

# Relationship Between Consumer Awareness and Purchase Intention for Environmentally Friendly Products among Gen-Z in Penang

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## Abstract

This research investigates the relationship between consumer awareness and intention to purchase environmentally friendly products, which has increasingly grown among Generation Z. This scenario emphasises the level of consumer awareness, including four dimensions such as environmental knowledge, environmental concern, subjective norms, and perceived behavioural control to influence the consumer's purchase intention. This is because there is still a large research gap in comprehending Gen-Z consumers' awareness level and purchasing intention for green products in Penang, Malaysia. While there is evidence of consumers moving towards sustainable consumption globally, studies focusing on the Penang region are scarce. This deficiency hinders the formulation of specific marketing approaches and policies, which are crucial in enhancing green purchasing behaviour among this group. Thus, the research aims to identify the level of consumer awareness and the level of purchase intention towards environmentally friendly products and investigate the relationship between consumer awareness and purchase intention. This study adopted a quantitative research approach; data were collected from 380 respondents via questionnaires to collect data among Gen-Z in Penang. The data was analysed using the Statistical Package for the Social Sciences (SPSS), which employs descriptive and data analysis. The outcome indicated that all four dimensions of consumer awareness and purchase intention had a significant and positive correlation among Gen-Z in Penang. The research findings conclude that environmental knowledge had the strongest relationship with purchase intention among the three dimensions. This study provides valuable insights to help increase awareness and intention to purchase sustainable products among Generation Z to decrease environmental impact.

## 1. Introduction

Environmental awareness is defined as the ability to perceive or be aware of the environment and the effects of human activities on it. This awareness creates a stewardship responsibility and accountability to practice and implement responsible behaviours and actions to mitigate environmental adverse effects (Du *et al.*, 2022).

Research shows that people who are more aware of the environment tend to buy products because of their environmental claims and social responsibility (Song *et al.*, 2019).

Over recent years, environmentally friendly products have been known as green or eco-friendly products with minor environmental impact, harmless to human health, and of high quality, which is the main reason people use these products' specifications to protect the environment by using natural ingredients. Green products are any product that is made free of chemicals, toxins, and other dangerous materials, such as paint, plastics, etc. Hence, to protect the environment, consumers are changing their lifestyles to the sustainable living era, and new market segments called green consumers have been formed. Therefore, green purchases will be one of the real actions that will reduce the negative impact of environmental degradation. Plus, shifting towards environmentally friendly products is crucial for promoting sustainability and protecting the planet (Bhardwaj *et al.*, 2020). One of the Gen-Z is the generation that comes after the millennials, born between 1997 and 2012 (Gomes *et al.*, 2023). Besides, it was discovered that environmental awareness, such as environmental attitude and concern, was among the main factors for green purchases among Gen-Z consumers.

Generation Z, which is the generation of digital natives and the ones who are more aware of social and environmental problems, is the key element in this process. Even though there is growing interest in sustainability, there is only a little research specifically on the awareness and the purchasing intentions of Generation Z in Penang, Malaysia, which is about sustainable and environmentally friendly products. Even though green purchase intentions have been explored extensively in the literature over the past two decades, most research behaviours are not from the green purchase intention perspective or the Malaysian market (Chuah & Lu, 2019). This has led to insufficient knowledge regarding the intention to purchase green products in Malaysia. According to the research, 80% of Malaysian youth are aware of sustainable products, but 45% of them buy them regularly, which shows that the barriers, such as effectiveness, availability, and affordability, are still there (Gomes *et al.*, 2023). However, there is a lack of local research which would be able to capture the specific attitudes and behaviours of Generation Z in Penang. Barriers such as the limited market offerings of sustainable products and the absence of policies supporting sustainability still exist. In summary, there is still a big gap in understanding the dynamics of consumer awareness and purchase intention, especially among the Z generation in Penang, Malaysia.

Therefore, to achieve the research objectives, the level of consumer awareness and purchasing intention among Generation Z regarding environmentally friendly products in Penang is determined. Consequently, the relationship between consumer awareness and purchasing intention among Generation Z regarding environmentally friendly products in Penang.

## 2. Literature Review

### 2.1 Consumer Awareness

Consumer awareness is critical to purchasing intention and market dynamics. In addition, consumers are responsible individuals who look at what they consume and their intention for green products to support change (Naderi & Van Steenburg, 2018). If consumers become more aware of the environmental impact of their purchases, they are more likely to choose sustainable products. This shift in consumer behaviours can reduce environmental degradation and promote sustainable business practices (Al-Swidi & Saleh, 2021). Based on Afzaal (2021) consumer awareness refers to the extent to which consumers know the consequences of their consumption on the environment and the level of sustainability of the products they use. This awareness can cause them to make a conscious decision on what to purchase and pressure companies to embrace environmentally friendly practices.

#### 2.1.1 Environmental Knowledge

Environmental knowledge involves the ability of an individual to include the environment and the effects that human beings have on it, as well as ways to minimise the damage. It also describes how much an individual understands the environmental issue (Fabiola *et al.*, 2020). It includes knowledge about the concepts of ecology, existing environmental issues, and the principles of sustainable living. Hence, it helps reduce the impact of pollution on the environment by reducing waste, pollution, or toxins (Sharma *et al.*, 2023). This is because products may be organic, herbal, or made from natural ingredients or are free from preservatives and chemicals. Thus, environmental knowledge is crucial due to its foundation for understanding environmental issues and the impact of human activities on the planet.

#### 2.1.2 Environmental Concern

Environmental concerns significantly influence consumer purchase intention. Among the constructs, environmental concern emerged as the most important determinant of purchase intention. Environmental concerns result in increased awareness of environmental issues, changing the kinds of products consumers begin

to demand (Ogiemwonyi *et al.*, 2023). It is a psychological factor in which people are willing to change their behaviours to minimize environmental damage, including their buying behaviours. In addition, environmental concern on the part of the individual is important to environmental investigation. It is also a critical factor influencing consumers' choices (Rashid *et al.*, 2022). It captures the dedication towards environmental concerns (Rashid *et al.*, 2022). This indicates an individual's concern and commitment towards environmental issues (Rashid *et al.*, 2022).

### 2.1.3 Subjective Norms

According to Chao and Yu (2023), subjective norms are defined as the perceived pressure or expectation from important people in an individual's life, such as friends and family. In addition, observing the behaviour of friends and perceived culture heavily influences consumer purchasing intention to buy sustainable products (Nguyen *et al.*, 2022). When individuals see friends who proactively participate in sustainability initiatives, they will likely view such actions as socially expected and be motivated to act likewise. This social pressure is not limited to individuals within one's close-knit network but is an attempt to align oneself with a specific culture or society regarding sustainable practices.

### 2.1.4 Perceived Behavioural Control

Perceived Behavioural Control (PBC) is defined as a person's belief about the likelihood of engaging in specific behaviour and the extent of effort required to do so. It is an element of the TPB model and is determined by the perceived resources, opportunities, and perceived self-efficacy to perform the behaviour. For example, if consumers find that green products are easily accessible and affordable and have adequate knowledge of how to use them, they will intend to purchase green products. Moreover, perceived behavioural control is defined by control-related beliefs concerning the factors that may support or hinder the behaviour. The control elements are the knowledge and skills required to perform the behaviour, time, money or other resources, people's involvement, etc. (Ajzen, 2020). People are expected to behave according to individual intentions if they possess sufficient real control over their actions (Bosnjak *et al.*, 2020).

## 2.2 Purchase Intention toward Environmentally Friendly Products

Research on green purchase intentions in the literature over the past decades has emphasised green purchase behaviours other than the green purchase intention perspective or the Malaysian market (Chuah & Lu, 2019b). Purchase intention toward environmentally friendly products is the consumers' tendency to buy green products instead of traditional ones based on their environmental awareness and information level. According to Martins *et al.* (2019), higher perceived purchase intention means a higher purchase probability. If the consumers' purchase intention is positive, then positive engagement will encourage that purchase. Based on Chekima and Chekima (2019), purchase intention refers to an individual's willingness and distinct kind of environmentally friendly behaviour to prefer green products over conventional products to exhibit their environmental care.

## 2.3 Past studies related to the relationship between consumer awareness and purchase intention for environmentally friendly products

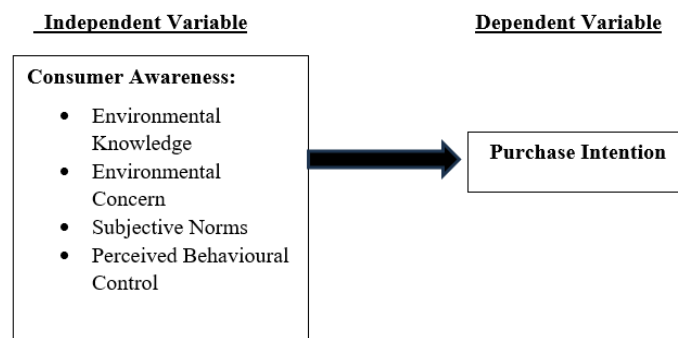
Previous studies show a strong relationship between consumer awareness and intention to buy environmentally friendly products. Various studies highlight that environmental knowledge, environmental concern, subjective norms, and perceived behavioural control have influenced purchase intention. According to Yue *et al.* (2024), the correlation analysis results show that environmental knowledge and environmental concern have a positive and significant correlation with green purchase intention. The results of the correlation analysis indicated that the subjects who reported higher levels of perceived environmental knowledge were more likely to report a greater level of environmental responsibility for consuming. A finding supported by Naalchi (2020) during previous studies showed a significant effect of environmental concern on intention. The study investigated that there was a significant and positive relationship between students' environmental attitudes and purchasing intention for green products (Naalchi, 2020).

Besides, the study by Wang *et al.* (2021) has highlighted that subjective norms and perceived behavioural mutually affect purchase intention regarding environmentally friendly products. This interaction implies that when complemented with perceived self-efficacy, social support can significantly strengthen consumers' commitment to environmental purchasing. The interaction of subjective norms and perceived behavioural control has a more expanded impact on green purchase intentions. Perceived social norms in green purchasing and perceived self-efficacy to purchase environmental products significantly influence consumers' intention to purchase green products. This brings about the need for positive social norms change and enabling consumers to promote green purchases (Shang *et al.*, 2024).

Implementing Green Supply Chain Management (GSCM) faces challenges across institutional, organisational, informational, and economic realms, both internally and externally. The construction industry, for instance, grapples significantly with a lack of government support (Syamimi Zulkefli *et al.*, 2019). Despite recognising GSCM's importance in addressing environmental issues, some businesses remain sceptical of its feasibility, while others encounter barriers hindering implementation (Rashid, 2019). Managers also encounter challenges in adopting and implementing GSCM practices, prompting a need to understand performance variations and contextual moderating effects (Rusmawati & Soewarno, 2021). The growing interest lies in how GSCM, coupled with business innovation, raises environmental awareness within businesses.

## 2.4 Conceptual Framework

The conceptual framework is shown in Fig. 1, indicates the main components of the independent variables and dependent variables. Based on the information below, the independent variable is consumer awareness, which consists of four dimensions: environmental knowledge, environmental concern, subjective norms, and perceived behavioural control. In contrast, the purchase intention is the dependent variable in this research. The hypothesis is proposed as follows: H1: There is a relationship between consumer awareness and purchase intention.

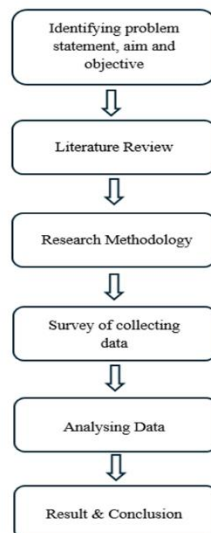


**Fig. 1** Framework for Consumer Awareness and Purchase Intention

## 3. Research Methodology

### 3.1 Research Design

According to Kirumbi (2018), a research design is the set of methods and procedures used in collecting and analysing measures of the variables specified in the research problem as shown in Fig. 2. The research aims to identify consumer awareness and purchasing intention for environmentally friendly products among Generation Z in Penang. The research's target respondent is the consumer of the Z-Generation. Based on the research, the quantitative approach is defined as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques (Bhat, 2018).



**Fig. 2** Research flow chart

This study aims to identify consumer awareness and purchase intention for environmentally friendly products among Generation Z in Penang. This is because Penang has a progressive stance on sustainability and environmental conservation. The target population of the respondents is Generation Z, and they have become increasingly influential in market trends. Those who care about the environment and influence others to prioritise sustainability while making purchases. Generation Z was born into a warming planet, so they will be considered the most environmentally conscious and green or climate generation (Gomes *et al.*, 2023). According to the Department of Statistics Malaysia (DOSM), the population of Penang is 408,985, and it ranges from 18 to 27 years old. The survey is used as the primary data collection tool for the purpose of research, and quantitative methods were used in this research. This study approaches a survey based on the questionnaire in which 384 questionnaires were distributed accurately among the consumers of Generation Z in Penang based on the random sample selection as per the Krejcie & Morgan table (1970).

### 3.2 Research Population and Sample

In this research, the target respondent is Generation Z in Pulau Pinang. In 2023, the population of Penang was 408,985 people, ranging from 18 to 27 years old. The sampling method contains two methods of sampling, which are random sampling and non-random sampling. However, non-random sampling is based on selecting smaller samples that provide more details and specifics. According to Krejcie & Morgan (1970), the sample size of this study is 384 of Generation Z in Penang, as shown in Figure 3 below.

Fig. 3 Determining sample size method

Table 3.1  
Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size  
Source: Krejcie & Morgan, 1970

### 3.3 Sampling Method

The sampling method contains two methods of sampling, which are random sampling and non-random sampling. The probability of sampling implies that each person in the population will have a chance to be selected. However, non-random sampling is based on selecting smaller samples that provide more details and specifics. Hence, this study used a non-random sampling method in its design. Non-random sampling contains four types that involve quota sampling, snowball sampling, judgment sampling, and convenience sampling.

In this research, the technique used to gather the data is convenience sampling, which collects the data online. The researcher made this choice because the method is the simplest to use and the most convenient to apply. The researchers directly sent the Google Form link in the online questionnaire to Generation Z, consisting of people aged 18 to 27 in Pulau Pinang. The process of determining the number of subjects or units that should be sampled in a study. Determining the amount of data needed in the study or the number and size of groups involving mathematical formulas is known as sample size determination (Bathinda, 2021).

### 3.4 Data Collection

Data collection is acquiring and measuring information about variables in a systematic manner, which aids in answering research questions, testing hypotheses, and evaluating the results (Muhammad & Kabir, 2016). The

researcher has been using primary sources of individuals, such as providing online questionnaires to Generation Z in Pulau Penang, for more information. The questionnaire aims to identify consumer awareness and purchase intention for environmentally friendly products among Generation Z in Penang.

### 3.5 Pilot Study

The goal of the pilot test is to make the questionnaire more understandable so that participants can read and accurately complete it. Conducting a pilot test in this study is crucial as it aids the researcher in mitigating survey-related errors. The study instrument's dependability was evaluated as part of the pilot testing procedure. This research distributed the questionnaire to 30 respondents from Generation Z in Penang, ranging from 18 to 27 years old, to ensure reliability.

### 3.6 Research Instrument

This questionnaire aims to collect relevant data from respondents that can be used for various purposes. In this study, as shown in Table 1, the questionnaire survey consists of three sections: Section A, Section B, and Section C. Section A deals with the personal data of the respondents, such as gender, age, and others. Section B consists of 16 questions related to the independent variable of the research (environmental knowledge, environmental concern, subjective norms, and perceived behavioural control). Section C consists of 4 dependent variable questions (purchase intention). This study uses each dimension through the five-point Likert scale in Part B and Part C, shown in Table 2.

**Table 1** *Research instrument*

Section	Details
A	Demographic Respondent
B	Independent Variable (IV): Consumer Awareness
C	Dependent Variable (DV): Purchase Intention

**Table 2** *Five-point Likert scale*

Scale	Interpretation
1	Strongly disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly agree

### 3.7 Data Analysis

Descriptive analysis, also known as descriptive statistics, is simply a statistical technique to generalise and bring the data set together. It consists of a simple minimum, maximum, mean, variance, and standard deviation analysis. This analytical approach is particularly beneficial for researchers when dealing with vast amounts of information and making it comprehensible. This study analysed data from the questionnaire using statistical tabulation software like Statistical Package for Social Sciences (SPSS).

#### 3.7.1 Descriptive Analysis

The Statistical Package for Social Sciences (SPSS) Version 26 was used to analyse the survey data for this study. Advanced statistical analysis, a large library of machine learning algorithms, text analysis, open-source extensibility, big data integration, and simple application integration are all features of the SPSS software platform. SPSS is accessible to users of all skill levels because of its ease of use, versatility, and scalability.

#### 3.7.2 Correlation Analysis

Correlation is designed to detect the strength of a relationship between two variables under observation. The correlation coefficient is a measure that describes the degree of relationship between variables as stated in Table 3. Generally, two correlation coefficients are used in applications, which are Pearson's Product Moment Correlation Coefficient and Spearman's Rank Correlation Coefficient, which measure the degree and direction of interaction between two variables.

**Table 3** Nominal degree of relationship

R, Coefficient Value	Interpretation
0.8 to 1.0	Very Strong
0.6 to 0.8	Strong
0.4 to 0.6	Moderate
0.2 to 0.4	Weak
0.0 to 0.2	Very Weak

#### 4. Data Analysis and Findings

##### 4.1 Survey Return Rate

The respondents mainly focused on Generation Z, which consists of people aged 18 to 27 at Pulau Pinang. Table 4 below shows a sample size of 384 questionnaires in the data collection. However, only 379 respondents completed the survey, resulting in a response rate of 98.96% in this study.

**Table 4** Response rate

Population	Sample Size	Questionnaire Distribute	Questionnaire Returned	Percentage
71	59	59	45	76.27%

##### 4.2 Reliability and Validity Analysis

Reliability analysis for the pilot test was conducted to test the validity of the variables. Table 5 shows the reliability test of the pilot study. In this research, 30 questionnaires were distributed to Gen-Z in Penang, among whom the target respondents had a purchase intention for green products. Cronbach’s Alpha value regarding purchase intention is 0.852; this value was considered good. On the other hand, Cronbach’s Alpha value for consumer awareness, which consists of environmental knowledge, environmental concern, subjective norms, and perceived behavioural control, is 0.834. It shows that the value is a good interpretation since the value is more than 0.7.

**Table 5** Reliability test for pilot study

Variables	Cronbach’s Alpha value (30 Respondents)	No. Items	Interpretation
IV: Consumer Awareness	0.834	16	Good
DV: Purchase Intention	0.759	4	Good

##### 4.3 Demographic Analysis

Table 6 shows 379 respondents of Gen-Z in Penang, Malaysia. The table shows the gender; there are 184 (51.50%) male respondents and 195 (48.50%) female respondents. It shows that female respondents were higher than male respondents. Besides, most respondents were 22 to 24 years old, which is 116 (30.60%), and the least was 18 years old, which is 78 (20.60%). From the result of the monthly income. The highest monthly income was below RM1,500, recorded as 209 (55.10%), followed by 82 (21.60%) for RM1,501 to RM3,000, and 59 respondents (15.60%) were in the RM3,001 - RM5,000 range. The lowest monthly income was RM5,001, above which was 29 (7.70%). Through the result of education level, this research found that bachelor’s degree holders in universities recorded 50.10% (190), whereas 31.10% (118) of the respondents had studied in STPM or Diploma or Foundation. The frequency and percentage of SPM and postgraduate were 11.90% (45) and 6.10% (23), respectively. Last, only 0.80% (3) were PHD respondents. In addition, most of the occupations were 240 (63.30%) respondents were students, while 100 (26.40%) were full-time employed. The Part-time employees were 35 (9.20%), and only 4 (1.10%) were unemployed. Next, out of the 379 Gen-Z respondents, 379 respondents were aware of green products. Most sources were social media, such as Facebook and Instagram, with 165 (43.50%) respondents, whereas 124 (32.70%) were through education. The family and friends were 45 (11.90%) and 38 (10.00%), respectively. Others include advertisements and stores, with only 7 (6.50%) respondents. Most of the respondents bought green products, which were 360 (95.00%), while 19 (5.00%) did not buy green products. Furthermore, number of 158 (41.70%) respondents bought green products at least once a month, and 119 (31.40%) respondents regularly bought green products. Additionally, 59 (15.60%) respondents bought green products once weekly, and 43 (11.30%) bought at least twice per week.

**Table 6** Summary of demographic analysis

Demographic	Frequency	Percentage (%)
Gender		
Male	184	51.50
Female	195	48.50
Age		
18 years old	78	20.60
19-21 years old	112	29.60
22-24 years old	116	30.60
25-27 years old	73	19.30
Monthly Income		
Below RM1,500	209	55.10
RM 1,501 - RM 3,000	82	21.60
RM 3,001 - RM 5,000	59	15.60
RM 5,001 above	29	7.70
Education Level		
SPM	45	11.90
STPM/ Diploma/ Foundation	118	31.10
Bachelor's degree	190	50.10
Postgraduate	23	6.10
Occupational		
Student	240	63.30
Full-time Employed	100	26.40
Part-time Employed	35	9.20
Unemployed	4	1.10
Awareness of Green Products		
Yes	379	100.00
No	-	-
Sources of Information about Green Products		
Family	45	11.90
Friends	38	10.00
Social media	165	43.50
Education	124	32.70
Other	7	6.50
Purchase Experience of Green Products		
Yes	360	95.00
No	19	5.00
Frequency of Purchase		
Regularly	119	31.40
Once per week	59	15.60
Twice per week	43	11.30
Once a month	158	41.70

#### 4.4 Descriptive Analysis

Based on Table 7 below, environmental concern had the highest average mean value of 4.3826, with a standard deviation of 0.47253. Conversely, perceived behavioural control indicates the lowest average mean value of 4.0508 and standard deviation of 0.62591. Through these results, the relationship of environmental concern was significantly positive with the purchase intention among Gen-Z in Penang due to the highest mean.

**Table 7** Descriptive analysis for Consumer Awareness (IV) and Purchase Intention (DV)

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Interpretation
IV: Consumer Awareness	379	2.47	5.00	4.2395	0.43985	High
DV: Purchase Intention	379	1.25	5.00	4.1128	0.68137	High

### 4.5 Normality Test

Table 8 shows the result of the normality test. The Kolmogorov-Smirnov test was used since the number of respondents exceeded 50, which was 379 respondents in this study. The result shows that the significant value of the Consumer Awareness (IV) and Purchase Intention (DV) was less than 0.5 ( $p < 0.05$ ), which means the data of respondents is not a normally distributed sample. Thus, the table indicates that all variables had  $p$ -values  $< 0.05$  for Consumer Awareness ( $< 0.001$ ) and Purchase Intention ( $< 0.001$ ). To achieve this research, a suitable correlation analysis was required, using the Spearman Correlation Analysis for both variables.

**Table 8** Normality test

Variables	Kolmogorov-Smirnov <sup>a</sup>			Result
	Statistic	df	Sig.	
IV: Consumer Awareness	0.131	379	$< 0.001$	Non-normal
DV: Purchase Intention	0.147	379	$< 0.001$	Non-normal

a. Lilliefors Significance Correction

### 4.6 Correlation Analysis

In this study, Spearman's correlation analysis was used due to the data not being normally distributed. Table 9 reveals the Spearman Correlation Test. The test shows that the correlation coefficient value was 0.653, and the significance value is  $< 0.001$  for this test. Therefore, it indicates a strong positive value of the correlation coefficient between Consumer Awareness and Purchase Intention.

**Table 9** Correlation between Consumer Awareness and Purchase Intention

Spearman's rho		IV: Consumer Awareness	DV: Purchase Intention
IV: Consumer Awareness	Correlation Coefficient	1.000	0.653**
	Sig. (2-tailed)	.	$< 0.001$
	N	379	379
DV: Purchase Intention	Correlation Coefficient	0.653**	1.000
	Sig. (2-tailed)	$< 0.001$	.
	N	379	379

\*\* . Correlation is significant at the 0.01 level (2-tailed)

### 5. Conclusion

The first research objective is to identify the level of consumer awareness among Generation Z regarding environmentally friendly products in Penang. Hence, the overall result of this research objective is a high level of consumer awareness, including four dimensions. The key dimensions of consumer awareness include Environmental Knowledge, Environmental Concern, Subjective Norms, and Perceived Behavioural Control. These dimensions illustrate a strong understanding and highlight their willingness to participate in environmentally conscious behaviours and purchase intention. Among the dimensions, environmental knowledge had the highest value. The findings show that environmental knowledge strongly and positively affects consumers' purchase behavioural intentions toward environmentally sustainable products (Zhuang *et al.*, 2021). The finding is consistent with the current research on the sustainability-oriented attitude of Generation Z. For example, Dragolea *et al.* (2023) note that Gen-Z purchases goods and services that can be sustainable due to their beliefs in environmental and social responsibility. This means that the youth's awareness of the environment has been boosted due to the Internet, which has led to an increase in the purchase of green products (Wang *et al.*, 2023).

Hence, the fairness of environmental concern and green purchase intention shows that the present and young adult and educated generations are dedicated to sustainable development. The Perceived Behavioural Control (PBC) had the lowest mean among the dimensions. It illustrates that purchasing green products is not entirely up to Gen-Z. They are constrained by external and internal factors that prevent environmentally friendly products from being successful, such as a limited budget. Some of these barriers are even more elaborate among Gen-Z consumers, who will have to rely on parents or have little earnings. Therefore, buying environmentally friendly products is difficult (Kumar *et al.*, 2021). This finding is consistent with the TPB, where subjective norms are defined as the perceived pressure from people in the social environment to perform a certain behaviour that influences someone's decision to act in a particular way. It has been revealed that the Gen-Z population, considered receptive to a range of social values and norms, is pretty sensitive to social context. For example, Nguyen *et al.* (2022) discovered that peer influence and family support are powerful drivers for young consumers' sustainable consumption.

The second research objective focused on measuring the level of purchasing intention among Generation Z regarding environmentally friendly products in Penang using four items. The findings show that the overall purchasing intention was at a high level. The result indicates that most Gen-Z people expect to switch to environmentally friendly brands because of environmental contribution, which significantly influences their purchase intention. It can be concluded that environmental contribution plays a critical role in purchasing intention, especially for Gen-Z. Therefore, it highlights its importance in promoting environmentally conscious consumption. A study of purchasing intention of environmentally friendly products among Generation Z in Malaysia shows they have a high intention to purchase such products. A study on young adults in Penang, Malaysia, showed that environmental knowledge and concern were significant determinants of their behavioural intention to purchase green products. Regarding the mean value, the majority of Generation Z shifted to eco-friendly brands, which has indicated a more proactive reception to ecological issues by the government. Generation Z wants to select environmentally friendly products and confirms that most people also worry about living sustainably and being green. Both millennials and Gen Z consumers are always seeking other forms of packaging other than plastic, with a preference for products that can be used only once to minimise waste and have strong attitudes toward recycling. (Neu, 2021). In this study, questionnaires are used to measure the level of operational performance in the manufacturing industry. There are seven Likert Scale questions, and the answers will be examined descriptively. The replies' ratings are averaged, and the findings are used to assess the level of operational performance. The score was assigned depending on whether the respondents strongly disagreed, disagreed, slightly agreed, or strongly agreed.

The third research is the relationship between consumer awareness and purchasing intention among Generation Z regarding environmentally friendly products in Penang. The result ensures that higher consumer awareness leads to greater purchase intention. The positive relationship aligns with the previous studies in which individuals with higher levels of environmental knowledge and concern are more likely to consider the environmental impact of their purchase intention. Individuals with a higher level of environmental knowledge and a deeper understanding of the benefits of environmentally friendly products are more likely to become the initiators of green consumption. Therefore, understanding green knowledge is the first step toward green consumerism (Cui, Li, & Wang, 2024). The positive impact of their attitudes on society and the environment can help to positively influence their sustainable purchasing behaviour (Nekmahmud & Fekete-Farkas, 2020). The study found that perceived behavioural control significantly and positively impacts green purchase intentions. When individuals can buy green products, they are more likely to act according to their intentions.

As a conclusion, this research achieved its objectives by determining the level of consumer awareness and purchase intention and their relationship. The findings show that the high levels of both variables, which include consumer awareness, including environmental knowledge, environmental concern, subjective norms, and perceived behavioural control, significantly influence the purchase intention for environmentally friendly products. Hence, it indicates the hypothesis was supported. Finally, future research should expand more dimensions, regions and generations to the understanding and effectiveness of efforts in this area.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Yeap Shan Wen, Fazian Hashim; **data collection:** Yeap Shan Wen; **analysis and interpretation of results:** Yeap Shan Wen; **draft**

**manuscript preparation:** Yeap Shan Wen, Fazian Hashim. All authors reviewed the results and approved the final version of the manuscript.

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