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THE IMPACT OF BARCODE TECHNOLOGY ON CONSUMER BEHAVIOR IN PURCHASING FUEL: A STUDY OF EFFICIENCY AND EFFECTIVENESS

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Abstract

This study examines the impact of barcode technology implementation on consumer behavior in purchasing Pertalite fuel among subsidized vehicle owners in Serang City, Banten. Using a mixed-methods approach, data were collected through surveys and interviews with 120 fuel consumers receiving government subsidies and 10 gas station operators. The findings highlight the increased transaction efficiency and perceived effectiveness of barcode technology for Pertalite fuel purchases, although consumer trust and adoption levels vary based on age and digital literacy among subsidized consumers. These results provide insights into the digital transformation in energy retail services, particularly for subsidized fuel programs such as Pertalite.

Keywords: ***barcode technology, consumer behavior, fuel purchasing, efficiency, effectiveness.***

INTRODUCTION

In recent years, the integration of barcode technology into fuel purchasing systems has become a key aspect of the digital transformation of the energy retail sector. One prominent example is the implementation of the MyPertamina app in Indonesia, which allows consumers to make fuel purchases by scanning digital barcodes, particularly for subsidized fuels such as Pertalite. This innovation aligns with the broader national agenda of digitalization, which aims to improve efficiency, transparency, and consumer convenience in fuel distribution and sales, while ensuring that subsidies reach the right recipients. Despite these technological advances, challenges remain in ensuring widespread adoption and a consistent user experience across regions. In particular, Serang City in Banten Province presents a unique case where consumer behavior and the effectiveness of barcode-based transactions exhibit significant variation. Issues such as low digital literacy, unstable internet connectivity, and varying consumer perceptions of the technology's ease of use and reliability have led to varying levels of adoption and user satisfaction. This raises important questions about the true impact of barcode technology on consumer behavior, particularly in terms of fuel purchasing efficiency and effectiveness. While some users report increased transaction speed and convenience, others raise concerns about ease of use and trust in the system. Therefore, it is crucial to examine how this technology influences consumer decision-making and satisfaction levels within specific socioeconomic and geographic contexts. The purpose of this study is to analyze the impact of barcode technology on consumer behavior in the context of fuel purchasing in Serang City. Specifically, this study aims to evaluate how the use of barcode-based transactions affects the efficiency and effectiveness of the purchasing process, as well as how this technology shapes consumer attitudes toward digital innovation in public services. By using Serang City as a case study, this paper provides valuable insights into the intersection of technology adoption, consumer behavior, and service improvement in the fuel retail industry.

METHOD

A. Research location

This research was conducted at several officially registered Public Fuel Filling Stations (SPBU) in Serang City, Banten Province, Indonesia, where Pertalite fuel purchases are facilitated through barcode-based transactions. Serang City was chosen due to its rapid urban growth and strategic position as the provincial capital, making it an

ideal location to study the adoption of digital technology in public service transactions such as fuel purchases, particularly for subsidized fuel types like Pertalite.

B. Research Design

A mixed-methods approach was used to gain a comprehensive understanding of consumer behavior and managerial perspectives regarding the use of barcode technology in fuel transactions, specifically the purchase of Pertalite. This study combined quantitative surveys and qualitative interviews to ensure the depth and breadth of data collection.

C. Data collection technique

The quantitative component involved distributing a structured questionnaire to 120 consumers who had used barcode-based payment methods to purchase Pertalite at selected gas stations. Respondents were selected purposively, targeting individuals with recent experience using the MyPertamina app or a similar digital barcode application for Pertalite transactions, particularly vehicle owners receiving government fuel subsidies. In parallel, the qualitative component consisted of in-depth interviews with 10 gas station managers or operators responsible for Pertalite sales. These interviews aimed to capture managerial insights regarding implementation challenges, operational effectiveness, and consumer feedback regarding Pertalite transactions. A semi-structured interview guide was used to maintain flexibility yet consistency across respondents.

D. Research instruments

Two main instruments were used in the data collection process:

1. Structured questionnaire, to assess consumer perceptions, transaction experiences, and levels of satisfaction with the use of barcodes in purchasing Pertalite by vehicle owners receiving fuel subsidies.
2. Semi-structured interview guide, for gas station managers, focusing on operational aspects, staff training, consumer response, and perception of barcode system efficiency in managing Pertalite sales and transactions, especially for subsidized consumers.

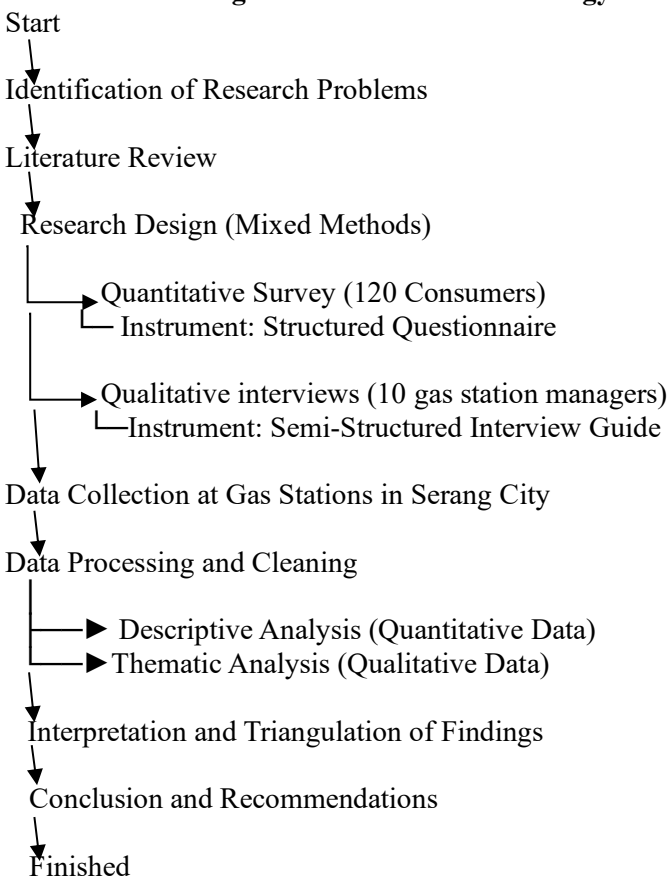
E. Data analysis

Quantitative data obtained from a survey of Pertalite consumers who received fuel subsidies were analyzed using descriptive statistical methods, including frequency distribution, percentages, and cross-tabulations to identify trends and patterns in consumer responses. Meanwhile, qualitative data from interviews with gas station managers were analyzed using a thematic analysis approach, namely by identifying, analyzing, and categorizing the main themes and issues that frequently arise in interviews related to Pertalite sales and operations, especially in serving subsidized fuel consumers, which were then triangulated with survey results to increase the validity of the findings. By combining descriptive and thematic approaches, this study ensures a comprehensive analysis of how barcode technology influences Pertalite purchasing behavior by subsidized vehicle owners, both from user and managerial perspectives.

Table 1. Summary of Research Methodology

Component	Description
Research Location	Gas stations in Serang City, Banten Province, serve vehicle owners who receive fuel subsidies.
Research design	Mixed methods: quantitative survey and qualitative interviews to assess barcode technology adoption
Respondents	-120 subsidized consumers (survey) who use barcode payments for Pertalite - 10 gas station managers (in-depth interviews)
Sampling Techniques	Purposive sampling based on recent experience using barcodes in purchasing Pertalite
Instrument	-Structured questionnaire for subsidized consumers – Semi-structured interview guide for managers
Data collection	- Direct field survey to consumers – face-to-face interviews with gas station managers
Data analysis	- Descriptive statistics (quantitative) – thematic analysis (qualitative)

Figure 1. Research Methodology Flow



RESULTS AND DISCUSSION

A. Quantitative Findings: Consumer Survey

This quantitative survey involved 120 respondents, vehicle owners receiving government fuel subsidies who use a barcode-based payment system to purchase Pertalite fuel at gas stations in Serang City. Demographic analysis revealed a diverse range of participants in terms of age, education level, and fuel purchase frequency. A significant majority (around 78%) stated that barcode technology speeds up the Pertalite purchase process, reduces waiting times, and increases overall convenience for subsidized fuel consumers. Furthermore, 65% of respondents expressed higher levels of satisfaction with digital payment methods compared to conventional cash transactions. However, 22% of respondents reported challenges in using the barcode system for Pertalite purchases, with issues including application glitches, unfamiliarity with the technology, and occasional connectivity issues. These findings suggest that while the adoption of barcode technology has generally improved transaction efficiency and customer satisfaction among subsidized Pertalite consumers, several aspects still need to be addressed to ensure a smooth user experience.

B. Qualitative Insights: A Managerial Perspective

An in-depth survey with 10 gas station managers provided more detailed insight into the operational impact of barcode technology on Pertalite fuel transactions, particularly for subsidized vehicle owners. Managers observed reduced transaction times and fewer cash handling errors. They also reported improvements in inventory management thanks to the real-time data generated by the barcode system, which helps accurately track Pertalite sales and availability for subsidized consumers. However, managers also highlighted several challenges, such as the need for ongoing staff training to handle technical issues and assist customers unfamiliar with the technology, particularly in ensuring smooth Pertalite transactions for subsidized consumers. They also noted that system disruptions, while rare, can hamper operations and reduce customer satisfaction in this group. These observations underscore the importance of reliable technical support and user education to maximize the benefits of barcode technology in Pertalite sales to subsidized consumers.

C. Comparative Analysis and Literature Context

The findings of this study align with previous studies showing that barcode and QR code technology can improve operational efficiency and customer satisfaction in retail contexts, including in the purchase of fuel such as Pertalite for subsidized vehicle owners. The positive reception from consumers and operational staff in Serang City reflects a broader trend of digital payment adoption in emerging markets. However, the identified challenges also align with literature that emphasizes the importance of user-centric design and reliable technical infrastructure to support technology adoption, ensuring smooth and efficient Pertalite transactions for subsidized consumers.

D. Implications for Practice and Policy

The study's findings indicate that barcode technology offers significant benefits in terms of efficiency and customer satisfaction in Pertalite purchasing transactions for subsidized vehicle owners. However, successful implementation requires attention to both technical and user challenges. Gas stations should invest in staff training programs and consumer education initiatives to facilitate smoother barcode technology adoption, particularly for subsidized consumer groups. Furthermore, policymakers can support the development of digital infrastructure to ensure consistent connectivity and system reliability, particularly in areas with limited digital infrastructure, to optimize the benefits of a digital payment system for subsidized Pertalite fuel. This will ultimately improve the service experience for vehicle owners receiving government subsidies.

CONCLUSION

This study examines the impact of barcode technology on consumer behavior in purchasing Pertalite fuel for subsidized vehicle owners in Serang City, Banten Province. The study findings indicate that the implementation of a barcode system, such as the one integrated into the MyPertamina application, has significantly improved transaction efficiency and customer satisfaction in purchasing Pertalite. The majority of consumers reported reduced queue times and increased convenience, in line with previous research highlighting the role of barcode technology in simplifying operations and improving the user experience. However, this study also identified several challenges hindering the optimal use of barcode technology for Pertalite transactions among subsidized consumers. These challenges include technical issues, such as application glitches and connectivity issues, as well as user factors such as low digital literacy. Gas station managers emphasized the importance of ongoing staff training and customer education to effectively address these challenges. These findings underscore the importance of a holistic approach that combines technological advancements with human-centered strategies to support successful technology adoption in Pertalite purchases by subsidized vehicle owners.

The implications of this research include two main points. For practitioners, it is important to invest in infrastructure improvements and capacity-building programs to support the seamless integration of barcode technology into Pertalite transactions, particularly for subsidized consumers. For policymakers, it is necessary to develop policies that support digital literacy and provide resources for strengthening technology in public services, particularly in the distribution of subsidized fuels such as Pertalite to vehicle owners receiving government subsidies. By addressing both the technological and human aspects, stakeholders can ensure that the benefits of the barcode system are fully realized, making the Pertalite purchasing process for subsidized consumers more efficient and effective. Future research could expand on these findings by exploring the long-term impact of barcode technology adoption across different regions and contexts, particularly in fuel subsidy programs like Pertalite, which targets vehicle owners receiving government subsidies. Furthermore, comparative studies with other digital payment systems could provide deeper insights into best practices in implementing technology in the fuel retail sector for subsidized consumers.

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