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Garment Manufacturing System

[1]Mr. Prasad Patil, [2] Ms. Arti Dhongade, [3]Mr. Omkar Bhosale,[4] Mr.Prathmesh Panpatte, [5] Miss. S. D. Patil

[1]Student, [2]Student, [3]Student,[4] Student,[5]Guide
[1]Department of Computer Engineering,
[1]D. Y. Patil Technical Campus, Talsande , Kolhapur, India

Abstract: This study is designed to assess and improve apparel sewing section efficiency and productivity throughout line balancing. Apparel industry is one of the oldest and among the most global industry, being primarily concerned with the design and production of cloth and their supply. The central process in apparel manufacturing is the joining together of components whichis known as the sewing process , which is the most labour intensive type of manufacturingprocess .Proper utilization of resources in garment sewing section is more critical to enhance the performance of the apparel industry by reducing production cost and minimizing wastage. For effective utilization of resources in the sewing section, good line balancing is important to increase productivity and production efficiency. This research was a design to analyse andimprove the assembling line in the case of Telaje garment manufacturing and sales plc.

IndexTerms **– Assembly line, Bottleneck, Line balancing, Productivity**

I. INTRODUCTION

As a supply chain of textile industry, garment industry is one of the major industries of the world . The production process of garments is separated into four main phases: designing/ clothing pattern generation, fabric spreading and cutting, sewing and ironing, and packing. The joining together of garment components, known as the sewing process which is the most labour intensive part of garment manufacturing. Furthermore, since the sewing process is labour intensive; apart from material costs, the cost structure of the sewing process is also important [6, 12]. Therefore, this process is of critical importance and needs to be planned more carefully As a consequence, good line balancing with small stocks in the sewing line has to be drawn up to increase the efficiency and quality of production. The production process includes a set of workstations, at each of which a specific task is carried out in a restricted sequence, with hundreds of employees and thousands of bundles of sub assemblies producing different styles simultaneously.

II. MOTIVATION

Motivation is crucial for any project or system development, including a Garment Manufacturing System. Here are some key motivations for implementing such a system using SQL and PHP:

- **Efficiency Improvement:** A well-designed Garment Manufacturing System can streamline processes, reduce manual errors, and improve overall efficiency in garment production. SQL and PHP can be used to create a database-driven system that automate tasks such as order management, inventory tracking, and production scheduling.

- **Cost Reduction:** By automating various aspects of garment manufacturing, businesses can reduce labor costs and minimize waste. SQL databases allow for efficient storage and retrieval of data .

- **Inventory Management:** Effective inventory management is critical in the garment manufacturing industry to ensure timely production and delivery of orders. SQL databases provide a robust platform for managing inventory data, including tracking raw materials, finished goods, and work-in-progress items. PHP can be used to develop dynamic interfaces for inventory management, allowing users to view stock levels, generate reports, and place orders as needed.

- **Quality Control:** Maintaining consistent quality standards is essential for garment manufacturers to uphold their reputation and meet customer expectations. SQL databases can store detailed information about product specifications, quality control processes, and inspection results. PHP can be utilized to develop interactive dashboards and reporting tools that allow quality control personnel to monitor production metrics and identify areas for improvement.

- **Scalability and Flexibility:** As a business grows, its manufacturing requirements mayevolve, necessitating a scalable and flexible system that can adapt to changing needs.SQL databases offer scalability by allowing businesses to easily expand their database infrastructure as data volumes increase. PHP's flexibility enables developers to modify and extend the functionality of the system to accommodate new requirements or integrate with other software solutions.

- **Data Analysis and Decision Making:** Data-driven insights are invaluable for making informed business decisions and optimizing manufacturing processes. SQL

Databases store large volumes of structured data, which can be analyzed using SQL queries to extract meaningful insights. PHP can be used to develop data visualization tools and reporting dashboards that present key performance indicators and trends, empowering decision-makers to identify opportunities for improvement and drive strategic initiatives.

By leveraging SQL and PHP to develop a Garment Manufacturing System, businesses can achieve greater efficiency, cost savings, and quality control, ultimately enhancing their competitiveness in the market.

III. LITERATURE REVIEW

Abstract This paper summarises the results of a more than 5-year practice-led studyon the use of upcycling design and production methods in garment mass production. The efficiency of upcycling design approach is described by analysing the generationand potential use of various types of fabric leftovers from garment manufacturing[1].

The results of this research show that depending on the size of the factory the fabric leftovers and textile waste generated in garment production ranges from 25–40% of the total fabric used. Experiments show that 50% of that material can be upcycledinto new garments and for some types of leftover—mainly spreading loss and excess fabric—it can even be up to 80%.[2]

Implementing upcycling on the industrial level requires transparency to understand the waste created in garment production and create designs that suite the production system. It is important to consider that the upcycling design process differs from regular design—a garment is designed basedon the parameters of the waste materials[3].

IV. ANALYSIS

1. MATERIALS AND METHODOLOGY

Methods :

This research was designed to analyse and enhance the assembling lines in the case of Telaje garment Manufacturing and sales Plc. The study was first conducted through observation starting from the production floor. Selection of sewing lines and ordered products are made. Then the experimental work is performed and then analysed. Based the results obtained, the way for improving asseTelaje garment production will be proposed. Both qualitative and quantitative approach methods were used. Collected data were analysed using descriptive statistics for analysis. The obtained results were presented using numerical value and the grap

Data collection :

The data were collected from Telaje Garment Manufacturing and Sales plc. In the garment sewing section .Both primary and secondary data sources were used to collect relevant data. Primary data was collected from direct observation from the production floors and interviews with the line supervisors and other responsible persons. The data mainly focused on one type of product within the assembling line knows as five pocket men Jeans Trousers.

1.1 Data analysis :

For this study, among nine lines of the factory, one line on the production floor, and one garment ordered product which is known as five pocket men's jeans trousers are selected. For the selected product, perform an operation breakdown based on their style and operational sequences before doing line balance. Working out a performance breakdown to compare the current factory method and the possible standard methods. Examine work measurement to establish the time for a qualified worker to carry out a specified job at a defined level of performance, and collecting and recording the time studies to systematic recording and critical examination of existing & proposed ways of doing work. Further Calculation was made for SMV & Efficiency to know thetime required to complete one piece of garment by a qualified (standard) operator at standard condition. Finally, for smooth production flow, improved efficiency and productivity, appropriate.

IV. MODULES

In this system requires mainly two modules i.e., 1) User 2) Municipal.

A. Module 1 User:

1. Register: User can register using their personal information.
2. Login: User can login with username and password.
3. Profile
    a. Personal Details
    b. Orm Suggestions.
    c. Sent complaints/feedbacks
4. Extra Activities about Roads
5. Extra Information about road network

Table 1: Highly Bottleneck Operation in the Existing Scenarios and balanced proposed line

Assigned no	description of operation	M/c type	Existing M/C and Opr.	Existing Line Output	Existing Balance Efficiency	Proposed M/C and Opr.	Proposed Line Output	Proposed Balance efficiency cy
D01	Sew Inseam	5th ol	1	184	29.1%	2	387pices/day	50.04%
D02	Top Stitch Side Seam	FOA	1	184	29.1%	2	387pices/day	50.04%
D08	Waist Band Attach To Main Body	SNLS	2	184	29.1%	6	387pices/day	50.04%
D09	Topstitch waist band corner	SNLS	2	184	29.1%	6	387pices/day	50.04%

Bottleneck processes are a Delay in transmission that slow down the production rate. This can be overcome by balancing the line. From the above pitch diagram and line capacity graph we understand that workers having lower capacity level are doing their jobs at

Operation such as Sew Inseam, Top Stitch Side Seam, Waist Band Attach To Main Body and Topstitch waist

band corner are take more time that cross upper control

Limit (UCL) and it is approximately 87.74seconds. They require more processing time for which cannot pass required amount of product to the next operator or next operation. These positions are creating bottlenecks. On the other side. Not any operators were doing the jobs more promptly than the requirement. So this indicates the line was imbalance.

Work load is excess that was distributed among the higher capacity possessing workers considering the layout. Thus the bottlenecks were solved and maximum capacity was utilized and most importantly productivity was improved. Finally minimize thus bottleneck process and increasing line productivity and total line efficiency enhancing up to 50.04%. Proposed line Operational procedure for selected style

3.3. Production Cost for five pocket trousers

In the daily production report, many companies include the actual garment production costs of the style. In this study, the production cost represents the sewing room cost and is taken to identify the cost of each situation. Therefore, all direct and indirect costs that are connected to garment sewing and managing sewing lines are considered in the calculated garment production cost. Based on tillage garment manufacturing and seals PLC production manager handles eight lines, monthly salary is 8500:00 birr considered as cost incurred per line per day by dividing the number of lines .To calculate machine deprecation average price of machine 16000ETB it gave 10 years deprecation for one day

=16000birr/10year*12month*26 day =4.1birr, where 26 are working design a month.

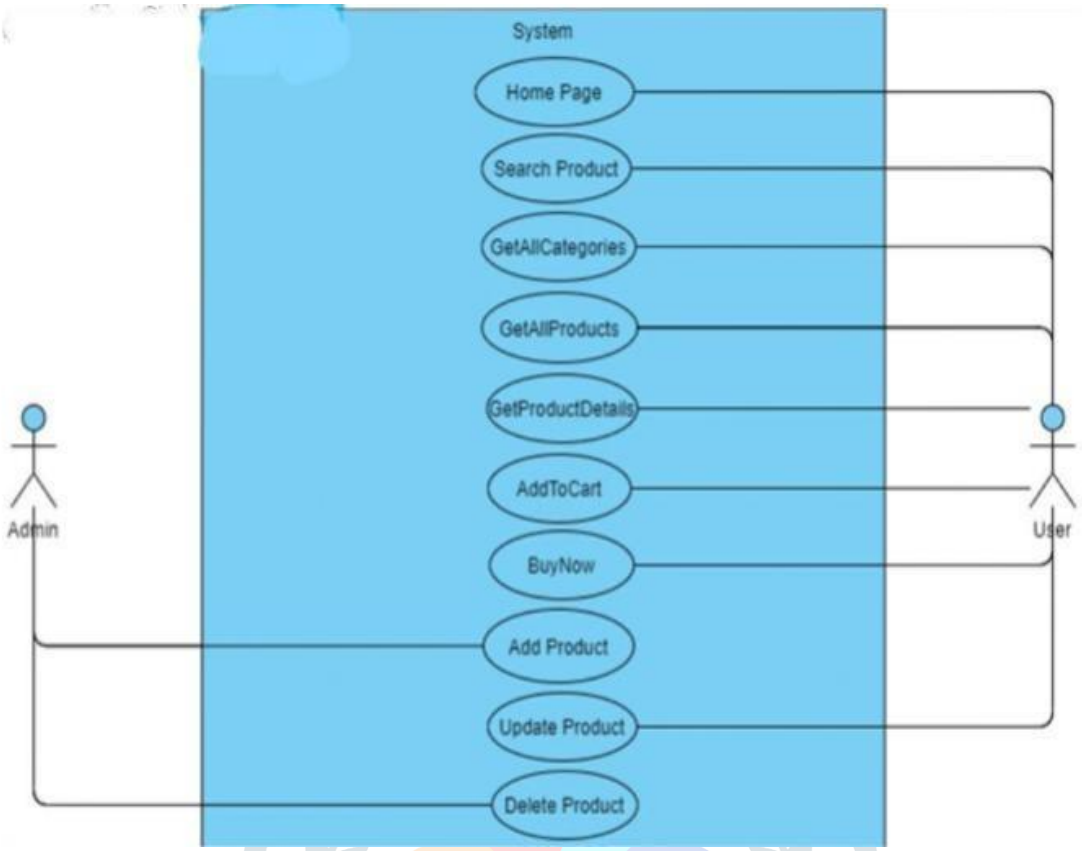
The rent of the house was 60,000birr/month. Rent of per day = 60000birr/26day=2307.69birr. For one line divided by the number of lines which is 288.46birr.

Table 2: production cost of trouser excising line scenario 1and 2

No	Employee designation	Daily salary	Number of employees	Total daily salary in ETB
1	Manager	461.53	1	461.53
	Designer	326.92	2	653.92
2	Production manager	326.92	1	326.92
2	Line supervisor	276.92	1	276.92
3	Maintenance	84.65	2	169.3
4	quality control	84.65	1	84.65
5	Recorder	69.23	1	69.23
6	Bundle transporter	69.23	2	138.46
7	Operators	69.23	44	3046.12
8	Helper	69.23	4	276.92
9	Expense	57.69birr		57.69
10	Depreciation	4.1birr	44machine	184.4
10	Rent	288.69birr	33	288.46
Total				6034.52Birr per day
	Existing line daily production cost per picess.	pcs daily output184	Daily production cost = Total cost/day 6034.52 daily output/pcs 184 32.796Birr/pcs	6034.52
	Proposed line	Daily product=220.375 pcs	Daily production cost = Total cost/day 6470.5 daily output/pcs 387 =16.72Birr/pcs	6470.5

Figure 3: Performance Measurement

VI. ARCHITECTURE



VII. SCOPE

- AI/ML: By adding pit detection in project and sending that data to municipal and it will get improve the quality.
- Implementing this website on higher level will get helpful to improve the quality high level
- Adding the new technology using bots in ai will helpful in emergency situation.
- Improving pit detection quality using IOT based instruments.
- Adding map system that will get helpful to achieve correct location
- Alert system for user as per road conditions.

VIII. CONCLUSION

The objective of this thesis was to improve the productivity of the manual single model assembly line. Line balancing concept was applied to a case study problem and four different assembly solutions were developed and compared, namely, (I) Increasing the level of resources in the bottleneck process, (II) avoiding non-value added activities by changing work method and layout, (III) merging operations having similar machines and (IV) combination of scenario II and III. Based on the analysis of each key performance indicator (KPIs), after measuring the results, the fourth scenario was suggested for implementation. This thesis work analysis the current situation relate to assembly line and developed the proposed line to improve the key performance

parameters such as line efficiency, productivity, and production cost by reducing and eliminating the problem of existing scenario of the line based on this proposed scenario was improving the efficiency from 29.1% to 50.04%,productivity from 184 pieces/day to 387 pieces/day and production cost was minimize from 32.796 cost per pieces(ET birr) to16.72 cost per pieces(ET birr).

IX. REFERENCES

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