



App Based Production Monitoring System for Apparel Small and Medium Sized Enterprises

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Abstract

The paper aims to elucidate the inevitability of production monitoring systems in Small and Medium Sized Enterprises (SMEs) manufacturing apparel in India. Presently, there is lack of proper monitoring system to control production and analyze the daily reports which is widely attributed to inadequate financial resources to acquire expensive Production Monitoring Systems. SMEs rely invariably on registers, challans and manual data sheet-based monitoring which are detrimental in the production process including unscheduled production stoppages as well as difficulty in ascertaining actuals with planned numbers. This research provides an insight to cost-effective solution to this problem through app-based platform. TrackMyProduction (TMP) framework proposed for SMEs, facilitates production monitoring and solve issues pertaining to production output addressing various impediments involved in the process. TMP app explains the method of monitoring real time production and features analysis of resource availability in each department with facility to monitor status of sewing, cutting and finishing at any point of time. The paper reveals the impact of TPM in apparel production planning through reports and their graphical analysis of the data collected to analyze the daily production based on various parameters involved in apparel production.

Keywords: Production Monitoring System (PMS), Mobile Application, Management Information System (MIS), Key Performance Indicators (KPIs), Enterprise Resource Planning (ERP), Small and Medium Enterprises (SMEs)

JEL Classification: L11, L26, L67

Paper Classification: Research Paper

Introduction

The Indian garment industry is facing tough competition in the global market, where price plays vital role to secure orders. Transparency in system, high quality of goods, excellent service and timely delivery help in establishing a long-term relationship with the clients. According to Vora and Solanki (2002), Garment manufacturers are forced to increase their productivity, reduce costs, adapt to demand cycle and improve quality because of increased competition and product diversification. The only way to survive is to be competitive and efficient in all respects.

SME's in India are mainly converters/vendors where maximum earnings come through efficient cutting and manufacturing processes. It is applicable to the exporters as well, since

globalization has made sourcing easy and effective. The aim of this research work is to develop an application for evaluating effectiveness of garment production companies in India. The evaluation of production effectiveness is the process by which the company sets the parameters for reaching the required goals. The real-time production data would help the garment manufacturers to control and evaluate their performance regularly in terms of its productivity as well as efficiency.

A real-time production monitoring system (PMS) is a production tool that can help the management to identify the problems as soon as they appear. It also aids in gathering and distributing information to the concerned people and thus helps to achieve production milestones at reduced down time and increased yield. According to Husin (2009), an effective system constitutes the following three elements:

Table 1: Elements of an Effective System

Elements	Description
Collection	Gathering data with minimal human intervention by connecting to automated, semi-automated and manual production to count the ongoing production.
Display	Management, line leaders, supervisors and other concerned departments get relevant production information on time. The display panels are getting popular day by day as they can combine the benefits of real time status with numerical values.
Analysis	Conducting relevant analysis at all levels is one of the prime benefits of an effective system if enough and accurate data is provided.

Background

Garment industry has witnessed continuous technological developments since emergence, particularly in product design and development, production planning and management and manufacturing equipment which are some of the prime aspects of industrial production. The technological uplifting has been affecting such areas continuously which lead to growth in terms of capacity as well as efficiency. It is quite difficult to predict the behavior of materials when they undergo manufacturing operations. Every material has its own features and tendencies as they are treated with external factors. Garment assembly involves fabric spreading & cutting, assembly processes i.e. sewing as well as ironing operations. Each process comes with its own set of challenges which depends on the nature of textile materials. Research works have been carried out for many years on these processes and advancements have been made.

Carvalho and Rocha (2003) examined that subjective and empirical judgements are still basis to judge most of process designs in the sewing operations. Samples are created and there are several changes in the configuration and set up of machines based on trial and error. This is a time-consuming process and operator's experience plays a vital role in saving time and resources. There are complex devices which are used to aid material handling, but they run with an initial set up and can't adopt to various sewing conditions by itself. This means that both the correct setting of the machine as well as supervision of quality and control of the process rely entirely on the skills of human operators.

The major technologies used in the garment industry for monitoring purposes are:

- Bar Code Technology and
- RFID Technology.

But the cost involved in acquiring as well as implementation is too much for a SME which makes it infeasible for a SME having 40-150 machines only. ERP is yet another monitoring system which is largely used. According to Young Moon B. (2007), Enterprise Resource Planning (ERP)

system is an information system formulated to integrate and optimize the business processes and flow of information in any organization. The ERP is an industry-driven concept and is widely used in the industry as a practical solution to keep all the information intact. The main problems of ERP Systems are that the cost of ERP Software, planning, customization, configuration, testing, implementation, etc. is too high and ERP deployments are extremely time-consuming. Projects usually take 1-3 years (or more) to get completed and fully efficient.

Target: SMEs

SMEs have emerged as a vibrant and dynamic sector of the Indian economy over the last five decades. According to IBEF, SMEs contributed 17 per cent to the nation's GDP during FY11 and employed 60 million people. SMEs play a vital role in creating employment opportunities at lower capital cost when compared to large industries. Apart from this, they helped in industrialization of rural areas which is important for overall growth of the country. SMEs contribute enormously to the socio-economic development of the country and act as ancillary units to large industries. TrackMyProduction, app-based PMS provides monitoring solutions for this sector primarily. The window for SMEs in India has been shown in Table 2.

Table 2- Definition of MSMEs in India

Manufacturing Enterprises – Investment in Plant & Machinery		
Category	INR	USD (\$)
Micro Enterprises	up to ₹ 25Lakh	up to \$ 62,500
Small Enterprises	above ₹ 25 Lakh & up to ₹ 5 Crore	above \$ 62,500 & up to \$ 1.25 million
Medium Enterprises	above ₹ 5 Crore & up to ₹ 10 Crore	above \$ 1.25 million & up to \$ 2.5 million

Source: Ministry of Micro, Small and Medium Enterprises

(As Per Micro, Small & Medium Enterprises Development (MSMED) Act, 2006)

Research Methodology

Data on Key Performance Indicators (KPIs) were collected through visits to several SMEs in Delhi/NCR and evaluated as per the industry standards, based on which suggestions for improvements were made. Once the KPI's were set, forms and report structures were formulated based on the register and challan system which the factories are following. The interlink and nodes between the department were set and the methods to develop the app were considered.

It is not always ergonomic for operators to use mouse and keyboard, so in some cases touchscreens may be preferred and using mobile phones for the same can be easier and comfortable. Hence, when developing GUI for touchscreens, not all "fundamentals" of mouse and keyboard interfaces were used.

Figure 1: Methodology Flow Chart



To begin with, a draft of the process flow was made which involved all the departments such as Production Planning and Control, Fabric and Trims Store, Cutting, Sewing, Finishing and Packaging. Apart from the main departments involved in the production, needle monitoring system was also developed which can ensure the proper use of sewing needles in the sewing lines as per the requirement. SMEs were visited, and app layout was designed. Once the app was developed as per the designed layout, a test run was conducted to understand its viability. Reports and graphs generated based on filled data were analyzed to monitor the progress in terms of production.

Analysis of Existing SMEs

In order to analyze the existing monitoring system of the SMEs (particularly in Delhi/NCR), SMEs were visited. The objective of this study was to ascertain facts pertaining to monitoring procedures and understand the data entry points. Few SMEs did not have line-based sewing and used to work on piece rate system.

Keeping a count of the daily output makes the higher managers aware of the progress of their orders but most of the SMEs visited just kept a note of the daily output in a register which doesn't solve the primary purpose of analyzing the daily output and making sure the production goes well and on time. The analysis of some of the SMEs visited has been tabulated in Table 3.

Table 3: Comparative analysis of SMEs visited

Characteristics	Unit A	Unit B	Unit C	Unit D
Location	Udyog Vihar	Udyog Vihar	Faridabad	Okhla
No. of Lines	No Line System (Piece Rate System)	3	3	No Line System (Piece Rate System)
No. of Machines	60	70	70	40 +Embroidery Section
Monitoring Methods	-Daily Output on Sheet -No Excel Based Updating	-Register -Challan Issue system	-Register -Considering ERP	-Register -Challan Issue System
Problems	Lack of control and access over Production	Lack of Communication between two units	Trim Planning and Halt in production due to lack of resources	No update on Cutting and Finishing/ No report generation

App Specifications and Layout

Based on the visits to SMEs, phases of the app are defined as per the observed requirements and problems faced by the factory. TrackMyProduction (TMP) can be analyzed in three phases.

The first one is to check the availability of resources and materials before proceeding with the process. For example, if one is to start the cutting process for a style, it should be made sure that fabric for that style is available in adequate quantity in the fabric store.

The main phase is to update the status according to style no., line no. and date. This solves the purpose of keeping a track of the daily output and rectifying the problems, if any.

The third phase is that of report generation where the higher managers can analyze the production at any point of time. The reports are graphically represented which saves time to analyze the progress of work. Reports can be generated based on line no., style no. as well as date.

Supervisor from each department will update the status of their respective department and will have the access to their department only. This solves the problem of faking and duplication of data intentionally.

The higher managers can have a holistic view of the complete application and can view the reports at any point of time. Java has been used as the programming language for the development of this android based production monitoring system. Firebase is used for database purposes and has been widely used in the developed prototype.

A Smartphone is the most basic requirement for this app and the app can be customized accordingly for an android, windows or iPhone user. The app is ideal for Android with Play Services having API Level > 14 or OS versions after KitKat.

App Process Flow

The basic process flow of the app is depicted as below:

Figure 2: App Process Flow

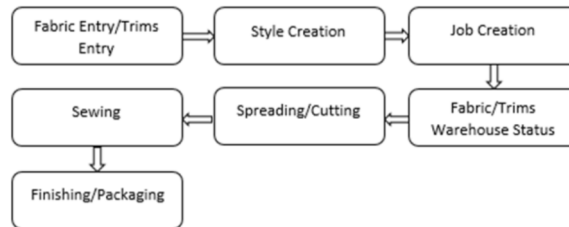
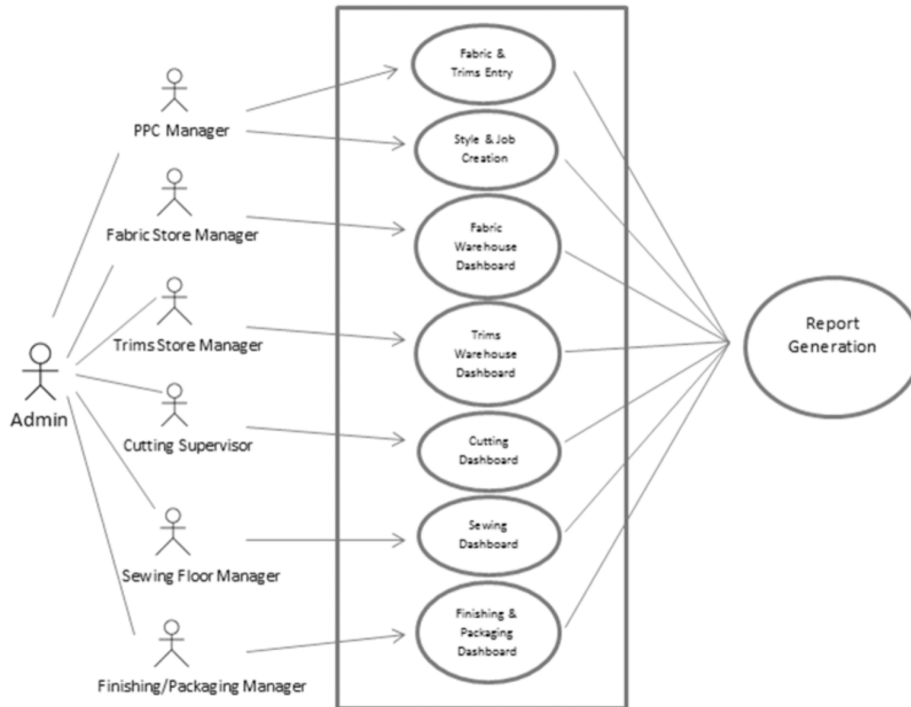


Figure 3: TMP Use Case Diagram



A separate login ID and password will be provided to manager of each department which can give him/her the access to enter the details of their specific department only. The production or quality manager can access the details and graphical analysis of each department. Once the fabric and trims are entered in the factory, basic details of both would be filled which would create their availability and can be seen in the fabric and trims warehouse respectively. There is a style and job creation page which would ensure the filling of basic details of the style with its colors, order quantity, buyer and other details.

After the style and job is created, one can see the availability of fabric in cutting department to start with the spreading and cutting processes. This includes ticketing and bundling too, wherever applicable. Graphical analysis of daily output along with style wise output is generated which makes it easier to analyze the cutting status at the end of the day.

Furthermore, availability of pieces for sewing can be seen in the sewing department after it is cut. Line no. wise output is filled which makes the graphical analysis more analytical. The same procedure continues to the finishing/packaging department making it easier to understand the real-time production status.

Special attention is given to the needle department as this is often neglected. So, a monitoring app for needle usage has also been developed which keeps a check on the number of broken as well as disposed needles.

App Development: TrackMyProduction Screens and Description

Fabric Entry

It is the most basic step of TMP application. Once an order of fabric is received in the factory, it is updated by the fabric store department. Once the details are filled, availability of the fabrics is shown as a list. The entry fields of this are following:

a) Color of fabric

Color of the fabric defines the overall look of the garment and it is one of the most sensitive and important aspect when it comes to garment manufacturing. Color of fabric is entered as per the order details and it is matched to the received fabric.

b) GSM

GSM stands for Grams per Square Meter. It is the weight of one square meter of fabric in grams. There are several methods to measure GSM of fabric. The most prominent ones are use of GSM cutter and Weighing Balance. GSM of fabric (for example, 120) is filled as per the received fabric.

c) Material

One of the major factors that decide the comfort level of the garment is the kind of fabric that is used for its manufacturing. Depending on the type and comfort of garment, fabrics are ordered

as per the details provided by the buyer. Some of the widely-used fabrics in garment industry are cotton, viscose, polyester etc.

d) Yarn Count

The fineness or coarseness of the fabric is defined by its yarn count. Yarn count is measured by counting the number of threads in one square inch or one square centimeter of fabric. It includes the length wise threads i.e. warp and width wise threads i.e. weft (for example 120*80)

e) Fabric Width

Consumption of fabric for a garment as well as its marker largely depicts on the width of the fabric and it is necessary to make sure that the width of fabric is according to the planned and ordered fabric. Once the width is checked, it is entered into the application and is moved to the fabric store department.

Trims Entry

Trims play a vital role in deciding the aesthetics of any garment. There are many instances where several trims are used in the same garment and it is necessary to make sure that all of them are available before the production of the pieces start. Even if one of the trims is missing, it may result in delays in loading of style which subsequently results in delay in delivery. Furthermore, it is quite challenging to keep the entries unique so that there is no confusion regarding overlapping of same trims for different styles. Several fields used for trims entry are following:

a) Name of Trims

Once the trims are received as per the order, the first entry is to overall distinguish its type. It is entered whether it is a zipper, buttons or other embellishments. While entering the name, it should be made sure that the name is quite explanatory and distinguishes it from others. Color of the trim is mentioned alongside the name to ensure smooth sectioning.

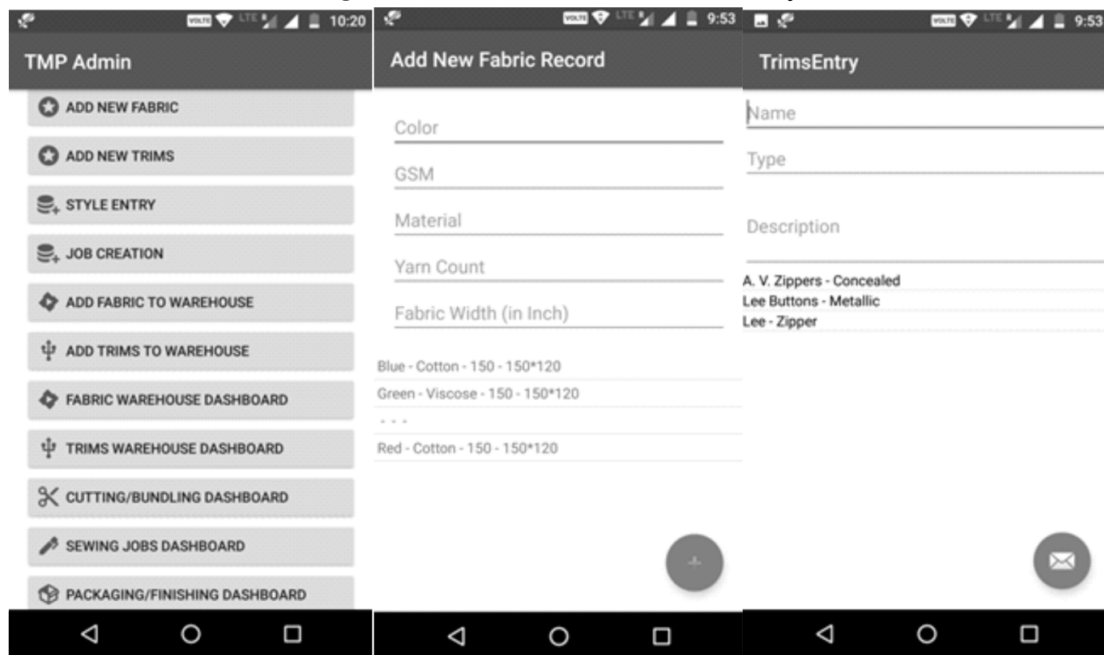
b) Type

Type of trim helps in further segregation of the received trims. For instance, if one receives two zippers of the same color, it would be difficult to distinguish just based on color. Thus, type (whether the zipper is concealed or not) can help in keeping a check on the received trims and making sure that there is no confusion when there is a need to issue them for production.

c) Description

There can be number of variations in trims and in any case, if there is an issue or miscommunication in issuing a trim as per a style, it can hamper the whole order and deadlines. Thus, to keep things clearer, a description section is provided where other details of trims can be mentioned such as the style for which it has to be used so that there is no scope of any loopholes.

Figure 4: Admin and Fabric/Trims Entry



Style Entry

Style Entry Page is used to add new styles and to identify the number of styles that are running on the floor. The added styles are shown as a list. Once you click on a style number, the details related to that style such as fabric consumption per piece, trim details and fabric details are displayed. If the style has not been added yet, then once you type a new style number there will be a section to add new style. Data Entry Points for this section are following:

a) Style Name

A unique style name must be given to the order. This style name/number is used for all the further tracking and is widely used on the production floor. Daily outputs are usually analyzed based on style number allocated to them.

b) Fabric Unit and Fabric Consumption Per Piece

The unit of measurement of fabric is mentioned in this section. Fabric consumption per piece is critically analyzed and it is very important to reduce the fabric wastage which is the major part of the cost involved in the production. Thus, in order to have a holistic idea of the consumption of fabric, fabric consumption per piece is defined beforehand after sampling and other testing.

c) Fabric Selection

The list of all the fabrics that have been received and entered in the app is displayed here as a dropdown menu. One must select the fabric that has to be used for a particular order as per the guidelines.

d) Trims Selection

A checklist of all the trims that have been added is displayed under trims selection. One can select multiple trims that must be used for a style number as per the desired order.

Job Creation

It is necessary to have a unique ID when it comes to know the exact status of an order. There can be more than one order with same style number, for instance, if one order was completed earlier and the other with the same style number is running. This can create confusion when it comes to tracking of the status of the order. Once the Job ID is created, it is shown in the TMP Job Dashboard. Once you click on a job, the status of each department is displayed i.e. status of fabric issued, trims issued, fabric cutting, sewing and packaging. In order to add a new job, data entry points that should be filled are following:

a) Buyer

Every buyer has their own set of norms and quality guidelines that are supposed to be strictly followed. Thus, name of the buyer gives everyone a brief idea about the norms that need to be followed for an order and the level of quality checks that the buyer will undergo.

b) Fabric Details and Style Name

The list of fabrics that has been added will be displayed as a dropdown menu and one must select the fabric as well as the color as per the style. The same needs to be followed for the style name.

c) Delivery Date

Under this section, delivery date for a job is mentioned as per the order confirmation. This helps in keeping a check on the progress and making sure that the order gets completed on time.

d) Quantity

The order quantity is also entered so that the status of progress can be monitored under the TMP Job Dashboard. It is easier to plan further processing beforehand if one gets to know that there might be a delay later.

Figure 5: Style Entry and Job Status



Add Fabric and Trims to the Warehouse

Fabric and Trims need to be registered to the warehouse to start with the cutting process to ensure that the fabric and trims are ready and in appropriate condition for use. The added fabrics and trims are displayed in their respective sections. Fabric and Trims are verified, and the available quantities are mentioned to begin with further process as per the requirement.

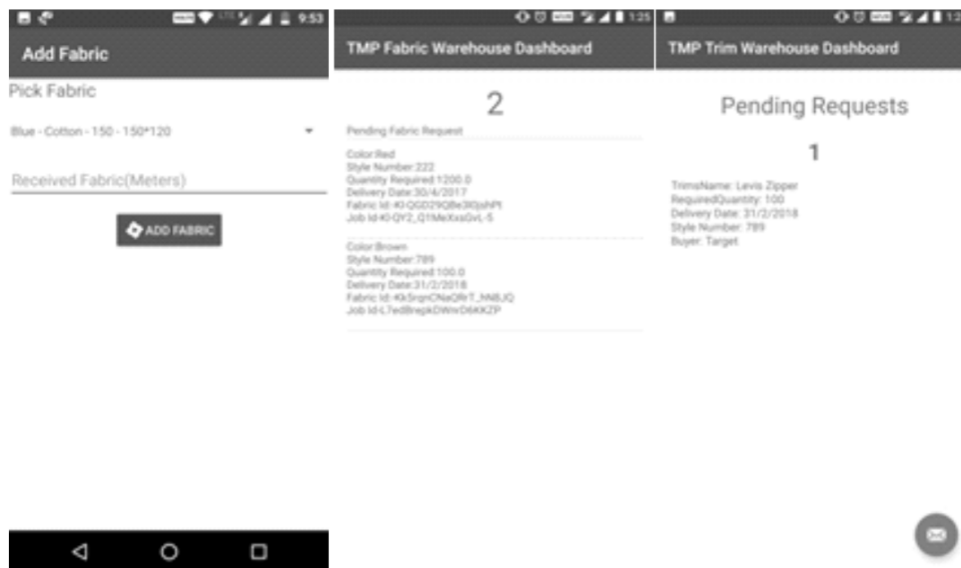
Fabric Warehouse Dashboard

Once the fabric is added to the warehouse, a request is sent to the fabric store manager under TMP Fabric Warehouse Dashboard. It is shown as a pending fabric request with all the details of the fabric such as color, style name, quantity, delivery date and job ID. In order to issue it for cutting, fabric store manager must select the order and put the quantity that needs to be issued for cutting. The issued quantity will be subtracted from the available quantity in the fabric store department.

Trims Warehouse Dashboard

Coordination between departments plays a vital role in making sure that the deadlines are met. Once the trims are added to the warehouse, a request is sent to the trims store manager under TMP Trims Warehouse Dashboard just like in the case of fabric. It is shown as a pending trims request with all the details of the trims. The trims store manager must issue the quantity as per the requirement. The issued quantity will be subtracted from the available quantity in the trims store department.

Figure 6: Fabric and Trims Dashboard



Cutting/Bundling Dashboard

Cutting department is one of the most essential sections for garment manufacturing. There are many complexities involved with the cutting department and it has a drastic impact on the cost of production as fabric wastages can increase the total cost of production to a large extent. Thus, it is very important to be well versed and prepared for the cutting procedures. Planning

needs to be done as per the fabric as different fabrics need to be handled differently. Marker needs to be efficient enough to make sure that the consumption of fabric is maximized, and wastage is reduced. Based on marker and nature of fabric, spreading of fabric is done. Automatic Spreading machines are also available which make the spreading process much easier. Once the fabric is spread on the table, cutting is done. There are several techniques used for cutting processes. Use of straight knives, band knives and round knives are the most prevalent ones in the industry. Cut pieces are bundled and ticketing is done to make sure that their movement and progress can easily be tracked. TMP can play a vital role in this case.

Once the fabric is issued by the fabric store manager, a request is sent to the cutting manager to start with the cutting process. It is displayed under the TMP Cutting Dashboard with the details of the order such as buyer, style name, color, quantity and delivery date. The cutting manager must update the quantity that has been cut. The cut quantity will be subtracted from the available quantity in the cutting department.

Reports play a vital role to analyze the progress and take necessary steps as and when required. Thus, in order to keep a track on the progress reports are created. The reports that are created are following:

- Weekly Status
- Style Wise Status

Graphical analysis is displayed week wise in the reports where number of pieces cut daily is shown as a bar graph. Thus, it becomes easy to depict if there is a sudden dip in the daily output. Style wise reports are also generated where output is displayed as per the date and style name.

Sewing Jobs Dashboard

Most of the emphasis is given to the sewing department in the garment manufacturing units. It is necessary to monitor the efficiency as well as the quality of the garments produced. Daily production output needs to be maintained to make sure that the production process is completed in accordance to the delivery date. There are different types of sewing arrangements used in the industry based on the size of the unit and the requirements of the style. In some of the smaller units, Make Through system is followed where a single operator makes the complete garment all by himself. The operator needs to be highly skilled for this as one needs to perform all the operations involved in the garment manufacturing.

The most commonly used arrangement is the bundle system where one operator performs the designated operation and passes the bundle to the next operator for next process. Thus, it becomes very important to keep a track of each operation so that the complete line works in a synchronized way with maximum output.

Once the pieces are cut and bundled in the cutting department, the cutting manager issues it to the sewing department. A request is sent to the sewing manager to start with the sewing process. It is displayed under the TMP Sewing Dashboard with the details of the order such as buyer, style name, color, quantity, fabric availability, trims availability and delivery date. The sewing manager must update the quantity for each of the style. Once the sewing manager clicks on a pending request, detailed screen is displayed. Line No. wise sewing quantity must be updated which gives the comparative analysis of all the lines. Defects per Hundred Units (DHU) are also filled to keep a check on the quality parameters and re- work. In order to calculate efficiency of a line, no. of operators working in that line along with working minutes are also filled by the sewing manager.

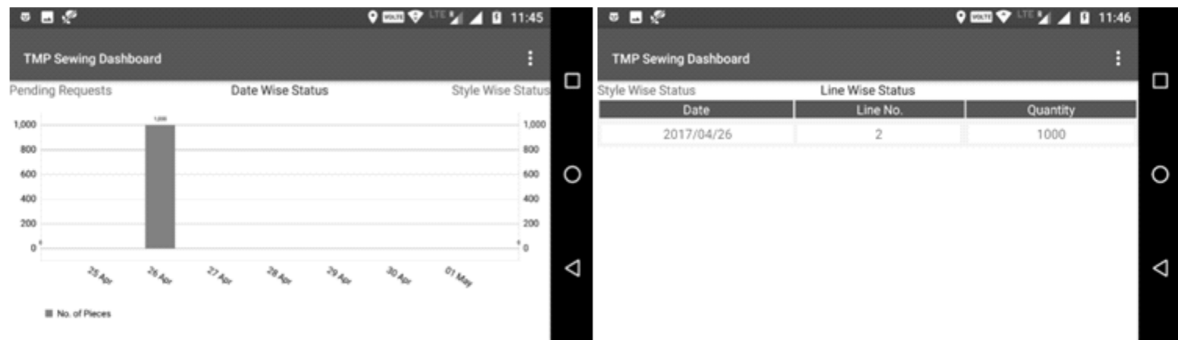
The sewed quantity will be subtracted from the available quantity in the sewing department.

Sewing department is the most basic and sensitive of all the departments as it involves the stitching part. Proper monitoring of each aspect is necessary to rectify any problem as soon as it happens so that the daily production is not affected. The reports that are created are following:

- Date Wise Status
- Style Wise Status
- Line No. Wise Status

Graphical analysis is displayed week wise in the reports where number of pieces stitched daily is shown as a bar graph. Style wise reports depict the output for each style daily while line no. wise status gives the overall performance of a line. There are several factories that follow line wise incentive system where the best performing lines are given certain benefits. Thus, line wise status can give a holistic view of performance of all the lines.

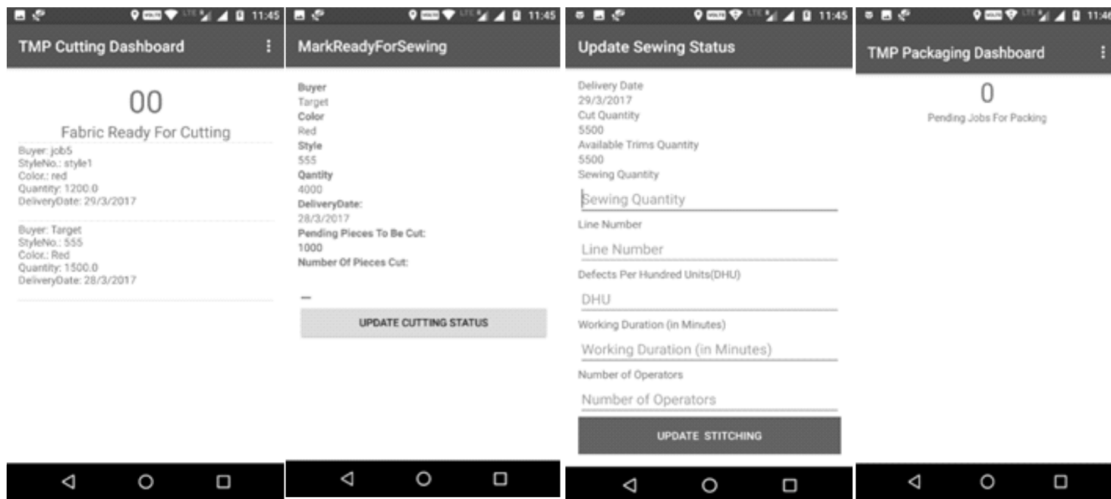
Figure 7: Sewing Dashboard



Finishing and Packaging Dashboard

Finishing and Packaging are the last steps before the dispatch of the order. Once the sewing process is complete, finishing processes are carried out where it is made sure that the labels are attached, hanger is used or not (if the buyer demands) etc. After the finishing process, packaging of the pieces is done as per the requirements. Sewing manager updates the status of the pieces sewn and based on that, a request is raised for finishing and packaging which is displayed under TMP Packaging and Finishing Dashboard. The Finishing and Packaging In-charge will update the status of packed quantity as per the style number. The packed quantity will be subtracted from the available quantity in the packaging department. Like the other departments, day wise reports and style no. wise reports are created to monitor the progress of the department.

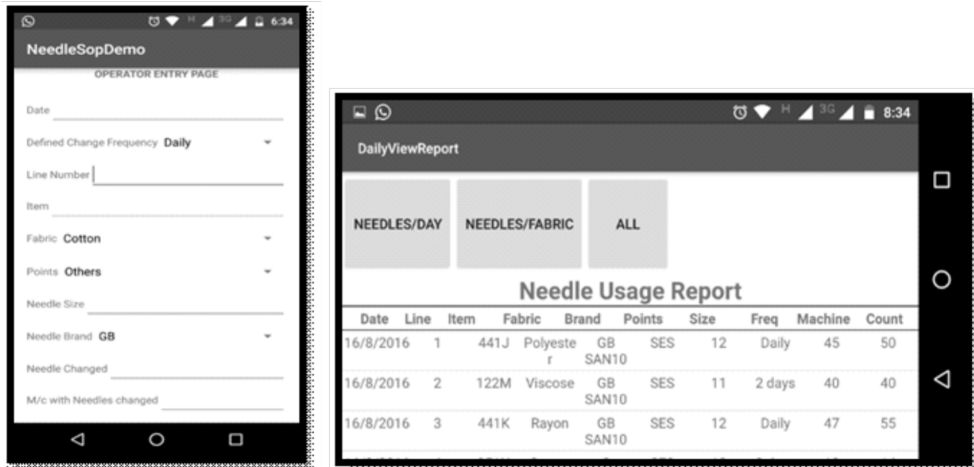
Figure 8: Cutting, Sewing and Packaging Status



Needle Monitoring System

Needle is one of the most basic needs for sewing and it plays a vital role in the quality of the manufactured garments. But, use of sewing needles is often neglected which leads to some severe repercussions in terms of quality issues. Thus, to develop needle as a department, a monitoring app for sewing needle usage was also created.

Figure 9: Needle Monitoring



The different data entry points on the operator entry page are following:

- a) **Date**

To keep the monitoring process up to date, data is entered every day so that it is easily observed whether the standard operating procedures are being followed or not.

- b) **Defined Change Frequency**

For every fabric and style, needle change frequency is defined. For instance, if the fabric is denim, change frequency can be of two days as the needles used might not get blunt easily while for a light weight polyester fabric, changing frequency can be daily as blunt needles might leave needle marks on the fabric which will raise quality issues.

c) **Line No. and Style/Item No.**

The data is entered for every line in accordance to the style running on that line. Thus, it becomes easier to monitor the number of needles changed in each line at the end of the day.

d) **Fabric Details**

Uses of needles depend heavily on the kind of material used. Thus, in order to analyze the data, it is mandatory to have a report which compares the needle usage as per the fabric.

e) **Needle Brand, Size and Points**

The brand of needle used is also updated to compare the performance of different needle brands and choose the one that suits the production parameters. Needle Size is also updated as per the testing results. It is also defined whether one must use a ball point needle or a sharp pointed needle. This depends on the type of fabric that is used for a style.

f) **Number of Needles Changed**

The number of needles changed is updated for each line along with other details which can give the holistic view of the consumption of sewing needles on a floor.

g) **Machines with Needles Changed**

In order to ensure that the SOP is strictly followed, machines with needles changed is also updated. For instance, if a line contains 40 machines and the needle change frequency is daily, then there should be minimum of 40 needles changed for a day. Even if the number of needles changed might be high, (considering case of multiple breakage of needles on a machine) machines with needles changed will give a real-time status on the authenticity of implementation.

There are three types of reports that are displayed for the needle department. They are following:

a) **Needles/Day**

This report gives us the date wise count of needles changed irrespective of line no., style name, fabric etc. Thus, it becomes easier to keep the inventory for needles up to date and it can be easily identified when needles need to be ordered so that there is no delay due to shortage of sewing needles of any type.

b) **Needles/Fabric**

Needles/Fabric gives us the needle consumption as per the fabric used. In case of light weight fabrics, the frequency of needle change is more often as it is necessary to ensure that the needle point doesn't get blunt as it would leave needle marks and holes in the garment. It has been observed that because of such defects many pieces get rejected, thus, fabric wise needle tracking can help in ensuring that light weight fabric gets required attention when it comes to needle usage.

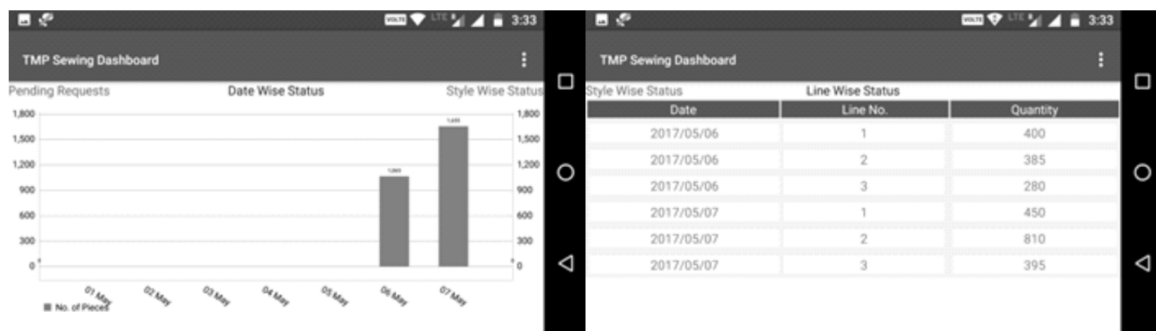
c) Consolidated Report

Consolidated Reports consist of all the filled details and gives us a holistic view of the whole department. The report contains date, line number, style, fabric, needle brand, needle points, needle size, needle change frequency, number of machines with needle change and the overall count of needle changes. It becomes easier for the quality manager to analyze each aspect of needle usage by having a look on a single report, thus saving a lot of time and effort.

A test run was conducted in one of the factories for two days and reports were sent to the managers for their feedback. The needle monitoring got positive response from the higher managers, but training sessions are required for the needle issuing manager who has to enter the data. In order to ensure that the filled data is accurate, the authorized person should be well versed with the terms used in the application.

Some of the report formats based on trial run were as follows:

Figure 10: Needle Monitoring Results



Conclusion

TrackMyProduction, app-based PMS that has been developed is an essential production tool for apparel SMEs, for both the management and the production team. The Production Monitoring System (PMS) captures and distributes unadulterated production information at all levels along the production process with minimum human intervention. Realistic production targets can be achieved when proper analysis of the collected data is done. Implementation of the changes required becomes easier and at the same time, results are beneficial and transparent for the organization.

TrackMyProduction hands over the control of production to the higher managers who can analyze the production processes in a short interval of time. Thus, this would reduce the communication gap between units where different processes are carried out. This app also makes sure that the availability of fabric and trims are properly analyzed before starting the sewing process so that there is no shortage of trim or cut pieces which might lead to wastage of time.

SMEs can easily afford TMP as it is not costly like ERPs and it is comparatively easier to implement as only limited number of people must be trained for the data entry and monitoring purpose. Thus, TMP can solve the problem of maintaining registers and issuing challans for each department and can help in smooth functioning of each department with real time data tracking.

Some of the major tangible benefits of TMP are that it improves the productivity of process as well as personnel with the help of real time monitoring. It reduces the cost of paper used in

monitoring based on registers and diminishes stock obsolescence with proper connectivity amongst the departments. TMP also saves time that is spent in looking at the progress and status of manufacturing.

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