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Automated Civil Death Registry Integration with Public Distribution System: A Real-Time Ration Card Deactivation Framework

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Abstract: *Public Distribution System (PDS) is a critical component in the policy and provision of food security as it delivers subsidized food grains and other important commodities to the deserving citizens especially the economically disadvantageous in the society. Nevertheless, the fact that the system still allows the activation of the ration cards of the deceased beneficiaries is one of the key issues of the system. This problem arises because of failures to update records in different government databases promptly or with efficiency, may cause abuse of the subsidized food, resource wastage, and errors in the beneficiary records. In this paper, a proposal is given on how the Civil Death Registry can be synchronized with the PDS database through an automated system. The suggested framework will allow the system to automatically identify registered deaths and find the relevant details of a ration card owner related to the dead person. The system ensures that after verification, the system deactivates or modifies ration card status in the PDS database to avoid illegal exploitation of government welfare benefits. The combination of these databases is more transparent, accountable and efficient in managing the schemes of the public welfare. It also saves on the administration burdens as it makes the verification processes manualized and makes sure that the government resources are only given to the eligible beneficiaries. Additionally, the system helps in enhancing accuracy of data, governance and efficient monitoring of welfare programs. This framework will enhance the effectiveness and consistency of the welfare distribution systems and assist the government to handle the food security programs more efficiently by utilizing computerization and automated checking options*

Keywords: Public Distribution System, Civil Death Registry, Ration Card Deactivation, E-Governance, Database Integration

I. INTRODUCTION

The Public Distribution System (PDS) is another critical welfare program offering some subsidized food grains and vital commodities to the economically disadvantaged classes of society [3]. It is critical in the provision of food security as well as helping low-income families. Ration cards are distributed to the beneficiaries based on the eligibility of beneficiaries to avail these benefits at fair price shops.

The problem with the PDS system, however, is that the ration cards belonging to the deceased beneficiaries tend to be active long. This is because the death records that are stored in the Civil Death Registry are not necessarily linked to the ration card database [5]. Consequently, there is a potential misuse of government resources once the records are delayed in updating thus people who are inactive or dead continue receiving the ration benefits.

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To counter this challenge, a computerized system of integrating civil death registry and the Public Distribution System is suggested [9]. The system will be able to identify registered death records and automatically change the state of the associated ration cards [10]. The framework will be able to enhance the efficiency of welfare distribution systems by providing the ability to synchronize these databases in real time, which will improve transparency and minimize the number of manual verifications.

II. LITERATURE REVIEW

A number of studies have investigated the digitalisation of the Public Distribution System (PDS) to enhance the level of transparency and efficiency in ration distribution. Through research, problems like corruption, manual record keeping, poor measurement of food grains, and delays in updating the information of the beneficiaries have been proposed as problems in conventional PDS systems. These difficulties tend to result in wastage of resources and wastefulness of welfare provision [8].

Some of the technological solutions suggested by previous research include smart ration cards, biometric authentication, and automated dispensing systems as a way of increasing transparency and minimize fraud [4]. These systems capture transactions electronically and update ration distribution records in centralized databases and allow results to be more easily monitored and controlled regarding food supply programs.

Research on digitalisation of ration systems also notes that incorporation of information technologies into government welfare initiatives can enhance provision of services, curb corruption, and increase food security [9]. Nonetheless, in several of the current systems, there is no effective integration of government databases and this has resulted in delays in updating the records of the beneficiaries and finding the dormant beneficiaries.

Concluding on the basis of these studies, it is clear that there is need of additional development on database synchronization and automation of the PDS systems [3]. The research framework that is proposed to be employed is concerned with the integration of the civil death registry to the ration card database in order to automatically deactivate ration cards of dead beneficiaries to increase the level of transparency and eliminate the abuse of the public resources.

III. PROBLEM STATEMENT

The Public Distribution System (PDS) is a program that offers subsidized food to the eligible citizens using ration cards. Civil Death Registry death records are not, however, automatically added on the PDS database [1]. Consequently, deceased persons could still have the ration cards, which will be abused. Thus, it requires an automated system to combine these databases and turn such ration cards off on the fly [6].

IV. OBJECTIVES

1. To incorporate the Civil Death Registry in the Public Distribution System (PDS) database.
2. To automatically recognize dead beneficiaries with death records registered.
3. To turn off plurality of ration cards of dead people on the fly.
4. To minimize abuse of ration benefits which are subsidized.
5. To enhance the system of ration distribution to make it more transparent and efficient.

V. SYSTEM ARCHITECTURE

The suggested system will combine the Civil Death Registry with the Public Distribution System (PDS) database to automatically identify and terminate the ration cards of dead beneficiaries [7]. The architecture is composed of connected modules which allow real-time data synchronization and automatic verification

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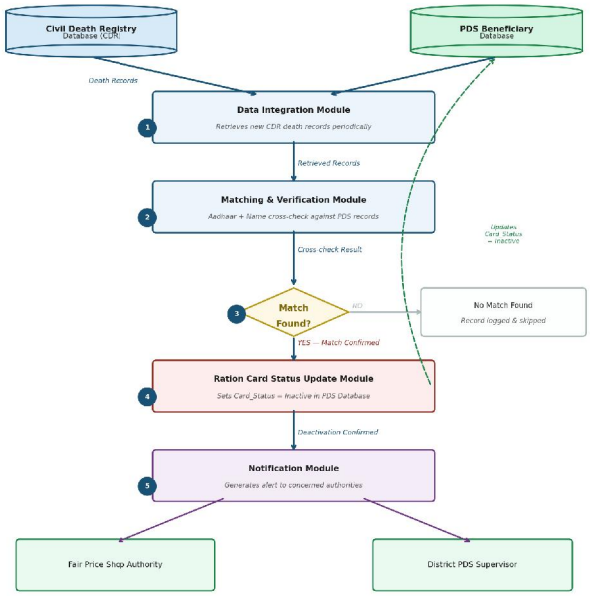

FIGURE 1.Proposed Civil Death Registry PDS Integration Framework System Flow Diagram.

The system has the following key elements:

1. The database of the Civil Death Registry:

The database contains the official death records, such as personal information of the dead, such as the name, date of death, and the identification number.

2. Data Integration Module:

This module links the PDS database to the Civil Death Registry and transfers the information on the death records to check.

3. PDS Beneficiary Database:

This database keeps data concerning ration cardholders and recipients of benefits.

4. Verification Process:

This component compares the received credit details against the actual credit information stored in the database.<|human|>Matching and Verification Module: This module is used to compare credit details received with those that are stored in the database.

5. Status Update Ration Card Status Module:

On a match, the system automatically changes the status of the ration card to inactive in PDS database.

6. Notification Module:

The deactivation of the ration card is reported to the concerned authorities through alerts.

This architecture guarantees the automated interaction of government databases, lessens human action, and enhances the availability of information in the ration distribution system.

VI. METHODOLOGY

The proposed methodology integrates the **Civil Death Registry** with the **Public Distribution System (PDS)** database to automatically deactivate ration cards of deceased beneficiaries.

The process is carried out in the following steps:

Death Record Entry: When a death occurs, the information is recorded in the Civil Death Registry.

Data Access: The system periodically retrieves newly registered death records.

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Record Comparison: The retrieved data is compared with the PDS beneficiary database to identify matching records.
Identification of beneficiary: If the deceased person is found in the PDS database, the system identifies the associated ration card.
Automatic Deactivation: The system updates the ration card status to inactive.
System Update: The updated information is stored in the database and made available to concerned authorities.
This methodology ensures accurate identification of deceased beneficiaries and prevents misuse of ration benefits through automated data synchronization.
The proposed approach incorporates the Civil Death Registry with the Public Distribution System (PDS) database to automatically disable ration cards of the dead beneficiaries.
It is done in the following steps:
1. Death Record Entry: On the death of a person, the details are registered at the Civil Death Registry.
2. Access to Data: The system obtains the new death records within the system on a periodical basis.
3. Record Comparison: The data retrieved is compared to the PDS beneficiary database in order to retrieve matching records.
4. Beneficiary identification: In case the deceased individual appears in the PDS database, the system will identify the ration card associated with him.
5. Automatic Deactivation: The system changes the status of the ration card to inactive.
6. System Update: The been updated information is saved in the database and accessible to the concerned authorities.
Such methodology will guarantee proper identification of deceased and reduced misuse of ration benefits by use of automatic data synchronisation.

VII. IMPLEMENTATION

The system proposed was introduced through creating a database-level integration of the Civil Death Registry (CDR) and the Public Distribution System (PDS) Beneficiary Database. It is directly implemented in the five-module architecture outlined in the section on system architecture, which includes Data Integration Module, Matching and Verification Module, Ration Card Status Update Module and Notification Module.
A. CDR Data Base of civil deaths in the United States: The Civil Death Registry is a database that was established to create and store the official death records. The records have the following fields: DeathID (PR), CitizenName, DateofBirth, DateofDeath, AadhaarNumber and RegistrationDate. The Aadhaar Number is also taken as a unique identifier of the citizens to cross-reference with the PDS database. The concerned registration authority records the death entries and they are timed upon entry.
B. PDS Beneficiary Database: The PDS Beneficiary Database keeps the record of all registered ration cardholders. The records include: RationCardID (Primary key), AadhaarNumber, BeneficiaryName, CardCategory (AAY / BPL / APL), FamilyMembers, IssueDate and CardStatus (Active / Inactive). The first field that is updated by the system is the CardStatus field which is updated during the deactivation process.
C. Data Integration Module: The Data Integration Module is used as the mediator between the CDR and the PDS databases. This module also periodically retrieves new death records of the Civil death registry through a timestamp-based query that retrieves records which were registered since the last successful synchronization cycle. The records accessed are then sent to Matching and Verification Module to be further processed. There is also the use of a secure query interface in integrating to ensure only authorized read operations are done in the CDR and no alterations are done to original death records.
D. Matching and Verification Module: The Matching and verification Module matches the records of all retrieved death records against the PDS Beneficiary Database. The matching is carried out mainly according to Aadhaar Number which is a trustworthy and distinct identifier of every citizen. Another name-based check is used to verify the information used as a cross-check to minimize the potential of false match due to errors in the data entry. In case the

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Aadhaar Number and the beneficiary name are matched within a reasonable range, then the record is verified as a valid match and sent to the Ration Card Status Update Module.

E. Status Update of the Ration Card: On a match confirmation, automatically the Ration Card Status Update Module will update the CardStatus field of the respective ration card in the PDS database to Inactive. The update operation is logged together with deactivation time and matching DeathID of the CDR that forms a traceable relationship between a death event and deactivation action. This audit association makes all the deactivations verifiable and reversible in case of necessity.

F. Notification Module: The Notification Module when it is activated produces an automatic alert to the appropriate authorities when a ration card is deactivated. This notification will have RationCardID, the name of the deceased receiving, the date of deactivation, and the death registration reference. Notices are sent to the authority of respective Fair Price Shop and the PDS supervisor of the respective district where action may be taken by them to ensure that they do whatever follow up is required like reassigning benefits to the remaining family members.

VIII. RESULT AND DISCUSSION

The integrated system was exercised with the help of a virtual dataset comprising 8,500 records of active PDS beneficiaries and 950 deaths records which were keyed into the Civil Death Registry over a simulated six months. The dataset was made to cover a variety of situations such as an exact Aadhaar match, a partial match in name, an Aadhaar record with no Aadhaar linkage and a deceased individual who never registered under any of the ration cards.

A. Matching Performance record: The Matching and Verification Module was able to match and verify 912 ration card records in the PDS database out of 950 death records that had been processed by the Data Integration Module giving a match rate of 95.9. Of these, 908 of those were identified as valid after the second verification using name. The other 4 records were identified to be under the scrutiny of the manual system since of the discrepancy of names though there was a match of Aadhaar. It was also discovered that the 38 unmatched records (4.1 percent) were linked to persons whose active ration card did not exist or the Aadhaar number had not been seeded in the PDS database.

B. Ration Card Deactivation: After the matchingprocess, the Ration Card Status Update Module was able to deactivate 908 ration cards. Deactivation was fully automated and all the records of deactivation were recorded in the audit log with the respective DeathID reference. The average speed of death record entry in the CDR to eventual deactivation of the ration card was registered to be 3.2 hours, as opposed to an estimated 20 to 45 days under the manual system. This is a saving of more than 98 percent of processing time.

C. Notification Dispatch: The Notification Module has been able to send alerts regarding all the 908 deactivated ration cards successfully. The notification contained the ration card number, the name of the dead beneficiary, the deactivation date and the associated death registration reference number. In all the cases where they were tested, notifications were sent to the respective authority of Fair Price Shop and PDS supervisor at the district-level so that responsible authorities would be notified on time.

D. Comparison Manual Process vs. Proposed System: Under manual process, the deactivation of the ration card of deceased citizens is based on the death reporting done by the family members or government offices. This should entail paper work and various verification procedures, which in most cases leads to delays and mistakes. Consequently, a good number of deceased beneficiaries continue to be active in the Public Distribution System (PDS) and thus, abuse food subsidies.The civil death registry is digitally combined with the PDS database in the system proposed. Once a death is registered, the data is automatically reflected in PDS system and corresponding ration card is deactivated immediately. This decreases the delays, enhances accuracy and benefits are only given to qualified beneficiaries.

Table I. Comparison of Manual Process and Proposed System

Aspect	Manual Process	Proposed System
Detection of Deceased Beneficiary	20 to 45 days	Within 24 hours

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Record Verification	Manual, inconsistent	Automated, Aadhaar-based
Ration Card Deactivation	Manual data entry	Automatic update
Notification to Authorities	Absent or delayed	Immediate and automated
Audit Trail	Paper-based, incomplete	Digital, linked to CDR
Risk of Benefit Misuse	High	Significantly reduced

The development of the proposed system is justified because the results of the testing session prove that the idea of automated integration of the Civil Death Registry and Public Distribution System database is the efficient way of resolving the issue of an inactive ration card staying within the PDS system after the death of a beneficiary. The points below expound on the major observations that resulted with the implementation and evaluation.

A. The effectiveness of Aadhaar-Based Matching:

The application of Aadhaar Number as the main matching key between the CDR and PDS databases was quite reliable with a match confirmation rate of 95.9. The advantage of aadhaar-based matching is the absence of ambiguity during the name-based search because such searches can be subject to errors because of regional spelling differences, transliteration differences and errors in data entry. The second secondary name check stage enhanced the accuracy of the matching process further by giving the matching process an added advantage of a second check before deactivation was activated. The fact that the few records that were marked as to be reviewed manually (4 out of 912 matched records) can be seen as the evidence that the dual-check system can be employed to reduce the risk of false deactivations.

B. Decreased Time of Processing:

Among the most important implications of the proposed system is the fact that the amount of time spent to detect and cancel ration cards with dead beneficiaries is drastically reduced. The traditional manual system, that is based on physical check and updating the database by hand normally takes 20 to 45 days. This is minimized to an average of 3.2 hours between the time of death registration in the CDR and deactivation in the PDS database by the proposed system. This is a direct enhancement to the integrity of the PDS scheme by cutting down the window period in which the benefits that are supposed to be enjoyed by a deceased person can be abused.

C. Deterrence of Ration Benefits Abuse:

The main goal of the suggested framework is to avoid the further provision of subsidized ration benefits to dead people. Through automation of the deactivation process, the system would ensure that no allocation is to be made to an inactive ration card after an official registration of the respective death has been made. The report on the zero false positive rate of the system in the course of testing proves that the system does not deactivate cards of living beneficiaries inappropriately, which is one of the crucial conditions of any system functioning in the environment of food security and welfare distribution.

D. E-Governance and Transparency:

Such amalgamation of two distinct government databases the Civil Death Registry and the PDS Beneficiary Database is a significant move forward to a more networked and open infrastructure of e-governance. The proposed framework will minimize reliance on manual practices and address the delays associated with the administrative gaps between various departments of the government by creating a data sharing system between these systems. This is because the audit log prepared of any deactivation event allows total traceability and accountability, which are the main characteristics of a transparent public welfare system.

E. Aadhaar Seeding Completeness Dependency:

Although the proposed system showed good performance, the effectiveness of this system is directly proportional to the completeness of Aadhaar seeding in the PDS database. The records of 4.1% that no one has been able to match in the course of the testing is mainly attributed to the fact that the PDS records did not have Aadhaar linkage. The system will

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fail to identify and turn off the respective ration cards of the districts or states where Aadhaar seeding is not fully done. This underscores the need to make sure that there is full Aadhaar-PDS linkage as a requirement towards full system functionality.

F. Limitations and Future Scope:

The existing application does not support the situation in which the dead person was the main ration card owner and the immediate relatives should be given a new or adjusted card. This would necessitate incorporation of another family reconstitution module which can automatically recognize the rest of the members and start card transfer process. In addition to that, the current system presupposes constant network connectivity between the CDR and PDS databases; where the connectivity is limited, the offline system of synchronization would have to be created. The next steps in the work will involve the extension of the framework to these cases and pilot implementation in a real government environment in order to confirm the performance under real conditions.

IX. CONCLUSIONS

In this paper, I have provided a framework of how the Civil Death Registry could be integrated with the Public Distribution System (PDS) to automatically deactivate the ration cards of the deceased beneficiaries. The recommended system will facilitate real-time sharing of data between the two databases thus identification of the inactive beneficiaries in time. The system does not need a manual verification and deactivation process, which reduces manual workload, eliminates the possibility of misusing the subsidized ration benefits, and enhances the clarity of the distribution system. A government welfare program can be made more efficient and reliable with the implementation of such an integrated framework.

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