtPotE3	1.641	TEoaRS3	1.249
IATtPotE4	1.909	IGPM2	1.112
IGPM1	1.200	IGPM3	1.126

Source: research data, 2023

To measure the degree of variable collinearity, the researcher utilized multicollinearity tests. All survey items had VIF (Variance Inflation Factor) values lower than 5, indicating no multicollinearity issues.

In marketing research studies, R^2 values of 0.75, 0.50, and 0.25 have been classified as significant, moderate, and weak. These classifications represent the degree to which the regression model accounts for the dependent variable's observed variability. The findings of R^2 values are shown in Table 4.

Table 4. R^2

Construct	R-square
Consumer Preference	0.735
Government Policy	0.366

Construct	R-square
Increasing Awareness Towards the Preservation of the Environment	0.323

Source: research data, 2023

According to the results, the R^2 value of Consumer Preference is 0.735. This indicates that six latent variables (Innovating Green Packaging Materials, The Establishment of a Recycling System, Packaging Optimization Strategy, Integrating Packaging for Large-Scale Orders, Government Policy, and Increasing Awareness Towards the Preservation of the Environment) represent 73.5% of the variance in Consumer Preference. The R^2 value of Government Policy is 0.366. This indicates that two latent variables (Innovating Green Packaging Materials and The Establishment of a Recycling System) represent 36.6% of the variance in Government Policy. The R^2 value of Increasing Awareness Towards the Preservation of the Environment is 0.323. This indicates that one latent variable (The Establishment of a Recycling System) represents 32.3% of the variance in Increasing Awareness Towards the Preservation of the Environment.

To determine the acceptance or rejection of the hypotheses, the researcher will use a T-Statistics value with a significance level of 0.05 or 5%. When the T-Statistics value is greater than 1.96, the hypothesis is accepted. Meanwhile, the hypothesis is rejected when the T-Statistics value is lower than 1.96.

Table 5. Hypothesis Testing

Path	Path Coefficient	T Values	P Values	Result
Innovating Green Packaging Materials → Consumer Preference	0.078	2.189	0.029	Significant
The Establishment of a Recycling System → Consumer Preference	0.083	1.961	0.050	Significant
Packaging Optimization Strategy → Consumer Preference	0.022	0.538	0.590	Not Significant
Integrating Packaging for Large-Scale Orders → Consumer Preference	-0.019	0.645	0.519	Not Significant
Innovating Green Packaging Materials → Government Policy	0.233	3.549	0.000	Significant
The Establishment of a Recycling System → Government Policy	0.447	8.083	0.000	Significant
The Establishment of a Recycling System → Increasing Awareness Towards the Preservation of the Environment	0.568	9.554	0.000	Significant
Government Policy → Consumer Preference	0.587	12.359	0.000	Significant
Increasing Awareness Towards the Preservation of the Environment → Consumer Preference	0.203	4.247	0.000	Significant

Source: research data, 2023

According to Table 5, it can be concluded that all paths, except for the path of Integrating Packaging for Large-Scale Orders toward Consumer Preference, have a positive influence between variables. Moreover, seven of the nine hypotheses exhibit a significant effect (P-value below 0.05), with the remaining two paths not indicating a significant effect (P-value above 0.05). These findings indicate that: 1) Innovating Green Packaging Materials has a positive and significant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 2.189; 2) The Establishment of a Recycling System has a positive and significant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 1.961; 3) Packaging Optimization Strategy has a positive but insignificant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 0.538; 4) Integrating Packaging for Large-Scale Orders has a positive but insignificant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 0.645; 5) Innovating Green Packaging Materials has a positive and significant effect on Government Policy at a degree of confidence of 95% and T-Statistic value of 3.549; 6) The Establishment of a Recycling System has a positive and significant effect on Government Policy at a degree of confidence of 95% and T-Statistic value of 8.083; 7) The Establishment of a Recycling System has a positive and significant effect on Increasing Awareness Towards the Preservation of the Environment at a degree of

confidence of 95% and T-Statistic value of 9.554; 8) Government Policy has a positive and significant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 12.359; and 9) Increasing Awareness Towards the Preservation of the Environment has a positive and significant effect on Consumer Preference at a degree of confidence of 95% and T-Statistic value of 4.247.

In this study, three structural paths involve mediating variables. In order to accept or reject the hypotheses, the researcher will test the mediation effect by assessing the indirect effect of those structural paths. In this test, the hypothesis is considered valid if the T value exceeds 1.96 and the P-value is less than 0.05.

Table 6. Indirect Effect Testing

Path	T Values	P Values
Innovating Green Packaging Materials → Government Policy → Consumer Preference	3.568	0.000
The Establishment of a Recycling System → Government Policy → Consumer Preference	6.407	0.000
The Establishment of a Recycling System → Increasing Awareness Towards the Preservation of the Environment → Consumer Preference	3.793	0.000

Source: research data, 2023

The test results reveal that all the indirect effects of three structural paths that involve mediating variables are significant, with a T-value above 1.96 and a P-value below 0.05. Therefore, it can be concluded that the relationship between The Establishment of a Recycling System and Consumer Preference is mediated by Government Policy and Increasing Awareness Towards the Preservation of the Environment. Government Policy mediates the relationship between Innovating Green Packaging Materials and Consumer Preference.

Discussion

H1: Innovating green packaging materials has a positive influence on consumer preference.

Innovating green packaging materials has a significant positive influence on consumer preference towards overpackaging solutions in e-commerce. The T-Statistics value of the hypothesis is 2.189, which is greater than 1.96, and the significance level is 0.029, lower than 0.05. This finding is aligned with a previous study by Socaciu et al. (2022), which supports that consumers prefer green packaging materials. Respondents believe utilizing eco-friendly packaging can reduce the negative impact of overpackaging, such as reducing packaging waste and making the recycling process easier for consumers. Other than that, high-quality eco-friendly packaging is durable and strong enough to protect the goods purchased from e-commerce. Considering those advantages, this solution is preferred by consumers.

H2: The establishment of a recycling system has a positive influence on consumer preference.

In e-commerce, the introduction of a recycling mechanism has had a positive effect on customer preference for overpackaging solutions. At a significance level of 0.05, the T-Statistics value of the hypothesis is 1.961, which is higher than 1.96. This result is consistent with earlier research by Xie et al. (2021) and Lu et al. (2020), which discovered that consumers preferred creating a recycling system to remedy overpackaging problems. Implementing an effective recycling system and expanding recycling facilities close to consumers' homes can motivate people to practice the 3Rs (reduce, reuse, recycle), which reduces packaging waste and the harmful effects of overpackaging.

H3: Packaging optimization strategy has a positive influence on consumer preference.

Packaging optimization strategy does not significantly influence consumer preference towards overpackaging solutions in e-commerce. The T-Statistics value of the hypothesis is 0.538, lower than 1.96, and the significance level is 0.590, greater than 0.05. This finding contradicts an earlier study by Lu et al. (2020) which discovered that packaging optimization is the most preferred solution to overpackaging issues in e-commerce. This could occur because the solution might require technologies and additional expenses

associated with its development and manufacture. Consumers may be concerned that those expenses would increase the product's price and the shipping and handling prices.

H4: Integrating packaging for large-scale orders negatively influences consumer preference.

Integrating packaging for large-scale orders does not significantly influence consumer preference toward overpackaging solutions in e-commerce. The T-Statistics value of the hypothesis is 0.645, lower than 1.96, and the significance level is 0.519, greater than 0.05. This result conflicts with an earlier study by Xie et al. (2021), which supports that integrating packaging for large-scale orders negatively influences consumer preference. As long as their items get to their homes as fast as possible and safely, they are not particularly concerned with what happens to the system that underlies the distribution and storage process.

H5: Government policy can positively mediate between innovating green packaging materials and consumer preference.

Since both the direct and indirect effects are significant and point in the same direction (positive), it can be concluded that government policy has a positive mediating effect between innovating green packaging materials and consumer preference, with the classification as complementary partial mediation. This finding is aligned with previous studies by Kao et al. (2020), who found that government policy can promote eco-friendly packaging materials, influencing consumer preference for that approach in reducing the negative impact of overpackaging. Through the intervention of government policies, the initiatives of using green packaging materials will be more feasible to be implemented.

H6: Government policy can positively mediate between establishing a recycling system and consumer preference.

Since both the direct and indirect effects are significant and point in the same direction (positive), it can be concluded that government policy has a positive mediating effect between establishing a recycling system and consumer preference, with the classification as complementary partial mediation. This finding is aligned with previous studies by Kao et al. (2020) and Xie et al. (2021), who also found that government policy can encourage the establishment of a recycling system, which will influence consumer preference towards that approach for reducing the negative impact of overpackaging. The government can give rewards and guidance to motivate e-commerce to develop an effective recycling system. This initiative can also encourage consumers to participate in the recycling program and use the recycling facilities provided by e-commerce or the government.

H7: Increasing awareness towards the preservation of the environment can positively mediate between establishing a recycling system and consumer preference.

Since both the direct effect and indirect effect are significant and point in the same direction (positive), it can be concluded that increasing awareness towards the preservation of the environment has a positive mediating effect between the establishment of a recycling system and consumer preference, with the classification as complementary partial mediation. This finding is aligned with previous studies by Kao et al. (2020), who also found that increasing environmental awareness among consumers can support the effectiveness of a recycling system established by e-commerce, which will influence consumers to choose that solution in reducing the negative impact of overpackaging. The effectiveness of a recycling system requires consumers' awareness and understanding of how to recycle packaging waste from e-commerce.

H8: Government policy has a positive influence on consumer preference.

Government policy has a significant positive influence on consumer preference towards overpackaging solutions in e-commerce. The T-Statistics value of the hypothesis is 12.359, greater than 1.96, and the significance level of 0.000, lower than 0.05. This finding is aligned with previous studies by Xie et

al. (2021), who indicated that consumers believe that government policy is required to address and manage the issues of overpackaging. Government regulations play a critical role in raising environmental awareness among consumers and guiding consumers to participate in implementing 3R practices along with e-commerce enterprises.

H9: Increasing awareness towards the preservation of the environment positively influences consumer preference.

Increasing awareness towards preserving the environment significantly influences consumer preference towards overpackaging solutions in e-commerce. The T-Statistics value of the hypothesis is 4.247, greater than 1.96, and the significance level of 0.000, lower than 0.05. This finding is aligned with previous studies by Xie et al. (2021) and Lu et al. (2020), who found that increasing awareness of the issue of overpackaging and knowledge regarding the importance of 3R (reduce, reuse, recycle) practices can affect consumers preference for sustainable behaviors, which leads to lessen the adverse effects of overpackaging. Consumers who are highly concerned about the environment are more likely to choose sustainable packaging and be more mindful while disposing of packaging waste.

D. CONCLUSION

These findings conclude that Innovating green packaging materials, establishing a recycling system, government policy, and increasing awareness towards the preservation of the environment significantly influence consumer preference towards overpackaging solutions in e-commerce. Those variables are also positively correlated, meaning consumers prefer those solutions to tackle the issue of overpackaging in e-commerce. Government policy is also found to have an intervening effect in establishing a recycling system and innovating green packaging materials. Additionally, increasing awareness towards preserving the environment is found to have a mediating effect in establishing a recycling system. It means that government policy and raising environmental awareness among consumers can encourage and increase the effectiveness of establishing a recycling system and the utilization of green packaging materials.

This research aims to assess the solutions towards overpackaging in e-commerce from the perspective of government, e-commerce enterprises, and consumers as factors influencing consumer preferences. Thus, the result of this study developed several recommendations for those stakeholders. The government policy should be improved to facilitate, set standards, and supervise the enterprise's development of overpackaging solutions. Additionally, it is recommended for e-commerce to establish a recycling system. Through this solution, consumers can discard and recycle packaging waste more easily. E-commerce can also try utilizing packaging that is made out of recycled waste. Furthermore, consumers should be more aware of the environmental issue and actively adopt sustainable behavior.

REFERENCES

Etikan, I. and Bala, K. (2017). Sampling and sampling methods. Biometrics & Biostatistics International Journal, 5(6), p.00149.

Fisher, K. and Lilienfeld, B. (2017). Optimizing Packaging for an E-commerce World. American Institute for Packaging and the Environment.

Lu, S., Yang, L., Liu, W. and Jia, L. (2020). User preference for electronic commerce overpackaging solutions: Implications for cleaner production. Journal of Cleaner Production, 258, p.120936.

Socaciu, M. I., Câmpian, V., Dabija, D. C., Fogarasi, M., Semeniuc, C. A., Podar, A. S., & Vodnar, D. C. (2022). Assessing consumers' preference and loyalty towards biopolymer films for food active packaging. Coatings, 12(11), 1770.

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. How to choose a sampling technique for research (April 10, 2016).

Wang, F. and Hu, Y. (2016). Research on green express packaging design under the electronic commerce. Open Journal of Business and Management, 4(4), pp.621-628.

Wolff, H.N. (2021). Annual growth rate of e-commerce in Indonesia from 2016 to 2020 with forecasts until 2024. Statista. Available at: https://www.statista.com/statistics/1235476/indonesia-e-commerce-growth-rate/

Wong, K.K.K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. Marketing bulletin, 24(1), pp.1-32.

Xie, G., Huang, L., Apostolidis, C., Huang, Z., Cai, W. and Li, G. (2021). Assessing consumer preference for overpackaging solutions in e-commerce. International Journal of Environmental Research and Public Health, 18(15), p.7951.