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Augmenting Use of Technology in Implementation of NFSA-2013: Documenting Evidence From Assam

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Abstract

Technology has the potential to help governments live up to their ambitions for public policy and delivery. To increase the efficiency of the Public Distribution System (PDS), the Government of India has launched multiple Information and Communication Technology (ICT) intervention projects under the National Food Security Act (NFSA), 2013. The article looks at the effectiveness of Aadhar Seeding, Biometric Authentication Systems, Fair Price Shop (FPS) Automation, Integrated Management of Public Distribution Systems (IMPDS), Mobile Applications (Mera Ration App), and Direct Benefit Transfer (DBT)- in enhancing transparency, accuracy, and accountability of PDS under NFSA, 2013 in the delivery of subsidized food grains in Assam. The study relies on secondary data. The augmentation of technology has the potential to increase the effectiveness, transparency, and accountability of the NFSA implementation and address the issue of food security. The authors suggest that ensuring the feasibility of FPSs, creating dashboards for data and reports for NFSA stakeholders, conducting social audits, and developing efficient monitoring and evaluation frameworks within the NFSA can greatly improve the efficiency of the PDS in Assam.

Keywords: NFSA- 2013, Public Distribution System, Assam, Technology, Development, Food Security

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1. Introduction

In the past few decades, the progress of human development has been accompanied by rapid technological advancements and an increasing proliferation of digitized gadgets and services. This provides extensive databases to help policymakers with policy creation, formulation, and evaluation. Technology has the potential to help governments live up to their ambitions for public policy and delivery.

Due to a lack of expertise, infrastructure, and training, a sizable portion of the population in developing nations continues to have no access to ICT services (Chhabra, 2020). In a country like India where people in rural areas lack basic amenities like safer food, water, sanitation, electricity, and proper roads, Information Technology (IT) can be used as a public policy tool to mitigate some of the administrative problems. IT can weaken the information asymmetry prevalent in the countryside by providing timely information to its citizens (Ashraf, 2004).

According to the United Nations, Conference on Trade and Development (UNCTAD) five 'A' s of technology are essential for the effectiveness of the usage of technology in day-to-day life: the availability of technology is available in the place where the person lives, affordability that price of the technology is affordable, awareness about the technology people are aware of the ways that the technology is relevant to their lives, accessibility is also important that the technology is accessible considering the language and physical conditions of users, ability that means appropriate user skills to translate technology access into valued development (UNCTAD, 2021).

2. Transforming the Public Distribution System: A Journey of Evolution

The PDS is the most extensive planned food distribution scheme in the world. It was implemented as a national policy following the Great Bengal Famine in the early 1940s. To guarantee household food security in India, PDS is regarded as one of the most significant government-run schemes for providing subsidized food grains (Singh et al., 2020). The Five-Year Plans had a major role in the development and extension of India's PDS. One major move was the formation of the Food Corporation of India (FCI) in 1964. This initiative was critical in alleviating India's food crisis and formed an important link with the PDS.

Deaton and Dreze, (2009) highlight the importance of the PDS in addressing hunger and malnutrition but also underscore its inefficiencies, leakages, and targeting errors, which undermine its potential impact on food security. To overcome errors in PDS the Government of India revamped the almost universal PDS and launched the Target Public Distribution System (TPDS) in 1997.

The TPDS is India's largest safety net programme, both in terms of government expenditure and the number of beneficiary households. However, TPDS also has been subject to evaluation and

critique by scholars. Khera (2011) showcased the shortcomings of TPDS, emphasizing the need for reforms to mitigate leakage and improve targeting. Therefore, the implementation of the National Food Security Act (NFSA), in 2013 has been seen as a significant step, in terms of recognizing the 'Right to food' for citizens, and regulating the performance of TDPS across India to achieve greater food security at the household level.

After South Africa and Brazil, India was the third nation to put a constitutional commitment to the right to food into law (Lindgren, 2022). The Food Security Act is not only a scheme but also an opportunity for India to assume full responsibility for the food safety of its citizens (Karhad, 2014).

In implementing NFSA, technology is being used to ensure transparency, reliability, and efficiency of the food grains procurement, storage, and distribution operations of the TDPS. The use of Aadhaar for the distribution of TPDS rations remains debatable, with critics claiming it is leading to exclusion because of technological failures. ICT has played a significant role in several states where the TPDS has improved its performance, digitizing beneficiary databases, computerizing supply chain management, establishing transparency portals, and establishing online grievance redress mechanisms. These ICT-based reforms are considered highly effective at improving food security in several low-income states like Bihar, Chhattisgarh, and Odisha in preventing food grain leakage from the PDS (Chatterjee, 2014).

Several states in India have made progress in introducing technology in the implementation of the NFSA. For example, Telangana has been at the forefront of leveraging technology to enhance the effectiveness of PDS in terms of introducing the online application of ration cards, computerizing supply chain management, introducing online transactions at FPS, etc (Mishra et al., 2022). Through the implementation of biometric authentication systems, mobile applications, and GPS tracking, Tamil Nadu has improved the targeting of beneficiaries and minimized leakages in food grain distribution (Kumar et al., 2020). Kerala has successfully implemented biometric authentication systems and electronic weighing scales in Fair Price Shops (FPS), along with the computerization of beneficiary databases (Kannan & Raveendran, 2015). Odisha secured the top position in the NFSA Ranking Index of 2022, marking a notable achievement in the modernization of its PDS. Odisha has achieved technological innovation, including the introduction of online monitoring for grain lifting plans across the State (Mishra, 2022). Among all the states of Northeast India Tripura and Sikkim have demonstrated notable progress in NFSA implementation, largely attributed to effective Godown management and Aadhaar seeding initiatives (CAF&PD, 2022).

3. Objectives & Methodology

The study aims to evaluate the effectiveness of technological interventions introduced under NFSA, 2013. It looks at the effectiveness of Aadhar Seeding1, Biometric Authentication2 Systems, Fair Price Shop (Ration Shop) Automation3, Integrated Management of Public Distribution Systems (IMPDS)4, Mobile Applications (Mera Ration App), and Direct Benefit Transfer (DBT)5 programme- in enhancing transparency, accuracy, and accountability of PDS under NFSA, 2013 in the delivery of subsidized food grains. This article also identifies the key challenges hindering the successful adoption and implementation of new technologies under the NFSA of 2013 in Assam. The paper is descriptive. The paper is based on secondary data mainly reports collected from the Government of India (GOI), the Comptroller and Auditor General report (CAG), the Ministry of Consumer Affairs and Public Distribution reports, Concurrent Evaluation of NFSA, GOI reports, Press Information Bureau (PIB) reports, and various research papers, books, journals, newspapers, articles, etc.

4. Use of Technology to Augment Public Policy Delivery

The idea of "e-governance" started to take shape with the development of the internet and has since helped to increase both the effectiveness of internal administration and the accessibility of online services for citizens, and has led to social media advancement which enables ordinary citizens to share more information among themselves and interact actively with governments. ICT has the potential to improve the quality of government and empower citizens. It helps make governments more efficient, effective, transparent, and accountable by reengineering administrative processes, improving public service delivery, and promoting citizen engagement and participation in policy-making processes. By digitizing administrative procedures and providing public information and services to citizens via the Internet, e-government makes governments not only more efficient and effective but also more accountable and transparent (Moon, 2017).

In India, science and technology have been given importance in nation-building since independence, and it has been given immense priority in the field of public policy making. The goal of employing ICT is to make government policies more efficient, effective, and cost-effective. The process of formulating and implementing public policy has taken on the shape of a collaborative effort between governmental organizations, state institutions, and social groupings. The current governance structure is multi-actor and multi-level so digital technologies connect stakeholders and enable evidence-based policy-making. As a result, ITC has become a critical tool in the intricate processes of public policymaking.

4.1 Key Features of NFSA, 2013

NFSA covers up to 75% of the rural and 50% of the urban populations. The households are categorized into two groups one is the poorest of the poor, *Antodaya Anna Yojana* (AAY) households' which are entitled to 35 kg of foodgrains per family per month, whereas the other one is Priority Households (PHH) beneficiaries, who are entitled to 5 kilogrammes per person per month. It is a shift from a welfare-based system to a rights-based system. NFSA, 2013 also provides support for women's and children's nutritional needs under the Integrated Child Development Services (ICDS) and Mid-Day Meal (MDM) programmes, pregnant women, breastfeeding mothers, and children between the ages of six months to fourteen years are entitled to meals that adhere to proposed nutritional content. Pregnant or breastfeeding women are eligible for a maternity bonus worth at least Rs. 6,0006.

Table 1 shows some key TPDS reforms linked with technology that were initiated under NFSA,2013 that have had a tremendous impact on the design and implementation of the NFSA program.

Table 1: Mapping of planning module for induction of technology under NFSA, 2013

Sources of error in TDPS	TPDS Process	Proposed ICT solution by NFSA, 2013	Planning module
Inclusion and exclusion Errors, Ghost card	Identification of Beneficiary	Digitization of beneficiary database, Biometric Identification	Digitization of database
Lack of information to Farmers	Procurement	Use of portal, Mobile application	Computerization of the supply chain
No real-time information on Inventory	Storage	(Radio-frequency identification) RFID-enabled application, Integrated information system	Computerization of the supply chain
Diversion during transit	Transportation Distribution	GPS solution	Computerization of the supply chain

Lack of prior Information to the Beneficiary	Distribution	Information through SMS, Toll-free numbers, Transparency Portal, Online allocation	Transparency portal
Manual recording of transactions at FPS	Distribution	Fair Price Shop (FPS) automation to minimize human intervention	FPS automation electronic Point of Sale (e-PoS)[1]
Lack of attention to Beneficiary complaints	Service Delivery	Grievance redressal mechanism, Toll-Free No	Grievance redressal mechanism

Source: Biswal & Jenamani, 2018

5. Status of Food Security and NFSA Implementation in Assam

As per the World Bank, Assam exhibits a poverty rate surpassing the national average, with certain regions within the state experiencing particularly high levels of poverty. The Planning Commission estimated that in the fiscal year 2011-12, around 25.70 % of Assam's rural population lived below the poverty level. Food security in Assam has been a critical concern, with various socio-economic factors affecting access to adequate and nutritious food for its population.

Baruah & Mahanta (2019) stated that the state faces challenges such as high levels of poverty, inadequate infrastructure, and vulnerability to natural disasters, all of which impact food availability, accessibility, and utilization. Assam's vulnerability to climate change, particularly floods and erosion, poses a significant threat to agricultural productivity and food security highlighting the adverse effects of climate change on crop yields and food production in the State (Saikia et al. 2016).

Government initiatives (such as the NFSA) aim to address food insecurity by providing subsidized food grains to eligible households. However, challenges persist in the effective implementation of these policies in the state. Identifying Below Poverty Line (BPL) households, which poses a significant challenge in Assam due to corruption, is crucial for the success of the entire PDS system.

Assam has been plagued by issues such as leakages, inefficiencies in distribution, targeting errors, and inadequate coverage, leading to gaps in food security coverage under NFSA, 2013 (Barman et al., 2018). There was a problem with poor-quality food grain distribution, smuggling of PDS goods sold on the open market at a higher price, food items delivered to APL households without ration cards,

[1] EPoS is the combination of hardware and software that allows you to accept all types of payments

and food grain delivery delays in Assam (Das, 2017). Therefore, ICT tools provide an opportunity to solve the problem of leakages and target errors as well as the diversion of food grains in PDS by keeping records of the beneficiaries (Gulati and Saini, 2015).

Even after the NFSA implementation in Assam which brought reforms to the existing PDS, the state has neglected many of the reform initiatives mainly the digital initiatives including Aadhar seeding, the adoption of digital payment systems, and the utilization of electronic Point of Sale (e-PoS) machines by FPS, etc. The e-PoS facility is not operational in all areas of Assam. Many FPSs follow a manual records system of beneficiary records of purchasing food grains from FPS (GOI, 2021). There is a need for better targeting mechanisms and improved delivery systems to ensure the efficient distribution of food grains to vulnerable populations (Dutta & Barman 2018).

Addressing food security challenges in Assam requires a holistic approach that includes improving agricultural productivity, enhancing infrastructure, strengthening social safety nets, and leveraging technology to ensure efficient food distribution and accessibility. Moreover, community-based approaches and participatory mechanisms can empower local communities to address food security challenges effectively.

6. Findings and Discussion

6.1 Significance of Technology in Improving the Implementation of NFSA, 2013 in Assam

Technology integration can streamline and automate various processes involved in NFSA implementation, such as beneficiary identification, ration card management, and the distribution of food grains. This efficiency improvement reduces administrative burden, minimizes errors, and ensures timely delivery of subsidized food grains to eligible beneficiaries. Some digitization efforts brought under NFSA, 2013 in TDPS in Assam, have been discussed below:

A) Digitization of Ration Card Database: Digitization of ration card database has proven beneficial in dual aspects. Initially, it enhances transparency through the provision of readily accessible databases (for example status of their ration allocation and distribution, ration card application status) to beneficiaries, government officials, and civil society. Having access to the databases government can easily monitor and manage the food distribution process efficiently. It facilitates the government in implementing supplementary technologies like barcodes and biometric smart cards to eliminate fraudulent or duplicate beneficiaries (PIB, 2015). The digitization procedure, which involves Aadhar seeding (is the process of attaching an Aadhaar holder's unique 12-digit Aadhaar number to their personal identification documents or benefits cards, such as scholarships. Pension ID. MNREGA Job Card, NFSA Ration Card, etc), are critical for various reasons. It helps in authenticating the identity of beneficiaries and ensures that food subsidies reach the intended recipients without

duplication. The state of Assam has achieved nearly 100% success in linking Aadhar with beneficiaries, showcasing a robust model for others to follow. By linking Aadhar with mobile numbers and bank accounts, the state has facilitated greater access to technology for the poor, empowering them with digital tools and services. This linkage not only ensures that the benefits reach the intended recipients but also integrates them into the financial system, thereby promoting financial inclusion. This demonstrates the effective use of technology in public policy, strengthening the NFSA's delivery mechanism and making governance more responsive and inclusive.

Table 2 illustrates the ration card database recorded by the government of Assam. It recorded the total number of beneficiaries, the Aadhaar-seeded RC database, and the Aadhaar-seeded beneficiary database. It highlights the number of ration cards linked with mobile numbers and bank accounts and about female heads of households (HOF) under the NFSA. The count of Silent RCs, which refers to ration cards that have not been used for three months stands at zero.

Table 2: Digitization of Ration Cards in Assam

Category	Total	AAY	PHH
Total Ration Cards	66,45,353	6,73,525	59,71,828
Total Beneficiaries	2,33,10,133	22,04,815	2,11,05,318
Aadhaar Seeded RCs	66,24,260	6,71,387	59,52,873
Aadhaar Seeded Beneficiaries	2,29,44,474	21,61,764	2,07,82,710
Mobile No. Seeded RCs	65,13,971	6,58,936	58,55,035
Bank A/C Seeded RCs	54,33,945	6,00,431	48,33,514
Female HOF (NFSA)	62,20,292	6,26,020	55,94,272
Silent RCs (3 months)	0	0	0

Source: https://nfsa.gov.in/public/nfsadashboard/PublicRCDashboard.aspx[7]

Table 3 presents the district-wise data for Aadhaar-seeded beneficiaries, demonstrating that 33 districts in Assam have successfully achieved Aadhaar seeding for NFSA beneficiaries. Most districts exhibit a high Aadhaar seeding rate, with percentages generally ranging between 94% and 99%. Moreover, Dima Hasao and Majuli, districts where seeding rates exceed 99%, indicate near-complete Aadhaar coverage among beneficiaries. The data was unavailable for the two districts Bajali and Tamulpur in the government records. All total Assam has a total of 35 districts.

Table 3: Aadhaar Seeded Beneficiaries District-Wise

Districts	Total Beneficiaries	Aadhaar Seeded Beneficiaries	AAY	PHH	%
Bajali	No Data	No Data	No Data	No Data	No Data
Baksa	7,26,225	7,16,461	70,240	6,46,221	98. 77%
Barpeta	13,34,764	13,22,600	1,24,051	11,98,549	99.09%
Biswanath	5,79,719	5,65,439	59,524	5,05,915	97.54%
Bongaigaon	5,89,875	5,58,030	54,818	5,03,212	94.61%
Cachar	13,02,217	12,68,571	1,20,341	11,48,230	97.41%
Charaideo	3,26,236	3,22,367	32,462	2,89,905	98.81%
Chirang	4,01,039	3,96,920	44,268	3,52,652	98.97%
Darang	7,27,896	6,97,974	55,641	6,42,333	95.88%
Dhemaji	5,67,055	5,66,420	53,474	5,12,946	99.89%
Dhubri	12,76,601	12,48,560	1,09,889	11,38,671	97.80%
Dibrugarh	8,58,775	8,44,288	79,523	7,64,765	98.31%
Dima Hasao	1,15,842	1,15,788	14,414	1,01,374	99.95%
Goalpara	7,10,314	7,08,794	61,920	6,46,874	99.79%
Golaghat	7,29,660	7,23,458	82,160	6,41,298	99.15%
Hailakandi	5,47,812	5,32,021	45,028	4,86,993	97.12%
Hojai	7,42,870	7,40,046	74,484	6,65,562	99.62%
Jorhat	6,18,527	6,17,437	67,489	5,49,948	99.82%
Kamrup	12,09,865	12,03,704	1,31,197	10,72,507	99.49%
Kamrup Metro	5,35,409	5,33,364	21,386	5,11,978	99.62%
Karbi Anglong	4,25,067	4,23,926	33,316	3,90,610	99.73%
Karimganj	9,41,174	9,31,123	73,629	8,57,494	98.93%
Kokrajhar	7,97,549	7,86,725	75,666	7,11,059	98.64%

Lakhimpur	8,20,713	8,12,676	75,848	7,36,828	99.02%
Majuli	1,50,783	1,50,734	22,246	1,28,488	99.97%
Marigaon	7,84,529	7,74,918	63,429	7,11,489	98.77%
Nagaon	15,38,467	14,97,055	1,43,118	13,53,937	97.31%
Nalbari	6,00,623	5,90,676	72,127	5,18,549	98.34%
Sivasagar	4,95,355	4,93,270	56,003	4,37,267	99.58%
Sonitpur	7,56,569	7,27,243	56,385	6,70,858	96.13%
South Salmara Mancachar	3,63,952	3,61,963	26,114	3,35,849	99.45%
Tamulpur	No Data	No Data	No Data	No Data	No Data
Tinsukia	8,59,928	8,53,116	80,197	7,72,919	99.21%
Udalguri	6,93,629	6,85,822	75,381	6,10,441	98.88%
West Karbi Anglong	1,74,604	1,72,966	6,337	1,66,629	99.06%

Source: https://nfsa.gov.in/public/nfsadashboard/PublicRCDashboard.aspx

*Percentage= (Total Beneficiaries/Aadhaar Seeded Beneficiaries) ×100

B) Real-Time Monitoring or End-to-end Computerisation of TDPS: End-to-end computerization refers to the digitization and automation of the whole process of PDS involved in delivering essential food commodities to eligible beneficiaries. The Department of Food and Public Distribution launched a Plan Scheme for "End-to-End Computerization of TPDS Operations" during the 12th Five Year Plan (2012-2017). Although the online allocation of food grains began in Assam, the computerization of supply chain management was not implemented until 2017 (PIB, 2017). Later, end-to-end computerization was initiated in Assam by selecting three districts- Nagaon, Karbi Anglong, and Kamrup Metropolitan as pilot districts (FPD&CA, 2024). Ration card details are accessible on Assam's transparency portal, and online allocation of food grains has commenced to enhance transparency in the distribution process, extending up to the FPS level; however, all the features of the end-to-end computerization are not fully utilized in the state yet (NFSA, 2023).

C) Integrated Management of PDS (IMPDS) or Portability - 'One Nation One Ration Card': Under NFSA, portability allows individuals who have been issued a ration card or similar entitlement in one state or district to receive their entitled food grains or subsidies while residing in a different state or district. Inter-state portability allows beneficiaries to avail of food subsidies in a different state.

Intra-state portability enables beneficiaries to access their entitlements in a different district or block within the same state. Table 4 illustrates the utilization of the portability facility by NFSA beneficiaries in July 2024 across 33 districts of Assam. However, data for the districts of Bajali and Tamulpur was not available. Portability helps people to get food grain entitlements, particularly for beneficiaries who move across districts or states.

Table 4: District-Wise Portability Abstract for July 2024

District	Total Cards	Availed Cards	Availed Transactions	Availed Port Cards	Availed Port Trans
Bajali	No Data	No Data	No Data	No Data	No Data
Baksa	218,959	204,705	204,723	217	217
Barpeta	365,142	326,854	326,866	965	965
Biswanath	170,572	156,709	156,718	173	173
Bongaigaon	159,637	146,302	146,304	214	214
Cachar	361,948	315,904	315,921	3,026	3,026
Charaideo	99,677	93,613	93,615	112	112
Chirang	114,035	107,744	107,749	192	192
Darrang	198,035	180,060	180,064	249	249
Dhemaji	172,032	163,487	163,869	210	210
Dhubri	323,791	292,555	292,563	415	415
Dibrugarh	270,675	246,829	246,856	728	728
Dima Hasao	33,593	29,157	29,157	183	183
Goalpara	206,723	188,544	188,546	1,013	1,013
Golaghat	241,855	222,215	222,219	459	459
Hailakandi	142,903	127,150	127,160	502	502
Hojai	146,995	136,472	136,601	313	313
Jorhat	210,210	198,832	198,836	203	203

Kamrup	360,560	325,360	325,364	993	993
Kamrup Metro	176,893	142,680	142,684	3,750	3,750
Karbi Anglong	119,988	109,658	109,660	841	841
Karimganj	248,271	217,480	217,501	906	906
Kokrajhar	214,321	199,841	199,844	551	551
Lakhimpur	241,591	225,781	225,797	399	399
Majuli	44,370	42,196	42,196	46	46
Marigaon	229,585	203,619	203,621	814	814
Nagaon	350,068	320,767	320,802	1,478	1,478
Nalbari	178,812	163,058	163,059	176	176
Sibsagar	160,069	150,410	150,413	104	104
Sonitpur	243,580	217,801	217,822	1,490	1,490
South Salmara Mancachar	86,593	76,618	76,618	147	147
Tamulpur	No Data	No Data	No Data	No Data	No Data
Tinsukia	278,047	256,454	256,472	734	734
Udalguri	202,568	186,349	186,354	830	830
West Karbi Anglong	48,965	42,951	42,955	291	291
Total	**6,621,063**	**6,018,155**	**6,018,929**	**22,724**	**22,724**

Source: https://epos.assam.gov.in/Portability_Interface.jsp[8]

The implementation of ONORC began in August 2019. Under the 'ONORC' initiative, Ration card portability was introduced to enhance flexibility and convenience for beneficiaries, particularly migrant workers, who frequently move due to various reasons such as employment opportunities or personal factors. This allows eligible households to access food grains from any FPS across the country

through biometric identification. Assam joined the project in June 2022, indicating a delayed implementation of India's ambitious digital program in the state (Northeast Today, 2022). However, the State is actively working on improving the system and addressing challenges such as card seeding and inter-district transfers. Table 5 shows the application of ONORC in Assam which indicates (in and out) card transactions and transfers in June and July 2024 in the state. ONORC is meant to facilitate greater accessibility and convenience for beneficiaries, particularly those who move across districts or states.

Although Assam has a high incidence of out-migration, data on the usage of ONORC was limited. As per the Government report 2023, the implementation of ONORC has been carried out in the state; however, its utilisation in FPS by beneficiaries is limited, mainly due to the lack of awareness among the beneficiaries. Hence, ONORC has not been utilized well in the State.

Table 5: ONORC Status for June & July 2024

Month	Direction	Cards	Transfers
June 2024	In	13	13
	Out	0	0
July 2024	In	30	31
	Out	526	553

Source: https://epos.assam.gov.in/impds_interface.jsp[9]

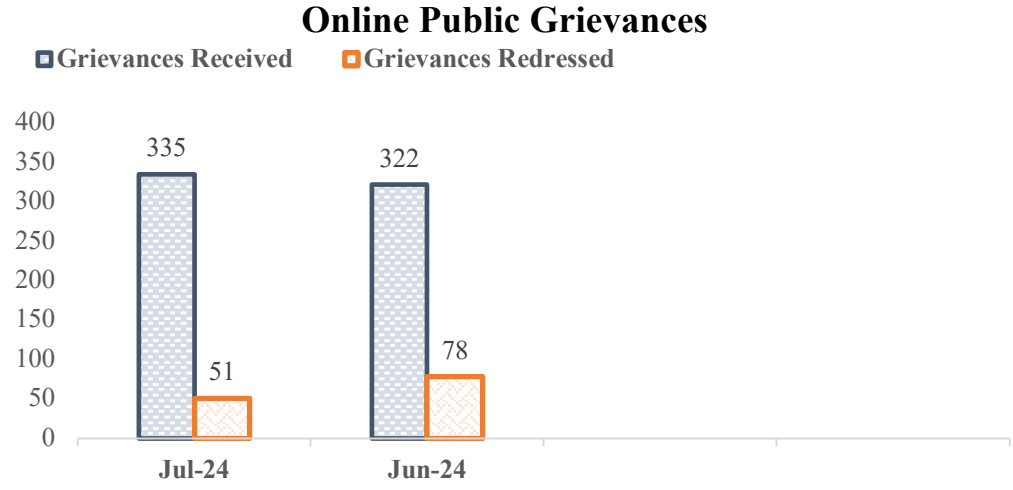
D) Fair Price Shop (FPS) Automation: FPS automation modernizes and optimizes the processes involved in food grain distribution by transitioning from manual record-keeping to digital systems. This shift reduces paperwork, errors, and administrative workload. It enhances the management of beneficiary data, entitlements, and stock levels, leading to more efficient FPS operations. FPSs in Assam have implemented electrical weighing machines, all of which are operational. This ensures accuracy in measuring food grain quantities, enhancing transparency and fairness in distribution. The ePOS system verifies beneficiary data through biometric or Aadhar authentication, ensuring that only legitimate cardholders or beneficiaries can access PDS benefits. Prior to this reform, the lack of such a mechanism enabled corrupt officials and employees within the Food and Civil Supplies Department to form networks with FPS owners, facilitating the diversion of PDS foodgrains to ineligible individuals. This corruption also led to the pilferage of PDS benefits, with wholesale dealers selling subsidized rice, wheat, or pulses at market prices, thereby depriving eligible cardholders of their entitlements (Sentinel Assam, 2024).

Concurrent evaluation of NFSA report 2023 highlighted that the Government of Assam has introduced e-POS facilities in FPSs, marking a significant step towards modernizing transaction processes (GOI, 2023). However, beneficiaries continue to make cash payments at FPSs because they do not have an Aadhar Card, which disqualifies them from obtaining a smart ration card for e-POS transactions. Beneficiaries who have Aadhar the implementation of biometric authentication has

been largely successful, with over 90% of attempts resulting in successful authentication in e-POS transactions. To buy the food grains beneficiaries typically take less than a minute to complete the authentication process when a data connection is available for the transaction through the e-POS machine. However, in some cases, FPSs have identified authentication failures primarily due to issues such as poor fingerprint quality, slow internet, and battery problems in e-POS machines. Also, CCTV installation has not been implemented across FPSs according to the act guidelines (GOI, 2023).

E) Grievance Redressal (GR): The Assam government has established grievance redress mechanisms to facilitate easier access for PDS beneficiaries, including toll-free helplines for lodging and tracking complaints regarding PDS operations. The PDS Public Grievance Redressal Cell-Call Center is a physical facility that operates from 9 AM to 6 PM. Anyone can call the PDS Public Grievance Redressal Cell-Call Center at 1967 (BSNL) or 1800-345-3611 (toll-free number) to submit their complaints. In Assam, although a grievance redressal mechanism exists, many beneficiaries are unaware of it. While a user-friendly online portal (www.assam.grams.nic.in) for grievance redressal was found, very few complaints were registered through it. Despite the state government maintaining a web portal for grievance redressal, digital complaints are minimal, with most people preferring offline channels to lodge their grievances (GOI, 2023). Figure 1 shows the limited number of grievances received and disposed of in June and July 2024 via online mode out of a total of 2,33,10,133 NFSA beneficiaries.

Figure 1: Online Public Grievances Record



Source: https://assam.grams.nic.in/Entrygrv.aspx[10]

F) Direct Benefit Transfer (DBT): The DBT system is a significant digital initiative by the government aimed at reforming the PDS under the NFSA. Unlike traditional methods where beneficiaries receive subsidized food grains, DBT provides cash transfers directly to their bank accounts. This approach encourages a diverse and nutritious consumption pattern, curbs leakages in

the system, and fosters financial inclusion. Beneficiaries have the flexibility to purchase food grains of their choice from the open market (Department of Food & Public Distribution, 2024). While the DBT program has been initiated in Union Territories (UTs)-Chandigarh, Dadra, and Nagar Haveli (urban areas), and Puducherry, it has not been implemented in the Northeastern region as well as in the other states of India (NFSA, 2024). The DBT experiment aims to minimize physical movement, empower beneficiaries in selecting their consumption preferences, enhance nutritional diversity, reduce leakages, improve targeting, and promote financial inclusion.

G) Mobile Application: To reach the intended beneficiaries "Mera Ration App" a mobile application has been developed by the Indian government to streamline the process of accessing ration-related services. It was launched by the Ministry of Consumer Affairs, Food, and Public Distribution. The "Mera Ration App" supports multiple Indian languages but the Assamese language has not been introduced yet. To make it more user-friendly the local language interface is much more relevant it will help the beneficiaries a lot to know about their entitlements.

In Assam, the use of technology for NFSA implementation is growing. But the problem lies in the rural parts, where internet connectivity is not so common. In Assam, an online system has been implemented for applying for ration cards, yet slow internet connectivity in rural areas poses challenges to its widespread use. The SMS alert provision in the NFSA is designed to notify beneficiaries about the availability and distribution of their entitled food but is also not implemented in the state (GOI, 2023).

Moreover, FPS automation measures have advanced with the introduction of e-POS capabilities, but cash payments continue to prevail, and CCTV installation has yet to be completed, indicating gaps in technological integration and compliance. The low use of online grievance redressal portals emphasizes the significance of boosting awareness and improving digital literacy among beneficiaries. Another important provision of NFSA the DBT programme, should be incorporated as per NFSA guidelines to help the beneficiaries with cash assistance instead of food grains. Therefore, ongoing efforts must focus on addressing technological gaps and ensuring seamless integration of digital innovations to optimize the effectiveness of NFSA implementation in Assam.

6.2 The Major Challenges in Technology Adoption in Assam

In Assam, the adoption of technology under the NFSA, 2013 faces several key challenges. According to the World Bank, Assam faces infrastructural deficiencies that hinder technological advancements and access to digital services (World Bank, 2018). Rural areas in Assam suffer from poor such as telecommunications and electricity infrastructure. Private companies tend to invest in profitable urban locations, leaving rural regions neglected. Additionally, low digital literacy and awareness in these rural areas prevent people from adopting modern technologies (Rahman & Zaman,

2018). Therefore, getting NFSA benefits many beneficiaries remain unaware of the technological solutions due to a lack of understanding and empowerment regarding modern technologies.

Financial constraints also limit the ability of FPS in Assam to invest in technology such as the purchase of e-POS machines for digital payment. Funds are required to acquire, install, and train personnel to operate such equipment, posing a challenge to the effective distribution of food grains to beneficiaries. Slow internet services in the hilly areas of Assam result hampers the implementation of end-to-end computerization of TDPS and GPS monitoring of good grain movements across the state, preventing real-time data monitoring and leading to misuse of food grains and leakages. These problems demonstrate the complex backdrop for technology adoption under the NFSA in Assam.

6.3 Recommendations

The augmentation of technology in the implementation of the NFSA of 2013 is a critical aspect of modernizing the welfare delivery system. Innovative technological solutions can overcome implementation challenges and contribute to ensuring food security for vulnerable populations. Introducing new initiatives such as data analysis, assessing FPS viability, and establishing dashboards for FPS data and reports, alongside social audits, and oversight mechanisms under NFSA, can greatly enhance the efficiency of the PDS.

The major recommendations of the study are:

1. ***Convergence of various Agencies to Leverage Technology:*** Collaboration between the Department of Food and Public Distribution and the Department of Telecom (DoT) is necessary in Assam to address low internet connectivity issues. Installing optical cables and implementing 5G services can accelerate digitalization efforts under NFSA.
2. ***Steps to increase FPS Income:*** Encouraging FPS owners in Assam to operate grocery shops alongside FPS can enhance their viability. This enables FPSs to cover expenses such as internet and electricity bills, facilitate online distribution processes, and use electronic machines for food grain distribution.
3. ***Alternative means for Service Delivery:*** In areas of Assam with poor data access, alternative arrangements such as Data Cards/Mobile hotspots should be implemented to ensure internet connectivity and facilitate Aadhaar-based biometric transactions at FPSs.
4. ***Regular Camps for Awareness Generation:*** Awareness campaigns are crucial in Assam to promote the portability facility and familiarize beneficiaries with technology usage. Launching SMS services in local languages to inform beneficiaries about food grain availability and release dates can enhance awareness, aligning with NFSA, 2013 norms.
5. ***Monitoring of the Scheme:*** Regular monitoring is essential in Assam to assess the impact of NFSA and identify challenges in technology adoption. Monitoring provides valuable insights into the effectiveness of NFSA in addressing food security issues in the state[11].

6. ***Create Mobile Applications:*** Developing mobile applications in the local language of Assam will allow NFSA beneficiaries to access information about their entitlements, check ration card status, and file grievances conveniently. It can facilitate direct communication between recipients and authorities, enhancing transparency and accountability in the distribution system.

7. Conclusion

Assam, like the rest of the Northeast region, is characterized by vulnerability, marginalization, inaccessibility, cultural diversity, ethnicity, and rich biodiversity. The NFSA, 2013, has achieved tremendous progress in enhancing technology in the region. ICT introduced under the act plays a pivotal role in resolving inclusion and exclusion errors, detecting multiple or ghost cards, maintaining a comprehensive database of entitlements and beneficiaries, and ensuring the distribution of food grains through biometric identification. To make NFSA successful issues of the digital divide need to be addressed. To bridge the digital gap effectively, three crucial elements must be emphasized: entrepreneurship, government policies that promote equity, and ground-level programs with active local community involvement. Partnerships between local bodies such as Panchayats, Autonomous District Councils (ADCs), Non-Governmental Organizations (NGOs), and cooperative societies are essential for the successful implementation of NFSA, 2013 and crucial for monitoring the policy's ground-level execution.

References

Arora, S., Tawheed, N., and Awasthi, V. "Challenges of Digital Transformation and Indian Public Distribution System: A Systemic Review, Pitfalls of Digital Transformation in the Indian Public Distribution System." *Journal of Hunan University* 48, no. 6 (2021).

Ashraf, T. "Information Technology and Public Policy: A Socio-Human Profile of Indian Digital Revolution." *The International Information & Library Review* 36, no. 4 (2004): 309-318. https://doi.org/10.1080/10572317.2004.10762650.

Barman, S., Hazarika, R., and Choudhury, B. "Food Security and Public Distribution System in Assam: An Analysis of the Coverage and Leakage Issues." *International Journal of Scientific Research and Management* 6, no. 10 (2018): 667-674.

Baruah, M., and Mahanta, R. "Food Security and Its Determinants in Assam, India." *Journal of International Academic Research for Multidisciplinary* 7, no. 3 (2019): 1-14.

Bezbaruah, M. P., and Baruah, S. "Food Security Status and Its Determinants among the Households in Assam." *Journal of Agrometeorology* 22, no. 1 (2020): 105-110.

Bhattacharya, S., Falcao, V. L., and Puri, R. "The Public Distribution System in India: Policy Evolution and Program Delivery Trends." *The World Bank*, USA, 2017.

Biswal, A. K., and Jenamani, M. "Leveraging ICT for Food Security: An Analysis in the Context of PDS in India." In *Annual Convention of the Computer Society of India*, 376-390, January 2018.

Chatterjee, M. "An Improved PDS in a 'Reviving' State: Food Security in Koraput, Odisha." *Economic & Political Weekly* 49, no. 45 (2014): 49–52.

Chhabra, V., Rajan, P., and Chopra, S. "User Acceptance of New Technology in Mandatory Adoption Scenario for Food Distribution in India." *International Journal on Food System Dynamics* 11, no. 2 (2020): 153-170.

Chigona, W., and Licker, P. "Using Diffusion of Innovations Framework to Explain Communal Computing Facilities Adoption among the Urban Poor." *Information Technologies & International Development* 4, no. 3 (2008): 57–73.

Das, G. K. "Performance Evaluation of Targeted Public Distribution System in Rural Assam." *Assam Economic Review* (2017): 10.

Deaton, A., and Dreze, J. "Food and Nutrition in India: Facts and Interpretations." *Economic and Political Weekly* 44, no. 7 (2009): 42-65.

Department of Consumer Affairs, Food, and Public Distribution. "Government of India: Status, State Ranking Index for NFSA Creating Resilient Food Systems to Optimize the Delivery of Benefits." 2022.

Department of Food & Public Distribution. "Implementation of NFSA". *Ministry of Consumer Affairs, Food & Public Distribution."* https://dfpd.gov.in/Home/ContentManagement?Url=implementation_of_nfsa.html&ManuId=3&language=1. 2024.

Dutta, T., and Barman, P. "Public Distribution System and Food Security in Assam: A Review." *International Journal of Current Research* 10, no. 6 (2018): 69718-69722.

Government of India (GOI). "Concurrent Evaluation of Implementation of the National Food Security Act, 2013 in the State of Assam." *Ministry of Consumer Affairs, Food & Public Distribution Department of Food & Public Distribution*, 2021.

Government of India. "Concurrent Evaluation of Implementation of NFSA-2013 in Bongaigaon and Barpeta Districts of Assam." *Ministry of Consumer Affairs, Food & Public Distribution Department of Food & Public Distribution*, 2023. https://nfsa.gov.in/portal/Concurrent_Evaluation

Gulati, A., and Saini, S. "Leakages from Public Distribution System (PDS) and the Way Forward." *Indian Council for Research on International Economic Relations (ICRIER)*, Working Paper, No. 294, New Delhi, 2015.

Food, Public Distribution, and Consumer Affairs. "End-to-end computerization". Government of Assam. 2024 https://fcsca.assam.gov.in/portlets/end-to-end-computerization

Kannan, K. P., and Raveendran, G. "PDS Reform in Kerala: Towards an Inclusive Food Security System." *Economic and Political Weekly* 50, no. 36 (2015): 62-70.

Karhad, B. D. "Food Security in India: Issues and Measures." *Indian Journal for Applied Research* 4, no. 4 (2014).

Khera, R. "Revival of the Public Distribution System: Evidence and Explanations." *Economic and Political Weekly* 46, no. 51 (2011): 13-15.

Kumar, S., Garg, A., and Singh, R. "Digital Governance and Its Impact on Public Distribution System: A Case Study of Tamil Nadu, India." *International Journal of Information Management* 53 (2020): 102097.

Mishra, M.K. "Odisha Successfully Deployed Tech-led 'Crop Analytics' at Ground Level." Retrieved from *Economic Times Government*, 2022.

https://government.economictimes.indiatimes.com/news/technology/odisha-successfully-deployed-tech-led-crop-analytics-for-ground-level-agri-reforms-it-secretary-mk-mishra/92956042.

Mishra, R. K., Nori, U., and Krishna, P. S. J. "National Food Security Act (NFSA) 2013: Viability of Public Distribution System in Telangana State, India." *Journal of Economic Policy & Research* 17, no. 1 (2022): 35-49.

Moon, M. J. "Korean e-Government in a Social Media Environment, Prospect, and Challenges." In *The Routledge Handbook of Global Public Policy and Administration*, Routledge, 2017.

National Food Security Act (NFSA) Portal. "Ration Card State Portals." Retrieved from https://nfsa.gov.in/portal/ration_card_state_portals_aa, 2023.

National Food Security Act (NFSA). "DBT Dashboard. National Food Security Act." Retrieved from https://nfsa.gov.in/public/nfsadashboard/PublicDBTDashboard.aspx, 2024.

North East Today. "Assam Becomes 36th State to Successfully Implement 'One Nation One Ration Card' Scheme." June 21, 2022.

Press Information Bureau (PIB). "Over 77 Crore Portable Transactions Were Recorded in the One Nation One Ration Card Scheme (ONORC)". *Ministry of Consumer Affairs, Food, and Public Distribution*, 2021. Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1847386.

Press Information Bureau. End-to-end computerization of TPDS. *Ministry of Consumer Affairs, Food & Public Distribution, Government of India.* 2017, March 28. https://pib.gov.in/newsite/PrintRelease.aspx?relid=160051

Puri, R. "India's National Food Security Act (NFSA): Early Experiences." *LANSA Working Paper Series - GOV.UK*, No. 4, 2017. https://assets.publishing.service.gov.uk/media/5964831e40f0b60a44000154/NFSA-LWP.pdf.

Rahman, A., and N. Zaman. "A Study on the Digital Literacy of People in Rural Assam, India." *International Journal of Humanities and Social Science* 8, no. 11 (2018): 118-126.

Saikia, N., Barman, P., and Mahanta, C. "Impact of Climate Change on Food Security in Assam." *International Journal of Advanced Research* 4, no. 6 (2016): 2422-2433.

Singh, S. K., Jenamani, M., Dasgupta, D., and Das, S. "A Conceptual Model for the Indian Public Distribution System Using Consortium Blockchain with On-chain and Off-chain Trusted Data." *Information Technology for Development* (2020): 1-25.

Subramanian, R. "India and Information Technology: A Historical & Critical Perspective." *Journal of Global Information Technology Management* 9, no. 4 (2006): 28-46. https://doi.org/10.1080/1097198X.2006.10856431.

Sentinel Assam. (2024). Technology use in PDS reforms. The Sentinel Assam. Retrieved August 2, 2024, from https://www.sentinelassam.com/more-news/editorial/technology-use-in-pds-reforms

Tanksale, A., and Jha, J. "Implementing National Food Security Act in India: Issues and Challenges." *British Food Journal* 117, no. 4 (2015): 1315–1335.

Weerakkody, V. E., Haddadeh, R. Al, Sobhi, F., Shareef, M. A., and Dwivedi, Y. K. "Examining the Influence of Intermediaries in Facilitating e-Government Adoption: An Empirical Investigation." *International Journal of Information Management* 33 (2013): 716-725.

World Bank. Assam Inclusive and Livable Cities Development Project: Resettlement Policy Framework. 2018.

Notes

[1] Aadhaar seeding is the process of attaching an Aadhaar holder's unique 12-digit Aadhaar number to their personal identification documents or benefits cards, such as scholarships. Pension ID. MNREGA Job Card, NFSA Ration Card.

[2] Biometric authentication is a cybersecurity procedure that confirms a user's identification by utilizing unique biological characteristics such as fingerprints, voices, retinas, and facial features.

[3] FPS Automation refers to electronic transactions at the FPS level. This automation helps record and transmit transactions at the FPS.

[4] Under IMPDS eligible ration card beneficiaries covered by NFSA will be able to lift their entitled foodgrains from any FPS of their choice anywhere in the country by using their biometric or Aadhaar authentication on an electronic Point of Sale (ePoS) device.
[5] Through DBT, benefits, and subsidies will be transferred directly to citizens living below the poverty line.

[6] National Food Security Act, 2013 (https://nfsa.gov.in/portal/nfsa-act).
[7] National Food Security Act. 2013 (https://nfsa.gov.in/public/nfsadashboard/PublicRCDashboard.aspx)

[8] EPOS 2024. https://epos.assam.gov.in/Portability_Interface.jsp

[9] ONRC 2024. (https://epos.assam.gov.in/impds_interface.jsp)

[10] GRAMS 2024. (https://assam.grams.nic.in/Entrygrv.aspx)

[11] Though there are mechanisms for monitoring of the scheme and physical inspection of the ration shops by the district food inspector, its efficacy can be called to question. Vigilance committees are constituted at the village level as per NFSA rules, but they are mostly dysfunctional, according the primary survey conducted by the authors.