Library Progress International
Vol.44, No.1, January-June 2024: P.395-401

Print version ISSN 0970 1052
Online version ISSN 2320 317X

Original Article

Available online at www.bpasjournals.com

Perspectives On The Digitalization Of Public Distribution System In Kanniyakumari District

Jemsala. J[1], Dr.S.Shiny[2]

[1] Research Scholar, St. Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Tirunelveli.anishjemsala3@gmail.com. Reg. No. 21113231012001
[2]Assistant Professor of Commerce, St. Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Tirunelveli. shinyigni@gmail.com: Contact

How to cite this article: Jemsala. J, S.Shiny (2024) Perspectives On The Digitalization Of Public Distribution System In Kanniyakumari District. *Library Progress International*, 44(1), 395-401.

Abstract

The Public Distribution System (PDS) is a key social welfare and anti-poverty initiative by the Government of India, aimed at providing essential commodities such as rice, wheat, sugar, and kerosene at subsidized rates. This system has been central to India's safety net framework for nearly 50 years, covering a vast population and representing significant public expenditure. The PDS supplies rationed quantities of basic food items and some non-food products through a nationwide network of fair price shops.

The digitalization of the Public Distribution System (PDS) refers to the integration of digital technologies into the traditional PDS framework to improve efficiency, transparency, and effectiveness. This process involves leveraging technologies like databases, biometric authentication, and mobile applications to streamline the distribution of essential commodities like food grains to beneficiaries.

This study examines customer attitudes toward the use of Electronic Point of Sale (e-POS) machines in the PDS and evaluates customer satisfaction regarding the implementation of these systems.

Keywords: Public Distribution System, Digitalization, e-POS, Smartcard, Customer Satisfaction, Biometric Systems.

1.1. INTRODUCTION

The Public Distribution System (PDS) has long been a cornerstone of India's welfare framework, aimed at ensuring food security for millions of citizens by distributing essential commodities like rice, wheat, and kerosene at subsidized prices. However, over the years, the system faced significant challenges, including inefficiencies, leakages, corruption, and difficulty in ensuring that benefits reached the intended recipients. To address these issues, the government introduced digitalization into the PDS framework, a transformative step toward improving its transparency, efficiency, and effectiveness.

Digitalization in PDS involves the integration of modern technologies such as biometric authentication, electronic point-of-sale (e-POS) devices, and online data management systems. These innovations help streamline operations, monitor supply chains, reduce fraud, and enhance beneficiary satisfaction. A major component of this initiative is the use of Aadhaar-linked biometric systems, which authenticate beneficiaries during the collection of rations, ensuring that food grains and other essential items reach the rightful recipients. Additionally, end-to-end computerization of the supply chain has been implemented, enabling real-time tracking of food grain movement from procurement centers to distribution points. This ensures better accountability and reduces the diversion of food grains. The digitalization of PDS also provides beneficiaries with access to online portals and mobile applications, allowing them to check their entitlements, file grievances, and receive timely updates.

The introduction of e-POS devices at fair price shops marks a significant step in combating corruption and promoting efficiency. These devices record each transaction digitally, allowing for greater transparency and accountability. This not only reduces human errors but also helps in ensuring that the right amount of food is distributed to the right people. While the digitalization of the PDS has brought about several positive changes, it also presents challenges such as infrastructure limitations in rural areas, technical glitches in e-POS systems, and the digital divide that may hinder access for vulnerable populations. Despite these challenges, the digital transformation of PDS is a crucial step in modernizing India's food security system, reducing wastage, and ensuring that the benefits of subsidized commodities reach those in need.

1.2. STATEMENT OF PROBLEMS IN THE DIGITALIZATION OF THE PUBLIC DISTRIBUTION SYSTEM (PDS):

The digitalization of the Public Distribution System (PDS) in India, while aimed at enhancing efficiency, transparency, and accountability, has encountered several challenges. These problems stem from both technical and socio-economic factors that hinder the full realization of the benefits of digitalization. The key problems associated with this transitions are Biometric and Delay Problem, Satisfaction and Benefits, Allotment and Purchase Transparency and Accessibility, Complaint and Usage problem.

These issues prompted the researcher to study Digitalization of PDS. The findings from this study aim to shed light on the diverse challenges faced by beneficiaries in the system. By understanding these challenges, the government can better recognize areas that require improvement and take necessary actions to enhance the effectiveness and efficiency of the PDS.

1.3. OBJECTIVES OF THE STUDY

1. To Examine the perspectives of consumers about digitalised Public Distribution System.
2. To analyses the satisfaction towards consumers about PDS.
3. To provide recommendations and strategies to develop the Public Distribution System.

1.3. REVIEWS OF THE STUDY

1. **Alok Kumar Sahoo D. K. Krishna and N. V. Kumbhare (2019)** identified several critical issues within the Public Distribution System (PDS) that hinder its efficiency and ability to achieve its objectives. Their analysis reveals multiple loopholes that contribute to the system's ineffectiveness. Major problem includes- identification of the beneficiaries, high diversion of food grains, stocks of food grains much more than minimum buffer norm, poor infrastructure for storages, subsidy reaching to real beneficiaries are low etc. Need for reform– transparent selection of beneficiaries, end to end computerization, more commodities, an effective grievance redressal agency, leveraging nationwide Aadhar and UIDs, inclusion of innovative schemes like food coupon, smart card etc.
2. **Girija C and Prasheedha V P (2020)** their study highlights that the implementation of the e-POS system has significantly enhanced security and transparency in the PDS compared to traditional methods. The system ensures that fraudulent data entries in the ration database are minimized. With the e-POS, the management of ration distribution has improved, instilling trust in beneficiaries and contributing to the overall effectiveness of the PDS. The researchers also note that the system helps eliminate malpractices and unfair trade practices, which were common in the earlier, manual system.
3. **Rukshana Begum.S, and Archana.S (2021)** In their analysis, the authors found that the smart card system is more secure and reliable than the traditional ration card system. Like the e-POS system, it prevents fraudulent data entry, thereby ensuring transparency and better management of the ration distribution process. The study also highlights how the smart card system allows the government to indirectly monitor the availability of rations for beneficiaries and control prices of essential commodities in the open market. This modernization effort combats corruption by making it difficult for dealers to maintain fake ration cards and provides a transparent system that benefits consumers and reduces malpractices.
4. **Sunil Kumar Verma et.al (2022)** in their study focuses on the benefits of digitizing ration cards and integrating Aadhaar-based biometric identification into the PDS. The digitization of ration cards, combined with Aadhaar seeding for all family members, has successfully eliminated the problem of fake ration cards. The use of biometric identification has increased transparency and ensured that food grains reach the rightful beneficiaries, addressing the long-standing issue of leakage and fraud within the PDS.

5. **Akshara .V and Prajisha P (2023)** emphasize the role of the PDS as a crucial safety net for food security. They note a significant structural break in the trend of procurement in 2020, attributing it to the impact of the COVID-19 pandemic. This implies that the pandemic disrupted food procurement, affecting PDS operations.
6. **Roli Misra and Ankit Upadhyay (2024)** focus on the digitalization of the PDS. Their study finds that integrating technology has made the system more transparent, cost-effective, and responsive. This includes the improved management of food grain stocks, enhanced storage facilities, and the use of GPS for monitoring grain transportation. As a result, the efficacy of the PDS has seen overall improvement.

1.5 METHODOLOGY OF THE STUDY

The study utilized both primary and secondary data. Secondary data was gathered from a variety of sources, including books, research journals, and websites. To ensure the sample's representativeness, a simple random sampling method was employed to collect responses from the respondents. Simple Random sampling is a scientific sampling method. Data is collected by personally visiting the consumers in Kanyakumari district and interviewed their attitudes about digitalised Public Distribution System and filled the question schedule. Data analysis involved the use of statistical techniques such as Simple Percentage Analysis, ANOVA and Factor Analysis.

1.6 ANALYSIS AND INTERPRETATIONS

1.6.1. Socio-Economic Factors of the Respondents

TABLE 1

S.No	Attributes	Frequency	Percentage
1.	**Gender**		
	Male	165	28.7
	Female	410	71.3
	Total	**575**	**100**
2.	**Literacy level**		
	Illiterate	87	15.1
	School educated	210	36.8
	Graduate	211	36.5
	Professional course	67	11.6
	Total	**575**	**100**
3.	**Occupation**		
	Wage earners	122	21.2
	Business man	110	19.1
	Salaried person	195	12.0
	Farmer	58	10.1
	Fishermen	69	33.9
	Self employed	21	3.7
	Total	**575**	**100**
4.	**Type of smart ration card**		
	PHHRICE	225	39.1
	PHHA	108	18.8
	NPHH or NPHHL	242	42.1
	Total	**575**	**100**

Source: Primary Data

The data from the above table suggests that the majority of the respondents are female, and most have completed their schooling as their highest educational qualification. In terms of occupation, a large portion of the respondents work as fishermen. Regarding smart card types, most respondents possess PHH-RICE cards.

1.6.2. FACTOR ANALYSIS FOR OPINION ABOUT DIGITALIZATION OF PDS

Factor analysis helps to reduce the innumerable variables into limited number of latent factors having inter–correlation within themselves. Hence factor analysis is attempted to reduce the numerous variables into limited number of factors. In order to apply factor analysis, the basic assumption to be fulfilled is the factorability of the correlation matrix. KMO measures of sampling adequacy and the Bartlett's test of sphericity determine the factorability of the correlation matrix. The results of the calculation are presented below.

Table 2
Opinion about Digitalization of PDS - KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.883
Bartlett's Test of Sphericity	Approx. Chi-Square	3209.255
	Df	300
	Significant.	0.000

Source: Computed Data

Table 2 shows that the KMO is 0.883 which indicates that the degrees of common variance among the variables is quite high and therefore Factor Analysis can be conducted.

The communalities of a factor are its common factor variance. The factor where factor loading is 0.50 or greater that is considered as significant factors. This limit is chosen because it had been judged that factors with less than 50 per cent common variations with the rotated factors pattern are too weak to report.

In the present study, the principal factor analysis method with orthogonal varimax rotation is used to identify the significance of different variable of the Opinion about Digitalization of PDS. The estimated results are given in Table 2.

Table 3: Opinion about Digitalization of PDS - Rotated Factor Matrix with Communalities

Factors	F1	F2	F3	F4	F5	h^2
Frequent delays in barcode processing	**.931**	.114	.177	.156	.234	.860
Impersonation is reduced	**.861**	.277	.151	.120	.152	.732
Biometric authentication is often problematic	**.860**	.243	.140	.130	.173	.523
Difficult for the respective person to go to the FPS to buy the commodities	**.838**	.229	.167	.008	.275	.745
No scope for black marketing and hoarding	**.828**	.288	.205	.029	.008	.989
Reduce bogus billing	.104	**.685**	.266	.085	.038	.943
Knowing the information and allotments are easily	.292	**.599**	.021	.071	.336	.964
Satisfied with SMS service	.092	**.569**	.061	.046	.035	.975
Aadhar linking is beneficial	.258	**.560**	.298	.014	.374	.849
Satisfied with TNePDS Mobile application	.279	**.553**	.160	.006	.331	.832
Prevent manipulations like weight and measure	.212	.203	**.703**	.025	.215	.930
Digitalization helps in allotting adequate quota to the card holders	.171	.167	**.667**	.029	.302	.895
Digitalization of PDS is good thing for family cardholders	.112	.163	**.661**	.062	.011	.913
Misuse of ration card is not possible	.227	.213	**.592**	.021	.217	.847
Less time taken for purchase	.196	.232	**.542**	.050	.141	.960
Easy to access for applying new cards, addition and deletion of members	.358	.180	.322	**.622**	.272	.980
E POS Machine system is satisfactory on FPS	.161	.091	.220	**.614**	.130	.771
Very Transparency in TNePDS system	.013	.055	.011	**.607**	.021	.823
Poor connectivity in the POS machine is delaying the disbursement of food grains to the card holder	.037	.047	.027	**.602**	.100	.962
Reduce Fake cards and Duplication of names	.011	.099	.016	**.573**	.050	.951
Easy to use of smart card instead of ration card	.027	.086	.087	.123	**.702**	.540
Proper platform to file complaint	.078	.135	.053	.175	**.691**	.669
ONORC system is acceptable	.101	.175	.202	.085	**.680**	.610

Extraction Method: Principal Component Analysis,
Rotation Method: Varimax with Kaiser Normalization.

Source: Computed Primary Data.

Table represents the matrix of common factor co-efficient or factor loadings. The number of factors extracted was five. The ratio which has the highest loadings in each factor are grouped, that is the ratios which are more closely

related to a particular group are boxed. The last column in the table is communality (h^2) that is the variance explained by the factor. The group-wise analysis is shown in the individual tables.

The rotated factor loadings for twenty-three statements have been extracted into five factors.

Results of the Opinion about Digitalization of PDS

The factors with identified new names like 'Biometric and Delay Problem Factor', 'Satisfaction and Benefits Factor', 'Allotment and Purchase Factor', 'Transparency and Accessibility Factor' and 'Complaint and Usage Factor' which influenced the Opinion about Digitalization of PDS are shown in the following tables and.

Factor I (F_1)- Factor I presents the relevant five variables such as Frequent delays in barcode processing (0.931), Impersonation is reduced (0.861), Biometric authentication is often problematic (0.860), Difficult for the respective person to go to the FPS to buy the commodities (0.838) and No scope for black marketing and hoarding (0.828) are having the highest significant positive loadings. Hence, the factor 1 is characterized as "Biometric and Delay Problem Factor".

Factor II (F_2) - In the second factor, there are five variables such as Reduce bogus billing (0.685), Knowing the information and allotments are easily (0.599), Satisfied with SMS service (0.569), Aadhar linking is beneficial (0.560) and Satisfied with TNePDS Mobile application (0.553) has the highest significant positive loadings. Hence, the factor II is characterized as "Satisfaction and Benefits Factor".

Factor III (F_3) - Factor III consists of five variables and they are Prevent manipulations like weight and measure (0.703), Digitalization helps in allotting adequate quota to the card holders (0.667), Digitalization of PDS is good thing for family cardholders (0.661), Misuse of ration card is not possible (0.592) and Less time taken for purchase (0.542) are having the highest significant positive loadings. Hence the factor III is characterized as "Allotment and Purchase Factor".

Factor IV (F_4) - The factor four contains five variables like Easy to access for applying new cards, addition and deletion of members (0.622), E POS Machine system is satisfactory on FPS (0.614), Very Transparency in TNePDS system (0.607), Poor connectivity in the POS machine is delaying the disbursement of food grains to the card holder (0.602) and Reduce Fake cards and Duplication of names (0.573) and with high factor loadings. Hence factor four is characterized as "Transparency and Accessibility Factor".

Factor V (F_5) - Factor V shows the three variables such as Easy to use of smart card instead of ration card (0.702), Proper platform to file complaint (0.691) and ONORC system is acceptable (0.680) and have the highest significant positive loading. Hence the factor V is "Complaint and usage Factor".

Table 4

Variables with the Highest Factor Loadings - Opinion about Digitalization of PDS

Factor	*Name of Newly Extracted Dimensions*	*Selected Statement (Variable)*	*Factor Loadings*
F_1	Biometric and Delay Problem Factor	Frequent delays in barcode processing	.931
F_2	Satisfaction and Benefits Factor	Reduce bogus billing	.685
F_3	Allotment and Purchase Factor	Prevent manipulations like weight and measure	.703
F_4	Transparency and Accessibility Factor	Easy to access for applying new cards, addition and deletion of members	.622
F_5	Complaint and Usage Factor	Easy to use of smart card instead of ration card	.702

Source: Computed Primary Data.

It is inferred from the Table 5.19 that the statement, Frequent delays in barcode processing (0.931), Reduce bogus billing (0.685), Prevent manipulations like weight and measure (0.703), Easy to access for applying new cards, addition and deletion of members (0.622) and Easy to use of smart card instead of ration card (0.702) are the statements with highest factor loading under the dimensions namely Biometric and Delay Problem Factor (F1), Satisfaction and Benefits Factor (F2), Allotment and Purchase Factor (F3), Transparency and Accessibility Factor (F4) and Complaint and Usage Factor (F5) respectively. Hence, these are the identified dimensions (factors), which influence the Opinion about Digitalization of PDS.

1.6.3. Association between Occupation of Consumers and Satisfaction towards Fair Price Shop

An attempt has been made to find the association between the occupation of consumers and satisfaction towards Fair Price Shop, 'ANOVA' test is used. The following hypothesis is framed.

The null hypothesis (H_{02}) **"There is no significant association between satisfaction towards Fair Price Shop and occupation of consumers in Kanniyakumari District"**.
The alternative hypothesis (H_{a2}) **"There is a significant association between satisfaction towards Fair Price Shop and occupation of consumers in Kanniyakumari District"**.

The result of the 'ANOVA' test for association between satisfaction towards Fair Price Shop and occupation of consumers is presented in Table 5.

Table 5
Association between Occupation of Consumer and Satisfaction towards Fair Price Shop

Satisfaction towards Fair Price Shop	Occupation (Mean Score)						F Statistics
	Wage earners	Salaried person	Business man	Farmer	Fishermen	Self employed	
Price	4.1475	4.2727	4.4308	2.3793	4.1014	3.8571	9.230*
Quality	2.9426	2.4909	2.3282	3.3103	1.8261	1.8598	9.562*
Measurement	3.8689	3.5727	3.0051	2.7069	3.1739	3.4286	9.334*
Services	3.8934	3.2818	3.5385	3.0517	2.7391	2.7143	10.064*
Location of FPS	3.4180	3.2818	2.1128	4.2931	3.4638	3.5714	8.816*
Time Factor	3.1557	2.4909	2.1744	2.4483	3.0870	3.5442	12.939*
Behaviour of Shop keeper	3.2623	2.9364	3.2000	2.4289	3.6522	4.0000	7.326*
Digitalization of PDS	4.1393	4.1818	4.3231	3.2931	4.1159	4.4286	9.163*

Source: Primary data
*-Significant at five per cent level

The above Table indicates that digitalization of PDS and price are the important satisfaction towards Fair Price Shop among the respondents who are fishermen as their mean scores are 4.1159 and 4.1014 respectively. The Table further highlights that digitalization of PDS and behaviour of Shop keeper are the important satisfaction towards Fair Price Shop among the respondents who are self-employed as their mean scores are 4.4286 and 4.0000 respectively. It is inferred that there is a significant association between the occupation of consumers and satisfaction towards Fair Price Shop in terms of price, quality, measurement, services, location of FPS, time factor, behaviour of shop keeper and digitalization of PDS.

1.7 Findings of the study

The research gathered information from a sample of 575 respondents in the Kanniya Kumari district to evaluate their perspectives on the digitalization of the public distribution system.

1. It is found that 28.7 per cent of the sample respondents are male and 71.3 per cent of them are female. It is inferred that majority of the sample respondents are female.
2. It is identified that 36.8 per cent of the sample respondents are school educated and 36.5 per cent of the sample respondents are graduate. It is inferred that most of the sample respondents are school educated.
3. It is identified that 33.9 per cent of the sample respondents are fishermen and 21.2 per cent of the sample respondents are wage earners. It is inferred that most of the sample respondents are salaried person.
4. The study highlights that 42.1 per cent of the sample respondents have NPHH or NPHHL smart card and 39.1 per cent of the sample respondents have PHHRICE smart card. It is inferred that most of the sample respondents have NPHH or NPHHL smart card.
5. Among different factors of Opinion about Digitalization of PDS, the important factor is Biometric and Delay Problem Factor which consists of five variables such as frequent delays in barcode processing, impersonation is reduced, biometric authentication is often problematic, difficult for the respective person to go to the FPS to buy the commodities and no scope for black marketing and hoarding and their respective factor loadings
6. It is found that there is a significant association between the occupation of consumers and satisfaction towards Fair Price Shop in terms of price, quality, measurement, services, location of FPS, time factor, behaviour of shop keeper and digitalization of PDS.

1.8 Suggestions

Digitalising the Public Distribution System (PDS) can indeed drive substantial improvements in transparency, efficiency, and accessibility, especially in ensuring that intended beneficiaries receive their rations without malpractices.

1. Conduct awareness campaigns and training programs, particularly in rural areas, to help beneficiaries understand how to access and use digital PDS services, such as mobile applications for ration tracking, grievance redressal, and accessing updates.
2. Use community centers, panchayats, or public gatherings to demonstrate the use of these apps and digital tools, ensuring language support and easy navigation for semi-literate users.
3. Installing Automated Electronic Weighing Machines at all Fair Price Shops (FPS) will help prevent tampering with quantities and ensure beneficiaries receive the exact entitlement.
4. Introduce a tiered reward system for FPS owners based on criteria such as accurate distribution, minimal grievances, and excellent customer service.
5. Regular training should be provided to (FPS owners) Kotedar to familiarize them with new digital tools, POS (point of sale) machines, and inventory management systems.
6. In areas with established markets, cash transfers directly into bank accounts can empower beneficiaries to choose and purchase their own food items. This system reduces the logistical burden on the government while offering flexibility to beneficiaries.

1.9. Conclusion

This study would pave the way for many more studies in future. For such studies, if this present study helps, the researcher would feel amply rewarded. The most of the respondents are not aware the digitalization of PDS such as mobile applications for ration tracking, grievance redressal, and accessing updates. So government should take necessary steps to improve their awareness of Digitalisation of PDS. The respondents were partly dissatisfied with the implementation of E-POS system in ration shop. Even after the implementation of the machine lack of knowledge of both shop dealer and beneficiaries, technical problems of the machine are the major problems faced by the respondents in ration shops. The study reveals that customers are satisfied with the new machine implementation not in all terms, the reason behind that was the troubles they had experienced at the beginning.

Referrences:

1. Alok Kumar Sahoo , D. K. Krishna and N. V. Kumbhare, Effectiveness of the Public Distribution System: A Critical Review, Asian Journal of Agricultural Extension, Economics & Sociology 30(1): 1-8, 2019; Article no.AJAEES.47559 ISSN: 2320-7027
2. Girija C and Prasheedha V P, Customer Perception on Digital Transformation of Public Distribution System, International Journal of Advances in Engineering and Management (IJAEM).
3. Rukshana Begum.S, and Archana.S, A Study on customer perceptions towards Technological Developments in Public Distribution Services [smart card] with Reference to Coimbatore, International Journal of Pure and Applied Mathematics Volume 119 No. 18 2018, 3251-3264 ISSN: 1314-3395 (on-line version)
4. Sunil Kumar Verma, Man Mohan Singh Negi and Sartik Bagh, Digitalisation of Public Distribution System and Food Security: A Study of Risia Block of Bahraich District of Uttar Pradesh, Ijfans International Journal Of Food And Nutritional Sciences, UGC CAREListed (Group-I)Journal Volume11, Iss10, 2022
5. Akshara .V and Prajisha P, A Study on Utilisation of Public Distribution System in the post pandemic period, Journal of Research Humanities and Social Science, Volume 11, 2021, ISSN (online) 2321-9467 Issue1 (2023) pp:89-96
6. R. Misra and A. Upadhyay ,Int. J. Soc. Sc. Manage. Vol. 11, Issue-(1-2): 1-6. DOI: 10.3126/ijssm.v11i1-2.62762 (2024)