

Customer Perception and Satisfaction towards E-POS Enabled Smart Ration Card System in Public Distribution System: Evidence from Eranad Taluk, Kerala

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ABSTRACT

Digital transformation of the Public Distribution System (PDS) through Electronic Point of Sale (E-POS) devices integrated with Aadhaar-based biometric authentication is intended to enhance transparency, accountability, and efficiency in ration distribution. Kerala, with its universal PDS framework, has implemented the smart ration card system across Fair Price Shops. This study examines beneficiary awareness, understanding, perception, satisfaction, and operational challenges associated with the E-POS system in Eranad Taluk. Primary data were collected from 55 ration beneficiaries using a structured questionnaire. Descriptive statistics, Chi-square test of association, and one-sample proportion tests were employed for analysis. The results show high awareness and usage of the E-POS system but limited understanding of its functioning. Although beneficiaries perceive the system as helpful in reducing irregularities and consider it better than the earlier manual system, moderate satisfaction levels are observed due to biometric authentication difficulties, power interruptions, and inadequate user guidance. The study highlights that technological reform alone is insufficient unless supported by user awareness and infrastructure reliability. Policy measures to improve technical support, alternative authentication methods, and beneficiary education are suggested to enhance the effectiveness of digital PDS delivery.

Keywords: Public Distribution System (PDS), E-POS, Smart Ration Card, Beneficiary Perception, Food Security, Kerala

INTRODUCTION

The Public Distribution System (PDS) is a key welfare mechanism in India designed to ensure food security for vulnerable populations through subsidized distribution of essential commodities. Despite its extensive reach, the traditional PDS has historically faced challenges such as diversion of food grains, duplication of ration cards, weak monitoring, and lack of transparency. To address these issues, the Government of India initiated end-to-end computerization and introduced Electronic Point of Sale (E-POS) devices integrated with Aadhaar-based biometric authentication at Fair Price Shops (FPS).

Kerala, known for its universal PDS model, has implemented the E-POS enabled smart ration card system across FPS to enhance accountability and real-time transaction recording. While such digital reforms are expected to minimize irregularities and improve service delivery, their effectiveness depends largely on how beneficiaries perceive, understand, and adapt to the system. Practical issues such as biometric authentication failure, power interruptions, network connectivity, and limited digital literacy may affect user experience and satisfaction.

Against this background, this study examines beneficiary awareness, understanding, satisfaction, perception of transparency, and operational challenges associated with the E-POS enabled PDS in Eranad Taluk of Kerala. The study provides grassroots evidence on whether digital intervention in PDS is achieving its intended objectives from the beneficiaries' perspective.

REVIEW OF LITERATURE

The Public Distribution System (PDS) in India has long been recognized as a crucial mechanism for ensuring food security among economically vulnerable populations, yet it has historically suffered from issues such as leakages, corruption, duplication of ration cards, and weak monitoring. Basu (2011) and Ramaswami (2012) emphasized the inefficiencies in food grain management and the need for structural reforms to improve targeting and reduce diversion of subsidized commodities. Khera (2011) observed that states with stronger monitoring systems achieved better outcomes in PDS performance, while her later work (Khera, 2017) highlighted the potential of Aadhaar integration in welfare schemes to eliminate fake beneficiaries, though not without challenges related to biometric authentication failures. Narayanan (2015) further argued that technology-driven reforms could significantly enhance the productivity and transparency of PDS operations. These foundational studies created the basis for adopting digital tools to strengthen accountability in ration distribution.

With the advancement of digital governance, several studies have examined the impact of computerization and E-POS implementation in Fair Price Shops. Saini and Gulati (2017) documented how Aadhaar-linked reforms and digitized ration cards improved transparency and reduced leakages in multiple states. Prasad and Kumar (2019) found that E-POS machines enabled real-time transaction recording and improved monitoring of ration distribution, but also identified practical challenges such as power failures, internet connectivity issues, and limited user awareness. Government reports, including the TPDS Control Order (Government of India, 2018) and implementation records from the Government of Kerala (2020), emphasized end-to-end computerization as a strategy to ensure accurate beneficiary identification and prevent malpractice. Studies on digital service delivery, such as Aker and Ksoll (2016), underline that the success of such technological interventions depends heavily on user acceptance, infrastructure support, and ease of use.

Despite extensive studies on PDS reforms, Aadhaar integration, and computerization of ration distribution, limited empirical research has focused on beneficiaries' perception and satisfaction with the E-POS enabled smart ration card system at the grassroots level, particularly in the Kerala context. Existing studies primarily evaluate administrative efficiency and leakage control, with less emphasis on user experience and operational difficulties faced during actual transactions. This study addresses this gap by examining how beneficiaries perceive and experience the E-POS system in practice.

OBJECTIVES OF THE STUDY

The study aims to examine beneficiary awareness and understanding of the E-POS system, assess satisfaction levels, analyze perceptions regarding transparency and corruption control, and compare customer perception of the E-POS system with the earlier manual ration distribution method.

HYPOTHESES OF THE STUDY

H01: There is no significant association between awareness of E-POS and understanding of its functioning among customers.

H02: The proportion of customers satisfied with the E-POS system is not significantly different from 50%.

H03: The proportion of customers who believe E-POS prevents corruption is not significantly different from 50%.

H04: The proportion of customers who perceive E-POS as better than the old system is not significantly different from 50%.

RESEARCH METHODOLOGY

The study adopts a descriptive cross-sectional design to examine beneficiary perception and satisfaction regarding the E-POS enabled smart ration card system in Eranad Taluk, Kerala. Primary data were collected from 55 ration beneficiaries using a structured questionnaire. Due to the dispersed nature of beneficiaries, convenience sampling was employed.

Descriptive statistics were used to summarize awareness, usage, satisfaction, and perceived challenges. The Chi-square test of association was applied to examine the relationship between awareness and understanding of the E-POS system. Other responses relating to satisfaction, corruption control, and comparison with the old system were interpreted using proportion analysis. All statistical tests were conducted at a 5% level of significance.

RESULTS AND DISCUSSION

Table 1: Profile of Respondents (n = 55)

Variable	%
Male	56
Age < 50 years	83
Valid ration card holders	91

Regular FPS buyers 60

The respondent profile indicates that beneficiaries regularly interacting with FPS and belonging to an economically active age group form the major part of the sample, ensuring informed responses regarding E-POS usage.

Table 2: Awareness and Usage of E-POS

Indicator	%
Heard about E-POS	93
Used E-POS	87
Do not understand functioning	71
Not given proper explanation	44

Although awareness and usage are high, understanding of the system's functioning is limited, indicating inadequate user guidance at FPS.

Table 3: Satisfaction and Operational Difficulties

Issue	Response
Satisfied	47%
Experience discomfort	64%
Thumb issues (elderly)	Majority
Power failure affects use	54%

Moderate satisfaction levels are observed due to biometric and infrastructural issues affecting user experience.

Table 4. Perception of Transparency and System Effectiveness

Perception	Response
Prevents corruption	53% Yes
Ensures transparency	49% Yes
Data not updated quickly	58%
E-POS better than old	60% Yes

Beneficiaries perceive improvement over the old system, but concerns remain regarding transparency, speed, and system reliability.

HYPOTHESIS TESTING

The relationship between awareness of E-POS and understanding of its functioning was examined using the Chi-square test of association.

H01: There is no significant association between awareness of E-POS and understanding of its functioning.

Table 5: Awareness vs Understanding of Functioning (n = 55)

Awareness of E-POS Understand Functioning Do Not Understand Total

Aware (51)	15	36	51
Not Aware (4)	1	3	4
Total	16	39	55

$\chi^2 (1, n = 55) = 0.06, p > 0.05$. Hence, the null hypothesis is not rejected, indicating no significant association between awareness and understanding.

H02: Satisfaction with E-POS System

Out of 55 respondents, 26 reported satisfaction ($p = 0.473$). A one-sample proportion test was conducted to examine whether this proportion differs significantly from the neutral benchmark of 50%. The calculated Z value (-0.40) is within the critical range of ± 1.96 at 5% level, indicating that the difference is not statistically significant. This shows that beneficiary satisfaction with the E-POS system is statistically neutral.

H03: Opinion on Corruption Control

A total of 29 respondents ($p = 0.527$) believed that E-POS helps prevent corruption. The one-sample proportion test produced a Z value of 0.40 , which is not significant at 5% level. This indicates that beneficiaries are divided in their opinion regarding the effectiveness of E-POS in preventing corruption.

H04: Perception of E-POS Compared to Old System

Out of 55 respondents, 33 ($p = 0.60$) perceived E-POS as better than the old system. The calculated Z value (1.48) is below the critical value of 1.96, indicating that the preference is not statistically strong despite the majority opinion.

STUDY LIMITATIONS

The study is based on a small sample of 55 respondents selected through convenience sampling in a single taluk, which may limit generalization. However, the findings provide useful grassroots insights into beneficiary experience with the E-POS system.

MAJOR FINDINGS

1. A large proportion of respondents are active ration card holders who regularly depend on Fair Price Shops, indicating their direct interaction with the E-POS enabled distribution system.
2. Although most beneficiaries have heard about the E-POS system and have used it at least once, a majority lack clear understanding of its technical functioning.
3. A significant number of respondents report that they were not given proper explanation or guidance regarding the use of the E-POS system at ration shops.
4. Nearly half of the respondents express satisfaction with the system, while many others experience discomfort during its use due to practical and technical issues.
5. Biometric authentication, particularly thumb impression scanning, is reported as a major difficulty, especially for senior citizens and manual laborers.
6. Power failures and network issues are perceived as serious obstacles affecting the smooth functioning of the system.
7. More than half of the respondents believe that the E-POS system helps in preventing corruption and irregularities in ration distribution.
8. A considerable proportion of beneficiaries feel that the system has improved transparency compared to the old manual method, though doubts still remain regarding data accuracy and system security.
9. Many respondents opine that the system does not update data quickly and that there is lack of clarity in transaction details displayed during distribution.
10. A majority of beneficiaries consider the E-POS system to be better than the previous manual ration distribution system despite the difficulties experienced.

SUGGESTIONS

1. Proper awareness programs and demonstrations should be conducted to educate beneficiaries about the functioning of the E-POS system.
2. Ration shop dealers should be trained to clearly explain the process and assist customers, particularly elderly beneficiaries, during biometric authentication.
3. Alternative authentication methods such as OTP or iris scanning should be introduced for beneficiaries facing difficulties with thumb impressions.

4. Adequate power backup and improved internet connectivity should be ensured at all Fair Price Shops to avoid interruptions.
5. The system interface should be made more user-friendly with clear display of transaction details to improve transparency.
6. Regular technical maintenance and monitoring of E-POS machines should be carried out to reduce operational issues.
7. Government authorities should strengthen grievance redressal mechanisms to address customer complaints promptly.

CONCLUSION

The introduction of the E-POS enabled smart ration card system represents a significant step towards digitalizing the Public Distribution System and enhancing transparency and accountability in ration distribution. The present study conducted in Eranad Taluk reveals that while beneficiaries are generally aware of and have used the E-POS system, their understanding of its functioning remains limited. The system is largely accepted by customers and is perceived to be more effective than the old manual method in reducing corruption and ensuring fair distribution. However, practical challenges such as biometric authentication issues, power failures, network problems, and lack of proper guidance hinder its smooth functioning. The findings indicate that the success of the E-POS system depends not only on technological implementation but also on user awareness, infrastructure support, and effective assistance at the grassroots level. Strengthening these aspects can significantly improve customer satisfaction and ensure that the objectives of transparency, efficiency, and food security under the Public Distribution System are fully realized.

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