

ANDROID BASED MID-DAY MEALS MONITORING SYSTEM

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ABSTRACT:

Mid-day meals is a school meal programme designed to improve the nutrition status of the school children. The government had started the scheme to ensure that the children get nutritious food in order to reduce the dropout rate in schools. State governments implement this scheme by providing menus with culturally acceptable items. Though this scheme has more benefits for the school children, the effective implementation of it is not monitored. Government had established committee to monitor the effective implementation of the scheme. Physical monitoring is a challenging task as it not cost effective as well it requires more human resource. In this paper, mobile application based monitoring system is proposed for School and Mass Education Department to continuously monitor the Mid Day Meal scheme with less economy and human resources. This application evaluates the scheme by ensuring the robustness, cleanliness and timely availability of quality meals to the students by collecting feedback from parents and faculties. It can also be used to calculate the food grains stock availability and expenses required for implementing the scheme. The monitoring system collects the feedback from the stakeholders of the school on Daily/weekly/monthly basis. The system captures the total meals served to the children; reasons for the meals not served; food grain, cooking and transportation expenses required in advance through regular update of bills. This information is analyzed and instant report is submitted to the higher authorities for availing the needed support required by the schools.

Keywords: Barcode scanner, Feedback, Rating, email ID, Password.

I. INTRODUCTION

The mid-day meal is nutritious meal program planned to improve the nutritional status and health of school students in the nation. This plan offer free lunch for the government school students. It is extremely healthy idea in the beginning stage, as it encourages the hunger students to attend the schools regularly. The study shows that malnutrition in students could severely affect the mental and physical growth of them. Students find difficult to concentrate in the teaching and learning activities in the school. Mid day meal scheme enhances the school

attendance and nutrition value among the students. Even though the schemes have many benefits, government has experienced difficulties in implementing and monitoring it. The first problem in the scheme is monitoring the expenses needed for availing quality ingredients for preparing healthy food. The other problems are ensuring the quality and quantity of food being served to the students and stock availability. Government has set up committees at state and district levels to monitor the effective implementation of the scheme. The reports submitted by the physical inspection committee are arbitrary and it takes more time to find the solution for the problems in the report. These problems should be addressed to make this scheme more effective. The transparency of this scheme is most important to avoid such problem. A real time monitoring system is required to monitor the efficiency and effectiveness of the scheme. Physical monitoring consumes lots of resources in terms of human and economy. One solution to avoid this problem is developing an automatic and adaptive monitoring system. This monitoring system provides instantaneous feedback about the challenging areas that requires more focus. Through this system, a government can easily identify the area to be improved in order to make the scheme more success.

II. REALATED WORK

Ashutosh Pandey et.al [8] proposed an android based application to simplify the work of faculties and to reduce the problems they faced in manual attendance monitoring method. With the help this application, faculties can also easily maintain the overall percentage of the students. It also reduced some types of problems they face in manual attendance monitoring method. This android application contains five modules such as admin control, teacher substantiation, student substantiation, displaying digital register, submitting final report. It was helpful to provide accurate data about the attendance of each student. This application was developed using android studio, PHP, MySQL server [1]. Admin responsibility is to maintain the database. Teachers can easily register the students' attendance into the digital register book and submit it into the web server of the admin panel. Reports can also be obtained by the heads to monitor the attendance of the students and provide necessary suggestions to improve their performance.

The feedback system for evaluating the teaching learning process of faculty is required to improve their performance. Ashish Vishwakarma et.al [2] developed a web application based system to evaluate the faculty performance. Student, faculty, head of department and admin are the people who involved in this application. This application evaluates the feedback from the students about the faculties. Based on their feedback, grades are also generated for the faculties. This application is very much useful to the colleges to know about the faculty performance through the student feedback [6]. Then, these reports will be sent to the principle by the head of department. It is better and comfortable way for the colleges to get the feedback from the students and analyze the performance of the faculties. In this application server-side was created by using PHP. HTML used as embedded scripting language. PHP supports many databases like

MySQL, Sybase, Oracle and etc. UNIX, Linux, windows are the platforms for the PHP.

Narut Phongoen et. al. developed a Smart Complaint Management application for android based smartphones to monitor the relationship between the customer and organization in the business field. This application was created to get the feedback from the customer. Through this application client can easily expose their problems to get a better solution. Most of the time these complaints are registered by customers using chat bot [3]. The chat bot communicate with the customer by using message application or voice chat, chat windows. This application uses two types of chat bot one is rule based chat bot and the other is AI based chat bot. Chat bot understood the human language with the help of Natural Language Processing. Supervised and unsupervised machine learning also included in this application to predict the future event by the human input.

Daniah Alrajhi et.al proposed an android application that was a barcode based student attendance system and it was too helpful for the faculties to maintain the student attendance. The main goal of this work is to design and implement smart attendance management system that can be easily monitored by the faculties and help them to avoid manual handling of registry book. The students can enroll their attendance using this system and reports can be generated by real-time processing [4]. The proposed work was designed and developed using Unified Modeling Language (UML), Microsoft Access and ASP.NET programming language.

Android application for student's attendance management using QR code was proposed by Hussan Elbehiery et.al.[11]. This application is a combination of android application system collecting the student's attendance by scanning the QR code and storing the details about the students. Accurate result was generated by this attendance system. By applying this method traditional method of attendance system is converted into computerized. Subject handling staff can use this system to take the attendance of the students. It also evaluates the overall attendance percentage. The data is stored in the SQLite database. It reduces the paper work. This QR based attendance system is considered as user friendly and more accurate that there will be a no chance to get any fraud work.

Temitope Mapayi et.al proposed an application for smart attendance using computer system. In this application open pi camera and raspberry technology with face recognition is used for monitoring the attendance. It demonstrates how a multi-camera installation reduces the effect of occlusion in the process of face detection, as better face detection increases the accuracy of class attendance monitoring [7]. Periodical face recognition produces updated data within a specified time interval. Cameras from different positions are connected to a computer. Scenes of the class are captured at different time instants and sent to the computer where faces are extracted and information in the attendance is updated. Real-time face recognition is performed during the lecture period. The lecture time is fragmented into some time intervals and each camera timely produces recognition information. The system checks the presence of each student throughout the lecture period, instead of just checking once at the beginning of the lecture. This system, thus, monitors student attendance in a timely manner.

III. MID-DAY MEALS MONITORING SYSTEM

"Mid day meal" android application is developed based on the idea of client-server architecture. The client is provided with an interactive android based user interface for the process of updating information. The server side processing is enabled using MS SQL. In this system, feedback from parents about the quality and quantity of food is collected. The collected data is processed and report is generated. Teacher can give the recommendations as feedback for improving the mid day meals system [2]. Attendance of the student in regard of meals served is monitored and updated in the database by the barcode scanner [4] [6]. Reports about the monthly cooking expenses, food grain and transportation expenses with bills are updated to the higher authorities in daily basis. The higher authorities can analyze the attendance data for calculating food requirement of schools.

SYSTEM ARCHITECTURE

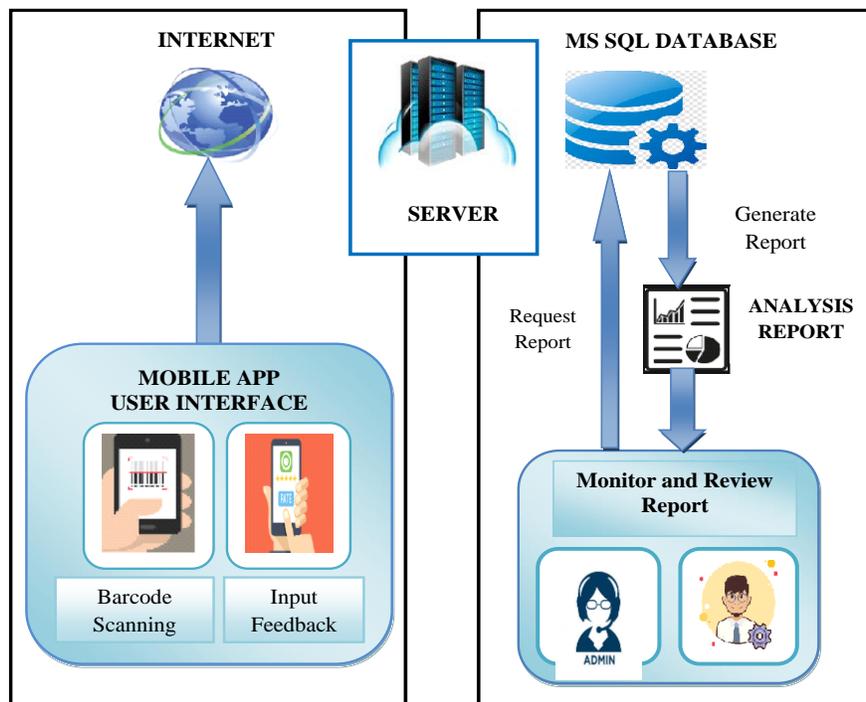


Figure 3.1: Architecture of MDM Monitoring System

This application consists of three modules. First module is Mobile application to update attendance, collect parents and teachers' feedback and submit the expense and stock details. The second module is the server module, which analysis the inputs and generates the report. The third module is database module, which stores the data from the user application. Each person has a unique user name and password to login this application.

In this application barcode scanner is used to register the attendance. Each student is provided an ID card embedded with bar code. The teacher alone can have a control on the Smartphone. The teacher should scan the id card of the student before they start to have their lunch. Camera based barcode scanning is used in this application [1]. Camera do better performance compared to the flashlights. Each barcode has unique number code. Students just have to scan their cards using barcode scanner and the unique code corresponding to that barcode is stored in the database. The system notes down their attendance in every day. Mobile back camera was used to scan the barcode.

A. MOBILE APPLICATION

The mobile application provides the user interface for the users of the application. The users of this application are Teacher, Parent and Monitoring committee. The users with valid login credentials can alone use this application. The teacher can scan the ID card to ensure the presence of students who are consuming food on that day. The students who are consuming food in the MDM scheme may be intimated to their parents. The reason for not consuming may be provided as feedback by parents. The parents of students who have taken food on that day may provide the feedback on the quality and quantity of the food served to their child. This feedback is based on the concern provided by their child. In addition to this feedback is also provided by the faculty in concern with students about the quality and quantity of the food. The monitoring committee may view the complete report of the scheme in the mobile application.

Parent's feedback

Parent's feedback can enhance the quality of the food. Closed-Ended questions used to limit the answers of the respondents to response options provided on the questionnaire. Closed-ended questions retrieve a limited set of responses that can be coded easily in a database with some number or symbol that represents a response. Multiple choice, satisfied, average, unsatisfied are given. Rating session also included in parents feedback page [5][10]. In this rating session parents can rate the food's quality, quantity and taste by using five stars. Comment and question with options also used in parents' feedback page. Parents can select the options depends on their opinion. Fair judge algorithm is used to verify fair and unfair users.

FAIR JUDGE ALGORITHM

Rating could be platforms, which enable large-scale collection of user opinion about items (products, other users, etc.). Throughout this technique we tend to use Fair Judge, a algorithm to identify such fallacious users. During this system we use Fair Judge, a algorithm to spot such fraudulent users.

Three metrics:

1. fairness,
2. goodness
3. reliability

Fairness: The fairness $F(u)$ of a user u in lies within the $[0,1]$ interval $\forall u \in U$. 0 denotes a 100% untrustworthy user, while 1 denotes a 100% trustworthy user.

Goodness : The standard of a food determines how it'd be rated by a good user The goodness $G(p)$ of a product p ranges from -1 (a very quality food) to +1 (a very prime quality food) $\forall p \in P$.

Reliability: This measure reflects how trustworthy the particular rating is. The reliability $R(u,p)$ of a rating (u,p) ranges lies from 0 (an untrustworthy rating) upto 1 (a trustworthy rating) $\forall (u,p) \in R$.

Fair Judge Algorithm Initialization part

- alpha1, alpha 2;
- beta1, beta2; (ranges from 1-5).
- I BD(BIRDNEST 1 to 5).
- error = 0.000001
- Input= Total no. of rates received by the day. E.g. 6 users give rating in the day P1.
(Here, Input=6)
- Output = Total no. of question rated by user U1. E.g. U1 rated 3 prod (Here, Output= 3)

Initialization Concept

Value of alpha1, 2; beta1, 2 and IBD should be changed to see the different results from the algorithm. Alpha and beta used as a temporary variable to calculate the average in rating.

Output

If the highest result is greater than the error rate than the loop will continue to find optimal solution.

Steps

- Step 1 : $t = 0$
 Step 2 : score board, $S1[][]$ (user U, and DayP,)
 - Step 2.1 : $F1[]$ (for products P_i) = 1.
 - Step 2.2 : $R1[]$ (same as Step 2). = 1.
 - Step 2.3 : $G1[]$ (of P_i)
 Step 3 : Start loop (do while)
 Step 3.1 : $t=t+1$

Step 3.2 : $G2[x]=K1+[(S1[i][j]*R1[i][j])+(S2[i++][j]*R[i++][j])/K2]$
 Step 3.3 : $G2[x++] K1+(Si[i][j++]*R[i][j++])$
 Step 4 : $R2[i][i] = F1[i]+[i-[c]/2]$
 Step 5 : $F2[i]= k1 + R[i][j] + R[i][j++] + R[i][j++]/k2$
 Step 6 : $G3[] = G1[]-G2[]R3[] = R1[][]-R2[] F3[] = F1[]-F2[]$
 Step 7 : $x = \text{highest}(G3([]))$
 Step 7.1 : $y = \text{highest}(R3[][])$
 Step 7.2 : $z = \text{highest}(F3([]))$
 Step 8 : $\text{array } x[] = \{x,y,z\}$
 Step 8.1 : $\text{highest} = \text{sort_highest}(x)$
 Step 8.2 : $\text{if } (\text{highest} > \text{error})$
 Step 8.3 : Repeat loop Step
 Step 8.4 : stop the program

Outcome: Average value of the rating.

Teacher's feedback

Teachers can enter their feedback through the feedback questions. Every day teachers should enter their feedback. Admin watch this feedback daily. After entering the feedback by the teachers these data are stored in the database. These feedback questions are about the quantity of food and ingredient, quality of foods. Through these questions admin can get information about the food quality and quantity.

Stock Maintenance

Each government school have one teacher for monitoring mid day meals system. That person take in charge for all the process in mid day meals. More than in-charge person cooking persons allocated for the cooking process. Every morning cooking person wants to get cooking ingredient from the in-charge. Government provides ingredients for cooking in every month. Based on the strength of the school government provide this ingredients. It should maintain in separate register book. If any things are needed for cooking mid day meals, the cooking in-charge can report it to the staff in-charge. The staff can update the information in the application. It is stored in the database. Then the report is sent to the higher authorities. Staffs feedback questions also based on the requirement and quantity of the food. Considering these performance indicator the feedback questions are framed.

Expense Report

Teachers report their expenses through the bill upload. It takes place by uploading image.

Teachers upload their bill image in the upload page. They should select the image first and they have to give name for that image. The name of the image should be the name of their school. The image path is connected to the database. In this way image stored in database.

B. WEB SERVER AND DATABASE

A database is characterized as a composed gathering of data. Our database is utilized to particularly store the data gathered by the mobile application. In addition to more features to the clients, our online framework can operate the recorded student attendance record by inquiring the database. This incorporates computerized operation, for example, condensing a specific student attendance by figuring the attendance rate for a unique course. The web server provides the facility of MySQL database. The server is the remote store of attendance record. Only the mobile application can communicate with the web server. The application can update the MySQL database and can retrieve data from web server. If the loss of data occurs user can restore from web server MySQL database. An instructor may alter details of a student yet a student is not permitted to do any alteration to their information. A database is characterized as a composed gathering of data. Our database is utilized to particularly store the data gathered by the mobile application. In addition to more features to the clients, our online framework can operate the recorded student attendance record by inquiring the database. This incorporates computerized operation, for example, condensing a specific student attendance by figuring the attendance rate for a unique course. The web server provides the facility of MySQL database. The server is the remote store of attendance record. Only the mobile application can communicate with the web server. The application can update the MySQL database and can retrieve data from web server. If the loss of data occurs user can restore from web server MySQL database. An instructor may alter details of a student yet a student is not permitted to do any alteration to their information.

The input provided by the teachers and parents are gathered in the database located in remote server. Microsoft SQL server is the web server based on relational database management system. The server communicates with database to store and retrieve the data. The request from the client will be processed and the response will be presented to the user in a personalized way.

ALGORITHM

Input: Number of Meals Served, Number of Students enrolled, attended, quality and quantity values.

Evaluation Method

Step 1: $\text{Per_attend} = \text{Number of students attended} / \text{Number of students enrolled}$.

Step 2: $\text{Per_meals_served} = (\text{Number of students_consumed_food}) / (\text{Number of students attended})$

Step 3.1: if (per_attend \geq 90)
 if (per_meals_served $>$ 90)
 if (quantity and quality is satisfied)
 “Meals is satisfied and Scheme is Excellent”
 else if(quantity and quality is average)
 “Meal taste is average and scheme is good”
 else
 “Meal taste is slightly unsatisfied”
 else if (per_meals_served \geq 70 and $<$ 80)
 “Improve quality of meals”
 else
 “Improve the quality and quantity”

Step 3.2: else if(per_attend $>$ 70and $<$ 90)
 if (meals_served $>$ 90)
 “Monitor attendance” Repeat from line 3 in step 3.1

Step 3.3: else
 “MDM scheme is poor and should be improved”

IV. PERFORMANCE EVALUATION OF MDM SYSTEM

Population

The MDM monitoring system is applied to one of the primary schools in a district. The population considered for evaluation is 75. Among the total population, 40 students prefer to have food under MDM scheme offered by the school. 35 of them took the home made food. The analysis is performed at two phases. The first phase is carried out for 15 days and the second phase is carried out for 1 month.

Analysis based on the quantity of the food served in MDM scheme

Feedback from parents is to be considered with the fact that child will give true feedback only to their parents. So, feedback about quality of the food is collected from parents in daily basis. The feedback provided by the parents with the concern from child is analyzed to obtain the status of the MDM scheme. In phase I, the day 1 results show that among 40 students 32.5% of students felt unsatisfied with the food quantity offered by the school. After continuous monitoring using MDM system and proper guidance provided by higher authorities, the analysis shows that there is improvement in food quantity provided between first day and last day of the implementation. In phase II, the students' rate of satisfaction is improved by 10% and 16 students have newly enrolled in the scheme. The feedback and improvement result is

summarized in the Table 1.

Opinion	Perception on food quantity	
	Before MDM (%)	After MDM (%)
Students Enrolled	40	56
Satisfied	27.5	37.5
Average	40.0	40.0
unsatisfied	32.5	22.5

Table 1 Analysis of feedback on quantity of food served.

The graphical representation of this result is shown below.

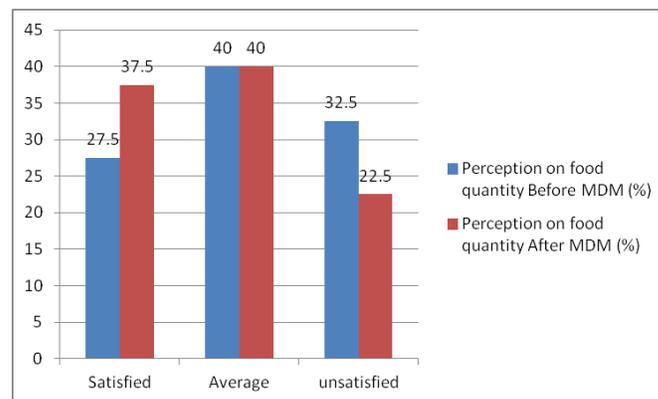


Figure 3.2 Analysis about quantity of food served

Analysis based on the quality of the food served in MDM scheme

In phase I, the result reveals that among 40 students 30.0% felt unsatisfied about the food quality offered by the school. After the implementation of MDM monitoring system, in second phase, the student rate of satisfaction on quality of food is improved by 10%. The feedback about the quality of food collected on first and last day is summarized in Table 2.

Opinion	Perception on food quality	
	Before MDM (%)	After MDM(%)
Students Enrolled	40	56
Satisfied	29.0	38.5
Average	41.0	41.0
Unsatisfied	30.0	20.5

Table 2 Analysis on based on the quality of food served in MDM Scheme

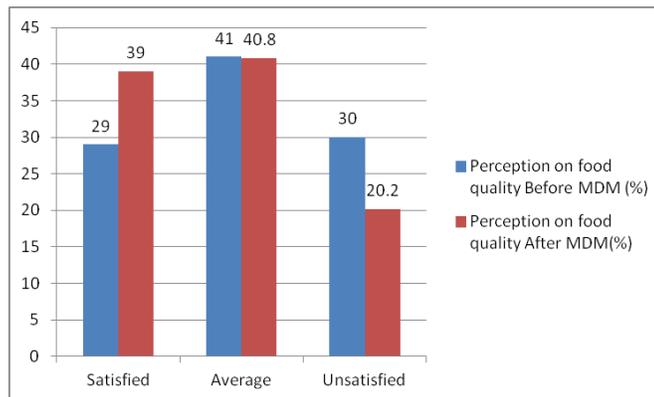


Figure 3.3 Analysis about quality of food served Analysis based on reasons for not taking food in MDM Scheme

A total of 35 students out of the student population in the school, don't take food properly under MDM scheme because of some reasons. The summary of reasons for not having food and its levels is described in Table 3. The reason for their intake of homemade food is poor hygiene, taste, health issues. Few students are taking the homemade food without any reason, just to avoid food from the schools.

Causes	Before MDM	After MDM	Improvement (%)
Students	35	19	40.0
No problem	9	5	10.0
Health Issues	10	8	5.0
Don't like taste	8	3	12.5
Poor- Hygiene	8	3	12.5

Table 3 Analysis of reason for not taking food in MDM scheme

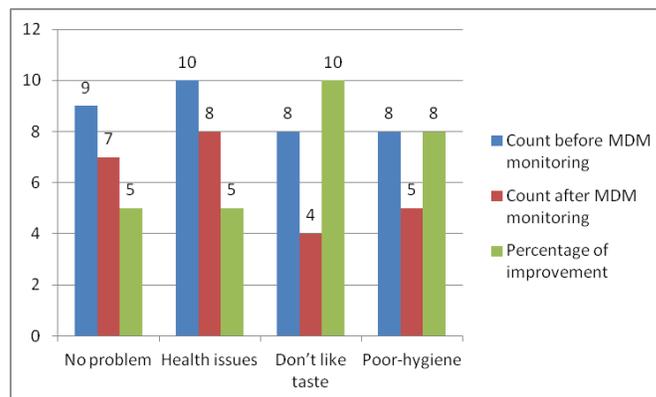


Figure 3.5 Analysis the causes for student not taking food

V. RESULTS

There are many app like mid day meals monitoring system, which only collect the students' attendance in manual method. Staff can login to app and update the attendance. During this application attendance shall be uploaded by barcode scanner method, feedback is collected from both parents and staff which help to boost the system effectively. In sample testing quality and quantity has been improved. This below graph describes about the performance of the mid day meals monitoring system.

After the implementation of mid day meals project, the entire count of the scholars in taking food from school was increased from 40 to 56.

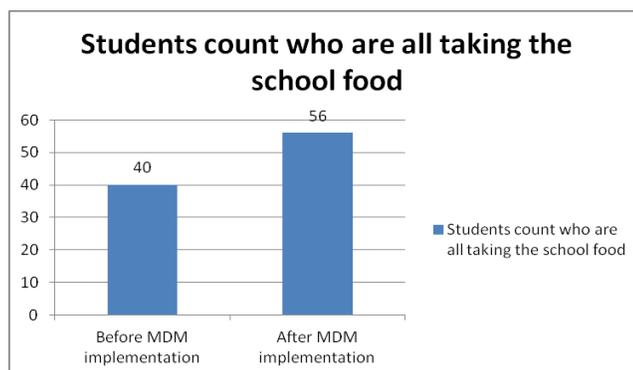


Figure 4.1 Comparison of students count who intake the food from school

VI. CONCLUSION

The count of students could be monitored using barcode scanner through ID card before taking the food. Collecting feedback daily from the parents ends up in great improvement in mid day meals. In each day staffs can upload the bill to higher authorities. Regular updating of students can be done through barcode scanner and so the manual work will be reduced. The consolidated endeavors of the legislature and others have assisted with raising the degrees of mid day meals served in various parts of the country. A few states have demonstrated phenomenal improvement and the children love the mid day meals being served there. Hopefully that the plan continues advancing a similar way and children get delightful nourishment at their individual schools. This will also help to develop the literacy levels of the country and develop it. The Mid day meal programme has now achieved world acknowledgment which is incredible. This system help higher authorities to get the daily update form each and every school in the country.

VII. FUTURE ENHANCEMENT

It is believed that almost all the system objectives that have been planned at the commencement of the software development have been met and the implementation process of the project is completed. A trial run of the system has been made and is giving good results, helps the government in mid day meals scheme. In future, the concepts can be applied and tested in large scale environments involving all the schools in various districts. It is also planned to implement automatic call-based feedback from parents about the quality and quantity of the mid day meals.

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