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Literature Survey on Automatic Ration Distribution System

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ABSTRACT:The Automatic Ration Distribution System (ARDS) is an innovative and technology-driven solution that aims to revolutionize the distribution of essential commodities, particularly food grains, within India's Public Distribution System (PDS). This literature survey paper provides a comprehensive and detailed overview of the existing research, studies, and scholarly works related to ARDS in India. By synthesizing and analysing a wide range of literature sources, including research papers, case studies, and policy documents, this paper aims to consolidate and elucidate the knowledge and understanding of ARDS, its key features, benefits, challenges, and policy implications. The findings of this literature survey contribute to the existing body of knowledge on ARDS, offering valuable insights for policymakers, researchers, and practitioners involved in the design, implementation, and evaluation of ARDS initiatives within the Indian context.

KEYWORDS:Automatic Ration Distribution, Application, Microcontroller, Public Distribution, Software

I. INTRODUCTION

India's Public Distribution System (PDS) is a vital social welfare program that seeks to address the food security needs of millions of economically disadvantaged households. However, the traditional manual processes and operational inefficiencies inherent in the PDS have impeded its effectiveness, resulting in leakages, corruption, and inadequate welfare outcomes. In recent years, there has been a growing recognition of the potential of technology-driven interventions to address these challenges and optimize the delivery of essential commodities to the intended beneficiaries. The Automatic Ration Distribution System (ARDS) represents a transformative approach that harnesses advanced technologies, including biometric identification, mobile applications, and real-time data analytics, to automate and streamline the entire supply chain of essential commodities within the PDS. By digitizing and automating the distribution process, ARDS aims to reduce leakages, enhance transparency, improve operational efficiency, and ensure targeted delivery to the rightful beneficiaries.

This literature survey paper conducts a comprehensive analysis of the existing body of research and scholarly works related to ARDS in India. Through an exhaustive review of literature sources, the paper aims to provide an in-depth understanding of ARDS, its implementation, and its impact on the PDS. The paper explores and examines the key features and components of ARDS, such as the use of biometric identification systems for beneficiary authentication, mobile applications for registration and tracking, and data analytics for optimizing distribution processes. Furthermore, this paper critically evaluates the benefits and advantages of ARDS, including its potential to curb corruption, enhance accountability, improve targeting accuracy, and streamline the overall distribution system.

It also delves into the challenges and obstacles faced during the implementation of ARDS, including the need for robust technological infrastructure, data security concerns, the digital divide among beneficiaries, and the importance of capacity building for stakeholders involved. By consolidating and analysing the existing literature, this research paper significantly contributes to the current knowledge base on ARDS in India's welfare ecosystem. The findings of this literature survey offer valuable insights for policymakers, researchers, and practitioners engaged in the design, implementation, and evaluation of ARDS initiatives. This literature survey serves as a foundation for future research

endeavours, informing evidence-based decision-making and facilitating the widespread adoption of ARDS to enhance the efficiency and effectiveness of the PDS, ultimately leading to improved welfare outcomes for the vulnerable populations in India.

II. LITERATURE REVIEW

Vaisakh A.K, et al. [1] Proposed a system called IPRDS, this allows customers to access the ration distribution system and displayed the quantity of commodities available and remaining quota and update it. The consumer allocation and wireless data can be controlled and modified by the central agency as well.

Chaitali Chandankhede, et al. [2] Created an automated PDS system for customers with a QR code. The customer's account shows the transaction details, including the total amount and the remaining stock in their account. Different modules are used at different levels like administration, and food grain distribution office.

Naveen B, et al. [3] Proposed a system using ARM muC. The proposed system utilizes an ARM microcontroller (muC) as the central processing unit. The ARM muC is a powerful and efficient microcontroller that can handle the required tasks for the distribution system. To ensure fairness and prevent malpractices in the distribution system, the quantity of grains is pre-calculated using a weighing machine. This means that the weighing machine measures the precise weight of the grains to be distributed, eliminating any chances of manipulation or inaccuracies. The distribution of grains is facilitated using embedded technology.

Rohan Pinto, et al. [4] The proposed system is created using GSM technology, which enables communication between the embedded circuit and the central server, facilitating real-time data exchange and control. Use of embedded circuit is considered as the embedded circuit is a key component of the developed system. It controls and manages various functionalities, such as data communication, data storage, and interaction with other hardware components. Instead of traditional ration cards, the developed system incorporates the use of Aadhaar cards. The system includes a website that provides access to customer data. This allows for efficient and convenient data management and retrieval.

Adithya B Anil, et al. [5] Survey is carried out to understand the current situation of the SCM in the PDS by the authors. A SWOT analysis is conducted to identify the different internal strengths, weaknesses, external opportunities, and threats within the PDS (Public Distribution System). Digitization of ration cards is carried out in the system. Strict Monitoring of the Complete Supply chain is done through the application, which makes the application transparent and relevant.

Balasubramani A, et al. [6] In the system, RFID Cards are used as ration cards and the customer data is stored according to the RFID card id. Verification of the customer is performed through data base of the government system accessed through the controller. Notification is sent to the customer and government system through GSM for accurate records.

Yashraj Jadhav, et al. [7] Created a hardware software integrated system which will detect face using HOG. After entering credentials and match the face with those stored in database ration will be dispensed. To detect the face, 128 different measurements are taken in consideration is software part. After the detection respective ration is dispensed according to the user. The major drawback is that the other family members can't get the ration as the face will not match.

Muhammad Shameem P., et al. [8] Designed a Web Application using PERN Stack. The system includes three logins customer, admin and shop. Database keeps the data of everything regarding PDS systems for maintaining the record. The network connectivity can be issue while using the website. Less connection of network in small towns is also a drawback, which will limit the reach of the application among the people.

B. Gaikwad Priya, et al. [9] Proposed model using 3 SAMRT CARDS for three types of rations, also cards are used to identify user and data about the user. A reader module to read the cards and then data is sent to PC Converter. Used VB software which stands for virtual basic. Output from this software is provided to microcontroller ATmega328/P. Microsoft access database is used to store the data. To display quantity LCD is used. Software consists of login page



where card details will be checked, goods selection page and generated final receipt. Once dispensing is done user will have to log out of the system. In conclusion, it can avoid corruption in ration system by providing transparency.

Nidhi Upadhyay, et al. [10] The paper put forward two IoT architectural models for the public distribution system. In the first one, A wireless device is utilized to generate food tickets and further acknowledgement is done using mobile app and cloud server through Wi-Fi/LTE/ GPRS. The authorities of the Public Distribution System (PDS) have an interface through which they can access and view all the ongoing processes. In the second architecture, system bypasses the mobile application. The wireless device is constructed using either ESP32 or HC-05 wireless modules along with a microcontroller. By utilizing this system, the authorities can gather information about the food demand, enabling them to optimize the food distribution system.

III. COMPARATIVE ANALYSIS

A comprehensive evaluation of 15 papers was undertaken as part of this study, with a specific focus on conducting a comparative analysis of 10 selected papers. The aim of this analysis was to examine the similarities and differences among these 10 papers in order to identify noteworthy trends and patterns in the field under investigation.

PAPER No.	Microcontroller	TECHNOLOGY USED	APP / WEB	SOLID GOOD	LIQUID GOOD
1	ARDUINO UNO	FINGERPRINT	NO	YES	NO
2	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
3	ARM 7 LPC2148	RFID	NO	YES	YES
4	ARDUINO	ID AND PASS USING KEYPAD	YES (WEB)	YES	NO
5	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
6	ATmega16	GSM TEXT	NO	YES	YES
7	RASPBERRY PI	FACE RECOGNITION CAMERA	NO	YES	NO
8	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
9	ARDUINO UNO	RFID	YES (APP)	YES	YES
10	ESP 32	NOT APPLICABLE	YES (APP)	YES	NO

Table 1: Comparative Study of Papers



IV. RESULTS AND DISCUSSION

When making decisions or taking actions, it is imperative to meticulously assess both the advantages and disadvantages associated with each option. By considering these aspects, individuals can make well-informed and responsible choices. Here, we outline the key advantages and disadvantages to be taken into account:

Advantages	Disadvantages
1. Reduced manual errors	1. Technological dependence
2. Efficient distribution	2. Accessibility issues
3. Increased transparency	3. Privacy and data security concerns
4. Cost-effective	4. Exclusion of vulnerable populations
5. Improved accountability	5. Lack of human interaction
6. Streamlined record-keeping	6. Potential for system malfunctions
7. Timely and accurate data analysis	7. Resistance to change and adoption
8. Real-time monitoring and reporting	8. Data management and integration challenges
9. Enhanced resource planning and management	9. Impersonal user experience
10. Facilitates targeted interventions	10. Limited flexibility for exceptional cases

Table 2: Advantages and Disadvantages

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