



Kardan Journal of Engineering and Technology (KJET)

ISSN: 2706-7815 (Print and Online), Journal homepage: <https://kardan.edu.af/KJET>

Humanitarian Aid Management Information System for Afghanistan

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To cite this article: Haleem, M. and Khan, W. (2023). Humanitarian Aid Management Information System for Afghanistan, *Kardan Journal of Engineering and Technology*, 5 (1), 7-16.

DOI: 10.31841/KJET.2023.30

To link to this article: <http://dx.doi.org/10.31841/KJET.2023.30>



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Published online: 10 December 2023



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Kardan Journal of Engineering and Technology 5 (1) 7–16

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Kardan Publications

Kabul, Afghanistan

DOI: 10.31841/KJET.2023.30

<https://kardan.edu.af/journals/CurrentIssue.aspx?j=>

KJET

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Received: 27 July 23
Revised: 20 August 23
Accepted: 10 Nov 23
Published: 10 Dec 23

Abstract

The progression of database technology laid the foundation for the automation of manual data handling systems by transformation to MIS - Management Information System. Well-organized MIS is a data-driven tool and a key dimension for quality data. The humanitarian aid management information system is a useful asset for developed countries that helps reshape their citizens' lives in a post-disaster. In the context of Afghanistan, currently, the aid distribution records are handled with a manual and traditional file processing system that is vulnerable to various concerned issues of data duplication, security, consistency, integrity and concurrency. To respond to the transparency factor of the aid distribution process, it is necessary to track all the relevant information on the aid items such as quantity, accuracy, reliability and availability. Some other focal points are the prevention of redundancy and fraud in this process. These issues if not handled then it affects the overall aid distribution process in terms of management and transparency. This article aims to respond to the issues of current practices of the aid distribution process in Afghanistan. Aid distribution MIS as the output of this research spans to cover an umbrella of milestones. These include the supply chain, inventory, security, consistency, visualization, user management, concurrency, data encryption, and scalability. It is worth mentioning that this work is in response to the request of the office of the deputy prime minister of Afghanistan.

Keywords: Consistency, Concurrency, encryption, scalability, MIS, transparency, supply chain

Introduction

Disaster Management Information System works as a shared collection of inter-related data designed to meet in information needs of an organization [1]. After the destructions of World Wars, the need of humanitarian management information system realized extensively across the world [2]. Currently the importance of the humanitarian aid MIS is highlighted with top priority in disaster management. It is due to the fact that it has become an essential point in the agenda for post-disaster activities. The objective of these MIS systems is to light the encumbrance the suffered victims [3]. The major aid-accomplishments through and post disaster for saving lives are to identify and serve humanity by co-ordinations with welfare, health and medical bodies [4]. The most significant motorists that handles the humanitarian aid accomplishments consist various constructs. These various stakeholders consists of Government and non-Government organization and agencies [5]. Since Second World War the private sector and volunteers

also shown their interest in the said recovery [7]. It is a well-known fact that the Information management drives the management of the assistance process in rescue and support [8]. The disaster information if systematically organized and utilized; then it can avoid the obstacles in the process.

2. Related Work

Research has been carried out in the field of humanitarian aid management information system and addressed the issue in developed countries. The key contribution of such MISs is take control of two main problems. Firstly, high redundancy in the recorded data regarding the disaster. The issue cause mishandling the case. As a result this leads various Non-Government Organizations, welfare bodies and volunteers to reach out the same case simultaneously multiple time [9]. Thus the same case me receive the aid redundantly. This imbalance produce in-justice in aid-distribution process. Secondly; for gaining grant, fraud attempts from malevolent applicants by their own intentions [10]. Both of these issues, if un-handled, could badly affect the process and the victims in various aspects. Due to inaccurate and low quality dis-guised data the resource like food and grocery may face the wastage. Also this leads to a confusion in the distribution process that becomes dis-ordered with this issue [11]. Hence the Uneven distribution relief relevant items upset the needy area its fatalities. OCHA – the Office for the Coordination of Humanitarian, analyzing needs and response by a closer overview on Afghanistan [11]. They estimated 28.3 million needy people to be supported with a total grant of \$4.63 billion. The overview [12] shows that the funding of \$387.4 in total done so for. Based on literature review and to the best of our knowledge the issue has not been address so far in context of Afghanistan. But for properly integrated and optimized management of aid [13, 14] the humanitarian aid MIS is an essential and needful solution. This paper explore for to identify the gap in the current system and provide the solution in term of humanitarian aid MIS for Afghanistan.

3. Methodology

As this research initiated to address the active problem – the necessary MIS for the office of the Deputy prime minister of Afghanistan to control and coordinate the aid distribution transparently. Work on the requested system started by the authors under the kind instruction of Dr. Ahmad Khalid Hatam, the chancellor of Kardan University. His kind Excellency coordinated with the client's office for further requirements elicitation. Firstly requirement collection is done by over-viewing the manual and traditional file system. Formal and informal interviews were conducted. Brainstorming sessions have been arranged with question-answer methods. The literature of the related work has been reviewed. The requirement specification document created. A recommended ERD – Entity Relationship Diagram has been drawn. A comprehensive presentation delivered to the coordination office of the deputy prime minister. The needful feature and the expected outcome of this work has been shared. Their feedback and point of view have been considered in terms of modules, forms, reports, security and validations. For the development life cycle a prototype model is recommended.

The first prototype of the desired system was developed. This version reflected the recorded requirement and observations for the time. The data entry of the victims and their area information was coded in the first prototype. By sharing the first prototype with the client's office, new amendments have been suggested. Thus periodically the process of collecting further requirements and the implementation were in progress simultaneously.

Through the life cycle of this work, all the main constructs of the system are identified in a periodic manner. The main points identified by interviews and observations were user management, implementation of the supply chain management, and tracking inventory transparent distribution. Other technical aspects such as prevention of SQL- Injection, data validation, and system availability are also considered as the key milestones in the desired MIS. Subject to the requirement specification document a multi-user system was required with a central repository. The requirement of better scalability and availability it is decided to have a web-based database system. As internal work of this research first the ERD has been designed. The implementation of the system started with a closer look over the requirement specification document. On discovery of new requirement in the system, the refinement applied.

4. Tools used in development

To satisfy the functional and nonfunctional requirement of the system, the following tools used in the development of the system. The tools selected due to their below-mentioned specifications that are relevant in our system.

1. HTML5
HTML5 known as the markup language to structure and present the World Wide Web contents and is final version of the HTML. It is also known as the Live Standard of the HTML.
2. CSS3
CSS Stands for Cascading Style Sheets. CSS3 is its 3rd level. It is a layout-setting language with variety of options used to describe the contents and style of a document. CSS declares how publish the contents.
3. Bootstrap
Bootstrap works as a front-end framework. It provides the faster and simple development in the web domain. It consists of HTML and cascading style sheets. It is useful for web forms, control buttons, grid-views, navigation controls, pictures and many more to easily setup as well-designed responsive page.
4. Javascript
JavaScript shortly JS is a tool for programmer used as the core technology with the World Wide Web. It works as integration hub for all the web relevant third party libraries.
5. JQuery
The slogan of jQuery is “write less and do more”. This is a fast and small but rich in features in term of libraries. It is a better option for handling events. It made it simple to user and explore the API-Application package interfaces.
6. PHP
As a server scripting language with the abilities developing the interactive and vigorous web pages, PHP has been selected to use.
7. MySQL
For ease in use, scalability, reliability and faster navigation through stored data we are using MySQL as an open source DBMS in our system. The organization is looking for a backend engine to drive the data comfortably in both desktop and networked environment.

5. System Architecture

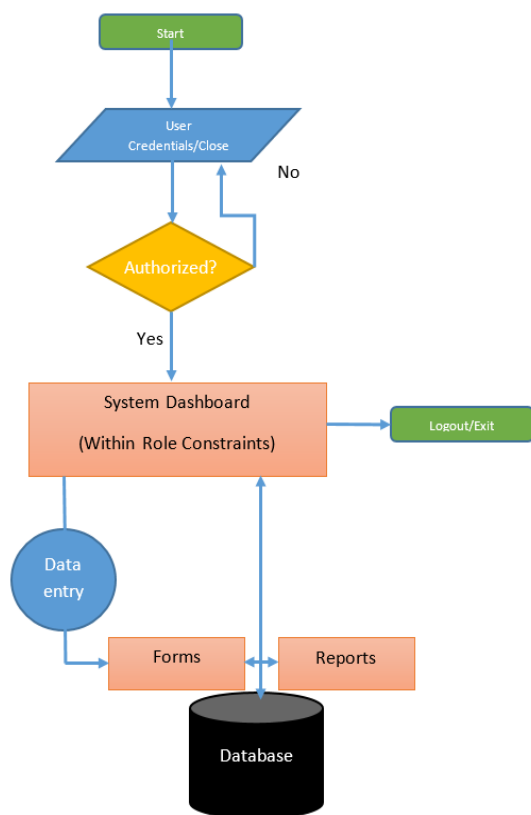


Figure 1

Description of the System Architecture:

Figure 1, shows the architecture of the system. It provides a total view of the system layout.

This web-based database-driven MIS starts using the URL. The user login screen obtains the user credentials. Subject to the existence of the user account the database connection gets opened. In case of an unknown username or password, the access denies by the system. The authorized user accesses the system within the constraints of the defined role in the database of the system. The user operates the system via a dashboard that reflects the user's privileges. The roles and privileges are granted according to the organizational structure. Users can go for data entry using system forms. The forms and report are accessible within access rights. Forms are reports used to access data from manipulation while reports return the information from the system in a printable form. In this system, well-comprehensive forms for aid distribution management are available such as user management, roles beneficiary registration, aid items and types, grant aid, stocks, and inventory. User-friendly well-formatted reports are designed for analytical information. Some key reports that satisfy the requirements are user lists, beneficiary reports, stock reports, inventory reports, donor reports, and supply chain reports.

6. System ERD

ERD- Entity relationship diagram figure-2, acts as a backbone for the repository of the database system. It provides the entities that store the subject-based information which meets the organization's requirements. These entities are interrelated for the desired results. Such as the beneficiary entity having an aid relationship with the aid item.

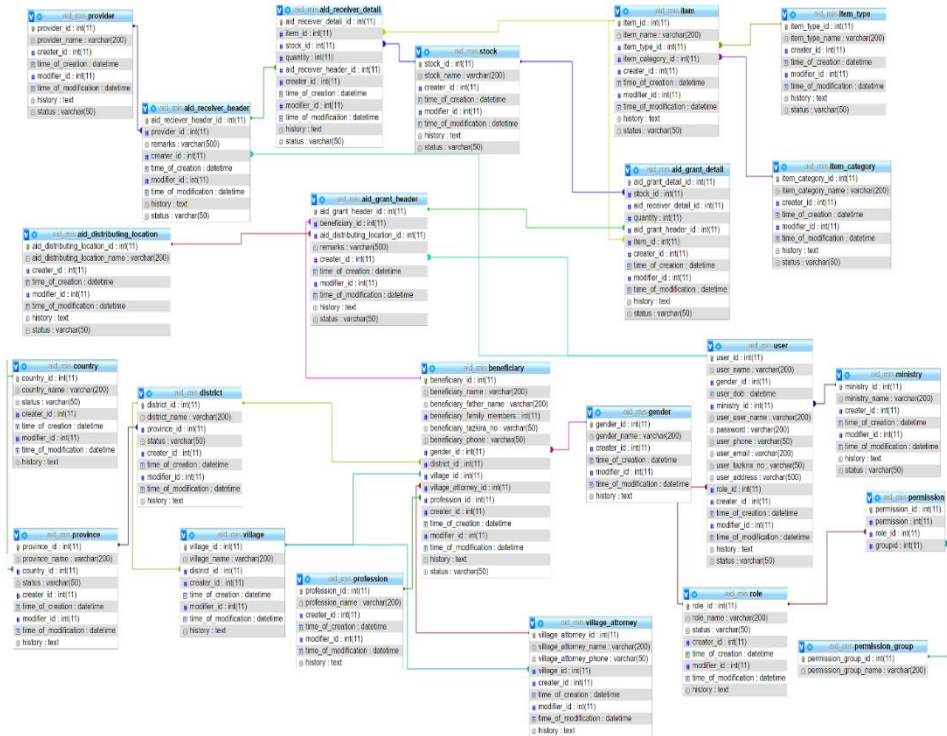


Figure 2

7. Implementation description

With identified requirements, a clear picture of the system returned. The prototype model has been used as the software model in the system development. Based on this model the initial version by information in hands shared with the client. It has been overviewed; new requirements identified and then a refined version delivered. The test focuses on input and output known as the “black box testing technique”. While checking the code complexity in terms of space and time conducted by using white box testing. The late testing technique helped in quality code while the black box is coupled with input and output.

8. System Screenshots

Sharing the outcome of this research, screenshots are given here with a brief description.

8.1 Login Form

The access rights are implemented using roles and privileges to authorized users over the objects and views of the system. Users can access the system via the login form as shown in figure 3. Subject to the key dimensions, the web application link the client organization is given as:

<https://aid.kabulcomplex.com/signin.php>

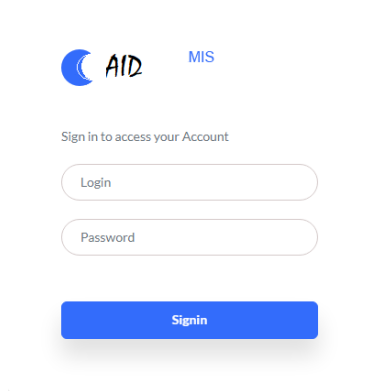


Figure 3

8.2 Landing Page

The logged-in users are directed to the landing page as show in the figure 4. This page is the main entry point to all the related section of this system. Such as dashboard, beneficiary, aid entry, aid distribution, item, stock and user management.

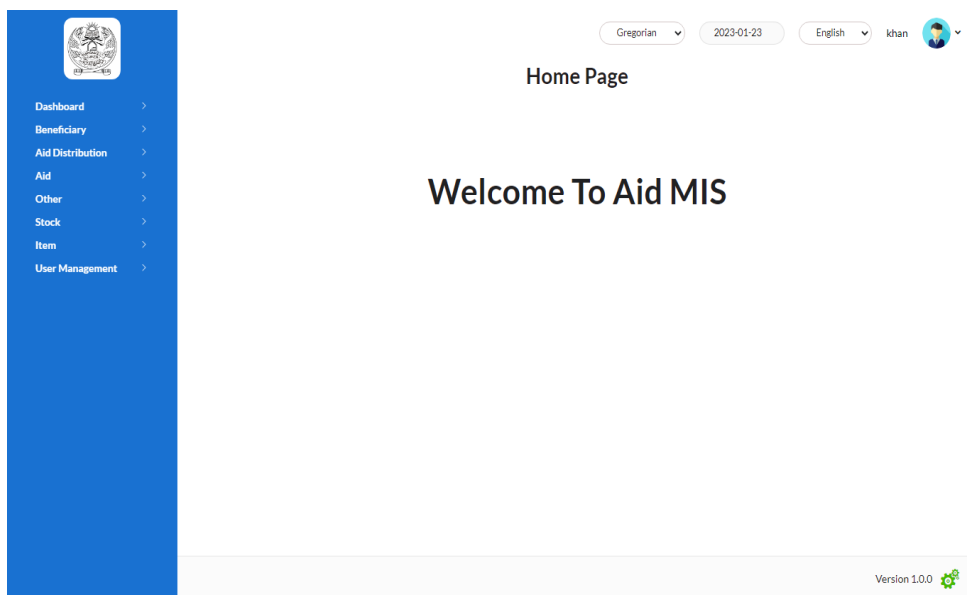


Figure 4

8.3 Beneficiary Registration

This form, figure 5, enroll the beneficiary for aid grant. The valid user can register a beneficiary. If the beneficiary already registered with a policy then the duplicate entry will be denied.

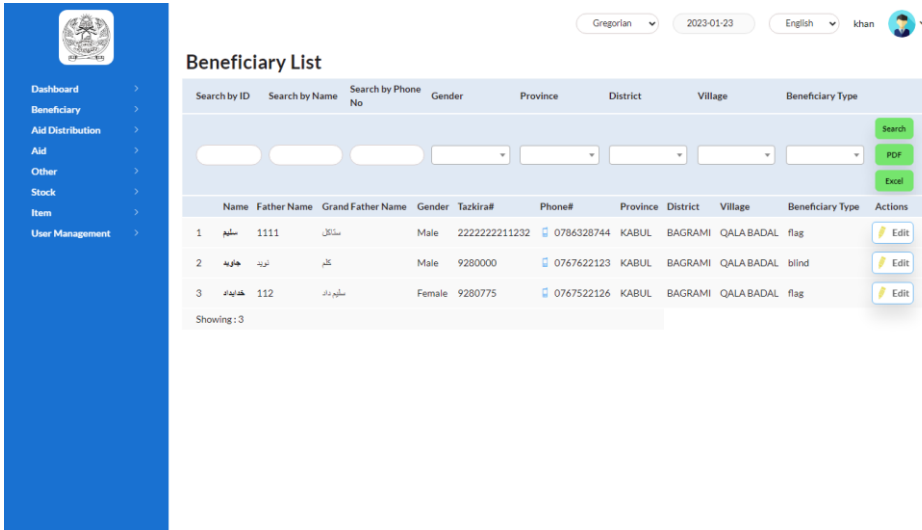


Figure 5

8.4 Beneficiary List

As shown in figure 6, the beneficiary list provides the facility to search the beneficiary and export the report to PDF and Excel format.

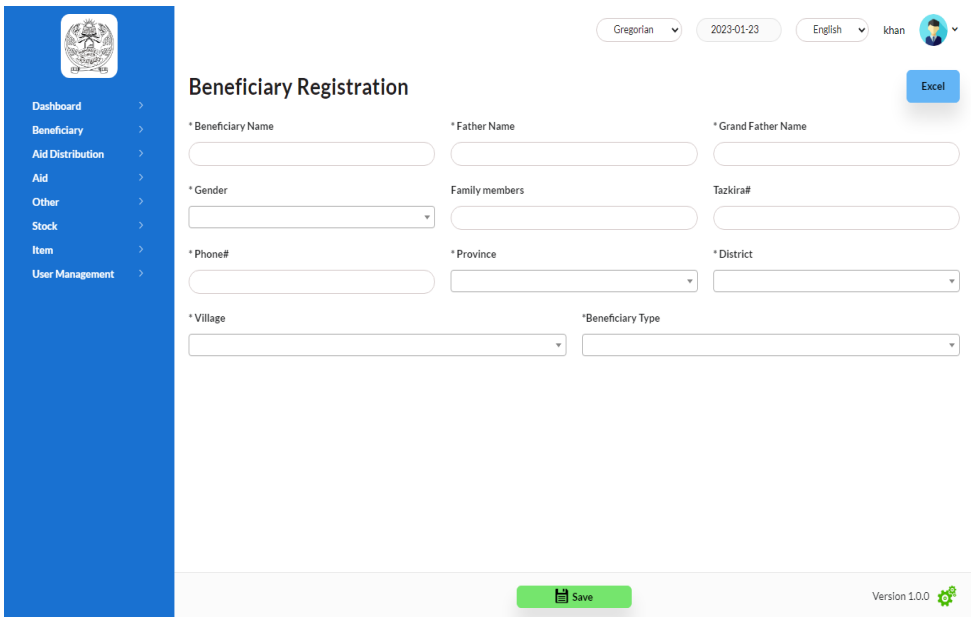


Figure 6

8.5 Grant Aid

Using this form as shown in figure 7, the user can grant the aid based on district or village level subject to the shown particulars.

Figure 7

8.6 Aid Distribution Report

Figure 8, this form shows the granted aid information. By use of this form the aid distribution flow can be tracked for analysis purpose.

Sr. No.	Distributed Aid ID	Date	Province	District	Village	Ministry	Donor	Remarks	Actions
1	3	2022-04-28	BALKH	BAGRAMI	QALA BADAL	Ministry of Economic	WFP		Details
2	4	2022-04-28	BALKH	BAGRAMI	QALA BADAL	Ministry of Economic	WFP		Details
3	5	2022-04-29	UROZGAN	CHAHAR ASYAB	GUL SORKH	Ministry of Health	Sra Miasht		Details
4	6	2022-04-29	NIMROZ	ESTALEF	SAYIDAN GULESTAN	Ministry of Higher Education	UN		Details

Figure 8

8.7 Role and Privileges

The user activities are restricted by the access rights given by the database administrator. Figure 9, shows the creation of role. The database administrator assign privileged to the roles. These privileged roles poses set the scope of responsibilities and operations. Users are given the membership over the role. Then, the users can access the system with the role.

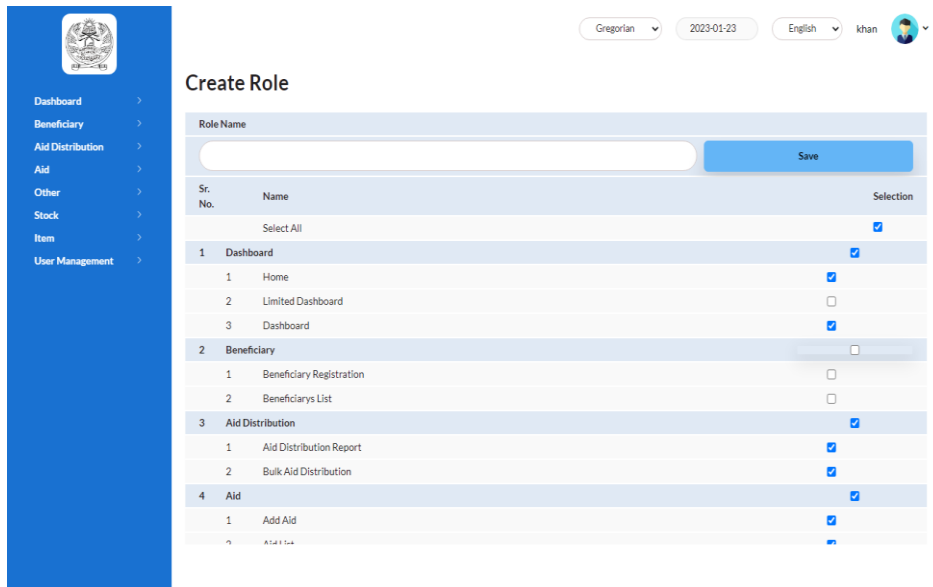


Figure 9

9. Result and Conclusion

In the field of science and technology research is all about responding to an active problem or filling a knowledge gap [14]. This research responded to an active problem of achieving a transparent distribution of aid under the current government's management of the country. This policy based research contributed in domain of automation of manual system. Through the process of this work it's identified that the manual or file system drawbacks could be fully addressed by a well-designed, optimized and integrated management information system.

10. Future Work

With focus on impact significant of technological development automation, this system will be enhanced with incorporation of Maps in the domain of e-management. The distribution process will be monitored with automated web-based map-driven information system. The key innovative feature of this system will be the use of GPS. GPS will be used as the communication channel in disconnect state of the internet. This factor will help in providing backup link and alternative solution of internet. It is planned to upgrade this aid distribution MIS to a version having two modes. One the analytical decision support mode and the operational.

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