Chapter 1

Introduction

Background and Significance of Research Problem

If you wanted to become rich, you built the roads first." It was a strategy that all generations of Chinese leaders adhered to, and they eagerly applied this strategy to China's practice. Since the reform and opening up, China's transportation industry experienced rapid growth, especially the expressway, which played a significant role in economic development. Since the 21st century, with the continuous growth of China's economy, the pace of domestic expressway construction gradually accelerated. According to the National Bureau of Statistics, by the end of 2015, the total length of expressways in China had reached 125,400 kilometers, ranking first in the world. Although such expressways were still in short supply, especially at the intersection of the ring road in the central province, highway toll station traffic jams occurred from time to time. To reduce the traffic jam pressure on the highway, China adopted the semi-artificial, semi-intelligent highway toll method. The intelligent charging system alleviated traffic congestion to some extent, but with the improvement of the national living standards and the surge in the number of cars, traffic congestion became more serious (Lv & Shang, 2023). In the face of the increasingly intense high-speed traffic congestion under the new situation, it became particularly important to improve the level of Electronic Toll Collection (ETC) technology development and innovate ETC marketing strategies.

At the same time, as big automobile consumers, the number of cars owned by residents also increased, resulting in serious congestion on some domestic expressways. The Electronic non-parking toll system (Electronic Toll Collection, ETC system) was the main way for western developed countries to solve the phenomenon of highway traffic toll congestion and improve the service level. The ETC system was installed on the car windshield with a car electronic label, and the toll station's ETC lane had microwave communication equipment for interaction signals, using a microwave special short-range communication system (DSRC, Dedicated Short Range Communication). With the help of computer Internet technology and commercial banks for background settlement processing, it realized that vehicles could complete the payment without the need to stop at the bridge toll station. Through the

introduction of the ETC system, the highway service station allowed vehicles to pass continuously, greatly improving the capacity of the toll station and enhancing the service efficiency of the service station. Generally, the ETC system only took about 2 seconds to charge each car passing through the toll station, which was about 10 times faster than the manual channel charge (Zhimin, et al., 2021, pp. 122-128).

On the other hand, the use of electronic non-parking toll collection methods for settlement also reduced the cost of highway management and reduced the noise and air pollution degree of toll stations (Xiao, et al., 2022). Therefore, the ETC system provided an efficient and feasible solution for highway management in terms of economic benefits, environmental benefits, and social benefits.

To further improve efficiency, China's Ministry of Transport led the way in promoting ETC business, which meant no stopping and fast traffic on expressways. Since 2019, the state vigorously promoted the construction of ETC base stations and unmanned toll stations, and successively reduced manned toll stations. In order to further promote the construction of this project and reduce resistance, the state vigorously encouraged the installation of ETC in government vehicles, schools, and banks, even offering rewards such as rice and flour oil to incentivize everyone to install ETC (Duan, 2022). However, due to the high cost of promoting ETC and the imperfect ETC system and hardware equipment, ETC often encountered various problems. So, three months after a symbolic official promotion, the bank also canceled the business a year later (Huangguan, 2020).

The promotion channel of ETC was mainly promoted by dealers and network platforms. With the continuous improvement of the ETC system, this project greatly improved the efficiency of China's logistics industry, reduced costs, and saved expenses, facilitated the people, and promoted the transformation of the transportation industry into intelligence. The advantages and difficulties of the ETC system's adoption in China were the subjects of several research studies (Chen, Fan, & Farn, 2007, pp. 300-311; Zhang, et al., 2018, pp. 161-166.). However, there was still a need for more research on how to create a cutting-edge marketing plan that would make the ETC system more competitive. The operational effectiveness of ETC and its technical elements were the main topics of current literature, whereas marketing strategies that could help ETC become more widely adopted and used received less attention.

Shaanxi A Technology Co., Ltd. was established in December 1996, and the company's address was located on Huazhong Road, Xi'an. It was the leading enterprise in the field of ETC in China, and ETC had to be mentioned as it was very

typical. The problems faced were also common to other companies. At the beginning of Company A, the company mainly engaged in intelligent transportation system engineering. Thereafter, the company also got involved in engineering design, construction, and maintenance, electronic computer and accessories, electronic products, and communication equipment. After years of development, the ETC products of Shaanxi A Technology Co., Ltd. had a certain influence in the regional market and were successfully operated on Silver Expressway, Western Expressway, and other sections, becoming an important source of business profit for the company.

However, in recent years, with the increase in the number of ETC project product suppliers in Shaanxi Province and the increasing saturation of the market in the province, A Technology Co., Ltd. also encountered fierce competition in the regional ETC project market. In the past, only Shaanxi A Technology Co., Ltd. had done ETC business, but it had now developed into 6 companies, and its market share had decreased to 50%. For a long time, Shaanxi A Technology Co., Ltd. had not paid enough attention to the marketing activities of ETC projects and had lacked relevant marketing experience and talent reserve. With the increase in the number of competitors, A Technology Company had found it difficult to stand out in the fierce market competition. Therefore, how to develop scientific marketing management, clarify the company's target market, and build a reasonable marketing combination strategy to establish the company's brand in the field of ETC products became an important topic that the company's management needed to study and solve.

Problems of Shaanxi A Technology Company:

1) The company did not pay attention to marketing for a long period after the establishment of A Technology Co., Ltd. The company did not give necessary attention to marketing activities at the leadership level. This was mainly related to the characteristics of the industry that the company was in. As a technology enterprise, the company needed to attach great importance to technology, innovation, research and development, and other aspects at the management level and provide a lot of human and financial support. This supported the company's leading position in technology, products, and other aspects and promoted the continuous growth of the company's various businesses. Additionally, competition in the past few years was not very fierce, resulting in the company equipping only five people in the marketing department to handle the market. This indicated that the company lacked sufficient attention to marketing

2) The marketing concept lagged behind due to the long-term neglect by Shaanxi A Technology Co., Ltd. in paying insufficient attention to marketing work. The

company remained in the initial stage of development concerning marketing concepts, marketing strategies, and other aspects, and failed to establish a more systematic management system. Additionally, due to the small number of marketing department personnel, they often had a heavier workload. In such cases, the marketing team of A Technology Co., Ltd. could only engage in more passive marketing. Consequently, as a result of this passive marketing approach, the company tended to respond slowly to the market, which resulted in missing some opportunities they should have capitalized on.

3) Product competitiveness was generally affected by the lack of attention to marketing. Company A had a shortage of marketing personnel and insufficient resources to conduct market research and gather feedback. This resulted in a limited understanding of the market's product competitiveness. Consequently, in terms of product pricing, function development, and market positioning, the competitiveness was compromised.

Scholars and practitioners could have better understood the marketing tactics that made the ETC system successful and how they affected the transportation industry's competitiveness by conducting studies in these areas.

Research Objectives

1. To analyze the segmentation, targeting, and positioning employed by Shaanxi A Technology Co., Ltd. for their ETC system.
2. To examine and evaluate the product aspects, pricing strategies, distribution channels, convenience factors, and communication strategies of the ETC system offered by Shaanxi A Technology Co., Ltd.
3. To identify the innovative marketing strategies utilized by the ETC system to enhance the competitiveness of Shaanxi A Technology Co., Ltd.

Scope of the Study

The content scope focused on studying STP (Segmentation, Targeting, and Positioning) strategies used as data for developing marketing strategies, following the 4Ps4Cs concept, which included Product, Price, Place, Promotion, and Consumer, Cost, Communication, Convenience. Then, it identified the innovative marketing strategies used by the ETC system. The study used data solely from the Chinese market, which was collected between 2019 and 2022.

Conceptual Framework

Conceptual framework as shown in Figure 1.1

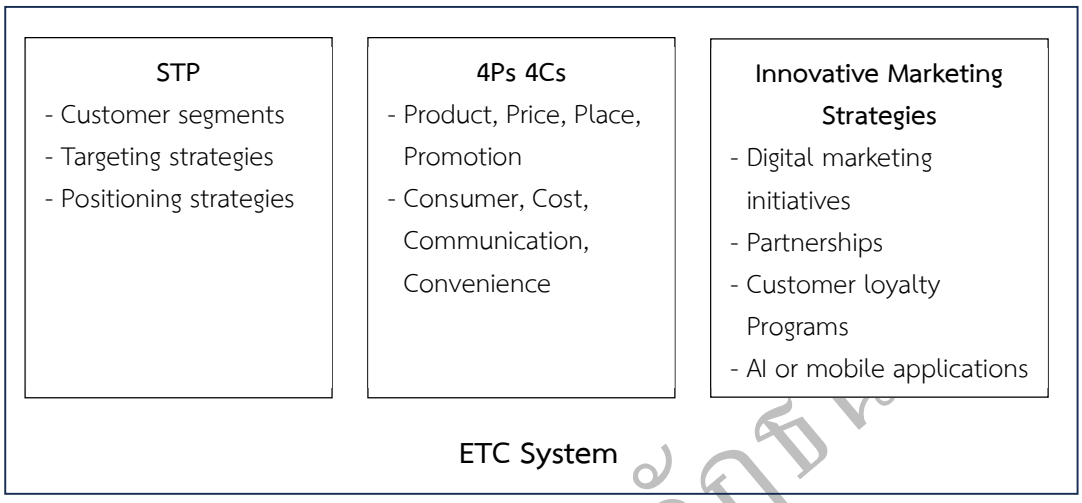

Figure 1.1 Conceptual Framework

In the context of segmentation, targeting, and positioning (STP), it involved the following components: identifying customer segments for Shaanxi A Technology Co., Ltd.'s ETC system, analyzing the needs, preferences, and characteristics of each segment, evaluating the targeting strategies used to successfully reach these particular customer segments, and examining the positioning strategies used to distinguish the ETC system and develop a distinctive value proposition.

The following elements were involved in the 4Ps and 4Cs analysis: Product features included assessing the ETC system at Shaanxi A Technology Co., Ltd.'s characteristics, advantages, and branding. Investigating price tactics was part of the process of attracting customers while maintaining profitability. Examining the distribution channels used to make the ETC system widely accessible to clients was the main goal of Distribution Channels with Analysis. Convenience Aspects involved evaluating the simplicity of installation and use of the ETC system, among other convenience factors. The analysis of communication tactics used to promote the ETC system and successfully engage customers was the focus of this section.

For innovative marketing strategies, this research identified the innovative marketing strategies used by Shaanxi A Technology Co., Ltd. for the ETC system in enhancing competitiveness, such as digital marketing initiatives, partnerships with

relevant industries, customer loyalty programs, and leveraging emerging technologies such as artificial intelligence or mobile applications.

This conceptual framework provided a structure for investigating the segmentation, targeting, and positioning strategies used by Shaanxi A Technology Co., Ltd., as well as analyzing the various elements of the marketing mix (4Ps and 4Cs) and identifying innovative marketing strategies. By following this framework, it gained insights into the effectiveness of the marketing strategies employed by the company and their impact on enhancing competitiveness in the ETC system market.

Definition of Terms

1. ETC is the abbreviation of electronic the collection, which refers to the electronic non-parking charging system. It refers to a new charging mode in which the ETC vehicle system and the toll station communicate with the vehicle, and then automatically deduct the fee with the network and the bank.

2. Highway mileage refers to the mileage of highway that actually reaches the grade highway stipulated in the technical standard of Highway Engineering [WTBZ] JTJ 01-88 within a certain period of time, and is officially accepted and delivered by the highway authorities. It includes the suburban roads in large and medium-sized cities and the road mileage and Bridges through small towns, excluding the mileage of the streets, factories and mines, forest production roads and agricultural production roads in large and medium-sized cities. Two or more highways pass through the same section together, and only calculated once, and the mileage length shall not be calculated repeatedly. It is an important index reflecting the development scale of highway construction, and also the basic data of calculating the transportation network density and other indicators.

3. On-board electronic label refers to the on-board unit that can store information, has microwave communication response function, and is equipped with non-contact CPU card read and write interface. With the Yuetong card, you can pass through the ETC lanes of the connected toll road without stopping. Chinese is abbreviated to "electronic label" and English is abbreviated to "OBU". Only with an electronic tag (OBU) installed on the vehicle, vehicles used together with the monthly pass card (with sufficient balance in the card) can pass the ETC lane smoothly. Electronic toll collection system is the most advanced road and bridge toll collection method in the world. Through the microwave special short-range communication between the on-board electronic label installed on the windshield of the vehicle and

the microwave antenna in the ETC lane of the toll station, the computer networking technology is used to handle the background settlement, so that the vehicle can pay the road and bridge fee without stopping at the road and bridge toll station. The implementation of unparking toll can allow vehicles to pass on expressway (dozens of kilometers or even more than 100 kilometers), which can greatly improve the traffic capacity of expressways; expressway toll electronation can reduce the cost of toll management, and help to improve the efficiency of vehicle operation. At the same time, it can also greatly reduce the noise level and exhaust emissions of toll stations. As the capacity has been greatly improved, the scale of toll stations can be reduced, and the cost of infrastructure and management costs can be saved. In addition, for cities, the charging system is not only an advanced charging technology, but also an effective traffic management means to regulate the traffic flow through economic leverage. For busy Bridges and tunnels, the toll system can avoid many weaknesses of the monthly ticket system and manual charging, and effectively improve the capital recovery capacity of these municipal facilities.

4. Microwave communication refers to a comprehensive technology where the signal is transmitted from 0.3 GHz to 300 GHz as a carrier. Some of the microwave radiation called millimeter waves is easily weakened by the atmosphere (especially wet weather).

5. DSRC system is a kind of wireless mobile communication system, which organically combines vehicle and road through two-way transmission of data, and uses computer network to provide wireless communication service of high-speed information transmission between vehicle and car in the intelligent transportation system. The DSRC system can support public safety and non-parking charging between driving vehicles, provide high-speed data transmission, and ensure low delay and low interference of communication links, ensuring the reliability of the entire traffic system.

6. Internet technology refers to a kind of information technology [1] developed and established on the basis of computer technology. Internet technology connects different devices through the WAN network of computer network, speeds up the transmission of information and expands the access channels of information, promotes the development of different software applications, and changes how people live and learn. The widespread application of Internet technology is a sign of entering the information society.

7. The expressway service area is a place for drivers and passengers to stay and rest, providing various facilities, such as parking lots, public toilets, gas station,

vehicle repair house, catering and concession shops. These service areas have an average spacing of about 50 kilometers, also adapting to future traffic growth. The service area has its own management and operation mode and regular characteristics, which is an indispensable part of the expressway management link. There are different service processes for people flow and traffic flow, and the traffic flow can also choose whether to stay for refueling. To meet the needs of passengers and drivers, the buildings or functional areas of the service area include comprehensive service buildings, toilets and parking lots.

8. Manual charging refers to the driver through the toll station, need to stop, and then the toll procedure by the toll collector.

9. Intelligence refers to the attributes that things can meet the various needs of people with the support of computer network, big data, the Internet of things and artificial intelligence. For example, a driverless car is an intelligent thing, which integrates the sensor Internet of Things, mobile Internet, big data analysis and other technologies, so as to actively meet people's travel needs. It is active because it is not like a traditional car, which requires passive human operation and driving. Compared with traditional media, intelligence is the comprehensive sublimation of media functions based on data. It means that new media can through the application of intelligent technology, gradually have similar to human perception, memory and thinking ability, learning ability, adaptive ability and behavior decision-making ability, in various scenarios, with human demand as the center, actively perceive outside things, similar to the human thinking mode and given knowledge and rules, through the data processing and feedback, the random external environment to make decisions and action. Intelligence is the trend of the development of modern human civilization. To realize intelligence, intelligent materials are an indispensable and important link. Intelligent material is an important direction of the development of material science, but also the inevitable development of material science. Intelligent material structure is a new and interdisciplinary comprehensive science. The research content of intelligent materials is very rich, involving many frontier disciplines and high-tech intelligent materials in industrial and agricultural production, science and technology, people's life, national economy and other aspects play a very important role, the application field is very broad.

10. Potential customer refers to a customer who has purchased a product or service, but has not yet become a customer of any similar product or organization, or who has been a customer of an organization, but has a more casual recognition of the brand in the purchase decision. Potential customers include two major parts of

general potential customers and competitor customers. General potential customers refer to the customers who have the purchase intention but have not become any similar product or organization, and who have been the customers of an organization but have recognized the brand arbitrarily; competitor customers refer to the customer groups owned by the competitors of the enterprise.

Expected Benefits

1. The national transportation department can make use of this study to reasonably build toll stations of artificial channels and arrange traffic related policies according to the traffic conditions.

2. ETC related manufacturers can improve some deficiencies of ETC and improve related functions according to the actual needs of customers.

3. The ETC Marketing Department can use this study to improve its marketing strategy and increase its circulation.

4. Through this study, Shaanxi A Technology Company can develop scientific marketing management, clarify the company's target market, and build A reasonable marketing combination strategy to build the company's brand in the field of ETC products.

5. Through this study, Shaanxi A Technology Company can find out the deficiencies of its own company in time, strengthen the construction of marketing work, and create more profits for the company.