AIC Algorithm for Making Decisions on Supermarket Choice: Evidence from Vietnam

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Abstract
The paper explores factors influencing making decisions on supermarket choice: Evidence from Vietnam. Data used in the study were gathered from highly reliable information sources and primary data collected through a survey of 201 clients living in Ho Chi Minh City, Vietnam. To analyze and evaluate data, this paper has used the following methods as the AIC algorithm and regression analysis. Through research results show that most customers are most concerned with the factors of a decision to choose the supermarket. Based on theory and previous studies, this research is done through 2 phases, qualitative research and quantitative research, using non-probability sampling. Finally, research results have identified four factors affecting the decision to choose the supermarket for shopping, including Location, Perception of prices and products, Attitude of employees, and Reference. The paper uses the optimal selection by the AIC Algorithm for Making Decisions on Supermarket Choice: Evidence from Vietnam.

Keywords
AIC algorithm, decision, the supermarket

1. Introduction

The study investigates the factors that influence supermarket brand selection behavior in Vietnam, as well as the degree to which these factors influence the customer's choice intention. The factors of store picture, price perception, risk perception, attitude, knowledge, and familiarity were determined, according to the findings [1]. Currently, the supermarket business is always welcome in Vietnam's retail market. Because the retail market is a potential market, bringing high profits for participating businesses, there are now many supermarkets in the market, especially in Ho Chi Minh (HCM) City, Vietnam, supermarkets continuously. Formed as Big C, Co.opmart, Emart, Aeon, ... To fully meet the requirements of consumers, businesses besides providing full products to consumers, businesses should also attract consumers, along with the challenge is also an opportunity for retailers to show professionalism, build image, retail skills, and art, etc. to fully meet the requirements and bring the best experience to consumers. The Vietnam retail sector is attracting both large and small companies to take part. In the first ten months of 2019, retail sales of products totaled 3 million billion VND, accounting for 76 percent of overall retail sales and up 12.8 percent from the same time last year [2]. This paper uses the optimal choice by the AIC Algorithm for making decisions on supermarket choice: Evidence from Vietnam.

2. Literature Review

2.1. Relevant previous studies

The paper seeks to identify the factors affecting food purchasing decisions at the Co-opmart supermarket chain in HCM City through the application of a mix of qualitative and quantitative. The study found four aspects to be important: commodities, cost, convenience, and communication. These factors influence the decision to shop at the Co-opmart supermarket [3].

One of the most convenient methods to buy groceries is at a supermarket. Ease of use, convenience, and a better shopping experience are all significant factors at the supermarket. The independent variables in the study were convenience, variety & assortments, product quality, price, and private label, whereas the dependent variable was consumers' supermarket selection choice. Consumer decisions on supermarket selection are positively influenced by variety and assortments, product quality, and private labels, according to the findings of this study [4].

Every month, the number of visitors to Brastagi Supermarket Medan grows. Typically, large events during the month stimulate a rise in the number of visitors, a factor of customer satisfaction that is high enough that tourists continue to pick Berastagi Supermarket for shopping and fruits in Medan's modern market. This study used incidental sampling, which is a sample collection strategy based on chance, in which anyone who crosses paths with a researcher can be used as a sample. According to the findings, product, price, location, and advertising all have a substantial impact on consumer decision-making [5].

Along with reviewing previous research models, we give 04 factors affecting the decision to choose the supermarket as the shopping address of Ho Chi Minh City consumers includes (1) price and product perception, (2) location, (3) employee attitude, (4) reference. We use the above 4 factors as a proposed research model for our research paper.

2.2. Perception of prices and products (PP)

According to Kotler [6], the product factor comprises 3 levels: core product, actual product, and supplementary product. That core product is the value the product brings to the consumer or the value that meets and satisfies the needs of consumers, the actual product is the function, the packaging, product quality, and supporting products are sales policies, customer care, and after-sales service. In most of the above research on the factors affecting shopping decisions at retail stores mentioned above, the product factor is an important factor, directly influencing the purchasing decision of consumers. The price not only includes the content of the price of the product or service that the consumer pays to the supplier or retailer, but also refers to the total cost that the consumer pays for that product or service [7].

2.3. Location (LO)

Location is often one of the most influential considerations in a customer's store choice. For example, a working couple may easily decide to shop closest to their bus stop. Most similar consumers shop at the retail stores closest to them. Placement determines strategic importance because they are an advantage for developing sustainable competition. If a retailer has the best position, which is most attractive to its customer, it will relegate the competitor to the second-best position (Levy et al. 2012). The convenience of location makes it convenient in shopping for customers. Most consumers will prefer to choose supermarkets close to home for shopping because of the convenience of transportation, which not only saves time but also reduces stress, costs, and other problems. Therefore, the location of the supermarket has a certain influence on consumers' decisions [8].

2.4. Attitude of employees (AE)

For the retail sector supermarkets, in particular, the interaction between supermarket staff and customers is always highly appreciated [9]. Customers or consumers who go shopping at the

supermarket will feel more excited if the collective of supermarket staff gives them a friendly and comfortable atmosphere. Not only influence during shopping but also employee's attitude will make you appreciate going to the supermarket where you are shopping. That affects whether you continue to choose that supermarket in the future [10].

2.5.   Reference (RE)

A reference group is a group of people influencing the formation of customer attitudes, perceptions, and behaviors towards a product, brand, or business [11]. Normally, people will always pay attention to the opinions of others such as friends, relatives ... in anything. For example, I like that bag but friend's advice you not to buy it because it doesn't look right for me, and it is the comments that will make me confused about shopping. Here in supermarket selection too, when my friends have a good rating of a supermarket and recommend it to me, I will consider that supermarket more than the others because here I already have confidence in my friends, I will be more secure in their referrals.

2.6.   The decision to choose the supermarket (DE)

Supermarkets have a major influence on food prices all over the world. The paper shows the major factors that influence supermarkets. They will use the model analysis results to intelligently combine the effects of each supermarket option factor [12]. The factors of store picture, price perception, risk perception, attitude, knowledge, and familiarity were determined to influence a decision to choose the supermarket [1]. Besides, the author's research model is reasonable because of its science, because this model is built on the consumer model of Kotler [13]. The author combines the "price", "product" factors of Chamhuri and Batt [14], the "location" factor of Roig-Tierno et al. [15], the "employee attitude" factor of Newman et al. [16].

3. Method
3.1.   Sample Approach

According to Bollen [17], the minimum sample size is 5 samples for one parameter to be estimated. The sample size can be defined as 5: 1 (5 observations per 1 variable) [18]. In this study there are 21 variables, therefore, the minimum sample size can be calculated as n = 5 x 21 = 105. Although the minimum sample size requires only 105 surveys, the author submitted go 221 survey questionnaires indirectly via the Internet with tools supporting Google Forms for consumers to ensure sample diversity and representativeness. Table 1 shows sample characteristics statistics.

Table 1

Research Sample

Characteristics		Amount	Percent (%)
	Male	88	43.8
	Female	113	56.2
	Below 18	16	8.0
Sex and Age	18-25	71	35.3
	26-35	51	25.4
	36-45	43	21.4
	Above 45	20	10.0
	Below 3 million VND	5	2.5
Income/Month	3-6 million VND	77	38.3
	7-10 million VND	59	29.4
	Over 10 million VND	60	29.9
Job	Student	25	12.4

	Office Staff	71	35.3
	Homemaker	79	39.3
	Other	26	12.9
	Always	37	18.4
Buying in Supermarket	Usually	95	47.3
	Often	39	19.4
	Sometimes	30	14.9

Collected data will be encrypted, entered in Table 2.

Table 2
Factor and Item

Factor	Code	Item
PP	PP1	I feel price goes hand in hand with quality
	PP2	I feel that the prices of products are always clearly communicated
	PP3	I feel that frozen food here is always fresh
	PP4	I feel the full product supply is always available
	PP5	I feel there is always an alternative product available and can easily find products
LO	LO1	Supermarkets have many convenient branches for shopping, no matter where they are
	LO2	Supermarket locations are always in a crowded residential area
	LO3	Shopping places near my home help you to easily move
	LO4	I can easily find supermarkets in the area near my home, company, ...
	LO5	The supermarket is in a place with a convenient traffic location
AE	AE1	I feel that the staff always provides services quickly
	AE2	I feel the staff are always ready and enthusiastic to respond to customer requests
	AE3	Employees have a certain level of knowledge about the product that makes me feel secure in using the product
	AE4	I feel the staff are always polite and happy for customers
	AE5	I feel employees are always attentive in protecting customers' belongings
RE	RE1	I feel that the opinions of friends and relatives affect my decisions
	RE2	When I see many people trusting supermarkets to shop, I will also want to shop here
	RE3	Having the recommendation of others will save you time in choosing the supermarket
	RE4	I feel secure when being introduced to others
	RE5	I appreciate the opinions of everyone around me
DE	DE1	The supermarket will be the supermarket that you prioritize to choose
	DE2	I decide to choose the supermarket as a shopping place in the future
	DE3	I will recommend the supermarket to your friends and relatives

The items used for these concepts will be measured using a 5-point Likert scale: 1 Totally Disagree, 2 Disagree, 3 Normal, 4 Agree, 5 Totally Agree.

3.2. Blinding

For the duration of the study, all study staff and respondents were blinded. No one from the outside world had any contact with the study participants.

4. Results

4.1. AIC (Akaike's Information Criteria) algorithm

R program used the AIC to select the best model. In the theoretical environment, AIC has been used to select models. The AIC technique can also handle many independent variables when multicollinearity develops. AIC can be used as a regression model to estimate one or more dependent variables from one or more independent variables. The AIC is a crucial and useful metric for determining a full and straightforward model. A model with a lower AIC is chosen based on the AIC information standard. When the minimal AIC value is reached, the best model will end [19-22]. Every step of the search for the best model is documented in R reports. For DE = f (PP + LO + AE + RE), the step stop with four independent variables has an AIC of -355.12.

Table 3
Estimates

DE	Estimate	SD	t-value	p-value	Decision
Intercept	0.49925				
PP	0.21635	0.04384	4.935	0.000	Accepted
LO	0.40515	0.05249	7.719	0.000	Accepted
AE	0.12723	0.03719	3.421	0.000	Accepted
RE	0.12890	0.04312	2.989	0.000	Accepted

We use t-value by p-value. The p-value for all variables is less than 0.05 [23], so they are correlated with the decision to choose the supermarket (DE) in table 3 was influenced Perception of prices and products (PP), Location (LO), Attitude of employees (AE), Reference (RE).

4.2. Model Evaluation

Table 4

Violations of regression model

	PP	LO	AE	RE
VIF	1.225733	1.208596	1.095582	1.118131
Autocorrelation	Durbin-Watson = 1.7654		test for autocorrelation p-value = 0.04398	
Model Evaluation	R-squared 0.5129		F-statistic 51.6	p-value: 0.00000

When the independent variables in regression models have a high correlation, the phenomenon of multicollinearity arises. When the VIF coefficient is over 10, Gujarati and Porter's model show evidence of multicollinearity [24]. Table 4 shows that the VIF (variance inflation factor) for independent variables is less than ten [25], as a result, the independent variables are not collinear. Because the p-value = 0.04398 is less than 0.05, the Durbin-Watson test shows that the model in table 4 has autocorrelation [26]. According to the results from table 4, the Perception of prices and products (PP), Location (LO), Attitude of employees (AE), Reference (RE) impact the decision to choose the supermarket (DE) is 51.29% in table 4. The regression equation below is statistically significant, according to the analyzes above [27].

$$DE = 0.49925 + 0.21635PP + 0.40515LO + 0.12723AE + 0.12890RE$$

5. Conclusions

The results of the analysis of the influence from high to low are Location (β = 0.40515), Perception of price and products (β = 0.21635), Reference (β = 0.12890), and Attitude of employees (β = 0.12723). After determining the influencing factors and their influence on the decision to choose a supermarket, the author concludes that the factors that have a powerful influence on the decision to choose a supermarket are location and feel on price and product. The factors are related in the same direction with the decision to choose a supermarket, so if any factor is increased, the decision to choose will increase. Therefore, businesses can influence the above factors to promote their business and create customer loyalty.

6. Acknowledgments

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