meLP

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Abstract— meLP is a management & service application designed for the maintenance and counter the issues faced in the textile industry immediately and efficiently.

Keywords: Android, Manufacturing, Data, Prototype, MMA, Management

I. INTRODUCTION

The garment manufacturing industry remains an archetypal labor-intensive industry; it has experienced some technical innovations which are mostly restricted to the application of CAD technology but most of the departments are labor-based. Management of systems is not machine based. Unsurprisingly, the management of labels too, at present is largely handled by people. As a result, the degree and scope for error due to this highly manual based management system is greater.

In the apparel industry, machine maintenance department is one that works silently. They don't get recognized much for their work. In the organized garment factories, maintenance people work closely with Industrial Engineering department when it comes for shop floor machine maintenance. In many factories management does not concern about their performance. So machine mechanics just do their job to keep machine running and always do breakdown maintenance. The management system, as it exists currently for breakdown maintenance of sewing machines, involves a lot of wasted effort both in terms of time and blocked manpower. Such wastes lead to improper maintenance management of the machines and their unreliable accountability. This in turn is responsible for time and manpower wastage resulting in reduced productivity, reduced quality, longer manufacturing cycle time, increased lead time. A factory can gain substantial benefit by setting up defined work responsibility and making list of activities to be done by maintenance department other than just repairing machines when it breakdown. (Sarkar, 2014) To reduce the labour dependency for such a process a Maintenance Mobile Application (MMA) called MELP for the breakdown maintenance is proposed, which can be installed in the smartphones of the supervisors on the production floor. This mobile application is capable of performing a range of functions that makes the managing and accounting of breakdown maintenance easier, right from generating of request for maintenance to keeping a log of such transactions. With features incorporated like user verification and authorization, floor, line & machine number selection, main frame log updating at each and every step, Job request generation for maintenance, tracking duration of the job etc. The development of the MMA and its implementation is believed to increase productivity (less m/c down-time) due to time spent in waiting for mechanic by up to 8 % - 20 % which again has other beneficial by products such as – increased goodwill amongst the manufacturers and retailers, counterfeit false revenue turned into proper taxable revenue to a certain extent etc.

It is an android application that is developed using java and related tools in android application studio. It is purely meant for shedding the load from the manager and distribute it on the employees at ground level.

II. LITERATURE REVIEW

The manufacturing industries have gone through significant changes in the last decade. New firms in markets have increased competition dramatically. Most of them focus on product quality, production time and cost of product. Because of these, a company should introduce a maintenance system to improve and increase both quality and productivity continuously. (Kiran, Mathew, & Kuriakose, January 2013) What is maintenance & why it is performed? Previous & present maintenance practices in both government & private sectors would imply that maintenance is the actions associated with equipment repair. Machine maintenance is gaining importance in industry because of the need to increase reliability and to decrease the possibility of production loss due to the machine breakdown. The action is taken to prevent a device or component from failing or to repair a normal equipment to keep it in working order. It is unfortunately, data obtain in many studies over the past decade indicates, that most of the private & government industries do not expand the necessary resources to maintain equipment in proper working order. Rather, they are waiting for equipment failure to occur & then whatever necessary action is taken to repair or replace it. (Motin (Tusher), 2012) The need for maintenance is predicated on actual of impending failure-ideally, maintenance is performed to keep equipment and systems running efficiently for at least designed life of the component. As such, the practical operation of a component is time-based function. (Motin (Tusher), 2012) Today's market conditions place great emphasis on variety, performance and quality of products. In order to meet these requirements manufacturers have been compelled to utilize complex and sophisticated machines. Over time, the driving need to meet and improve on the requirements has shifted the trend of manufacturing to high levels of automation (Raouf & Ben-Daya, 1995). The objective behind automation is to achieve higher productivity and profit in order to effectively stay competitive in 10 business. High levels of automation require that the machines employed operate without trouble and this requirement has changed the technology and operating philosophy of manufacturing industry around the world (Mishra & Pathak, 2006). Despite the successes chalked in this arena, one important factor that necessarily has to be always considered is cost of maintenance. The high and rising capital costs of modern production machines as well as high maintenance costs, which have an estimated range of 15% - 40% of production cost, are developments which have forced

companies to pay attention to maintenance (Coetzee, 1999) (Löfsten, 1999). Further, technology is becoming increasingly complex, with electronics, robotics and computer control now influencing every aspect of manufacturing and maintenance. This has led to many changes in maintenance activities. Special and continuous training programmes are required to provide relevant knowledge, understanding and skills to service the increasingly specialized equipment and keep up with development in industry (Mishra & Pathak, 2006). British Standard 3811:1974 states that maintenance is a combination of any actions carried out to retain an item in, or to restore it to, an acceptable condition. Manufacturing industry today has employed many maintenance strategies and philosophies in order to reduce cost, improve the availability of machines and equipment and increase profitability. In addition, various computerized maintenance management systems, which employ customized software, are available to manufacturing companies to facilitate efficient maintenance management of the increasing number of complex devices equipment and systems utilized on a daily basis (DiPaolo, 2010). (al, Bamber et, 1999) reports that an effective maintenance activity can make a significant contribution to company profitability through increased production efficiency, plant, availability and reliability.

III. Research Statement

Even after running 24X7 manufacturing units have problems in keeping up with the demands. These delay in keeping up with demands is due stoppage of machines. Production may be stopped due to many reasons like breakdown of machine, maintenance work, labour issues, insufficient material supply, problems in the method of production etc. Excluding all other factors like materials, method, man, etc. It is necessary to reduce the breakdown (down time) of machine or equipment's in the company for the 11 efficient nonstop production to meet the demands. Machine breakdown disturbs the production of particular operations and subsequent operations by delaying feeding. Breakdowns are the most common causes of efficiency loss in manufacturing. Eliminating unplanned down time is critical to improving Overall Equipment Efficiency. It is not only important to know how much Down Time your process is experiencing (and when) but also to be able to attribute the lost time to the specific source or reason for the loss. (Kiran, Mathew, & Kuriakose, January 2013) It is found that there is still information gap on maintenance activities being undertaken within the industry. Campbell (JD, 2005) report that there is some level of maintenance activities taking place within the industry but offer no specific details; for example, the type of maintenance strategy adopted, equipment and technology employed, the role of the maintenance manager, training and documentation among others. It is also seen that time lost in downtime of the machines or equipment is considerably high in Indian garment industry. Case study was conducted on the breakdowns of sewing machines or equipment of the company and to find out the root causes of machine downtime so as to eliminate them and to increase productivity.

IV. Objectives and Methods

To develop a prototype of Maintenance Mobile Application (MMA) to decrease overall sewing machine downtime by streamlining the process of M/C breakdown maintenance. The intended results of proposed system can be enumerated as follows:

- Faster dissemination of information from production floor to technicians regarding machine breakdown.
- Easy way to broadcast maintenance request.
- Time and breakdown details are recorded for analytics.
- Keeps managerial level updated about the machine breakdowns and productivity loss due to that.

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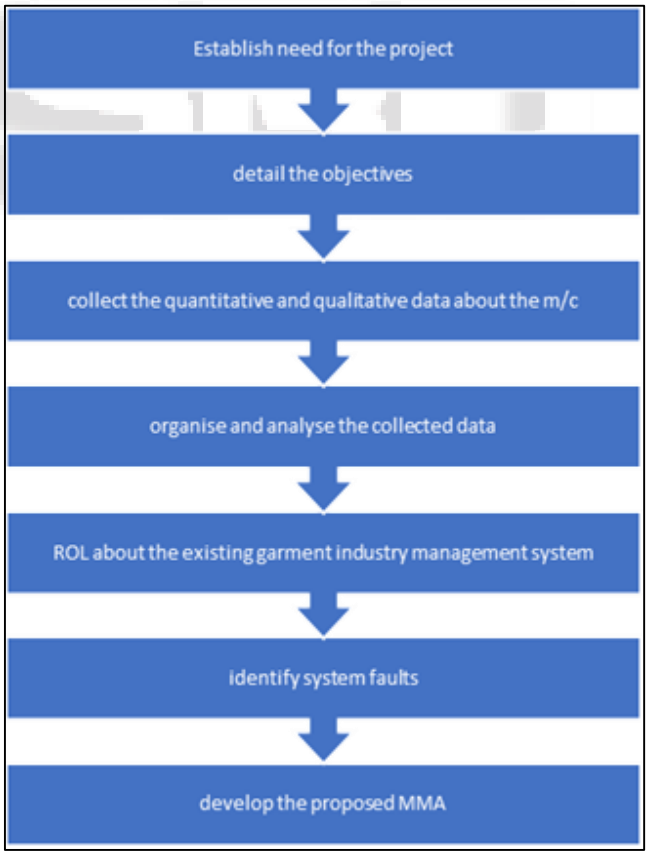
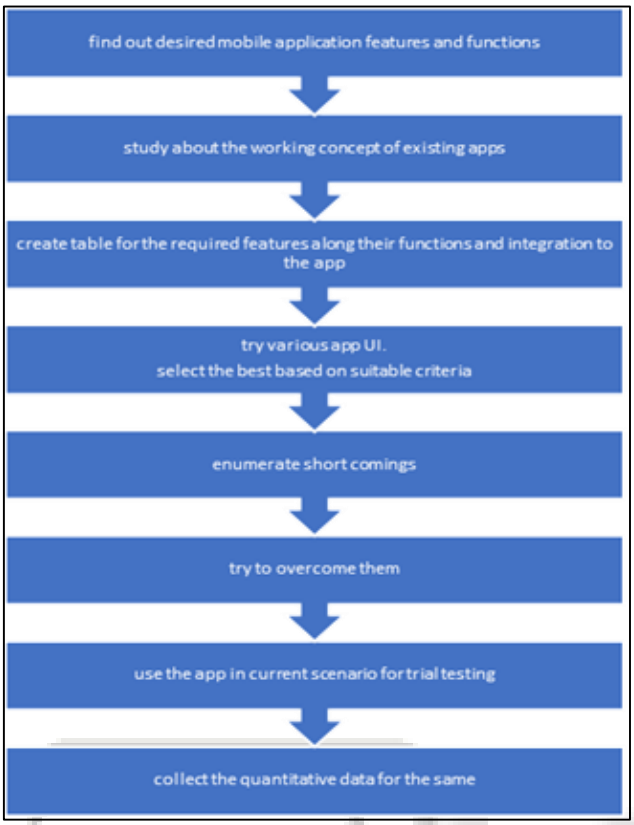
V. Methodology

A. *Research Methodology*



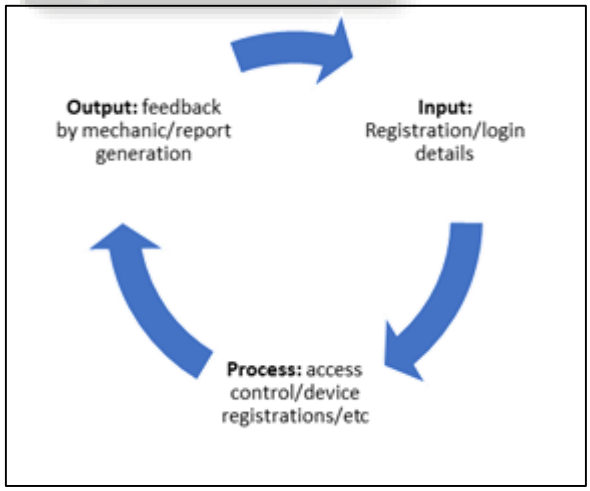
B. MMA Development Methodology



VI. PROTOTYPE

A. Requirements

The requirements of the mobile application in terms of input, its detailed processing and the output generated are the three main categories in this section as can be seen in figure 4.1 below:



These categories are: Input:

- Registration/login details of line supervisor and maintenance person
- Required data entry like unit, floor & line number, m/c code, breakdown issue and priority level Process:
- Access control/authorization
- Device registration for cloud messaging
- Request notification to mechanic group & acceptance notification to supervisor
- Time record from request generation to request completion Output:
- Feedback by maintenance person
- Report generation

1) Input

a) Registration/login details of line supervisor and maintenance person:

- MMA comes with the option of user registration with unique passwords for every different production unit.
- Upon registration, login can be performed using the same credentials used during registration.

b) Required Data Entry

- For line supervisor certain data needs to be entered to specify his/her work-station like unit, floor & line numbers.
- In case of generating breakdown requests values like machine code/number, breakdown issues and priority level of the issue needs to be entered.

2) Process

a) Process Access control/authorization:

Everyone should not be able to use the MMA to avoid fraudulent request generation. An authorization protocol provides security and restricts the access of non-authorized personnel. Clearly defining the chain of access helps maintain a close control over the system. On the application end unique password links all the line supervisor and maintenance person to the designated company.

b) Device registration for cloud messaging:

As the MMA involves send of request messages and notifications from supervisor app & mechanic app and vice-versa, this technology of cloud messaging requires device registration at the beginning.

c) Request notification to mechanic group & acceptance notification to supervisor:

When a breakdown request is generated by the line supervisor, request message is populated to all the devices available in the mechanic group of that production unit. And upon acceptance of request by any mechanic a notification is sent to the line supervisor notifying about the mechanic who has accepted the request.

d) Time record from request generation to request completion:

Time plays a crucial in this MMA system. With the purpose to reduce the overall wait time for the mechanic during breakdown maintenance, recording time at every instance is very important like time of request generation, time of request acceptance, start time of maintenance and end time of maintenance.

3) Output

After the entire process of breakdown maintenance is done the MMA will log all the transactions as and when they happen. The final MMA generated report would have the following details:

- Maintenance Request ID
- Supervisor Name
- Location of issue: Line, Floor & Unit number
- Machine type/number
- Breakdown reason
- Priority level

- Timings of Events: time of request generation, time of request acceptance, start time of maintenance and end time of maintenance.
- Mechanic name
- Feedback

VII. FEASIBILITY STUDY

Depending on the results of the initial investigation, the survey is expanded to a more detailed feasibility study. Feasibility study is a test of system proposal according to its work ability, impact on the organization, ability to meet user needs, and effective use of resources. The objective for this phase is not to solve the problem but to acquire a sense of scope. During the study, the problem definition is crystallized and aspects of the problem to be included in the system are determined. Mobile Application Development Systems are capital investments because resources are being spent currently in order to achieve benefits to be received over a period of time following completion. There should be a careful assessment of each project before it is begun in terms of economic justification, technical feasibility, operational impact and adherence to the master development plan. The project was started by listing the possible queries that the user might want to be satisfied. And on these lines the project was guided further. The three main points, kept in mind at the time of project are:

- Possible (To build it with the given technology and resources)
- Affordable (given the time and cost constraints of the organization)
- Acceptable (for use by the eventual users of the system The three major areas to be considered while determining the feasibility of a project are:

A. Technical Feasibility:

The technical issue usually raised during the feasibility stage of the investigation includes the following:

- Does the necessary technology exist to do what is suggested?
- Do the proposed equipment have the technical capacity to hold the data required to use the new system?
- Will the proposed system provide adequate response to inquiries, regardless of the number or location of users?
- Can the system be upgraded if developed?
- Are there technical guarantees of accuracy, reliability, ease of access and data security?

Earlier no system existed to cater to the needs of breakdown maintenance in garment industry or any other production-specific. The current system developed is technically feasible. It is a web-based user interface. Thus it provides an easy access to the users. The databases purpose is to create, establish and maintain a workflow among various entities in order to facilitate all concerned users in their various capacities or roles. Permission to the users would be granted based on the roles specified.

Therefore, it provides the technical guarantee of accuracy, reliability and security. The software and hardware requirements for the development of this project are not many and are already available as free as open source. The work for the project is done with the current equipment and existing software technology. Necessary bandwidth exists for providing a fast feedback to the users irrespective of the number of users using the system.

B. Timeline Feasibility:

It is important to understand that a need must be fulfilled when it has to be. Some otherwise feasible and highly desirable projects can become non-feasible due to very restrictive timeline constraints. This fact makes it imperative that milestones are clearly linked to the timeline and projects are well conceived with safe unforeseen margins. We make sure that we strictly follow what has been stated above.

C. Operational Feasibility:

Operational feasibility is a measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development. Operational feasibility reviews the willingness of the organization to support the proposed system. This is probably the most difficult of the feasibilities to gauge. In order to determine this feasibility, it is important to understand the management commitment to the proposed project. If the request was initiated by management, it is likely that there is management support and the system will be accepted and used. However, it is also important that the employee base will be accepting of the change. Operational feasibility studies are generally utilized to answer the following questions:

- Process – How do the end-users feel about a new process that may be implemented?
- Evaluation – Whether or not the process within the organization will work but also if it can work.
- Implementation – Stakeholder, manager, and end-user tasks.
- Resistance – Evaluate management, team, and individual resistance and how that resistance will be handled.
- In-House Strategies – How will the work environment be affected? How much will it change?
- Adapt & Review – Once change resistance is overcome, explain how the new process will be implemented along with a review process to monitor the process change. As per survey, it is seen that the top management are willing to implement the MMA which will provide them access to the maintenance issues and gain/loss to the company due to that. However, in a labour-oriented industry and that too in India the product might face initial resistance at lower levels of the industry as the system will provide complete transparency and negligible chances to data alteration. Further, the system will partially automate the process of breakdown maintenance with control over the process and data. And, once the resistance is overcome the system will greatly reduce the wait time loss during breakdown maintenance which in turn will increase productivity, on-time delivery and thus profitability

VIII. CONCLUSION

1) This app proves to be reliable for all the labor in textile industry.
2) It avails the user with efficient maintenance tools.

3) It can be effectively implemented in almost all the industries if made the suitable and efficient changes.
4) The performance and working of the application is found to be optimum.

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