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Regional Case Study

Analysis of Consumer Preferences on Online Delivery Plastic Packaging Consumption Behavior: An Indonesian Survey

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Abstract

A heavy dependency on online shopping platforms and home delivery, together with emerging post-pandemic responses from developing nations like India, China, Brazil, and primarily Indonesia, sum up a surge in demand for unsustainable plastic packaging techniques. Consumer preference as the center of successful commercial strategy and become a consideration in waste management studies. This study aims to develop an understanding of consumer preference factors as a response to tackling the plastic problem due to the online delivery system in Indonesia. Google's web-based platform is used to capture the number of online deliveries in a weekly period. A five-level Likert scale measures attitudes, social norms, or perceptions toward a constructed questionnaire. From the ordinal regression analysis, younger people intend to consume more with online platforms, and the more people don't have a proper waste collection, the higher they will consume online plastic delivery.

Keywords: Consumer preference, online delivery, plastic waste

1. Introduction

Consumer preference has critically become a consideration in waste management studies. Preference helps to identify predictors of consumption behavior. It is a center of successful commercial strategy and always be highlighted for the manufacturer's decision-making (Galati et al., 2022). From the social scientific studies, plastic consumption preferences are potentially influenced by sociodemographics, attitudes, convenience, context factors, habits, diffusion of responsibility, and social factor (Heidbreder et al., 2020). However, preferences for plastic packaging consumption yet often overlooked. Such as the previous pandemic outbreak has altered the consumption pattern and thus drove society through safety concerns and limited alternatives, leaving a shift into highly dependence on plastic packaging, especially from food express delivery businesses (Janairo, 2021; Phelan et al., 2022). A recent report claim that South Korea found an increase of 600,000 tons disposed of plastic annually from online delivery, which is accumulated 4.8 higher than offline shopping (Pinos et al., 2022). Moreover, a significant drop in consumption demand in UK and Japan are due to the less protection of plastic packaging during an outbreak (Kitz et al., 2021).

A study found that consumers are willing to pay a premium for environmentally friendly packaging, particularly when it comes to food delivery. This suggests that consumers view plastic packaging as an important issue and are willing to take action to reduce their impact on the environment (Nguyen et al., 2020). Another study found that consumers are more likely to choose a delivery option that uses environmentally friendly packaging over one that does not, even if it costs more (Schuermann ad Woo, 2022). Another research has emphasized the significance of consumer behavior in online

shopping. It highlighted the role of emotions and convenience in shaping consumer preferences. For example, consumers may prioritize convenience over environmental concerns, choosing to use plastic packaging if it ensures the safe delivery of their food (Ettis et al., 2017). On the other hand, they may choose to avoid plastic packaging if they have a negative emotional association with it (Sun and Trudel, 2017). Additionally, the study showed that consumer attitudes towards plastic packaging vary depending on the type of product being delivered. For example, consumers may be more likely to accept plastic packaging for delivery of non-perishable goods, such as books, while they may be more likely to reject it for perishable goods, such as food (Betizen-Heineke et al., 2017). A recent study indicated that the design of plastic packaging also plays a role in consumer preferences. This suggests that businesses may be able to influence consumer behavior by designing packaging that is more appealing, environmentally friendly, or sustainable. For example, businesses could use clear, recyclable packaging to show consumers that their delivery is eco-friendly (Rajendran et al., 2019). Most of the literature highlights that consumer preferences on plastic packaging in online delivery are influenced by a range of factors, including the cost, convenience, and environmental impact of the packaging. Therefore, understanding those factors may be essential as mitigation action to reduce the plastic waste related problems in the environment.

Emerging post-pandemic responses from developing countries such as India, China, Brazil, and mainly Indonesia summarize a heavy dependence on online shopping platforms and home delivery, leading to an increased demand for unsustainable plastic packaging practices (Liu et al., 2020; Kautish et al., 2021). Few studies examine the relationship and environmental impacts of the booming delivery industry (Pinos et al., 2022). Therefore, this paper aims to develop an understanding of consumer preference factors as a response to tackling the plastic problem due to the online delivery system in Indonesia.

2. Methods

Google's web-based platform used to gather information about a consumer's preferences, attitudes, and behavior toward plastic packaging. Online questionnaires can reach a larger and more diverse audience, as they can be accessed from anywhere in the world with an internet connection. To understand the consumer preference value, questions may include: (1) Demographic information (age, income, job status, etc.); (2) awareness of the product/service, (3) frequency of usage, and (4) satisfaction with the product/service (Janairo, 2021; Pinos et al., 2022). The construct question is described in Table 1, followed by the reference data.

The likert scale is used in survey research to measure attitudes, opinions, or perceptions (Cavaliere et al., 2021). It consists of a series of statements or questions. Respondents are asked to indicate their level of agreement or disagreement with each statement on a scale of levels, typically ranging from strongly disagree to agree strongly. The scale ranges from 1 (strongly disagree) to 5 (strongly agree). The Likert scale is widely used because it is easy to understand and simple to administer, and it provides a continuous, quantitative measure of attitudes, social norms, or perceptions (Kautish et al., 2021).

Mean value, standard deviation, frequency distributions, and percentage describe the statistical data (Aikowe and Mazancová, 2021). The ordinal regression approach is a type of regression analysis used for predicting an ordinal dependent variable, meaning it has categories with a clear order or ranking. The linear method of ordinal regression models the relationship between the ordinal dependent variable and independent variables as a linear combination. The goal is to find the best-fitting line that can predict the ordinal response based on the values of the independent variables. The step-by-step analysis is inspired by Grigoroudis et al. (2021), Tutz (2022), and Dias et al. (2021).

Table 1. Questionaire construct

Construct	Label	Description	Type	References
Behaviour of Consumption	DV	Amount of in weekly online delivery	Scale	Janairo, 2021
Respondent Descriptors	C1	Age	Scale	Seo and Kudo, 2022
	C2	Income	Scale	Gareiou et al., 2022
Attitude				
	Item 1	I understand free-plastic campaign	Ordinal	Kautish et al., 2021
	Item 2	I think plastic is hard to degrade	Ordinal	Otaki and Kyono, 2022
	Item 3	I do not know about recycling	Ordinal	Aktas et al., 2018
	Item 4	I think recycling is unprofitable	Ordinal	Grigoroudis et al., 2021
Social Norms				
	Item 5	Surrounding ask to improve recycling	Ordinal	Pinos et al., 2022
	Item 6	Surrounding tell about plastic litter	Ordinal	Senturk and Dumludag, 2021
	Item 7	Surrounding education the importance	Ordinal	Zhang et al., 2019
Percieved Behaviour	Item 8	Community recycling reduce consumption	Ordinal	Misgana and Tucho, 2022
	Item 9	Recycling facility reduce consumption	Ordinal	Cavaliere et al., 2020
	Item 10	I dont have proper waste collection	Ordinal	Liu et al., 2020

3. Result and Discussion

Four hundred thirty (403) random respondents participated from Indonesia and were carried out from August to November 2022. The consumption of plastic packaging from online deliveries ranges from a minimum of 0 (zero) use to 9 times used in a week. The mean value equals 2.10, with a deviation of about 2.369. The mean value describes that most respondents mainly ordered online delivery with plastic packaging two times in a week (Gareiou et al., 2022). The skewness value is 1.411, which describes the mean as typically more significant than the median. The most frequently occurring value is located on the distribution's left side. Otherwise, the Kurtosis value is 0.837, which analyzed that data is a platykurtic distribution with a wide range of values and little concentration of values around the mean (Galati et al., 2022; Senturk and Dumludag, 2021). The normality test value of Klomogrov-Smirnov and Shapiro-Wilk both are below the significance of 0.05, which confirm the overall data distribution is not normally distributed (Van et al., 2021; Rattray and Jones, 2007; Minelgaitė and Liobikienė, 2019).

From Table 3. we can assess the descriptive result of the Likert questionnaire. The minor standard deviation corresponds with Item number 5 and 6, which describes the most narrow result from the

respondent. Respondents generally agree with a statement that surrounding improvement in recycling and knowledge of plastic impact will encourage them to minimize plastic consumption. This statement are relevant with the studies by Cavaliere et al. (2020), Borg et al. (2020), and Aktas et al. (2018). However, item of education is not significant in this research, which differs from Kautish et al. (2021) finding. Another researcher also proposes pricing value (Janairo, 2021) and availability alternatives (Galati et al., 2022) to maximize response coverage. On the other side, the mean value of item number 3 is smaller than the other range at 2.48. It assumes that most respondents respond neutrally to whether to know about recycling.

Table 2. Descriptive statistics and test of normality

	Descriptive Statistics			**Test of Normality**			
		Statistic	**Std. Error**		**Statistic**	**df**	**Sig.**
Deliveries Each Week	N	430		Kolmogorov-Smirnov	0.352	430	0.000
	Mean	2.10					
	Std. Deviation	2.369		Shapiro-Wilk	0.735	430	0.000
	Skewness	1.1411	0.118				
	Kurtosis	0.837	0.235				

This result is in line with the research of Aktas et al. (2018), which states that recycling knowledge is potentially varied, and it is supported by Pinos et al. (2022) that in a developing country, recycling is controversial because of a lack of policies, funds, and civic awareness. For others, items' interpretations are unclear to be described directly from the descriptive statistic. Due to that and the not normally distributed data, an ordinal regression analysis is needed to understand the relationship between consumption frequencies and related factors deeply (Grigoroudis et al., 2021; Dias et al., 2021).

Table 3. Descriptive of likert result

Responses	**Items Questionnaire**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Strongly Disagree	11	12	112	61	1	3	4	52	37	43
Disagree	10	13	128	65	7	7	11	44	32	45
Neutral	71	30	106	88	42	38	38	58	72	68
Agree	127	57	39	113	91	109	108	41	115	94
Strongly Agree	211	318	45	103	289	273	269	235	174	180
Mean	4.20	4.53	2.48	3.31	4.53	4.49	4.46	3.84	3.83	3.75
Std. Deviation	0.970	0.953	1.258	1.360	0.756	0.781	0.832	1.470	1.272	1.356

Table 4. Ordinal logistic regression result

	Estimate	**Std. Error**	**OR**		**Estimate**	**Std. Error**	**OR**
[C1]	-0.014	0.008	0.986	[C2]	0.607	0.101	1.835
[Item 1 = 1]	-0.301	0.704	0.740	[Item 6 = 1]	22.836	11784.069	N/A
[Item 1 = 2]	0.039	0.618	1.040	[Item 6 = 2]	0.065	0.980	1.067
[Item 1 = 3]	0.375	0.278	1.455	[Item 6 = 3]	0.989	0.488	2.689
[Item 1 = 4]	0.128	0.235	1.137	[Item 6 = 4]	0.646	0.348	1.908
[Item 1 = 5]	0[a]	.	.	[Item 6 = 5]	0[a]	.	.
[Item 2 = 1]	0.696	0.617	2.006	[Item 7 = 1]	-19.626	11784.069	0.000
[Item 2 = 2]	-0.863	0.592	0.422	[Item 7 = 2]	0.714	0.830	2.042
[Item 2 = 3]	0.671	0.412	1.956	[Item 7 = 3]	-1.113	0.486	0.329

	Estimate	**Std. Error**	**OR**		**Estimate**	**Std. Error**	**OR**
[Item 2 = 4]	0.394	0.289	1.483	[Item 7 = 4]	-0.532	0.352	0.587
[Item 2 = 5]	0[a]	.	.	[Item 7 = 5]	0[a]	.	.
[Item 3 = 1]	0.080	0.366	1.083	[Item 8 = 1]	0.623	0.363	1.865
[Item 3 = 2]	0.404	0.365	1.498	[Item 8 = 2]	0.211	0.343	1.235
[Item 3 = 3]	0.215	0.366	1.240	[Item 8 = 3]	.078	0.316	1.081
[Item 3 = 4]	-0.086	0.452	0.918	[Item 8 = 4]	-0.610	0.347	0.543
[Item 3 = 5]	0[a]	.	.	[Item 8 = 5]	0[a]	.	.
[Item 4 = 1]	-0.420	0.374	0.657	[Item 9 = 1]	-0.236	0.446	0.790
[Item 4 = 2]	0.065	0.345	1.067	[Item 9 = 2]	-0.365	0.446	0.694
[Item 4 = 3]	0.036	0.322	1.037	[Item 9 = 3]	0.016	0.337	1.016
[Item 4 = 4]	0.146	0.300	1.157	[Item 9 = 4]	-0.312	0.277	0.732
[Item 4 = 5]	0[a]	.	.	[Item 9 = 5]	0[a]	.	.
[Item 5 = 1]	-23.925	0.000	0.000	[Item 10 = 1]	-0.391	0.375	0.676
[Item 5 = 2]	-0.817	0.820	0.442	[Item 10 = 2]	-0.234	0.374	0.791
[Item 5 = 3]	.069	0.376	1.071	[Item 10 = 3]	-0.160	0.327	0.852
[Item 5 = 4]	-0.286	0.275	0.751	[Item 10 = 4]	0.012	0.297	1.012
[Item 5 = 5]	0[a]	.	.	[Item 10 = 5]	0[a]	.	.

Link funtion: Logit.
a. This parameter is set to zero because it is redundant

Table 5. OLR model fitting and goodness-of-fit

Model Fitting Information					**Goodness-of-Fit**			
Model	**-2 Log Likelihood**	**Chi-Square**	**df**	**Sig.**		**Chi-Square**	**df**	**Sig.**
Intercept Only	1235.040				Pearson	3157.007	3382	0.997
Final	1146.411	88.629	42	0.000	Deviance	1145.025	3382	1.000

Table 6. OLR model fitting and goodness-of-fit

Model	**-2 Log Likelihood**	**Chi-Square**	**df**	**Sig.**	**Cox and Snell**	**Nagelkerke**	**McFadden**
Null Hypothesis	1146.411				0.186	0.197	0.072
General	1123.421	22.991	294	1.000			

Based on the estimation value from Table 4 - 6, the interpretation of the complex relationship between the frequency of plastic package use from online delivery with various influential factors is summarized. By definition, the estimated value shows the probability of a given case falling above a given category on the dependent variable. A positive sign is associated with an increased likelihood of a case following a higher category of the dependent variable. For instance, the group item of respondent descriptors, attitude, and perceived behavior can explain the cause-effect relationship from the variety of estimation values ranging from small to greater numbers as it is explained by Spais and Vasileiou (2006) and Tutz (2022). On the other hand, the knowledge group failed to explain their varieties due to significant estimation value. The reason undescribable for items 5, 6, and 7 relies on the narrow standard deviation, as mentioned in Table 5. The broad range of deviation is important to reveal reasons behind the change of occurrence (Daverio, 2020; Grigoroudis et al., 2021). The correlation of the remaining group with the

frequency scale would understand by combining the result of estimation values and Odd Ratio (OR) value from the model. OR describes the odds of failing ratio into a higher or lower category on the dependent variable with a unit change in the independent variable. An increasing odds (>1) shows a possible unit increase in the dependent variable, in this case, the frequency of plastic consumption (Tutz, 2022).

First and foremost, the age descriptor gave an estimation value of -0.014 with an OR of 0.986, which means that as the age of respondents increases, it will decrease online delivery consumption. This correlates with the findings that younger people intend to consume more with online platforms, especially university and first-year students (Aikowe and Mazancová, 2021). The second is the income parameter, which has a 0.607 estimation value and 1.835 OR. These remain in more significant impactful variables among other groups. It describes that a slight increase in income will linearly increase delivery consumption. This founding is identical to the research of high-income and middle-income economies regarding the awareness of citizens in a developing country (Gareiou et al., 2022). This relevance also reveals towards e-shopping behavior mentioned by Dias et al. (2021). Items 1, 2, and 3 in the attitude group show a constant slight decrease by OR value greater than one on average. It is interpreted that the more people agree to the attitude of plastic consumption, the less they will consume online delivery. For example, the understanding of the free-plastic campaign (Item 1), the higher they agree (Item 1=4), the lesser they will buy online delivery (compared to neutral response, Item 1=3). The comparison between these two is based on the minor standard error (<40%), which clarifies the slightly narrow correlation rather that Item 1=1 and Item 1=2. Another example is item 3, where the agree value (Item 4=4) is lesser than the neutral response (Item 4=3). It implies that respondents will do online deliveries when they agree there is no profit in recycling, which closely relates to the methodology explained by (Heidbreder et al., 2019).

The perceived behavior group items could give a more precise understanding between online consumption and its influential impact. Such as for, the parameter of community recycling encourages gradual drops and could see a reduction in online order consumption in the odds ratio. The more people disagree, the gain of online delivery rises at 1.865 degrees; the more people agree, the less they consume online delivery (OR value 0.543). It is proven by research from Misgana and Tucho (2022), which claims that a high level of awareness in the community would be vital for implementing policy measures on reducing single-use plastic bags. The more people don't have a proper waste collection, the higher they will consume online plastic delivery. These numbers are growing from 0.676; to 0.791, 0.852, and 1.012. The report said a facility contributes externally to shifting people's consumption behavior. Increasing project to improve waste collection is critically essential, and providing facilities will trigger people (Phelan et al., 2022; Minelgaitė and Liobikienė, 2019). Lastly, the model fitting information confirms the likelihood of data analysis. The model shows a significance value below <0.5 in fit compared to the null model. Hence, it refers to measuring how well the observed data corresponded to the assumed model. Furthermore, the Psuedo model is used to approximate variation in the criterion variable. This value shows a below 20 percent variation (Spais and Vasileiou, 2006).

4. Conclusions

Consumer preference is a growing topic among waste management studies. There are minimum of exploration between online deliveries and single-use plastic consumption. Our research signifies that factor such as age and income significantly inflkuece the online delivery decision. With the greater income will lead greater orders also with the younger generation. From the reasoning studies, it is slightly understandable that attitude drives the consumer preference, however the percieved behaviour such as community and facility provide a clearer understanding. On the other side, the social nome seems actively being introduce to the respondent, however it could not tell the significance relefgace to the online delivery consumption. Therefore, to improve the certainties of this study, researcher suggest to expand the variety of plastic and delivery variables.

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