Factors in automotive innovation that affect the decision to purchase a car in Udon Thani Province, Thailand

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Abstract: This research aims to investigate the factors related to automotive innovations and technologies that affect the car purchase decision-making process of consumers in Udon Thani. The study focuses on the relationship between demographic factors and automotive innovations, including engine and drivetrain systems, safety systems, convenience features, and vehicle design. The sample consisted of working individuals of all genders aged 25 and above residing in Udon Thani, totaling 412 people. Statistical tools used for data analysis included percentages, means, standard deviations, t-tests, and one-way ANOVA. Personal factors did not influence car purchase decisions among the sample group in Udon Thani. However, all four aspects of automotive innovations studied engine and drivetrain innovations, safety innovations, convenience innovations, and design innovations significantly affect car purchase decisions ($p \leq 0.05$).

Keywords: Automobile, Automotive Innovation, Decision Making

1. Introduction

Modern travel has become increasingly essential to daily life, particularly in terms of convenience and flexibility, allowing individuals to set their own travel schedules. Cars have thus become a key convenience that meets the transportation needs of people today, whether for commuting to work, running personal errands, or traveling. Additionally, cars play a significant role in supporting various business operations, such as transporting goods and services. However, these conveniences come with associated costs, such as maintenance expenses, car loan payments, tax renewals, and insurance, which car users need to consider (Oladimeji, 2023).

Car sales in Thailand over the past several years have demonstrated that the demand for automobiles remains high, despite fluctuations caused by external factors such as economic recessions, political uncertainty, and the COVID-19 pandemic, which had a noticeable impact on sales. However, in 2022, car sales began to recover, with a cumulative increase of 11.9% compared to the previous year. Projections for 2023 indicate continued growth, particularly in the electric vehicle segment, which is gaining popularity. The expansion of the labor market and rising incomes also influence the growth of the automotive industry in Thailand, leading to an overall increase in car sales (MReport,2023).

Competition in Thailand's automotive industry continues to intensify with the entry of car brands from various countries. As a result, each brand must innovate and adapt to meet the evolving demands of consumers. The purchasing behavior of Thai car buyers has become increasingly complex, with consumers showing less brand loyalty and relying heavily on online media as a key source of information for their purchasing decisions. They often use search engines and brand websites to research and decide on their car purchases. Additionally, automotive innovations and technologies play a significant role in attracting consumer interest, particularly in areas such as safety, performance, and modern design (Salika,2023; Yongpisanphob, 2023).

This research aims to study the factors related to automotive innovations and technologies that influence the decision-making process of car buyers in Udon Thani province. The focus is on examining the relationship between demographic factors and automotive innovations, which include engine and drivetrain systems, safety systems, convenience features, and car design. The goal is to understand the behavior and needs of consumers in this area.

2.Research objectives

2.1 To study the factors related to automotive innovations and technologies that influence the decision-making process of car buyers in Udon Thani province.

3. Review of Literature

There are four main theories and concepts used in this study: 1. Demographic Characteristics Theory; 2. Attitude Theory; 3. Consumer Behavior Theory; and 4. Measurement Concepts. Additionally, information related to automotive innovations has also been gathered.

3.1 Theories of demographic characteristics

According to Satawatin (2003), people with various demographic features have distinct psychological qualities. The analysis was based on the following variables: gender, age, education, occupation, and income.

3.2 The theory of attitudes

According to Phanthumnawin (1981), attitude is a psychological variable that influences behavior more than other psychological traits like personality, motivation, and perception, resulting in a person acting adversely or favorably. As a result, a person is more inclined to respond in a specific manner to that person or scenario.

3.3 Theoretical Consumer Behavior

Solomon (1996) describes consumer behavior as "any activity of a purchaser that is directly connected to the selection, purchase, and usage of products and services." This includes the purchase decision process that directs or prescribes such action to satisfy the demand and needs of consumers.

3.4 The measurement concept

The concept of the Likert Scale (Likert, 1932) was used to analyze and measure attitudes and marketing mix. The following are the scoring criteria:

Very Important / Strongly Agree	5 scores
Important / Agree	4 scores
Moderately Important / Undecided	3 scores
Slightly Important / Disagree	2 scores
Unimportant / Strongly Disagree	1 score

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3.5 Concepts of Automotive Innovation

Based on a review of the literature, automotive innovations currently being developed can be categorized into four main areas: (1) Propulsion System Innovations: Focuses on enhancing engine systems for higher efficiency, such as the use of turbochargers, hybrid systems, and electric vehicles, aiming to reduce fuel consumption and promote environmental friendliness. (2) Safety Innovations: Emphasizes the development of systems to prevent and minimize damage from accidents, including automatic emergency braking systems, collision warning systems, and stability control systems. (3) Comfort and Entertainment Innovations: Concentrates on adding features that meet consumer needs, such as automatic parking assistance, smartphone connectivity, and high-quality audio systems.

(4) Design Innovations: Focuses on designing vehicles with modern aesthetics and improved aerodynamics to enhance driving performance (Conway et al, 2021; Tian et al, 2023)

4. Related research

Based on the literature review and theories utilized in the study, it was found that various factors significantly influence decision-making. These factors are particularly diverse and relate to multiple aspects, especially demographics and the decision-making process. The findings from relevant research can be summarized as follows:

(1) Demographic Factors: Ragum et al. (2022) found that gender, age, and education level influence the decision to purchase electric vehicles. Men and those with higher education levels tend to opt for electric vehicles more often. Phutthiworathikun (2019) reported that personal factors such as gender, age, marital status, and occupation do not significantly affect the decision to purchase a Nissan Leaf electric car in Bangkok. This is because the need for convenience and energy savings when using a vehicle is of greater importance.

(2) Attitudes and Perceptions: Toonkeaw (2020) found that attitudes towards environmental conservation influence the decision to purchase electric vehicles in Bangkok. Consumers with a tendency towards conservatism are more likely to purchase electric vehicles than other groups. Wongkittiwat (2016) indicated that awareness of information and brand value have a significant influence on the decision to purchase electric vehicles among

5. Research Methodology

This study was survey research, which was subsequently statistically evaluated and presented in a descriptive format. The demographic and sample groups, study instruments, and data analysis are as follows.

5.1 Population and sample

This study uses a population of 1,120,322 working-age individuals of all genders, aged 25 years and above, who reside in Udon Thani province (Office of Registration Administration, 2023). The researcher employed Taro Yamane's method to determine a representative sample size with a 95 percent confidence level (Yamane, 1973), resulting in a total sample of 400 respondents.

5.2 Collection of data

A questionnaire was used as the research instrument in this study, administered via Google Docs, with data collection occurring between December 2023 and February 2024. The questionnaire was divided into two parts: Part 1 consisted of questions regarding the demographic information of the respondents, including gender, age, marital status, education level, occupation, and income. Part 2 focused on questions related to understanding automotive innovations that influence car purchasing decisions. These were attitudinal questions, requiring respondents to rate each sub-topic on a 5-point Likert scale (Likert, 1932), selecting only one answer per question. The questionnaire was validated to ensure accuracy, and its reliability was determined using Cronbach's alpha (Cronbach, 1951), with a confidence level of 0.85.

5.3 Data analysis

This study analyzed data using various statistical methods, which included: 1. descriptive statistics; 2. frequency and percentage values to present general information; 3. explanation of the automotive innovation variables affecting car purchasing decisions, using frequency, percentage, and standard deviation; and 4. inferential statistics, including comparative analysis of mean differences in understanding automotive innovations influencing car purchasing decisions, categorized by general demographic data, using a t-test for cases with two independent variables. A statistical significance level was set at 0.05. In cases where there were more than two groups of independent variables, one-way analysis of variance (ANOVA) was employed. When significant differences were found at the 0.05 level, mean differences were tested individually using the least significant difference (LSD)

method.

6. Results

6.1 Personal Demographic Information of the Sample Group.

The sample group comprises 55.60% males, with 51.50% being married. The majority are aged between 35 and 44 years. Most of the participants have a bachelor's degree, which is the highest level of education for 81.60% of them. The two most common occupations are employees in private companies and government or state enterprise employees, representing 41.30% and 27.90%, respectively. Their monthly income ranges from 20,000 to 40,000 baht (Table 1).

6.2 Behavior and Experience in Car Purchase Decisions.

The sample group shows a high level of experience with purchasing or researching information about cars, at 97.33%. The primary reasons for buying a car are safety and convenience. When deciding to purchase a vehicle, they primarily consider the after-sales service of the dealership, the price of the car, and the car brand. For gathering information to make a purchase decision, the sample group relies mostly on social media, expert reviews, and car-related websites. When analyzing who influences the car purchase decision, the primary contributors are themselves and their families (Table 1).

Table 2. Demographic characteristics of respondents.

Demographic characteristics	Number	Percentage
1. Gender		
Male	229	55.60
Female	183	44.40
Total	412	100.00
2. Status		
Single	182	44.20
Married	212	51.50
Widowed	18	4.30
Total	412	100.00
3. AGE		
25-34	70	17.00
35-44	310	75.20
45-54	32	7.80
Total	412	100
4. Education		
Upper Secondary School or High Vocational Certificate.	60	14.60
Bachelor's degree	336	81.60
	11	2.70
Higher than bachelor's degree	5	1.10
Total	412	100.00

Table 2. Demographic characteristics of respondents (Cont.).

Demographic characteristics	Number	Percentage
5. Occupation		
Student/	10	2.40
Government employee or State enterprises	115	27.90
Personal business	61	14.80
Private company employees	170	41.30
Freelance	27	6.60
Farmer	29	7.00
Total	412	100.00
6. Income (Baht per month)		
< 20,000	134	32.50
20,001-40,000	163	39.60
40,001-60,000	54	13.10
> 60,000	61	14.80
Total	412	100.00
7. Experience in purchasing a car or researching information about cars.		
Ever	401	97.33
Never	11	2.67
Total	412	100.00
8. The purpose used in making a car purchase decision.		
To display social status and gain acceptance.	31	7.52
To generate income.	38	9.22
To avoid issues with public transportation.	176	42.72
For safety during travel.	326	79.13
For convenience in travel.	372	90.29
9. Factors to consider when deciding to purchase a car		
The reliability of the dealership	151	36.65
The service provided by the sales consultant	123	29.85
The resale value of the car	154	37.38
The after-sales service at the service center	374	90.78
Discounts or free gifts	170	41.26
Price	370	89.81
Car brand	237	57.52
10. Sources used to gather information for making a car purchase decision		
Expert car reviews	297	72.09
Brochures or pamphlets	41	9.95
Automotive websites	291	70.63
Family members or close acquaintances	72	17.48
Sales consultants	175	42.48
Various social media platforms	325	78.88
11. Individuals involved in the car purchase decision		
Salesperson	28	6.80
Friends or close acquaintances	29	7.04
Family members	217	52.67
Self	392	95.15

6.3 Attitudinal Information

Regarding the factors of automotive innovation affecting car purchase decisions, divided into four aspects, and the

level of decision-making when evaluating automotive innovations, it was found that all aspects scored between 4.10 and 4.75. This indicates a positive opinion and attitude towards automotive innovations (Table 2).

Table 2. Attitude information

Attitude	Mean	S.D.	Meaning	
Factors Related to Automotive Innovation Affecting Car Purchase Decisions				
1. Innovations in Engine and Drive Systems	4.22	0.624	Important Agree	/
2. Innovations in Driving Safety	4.47	0.600	Important Agree	/
3. Innovations in Comfort and Convenience	4.10	0.649	Important Agree	/
4. Innovations in Vehicle Design	4.48	0.625	Important Agree	/
5. Levels of Decision-Making When Evaluating Automotive Innovations	4.75	0.504	Important Agree	/

6.4 Hypothesis testing

A study of the factors that can influence farmers' attitudes toward environmentally friendly pesticides. The statistic was used to compare two sets of independent variables. The t-test was employed when the independent variable was more than 2. group by utilizing one-way ANOVA to evaluate the difference between the means of the independent variables with three or more variables when a statistically significant difference was discovered at the p-value of 0.05. The Fisher's least significant difference (LSD) technique was used to evaluate the mean difference in pairs at the 0.05 level (Table 3).

Table 3. summarizes the findings of hypothesis testing.

Hypothesis	P-value	Hypothesis testing	
		Do not reject	Reject
Hypothesis 1: Different demographic factors result in different decisions regarding car purchases in Udon Thani province.			
Hypothesis 1.1 Different genders result in different decisions regarding car purchases in Udon Thani province.	0.735		/
Hypothesis 1.2 Different ages result in different decisions regarding car purchases in Udon Thani province.	0.270		/
Hypothesis 1.3 Different statuses result in different decisions regarding car purchases in Udon Thani province.	0.750		/
Hypothesis 1.4 Different degrees of education result in different decisions regarding car purchases in Udon Thani province.	0.626		/
Hypothesis 1.5 Different occupations result in different decisions regarding car purchases in Udon Thani province.	0.844		/
Hypothesis 1.6 Different incomes result in different decisions regarding car purchases in Udon Thani province.	0.700		/
Hypothesis 2: The innovation factor is related to car purchasing decisions in Udon Thani Province.			
Hypothesis 2.1 The innovation factors of engine technology and propulsion systems are related to car purchasing decisions in Udon Thani Province.	0.000*	/	
Hypothesis 2.2 The innovation factor of driving safety is related to car purchasing decisions in Udon Thani Province.	0.000*	/	
Hypothesis 3.3 The innovation factor of comfort is related to car	0.000*	/	

purchasing decisions in Udon Thani Province.			
Hypothesis 3.4 The innovation factor of design is related to car purchasing decisions in Udon Thani Province.	0.001*	/	

Notes: * indicate significant at the P≤0.05.

7. Conclusion

Personal factors do not affect car purchase decisions among the sample group in Udon Thani. However, all four studied aspects of automotive innovation engine and drivetrain innovations, safety innovations, convenience innovations, and design innovations significantly influence car purchase decisions ($p \leq 0.05$).

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