Modeling Consumer Decisions for Purchasing Green Products: Insights into Environmentally Conscious Companies

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Abstract: Environmental challenges are increasingly addressed through movements that promote environmental care and awareness. Consumers with a high degree of environmental consciousness are more inclined to purchase environmentally friendly or "green" products, perceiving these purchases as a contribution to environmental sustainability. This research aims to analyze the relationship between purchasing decisions for green products and the factors that influence them, further ensuring the stability of findings in environmentally friendly marketing in the context of company development to assess long-term stability. The research utilizes two methodologies: Structural Equation Modeling (SEM) with Partial Least Squares (PLS) is employed to identify and quantify the relationships between green product purchasing decisions and key influencing factors, including green product knowledge, consumer perception, and perceived price. Meanwhile, dynamic system simulation is used to measure the stability and evolution of green product purchasing decisions over time. The findings reveal that the relationships between these influencing variables are statistically significant and demonstrate a stable trend. The dynamic simulation indicates that the expected values for green product purchasing decisions are consistently achieved annually, reaching a stable equilibrium within a decade. These outcomes provide valuable insights for designing marketing strategies that enhance consumer awareness of green products and assist in decision-making processes, thereby promoting sustainable consumer behavior. The practical implications of this research are twofold: it offers strategic guidance for companies aiming to market green products effectively and provides consumers with a framework to make informed purchasing decisions that align with environmental sustainability goals.

Keywords: Green product knowledge; Consumer perception; Perceived price; Green product purchasing decisions; Dynamic system simulation; Structural Equation Modeling (SEM); Partial Least Squares (PLS)

1 Introduction

Technological advancements and changing consumption patterns of people have had a negative impact on the environment. With today's technology, it has become easier to satisfy people's needs and wants. People's increasing consumption patterns are one of the causes of environmental problems such as increasing waste, water, soil, and air pollution, leading to climate change and global warming marketing [1]. The implicit belief in the importance of society and the environment has led to new developments in the field of marketing, which in turn gave rise to the concepts of sustainable marketing and green marketing [2]. Practical measures to reduce environmental problems are the environmental protection movement or environmental protection movement. The environmental movement has led to an increase in demand for eco-friendly products. Eco-friendly products are products that are manufactured and designed to be repaired, recycled, and reused so that they do not have a negative impact on the environment [3]. The increasing demand for environmentally friendly products encourages companies to develop and produce more environmentally friendly products.

The consumer's perception has a great influence on the choice of a product, e.g., an environmentally friendly product. After receiving socialization information on the topic of global warming, a person's reaction to socialization will adjust and make him understand the importance of the topic. Consumption of products that can reduce the impact

of global warming is a suitable target market for environmentally friendly products [4]. Perceived price plays an important role in purchasing decisions. For some consumers, price is the first consideration when purchasing a product [5]. Lack of knowledge about green products is a major barrier to green product consumption [6]. Before purchasing, consumers' product knowledge is used to evaluate the environmental properties and benefits of green products.

As one of the factors that influence consumers' purchasing decisions, the price factor also affects consumers' purchasing decisions. The similarity is that consumers want quality products at affordable prices. Lifestyle changes may be based on the price of a product or service, which also affects a person's decision to purchase or use that product or service. The culture of drinking and enjoying coffee has now become a way of life. This is especially true of the world's most famous café, Starbucks. This cafe belongs to an American company but has a different concept of simplicity, luxury, and social prestige for young people and leaders. Starbucks Coffee is one of the largest coffee companies in the world. In 2002, Starbucks entered the Indonesian market. Currently, Starbucks has 440 stores in 22 major cities in Indonesia.

In this phenomenon, Starbucks needs to analyze the advantages and disadvantages of the marketing activities carried out, especially to survive or win in the competition. The company needs to innovate to improve the quality of consumers' lifestyles, prices, and other factors that may affect the decline in product sales. In the research conducted by Wulandari and Miswanto [7], four variables are studied to determine the elements that influence purchase decisions for environmentally friendly products: knowledge of environmentally friendly products, pricing perception, environmentally friendly beliefs, and purchasing decisions. The current study, on the other hand, focuses on three variables: knowledge of environmentally friendly products, customer awareness, and price awareness, which can be studied as supporting factors. Based on the preceding information, supporting factors are required to influence the decision to purchase green products as a marketing strategy that must be designed by the company.

2 Literature Review

2.1 Green Product Knowledge

Ottman [8] defines green products as products that are durable, non-toxic, and whose packaging is made from recycled materials. These products are considered environmentally friendly and often require a certain level of recycling to effectively reduce the negative impact on the environment, use less packaging than traditional items, or even less harmful components than those used in production or packaging. The natural environment includes, for example, ecologically friendly cars (hybrid cars), recyclable goods, energy-efficient gadgets, organic tea, and natural personal care products [9].

Knowledge about green products—the knowledge that green consumers have—will be the basis for evaluating the environmental properties and benefits of green products when making purchasing decisions. Green consumers will gradually increase their product knowledge by actively seeking information about green products from various sources. The more consumers know about green products, the better they understand the functions and environmental properties of green products [10].

2.2 Consumer Perception

Perception is defined by Kotler and Armstrong [11] as the process by which people choose, organize, and evaluate information to build a coherent picture of the world. Perception is an important activity that connects the individual consumer to groups, situations, and marketing influences [12].

Perceived quality is defined as consumers' decisions regarding the quality and superiority of the product [13]. When choosing environmentally friendly products, it is consumers' perception of the environment that provides the greatest insight into their environmental awareness [14].

2.3 Perceived Price

Perceived price, according to Wulandari and Miswanto [7], is the way customers think of the price or equal compromise that must be made to obtain a product in comparison to the price or sacrifice of comparable offerings. According to Kotler and Armstrong [15], a price is the value clients sacrifice to obtain a product or service.

Price perception is the way consumers perceive the high and low value of a particular price [16]. Added by Lichtenstein et al. [17], price perception refers to how consumers understand price information and what it means to them. Consumers' price perception can influence their decision to purchase a product. Therefore, each manufacturer will try to widely advertise the products or services they sell.

2.4 Green Product Purchasing Decisions

The purchasing decision process is heavily influenced by consumer behavior. This process is a real problem-solving process aimed at meeting consumers' wants or needs. Purchasing decisions are an integrative method that utilizes information to evaluate two or more alternative behaviors and choose one of them [18]. In general, consumer

purchasing decisions are about purchasing brands they like [18]. According to Kotler and Keller [19], purchasing decisions are about identifying all possible options for solving a problem and systematically and objectively evaluating options and goals to determine everyone's interests and activities. Meanwhile, Jirangkul [20] argues that consumer purchasing decision is a holistic approach that uses information to evaluate and choose between two or more distinct actions.

According to Hidayah and Sugandini [21], green products are products that are manufactured using advanced technology, are environmentally friendly, and do not pollute or harm natural resources. Hanifah et al. [18] argue that green products are an important alternative that can reduce pollution and negative environmental impacts. Eco-friendly products are organic materials that save energy, products that last longer, and renewable materials that can be recycled and reduce pollution and waste.

2.5 Hypotheses Development

Based on the obtained literature review, the factors influencing purchasing decisions for environmentally friendly products at Starbucks Yogyakarta are examined. The variables used in this study are a combination of several studies conducted previously. These variables include green product knowledge, consumer awareness, price awareness, and green product purchasing decisions. This is the conceptual model in Figure 1 below:
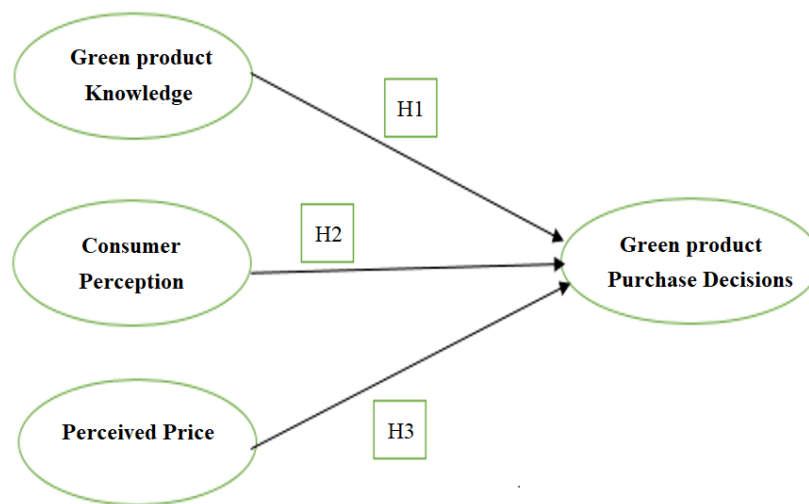

Figure 1. Conceptual model

This research proposes the following 3 hypotheses:

Ottman [8] defines green products as products that are durable, non-toxic, and whose packaging is made from recycled materials. These products are considered environmentally friendly and often require a certain level of recycling to effectively reduce the negative impact on the environment, use less packaging than traditional items, or even less harmful components than those used in production or packaging. The surroundings include, for example, ecologically friendly cars (hybrid cars), recyclable goods, energy-efficient gadgets, organic tea, and herbal personal care products [9]. Green product knowledge helps consumers understand the environmental impact of the products they buy and increase preferences. Understanding green products can change consumer preferences towards purchasing decisions. Green Product Knowledge is important to convey by company. Companies need to educate consumers about product benefits. Apart from that, green products are more valuable for business compared to conventional products.

H1: Green product knowledge has a positive influence on green product purchasing decisions.

Perception is defined by Kotler and Armstrong [11] as a technique by which individuals choose, organize, and evaluate data to build a meaningful image of the world. Perception is an important activity that connects the individual consumer to groups, situations, and marketing influences [12]. Consumer perception greatly influences a person's choices towards a product, for example a green product. After getting information dissemination regarding the issue of global warming, it will shape a person's response to exposure to socialization and make them understand the importance of it. Consume products that can reduce the impact of global warming, this is a suitable target market for green products. Consumers often judge product quality based on their perception, even before trying it directly. Consumer perception influences whether consumers feel a product is valuable to them, thus leading to purchasing decisions.

H2: Consumer perception has a positive influence on green product purchasing decisions.

Perceived price, according to Wulandari and Miswanto [7], is the customer's view of the price or comparable sacrifice that must be made to obtain a product about the price or cost of other similar products. According to Kotler and Armstrong [15], price is the value that customers sacrifice to receive a product or service. be higher compared to the price of conventional products. It is indeed product production which is safer for the environment requires relatively low costs higher than conventional products. Although the price is green product is higher than the price of conventional products environmentally friendly consumers will still buy them. They believe that the benefits obtained are commensurate, even though they require costs addition. Consumers tend to compare the perceived price of a product with other alternatives on the market. Perceived competitive benefits can drive purchasing decisions.

H3: Perceived price has a positive influence on green product purchasing decisions.

3 Research Method

3.1 Population, Sample, and Sampling Method

The population of this study includes users of Starbucks Yogyakarta consumer products. In this case, the sample was 100 respondents. The sampling technique used in this study is purposive sampling. Purposive sampling is a sampling technique in research that is carried out by selecting subjects based on specific criteria that have been determined by the researcher [22]. In targeted sampling, samples with specific requirements are taken in residential areas. This technique has the advantage that the selected sample is consistent with the research objectives since the determination is based on predetermined criteria. This research was conducted in the city of Yogyakarta. The choice of this location is based on the desire to determine purchasing decisions for environmentally friendly products in Yogyakarta, which, according to the researcher, has high consumption and a sufficiently large population.

3.2 Data Collection Method

The questionnaire method is used in this study. Questionnaires are used to collect data, and various software programs such as Microsoft Office, Excel, and Word are used to manage the data. The researchers collect the data on site using an online questionnaire, i.e., a statement sent via online media and answered directly by the respondents, so that the researchers do not have to meet the respondents directly. The questionnaire is structured with answer options in the form of a Likert scale. This type of research data is quantitative. The Likert scale ranges from 1 to 5. To validate the data, three experts provided questionnaires, including academic experts, corporate regulatory experts, and consumer experts. The data obtained from the expert assessments were processed using the Geomean function in Microsoft Excel. There is a geomean data table connected to Microsoft Excel which will display the input data along with the relevant variables and indicator values. Quantitative research methods frequently include data collection, analysis, and interpretation, as well as the documentation of research findings. This study employs primary data gathered by completing a questionnaire [22].

3.3 Data Analysis Method

Testing of the research hypotheses was carried out using the SEM method with the PLS method. PLS is a structural equation model based on components or variance. SEM is an area of statistical research that allows testing a range of relationships that are relatively difficult to measure simultaneously. The validity test aims to evaluate a questionnaire instrument so that it meets the stated validity requirements, and to test convergent validity, it is carried out using external loading values or factor loading values. An indicator is declared valid or meets convergence validity if it has an external loading value > 0.7. The reliability test aims to assess the data consistency. Reliable An instrument is one that produces the same results when used repeatedly to measure the same thing. The reliability test is carried out if the composite reliability value is greater than 0.7. The hypothesis tests are performed by checking the p-value of each hypothesis. If the hypothesis test gives a p-value less than 0.05, the hypothesis is considered accepted, and if the hypothesis gives a p-value more than 0.05, the hypothesis is rejected [23].

This study requires about three expert judgments through questionnaires to validate the data. Including experts from Environmental organizational (R1), Entrepreneur (R2) and academics expert (R3). The data obtained from expert judgments is processed using GEOMEAN function in Microsoft Excel. The researchers carried out simulations using the Powersim 9 software for dynamic systems. Dynamic systems are a widely used method for predicting systems and developing new strategies based on the prediction results. System dynamics can provide better predictions of short-, medium-, and long-term trends than statistical models, leading to better decisions. System dynamics is often used as an approach for analyzing and designing strategies. In system dynamics, it is used to solve dynamic problems occurring in various complex systems that have characteristics such as interdependence, mutual interaction, feedback, and causal relationships [24]. Using system dynamics research, researchers will create a causal loop diagram (CLD) based on the conceptual model and continue to create diagrams to conduct simulations.

4 Result and Discussion

4.1 Structural Equation Model with the PLS

4.1.1 Measurement model (outer model)

Outer model that determines the relationship between indicator latent variables or manifest variables (measurement model) seen in Figure 2 below:
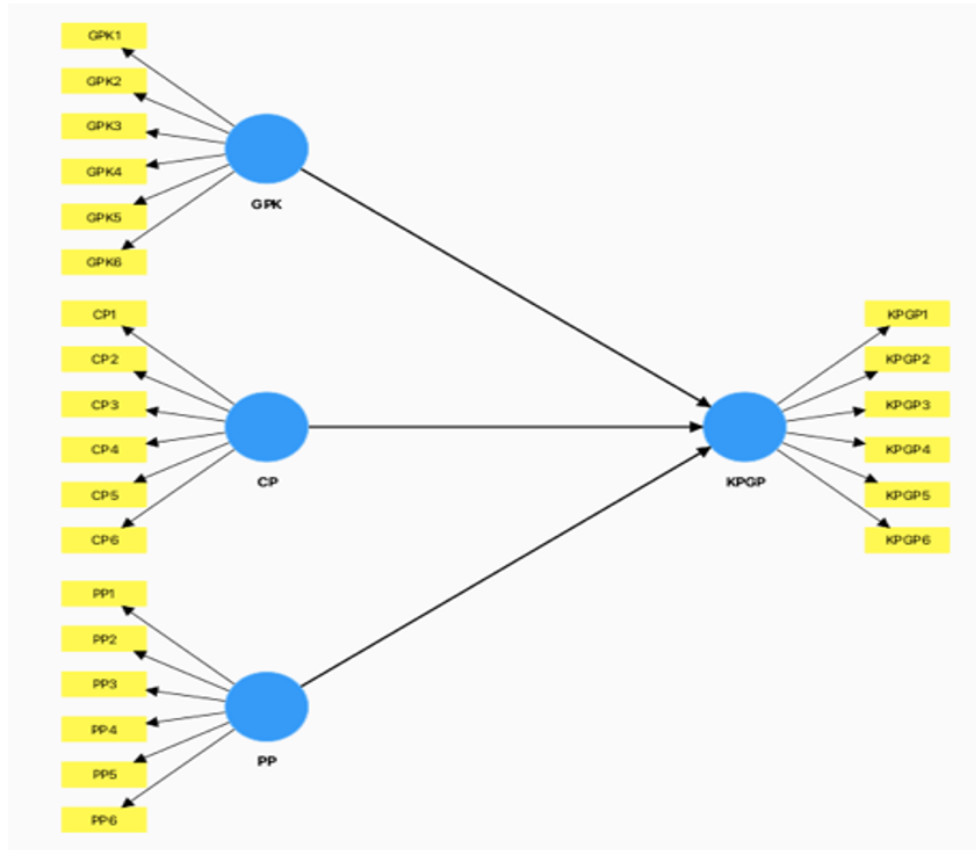

Figure 2. Initial model

1. Validity Test

In evaluating the external reflective model, validity is used as a reference. Convergent validity can be measured by the outer loading value, as shown in Figure 3 below:

Figure 3 demonstrates the outcome of validity tests for the significant variables in the study. Multiple indicators represent each variable. The hand for each variable is said to be acceptable if it has a factor loading value greater than 0.7.

2. Reliability Test

Table 1 shows that based on the calculation output of the PLS algorithm, its reliability value can be evaluated. The Cronbach Alpha values for variables X1, X2, X3, and Y show results above 0.7. Then, composite reliability > 0.7 and AVE > 0.5. Based on these values, all variables are declared reliable.

Table 1. Reliability test

Variable	AVE	Composite Reliability	Cronbach Alpha
X1	0.615	0.905	0.874
X2	0.584	0.894	0.857
X3	0.593	0.897	0.863
Y	0.643	0.915	0.889

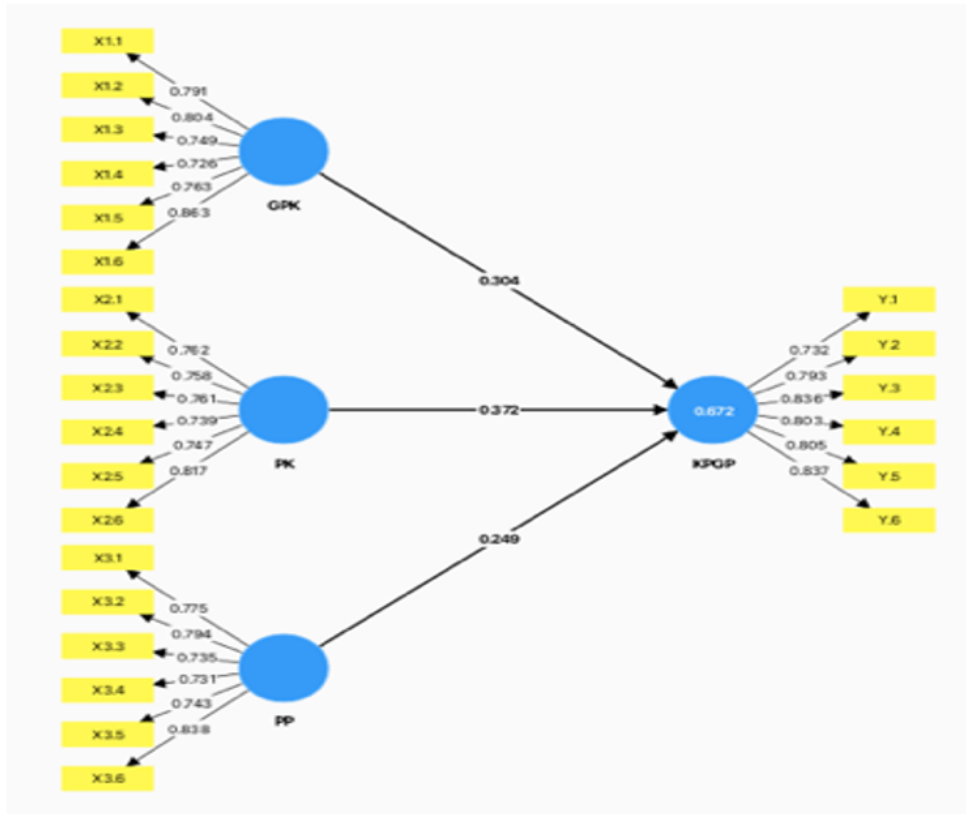Source: Primary Data Processed (2024).

126

Figure 3. Measurement model

4.1.2 Structural model (inner model)

Evaluation of the inner model structural model can be evaluated using the R-square test for the dependent variable and the t test as well as the significance of the structural path coefficients (parameters).

Table 2. R-square

Item	R-Square	R-Square Adjusted
GreenProduct Purchasing Decisions	0.672	0.662

Source: Primary Data Processed (2024).

The R-square value is used to assess the predictive power of the structural model in SEM-PLS analysis. R-square values of 0.25, 0.50, and 0.75 conclude that the model has weaknesses and strengths [23]. The higher the R2 value, the better the prediction model and research model proposed. Based on Table 2, it is known that the R-square value of the Green Product Purchase Decision variable is 0.672. This value shows that the variables Green Products Knowledge, Consumer Perception, and Perceived Price have a power on Green Product Purchasing Decisions of 67.2%, and the remaining 32.8% is influenced by other variables outside this research.

4.1.3 Path coefficient

Based on PLS Bootstrapping output calculations using standard T-statistic > 1.96 or P-value > 0.5 P-value, each hypothesis can be evaluated.

Table 3. Hypothesis test result

Variable	Original Sample (O)	Sampel Mean (M)	Standard Deviation (STDEV)	T-Statistics (|O/STDEV|)	P-Values
GPK → KPGP	0.304	0.291	0.140	2.170	0.030
CP → KPGP	0.372	0.389	0.111	3.341	0.001
PP → KPGP	0.249	0.249	0.099	2.529	0.011

Source: Primary Data Processed (2024).

Based on Table 3 above, it shows that consumers perception provided the largest contribution, namely 0.372. Next, the green product knowledge variable is 0.304 and 0.304. The last variable perceived price is 0.249. Thus, it was concluded that the relationship between green product knowledge and consumer variables perception, and perceived price have a positive relationship direction significant impact on green product purchasing decisions. This means value resulting in influencing the value of green product purchasing decisions provides a positive and significant direction, so to speak that changes in the value of green product purchasing decisions are proportional straight with every change in value that occurs in the green product knowledge, consumer perception, and perceived price. It can be seen that each exogenous variable has a positive relationship with the endogenous variable. The results of the analysis show that all hypotheses in the research are accepted because they have a positive influence.

Green product knowledge has a positive influence on the decision to purchase green product companies. Based on PLS bootstrapping output calculations using standard T-statistics > 1.96 or P-value < 0.05. The results of this analysis are in line with the findings of Wulandari and Miswanto [7], whose research shows that the green product knowledge variable has a significant positive effect on green product purchasing decisions. This shows that green product knowledge helps consumers understand the environmental impact of the products they buy, thus having an impact on purchasing decisions.

Consumer perception has a positive influence on the decision to purchase companies green products. Based on PLS bootstrapping output calculations using standard T-statistics > 1.96 or P-value < 0.05. The results of this analysis are in line with the findings of Lestiani [25], whose research shows that the perception variable has a positive influence on the decision to purchase the green product Tessa Tissue in Solo City. Ultimately, consumer perception influences whether consumers feel a product is valuable to them, thus leading to purchasing decisions.

Perceived price has a positive effect on the decision to purchase companies green products. Based on PLS bootstrapping output calculations using standard T-statistics > 1.96 or P-value < 0.05. The results of this analysis are in line with the findings of Wulandari and Miswanto [7], whose research shows that the perceived price variable can moderate the relationship between environmentally friendly beliefs and purchasing decisions for environmentally friendly products. The perceived price of a product by consumers is considered to provide competitive benefits and can encourage purchasing decisions.

Based on the results of the green product knowledge, consumer perception, and perceived price tests, the green product purchasing decision has an R-Square value of 67.2%. So H4 is accepted because the R-Square value has a strong influence on the decision to purchase green products. Thus, it can be concluded that all exogenous variables have a significant positive influence on the decision to purchase companies green products.

4.2 Simulation

4.2.1 Flow diagram and input data

The simulation design was created based on selecting significant indicators for the five variables. The design is in the form of a model for green product purchasing decisions obtained from analysis using SEM-PLS. A CLD was constructed based on the findings of the research model described above. The flow diagram for the Green Product Purchasing Decision Model in a System Dynamics framework is presented in Figure 4, while the input values for this flow diagram are detailed in Table 4.

Table 4. Data of expert judgement result and geomean

| No.	Variable	R1	R2	R3	Geomean
1	**Green Product Knowledge**	3	3	2	3
2	Environmental Knowledge	2	3	3	3
3	Product Recycling	3	2	3	3
4	Positive Attitude	3	2	2	2
5	**Consumer Perception**	2	3	2	2
6	Quality Perception	3	2	2	2
7	Brand Image Perception	2	3	2	2
8	Social Perception	3	2	3	3
9	Perceived Price	3	3	2	3
10	Product Value	2	3	3	3
11	Relative Price	3	2	3	2
12	Quality and Price	3	3	3	3
13	**Green Product Purchasing Decision**	3	3	3	3
14	Material Product	3	3	2	3
15	Usefulness of information	3	2	3	3
16	Environmentally friendly packaging	3	3	3	3
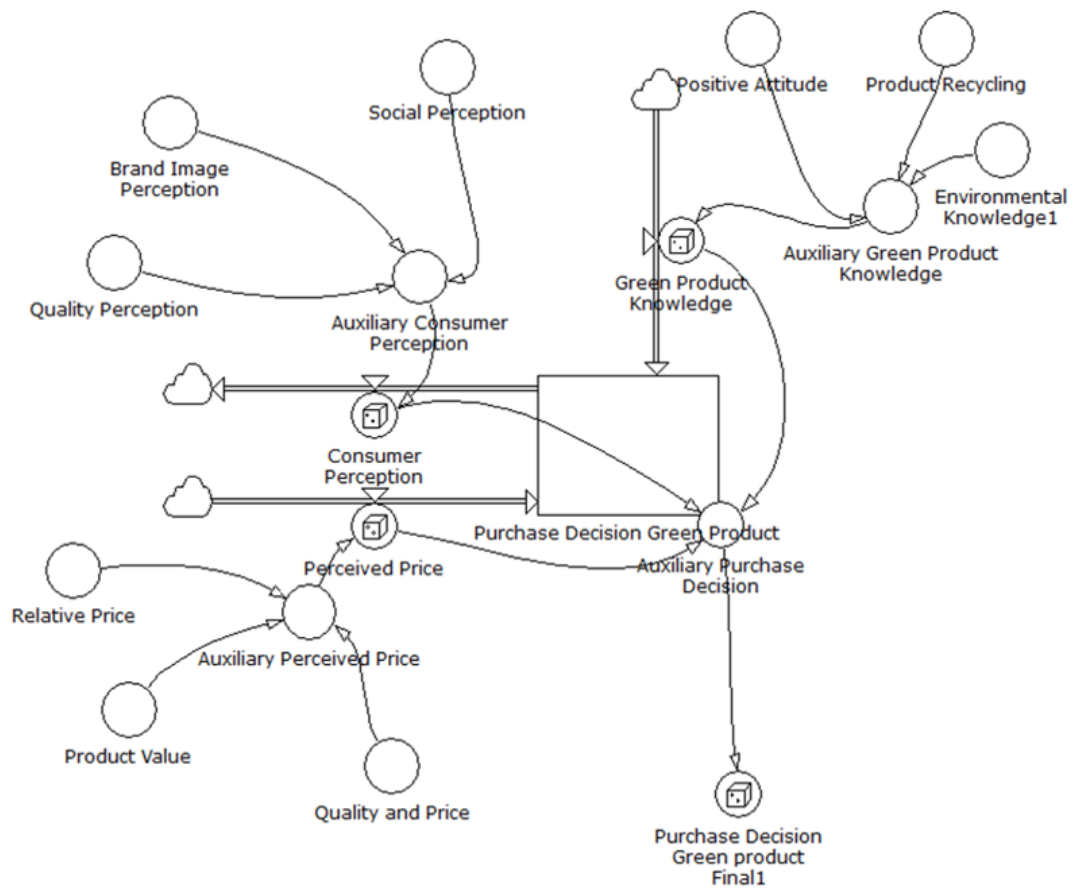
Figure 4. Flow diagram

4.2.2 Simulation result

The simulation results were obtained from models that were run over a period of 10 years. These results, as outlined below, are illustrated in Figure 5.
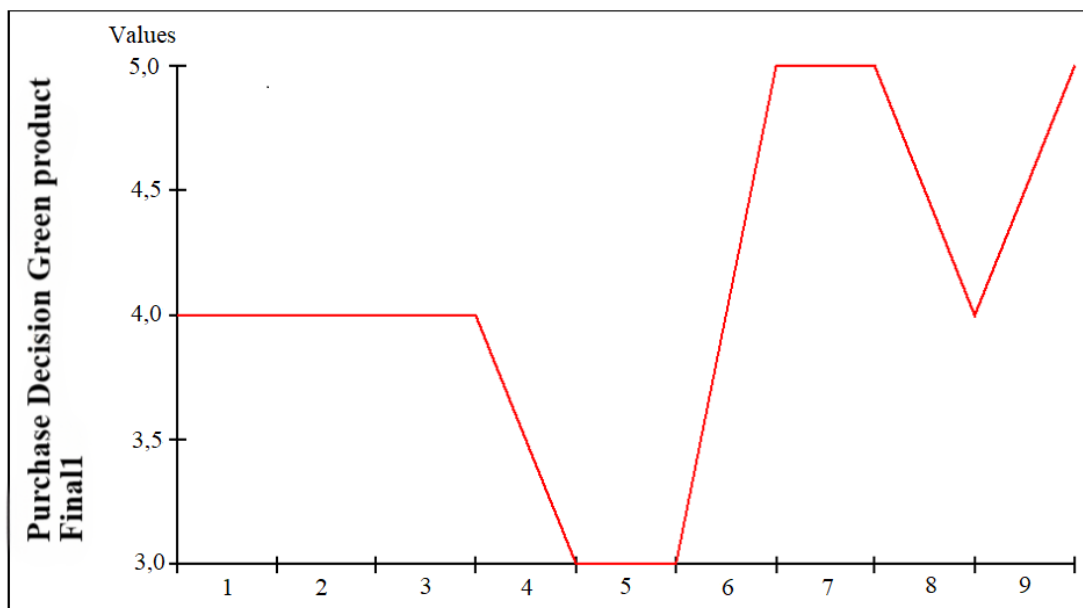

Figure 5. Simulation result

The study simulated the time required to model a purchasing decision for an environmentally friendly product over 10 years. From the simulation results, the researchers can conclude that the value does not always rise or fall. The calculation results have a minimum value of three and a maximum value of five. The purchase decision for environmentally friendly products reaches a stable level at a value of three to five, which is carried out in a stable state for the next 10 years. A stable state is a state in which the system is in equilibrium, no longer changing over time, or stable [26]. Scenario design can provide companies with actionable advice to make the right green product purchasing decisions

5 Conclusions

Based on various tests resulting from the results of the data presentation and the researcher's discussion, the following conclusions can be drawn: green product knowledge, consumer perception, and perceived price also influence green product purchasing decisions. The t-statistic value on the relationship these variables is greater than 1.96, and the P-Value value smaller than 0.05. The company has to be equipped to deliver to consumers knowledge about green products so that they can easily understand the purpose of the company's environmentally friendly products. Secondly, the company is expected to maintain the standard price of the products it sells so that consumers can afford to buy them and to adjust product prices to competitors' prices so that consumers can afford to use them without changing the product. From the simulation results, the calculation results have a minimum value of three and a maximum value of five. The purchase decision for environmentally friendly products reaches a stable level at a value of three to five, then the predicted value of purchasing decisions for environmentally friendly products is collected annually and reaches a stable point over the next 10 years. The insights thus obtained can form a scenario that suggests strategic marketing actions to companies and provides a basis for consumers' knowledge of environmentally friendly products in the hope that it can help them in their purchase decision. This research contributes to the scientific foundation by providing scientists with knowledge to develop and use. Future research should make current conditions and improvements to this model.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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