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OPTIMIZING THE MAN-MACHINE RATIO TO MAKE THE FACTORY MORE COST-EFFECTIVE

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Abstract:
Purpose- For the garment industry proper utilization of machines & manpower is very important to make a profitable business in this competitive global market. The man-machine ratio (MMR) gives an indication to the management about the indirect cost of the factory. Higher MMR can be a cause of low profit margins. However, there was not any standard MMR for the factory. It depends upon various factors like product type, machine type, production system, etc. Eliminating the waste from the process can help to reduce the manpower. However optimum use of the manpower can lead to optimum MMR.

Methodology- A kid's wear manufacturer's data is considered for this project. Understanding the department involved in that factory. How each department contributes to the factory MMR. Understand the product portfolio & take three main products that consume 80% of the total production time that the factory has. Eliminate some waste from the process & implement new processes. Analysis & comparison before the new process & after the new process data.

Findings- In a few operations, it has been found that the garments have been overly processed & that doesn't create any value addition. Removing that waste will give a better MMR score for the factory. In this project, 38 manpower are reduced from the current process by reducing one of the Muda (over-processing). By this study, it has been found that MMR is optimized from 2.10 to 1.99. This helps the factory become more cost-effective by reducing the cost of 60 lakh per annum.

Keywords- Man-machine ratio, Garment industry, Kid wear, Profitability, Kaizen.

Paper Type- Research Paper

I. INTRODUCTION

Global apparel consumption was USD 1.8 trillion in 2017-18 & expected to reach USD 2.6 trillion by 2025-26. India is 5th largest apparel exporter with 4% of the global share (Global Textile & Apparel Industry – India's Position, 2019). 6 million workers are directly & indirectly associated with this industry (Panthaki, 2008) as the garment industry is very labor-intensive. production of garments requires the employment of a relatively large number of people.

Number of workers is directly proportionate to the cost of manufacturing. As a result, factories are shifting from developing countries to underdeveloped countries to reduce manufacturing costs. Due to lower labor costs, power costs, lending rates & water costs, garment manufacturers are moving from India to countries like Bangladesh, Ethiopia, etc. (Nayyar, Chawla, & Pagaria, 2020). To withstand this problem factories should focus on improving the utilization & productivity of the workers.

1.1. Problem statement

In a study, it has been found that 32 industry respondents share their Man-machine ratio (MMR). The table is shown below

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Table 1: MMR of Industry Respondent

Respondents	MMR (Man:Machine)	Respondents	MMR (Man:Machine)
Respondent 1	1.75	Respondent 17	1.78
Respondent 2	1.65	Respondent 18	2.36
Respondent 3	1.25	Respondent 19	1.29
Respondent 4	1.38	Respondent 20	1.45
Respondent 5	1.81	Respondent 21	1.33
Respondent 6	1.50	Respondent 22	1.40
Respondent 7	1.20	Respondent 23	1.78
Respondent 8	1.80	Respondent 24	1.75
Respondent 9	2.20	Respondent 25	1.80
Respondent 10	1.90	Respondent 26	1.75
Respondent 11	2.23	Respondent 27	1.65
Respondent 12	1.70	Respondent 28	1.90
Respondent 13	1.70	Respondent 29	2.18
Respondent 14	1.70	Respondent 30	1.80
Respondent 15	1.70	Respondent 31	1.39
Respondent 16	1.81	Respondent 32	1.70

The average MMR is 1.71. However in the ABC factory, it has been found that the MMR is 2.10. This can be reduced.
Cost per minute of factory = (Actual salary for one day/ (Total garment produced in one day x SAM of a single garment))

Year	Month	CPM
2022	Fab	8.58
2022	Jan	9.41
2021	Dec	9.54
2021	Nov	8.85
2021	Oct	9.12
2021	Sept	8.69
2021	Aug	8.44
2021	July	7.57
2021	June	7.47
2021	May	10.73
2021	Apr	7.72
2021	Mar	7.45
Average		**8.63**

Table 2: Yearly CPM of sample company

The factory has a higher CPM value (as per discussed with the marketing team). The company feels that by reducing the manpower actual salary of the factory will be reduced. Once the salary gets reduced the CPM value of the factory will optimized. In a few sections of the line, it has been found that there is little over-processing has been done on the product. There are few NNVAs but those activity are not require as same activity is done in the further process. As a result, the productivity of the factory is poor which in turn results in higher manufacturing costs & higher Man Machine Ratio.

1.2. Primary Objective

- Optimization of Man-Machine ratio.
- Make the factory more cost-effective.
- To gain high resource utilization & profitability.

DOI: 10.17148/IARJSET.2024.11116

II. LITERATURE REVIEW

a. **SAM:** SMV is a numerical value that represents the standard time of a process or operation in a standard environment for a standard worker. SMV is calculated by adding the allowances to the basic time. Many techniques have been developed to establish SMV. (Salvendy, G. (2001). Handbook of Industrial Engineering. 1st edition, Wiley, New York, 2001.)

b. **Productivity**: This term can be used to assess or measure the extent to which a certain output can be extracted from a given input (Kanawaty G., Introduction to Work Study, 1992). Productivity = Output/ Input. For a high return on investment from expensive resources in today's competitive business environment, effective use of machines and manpower is essential in the manufacturing of apparel products (B & Regy, Mar 2014).

c. **Profitability:** The ability of a business to earn a profit is called Profitability. A profit is what is left of the revenue a business generates after it pays all expenses directly related to the generation of the revenue, such as producing a product, and other expenses related to the conduct of the business activities (Grimsley, 2021).

d. **Key Performance Indicator** of Factory How well a factory is performing can be measured by the Key Performance Indicator (KPI). The top 10 KPIs for the garment factory are:

- Factory efficiency %,
- MMR,
- Cut to ship ratio,
- Order to ship ratio,
- On time delivery,
- Average style changeover time,
- Right first-time quality,
- Quality to production,
- Downtime percentage &
- Employee turnover rate (Sarkar P., 012).

e. **Man-Machine Ratio:** The primary focus of this project is to work on Man Machine Ratio (MMR). Man machine ratio can be defined as a total workforce to total number of operational sewing machine in a particular factory. MMR = Total workforce in a factory / Total number of operational sewing machines Depending on the structure of a company man-machine ratio is widely varied. If the factory have only garment production associated department (i.e., cutting, sewing, maintenance, quality & IE) then the ratio will be low, on the other hand if the factory include department like sampling, designing, marketing than man machine ratio will be higher (sarkar, 2012).

i.Importance of measuring MMR

- Factory management can assess how many personnel are required per machine by measuring MMR. To get a clear indication of the indirect cost ratio upon the direct labor cost of a factory MMR ratio is very helpful.
- To control overhead cost Man to man-to-machine ratio (MMR) analysis is done. The salary of all the manpower is included in the cost of the factory. Based on the factory size & product different factories may have different MMR.
- To control overhead cost factories, measure this ratio and try to meet the benchmark man-to-machine ratio. When MMR increases in a specific month, the factory checks where manpower increases.
- Based on specific style manpower may get an increase in the sewing floor, that manpower may be trimmer, checker, pressman & helper. Department heads have to confirm whether that manpower is a permanent requirement or for a particular style (Sarkar P. , Industrial Engineer's digest, 2021).

f. Type of Manpower Total available workforce can further divide into two categories,

- Direct labor
- Indirect Labor.

Direct labor work and process the different materials manually or with the aid of machines & indirect labor helps the direct labor in performing their duties (KIRAN, 2019). As factory 8 have both type of manpower, measuring the manpower requirement is very important. There are different ways of measuring the manpower requirement for a factory, those are Ratio, Technical estimates, Project control reporting, and Trend data (U.S DEPARTMENT OF HEALTH, 1969).

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For calculating manpower requirement in the skill-based task, the steps are measuring the work content then deciding on target & lastly calculating the manpower to meet the target (Jana, A Scientific Approach to Manpower Planning, 2009). **Indirect labors** are manpower who are not directly involved in the production or process but they do office work to help the production.

In a study it has been found that a company has a strength of 1047 employee & 522 machines, MMR is 2.01 whereas in cutting have a strength of 130 manpower (B & REGY, Optimization of Man-Machine ratio in the garment industry, Mar 2014). As we calculate the MMR excluding the cutting department our MMR should be less than 2.01. Although there is no standard MMR in the garment industry lowest MMR is found 1.25 for a knit garment factory from a survey where 32 respondents participated (Sarkar P., OnlineClothingStudy.com, 2021).

In a study of manpower assessment by technical audit, it has been found that work study, sample observation, job evaluation & work measurement are the technique that helps to reduce manpower with an assurance that the factory will run smoothly. This in turn saves a cost of approx 10.00 lac per annum (Srivastava, 2009).

III. METHODOLOGY

This study is based on the work content measurement of each designation. Once work content is measured, it can help to calculate the manpower requirement for each designation. Before that studying the existing department is required.

i. Identifying the current department and designation in each department

In this step, manpower is present in each designation & each department needs to find out. Understood the work nature of that particular department & designation.

ii. Defining current MMR & contribution of each department

Once the cleaning process was completed the new MMR needed to be identified. This data gave an idea of which area needs to focus to further reduce the manpower

iii. Identifying product type & SAM required for each product

Check last year's production data & find the product basket. Identify the most produced goods & what is the SAM requirement of each product.

iv. Identify the waste in the process & eliminate waste from process

Understand the process & find the waste in the process to reduce the manpower.

v. Implementation new process & analyses the Inline data

In 1st step, identifying last year's data of product-wise required SAM & total quality produced in each product vertical. From this data, product-wise line requirement percentages can be obtained.

Suppose for a particular product
Yearly SAM requirement -A
Total SAM requirement by factory – B
Total quantity produced – C

$$\text{Percentage SAM requirement (D)} = \frac{\text{(Yearly SAM requirement)} * 100}{\text{Total SAM requirement by factory}}$$

$$= (A / B) * 100$$

Suppose, Total line available - E

So, line required per product (F) = (Percentage SAM requirement x Total line available)

$$= E\ (A / B) * 100$$

SAM of a particular operation= (Average observe time x Rating factor) x Allowance %

Manpower requirement = (SAM of a operation x total no of piece produce) / Available time

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b. Process sequence

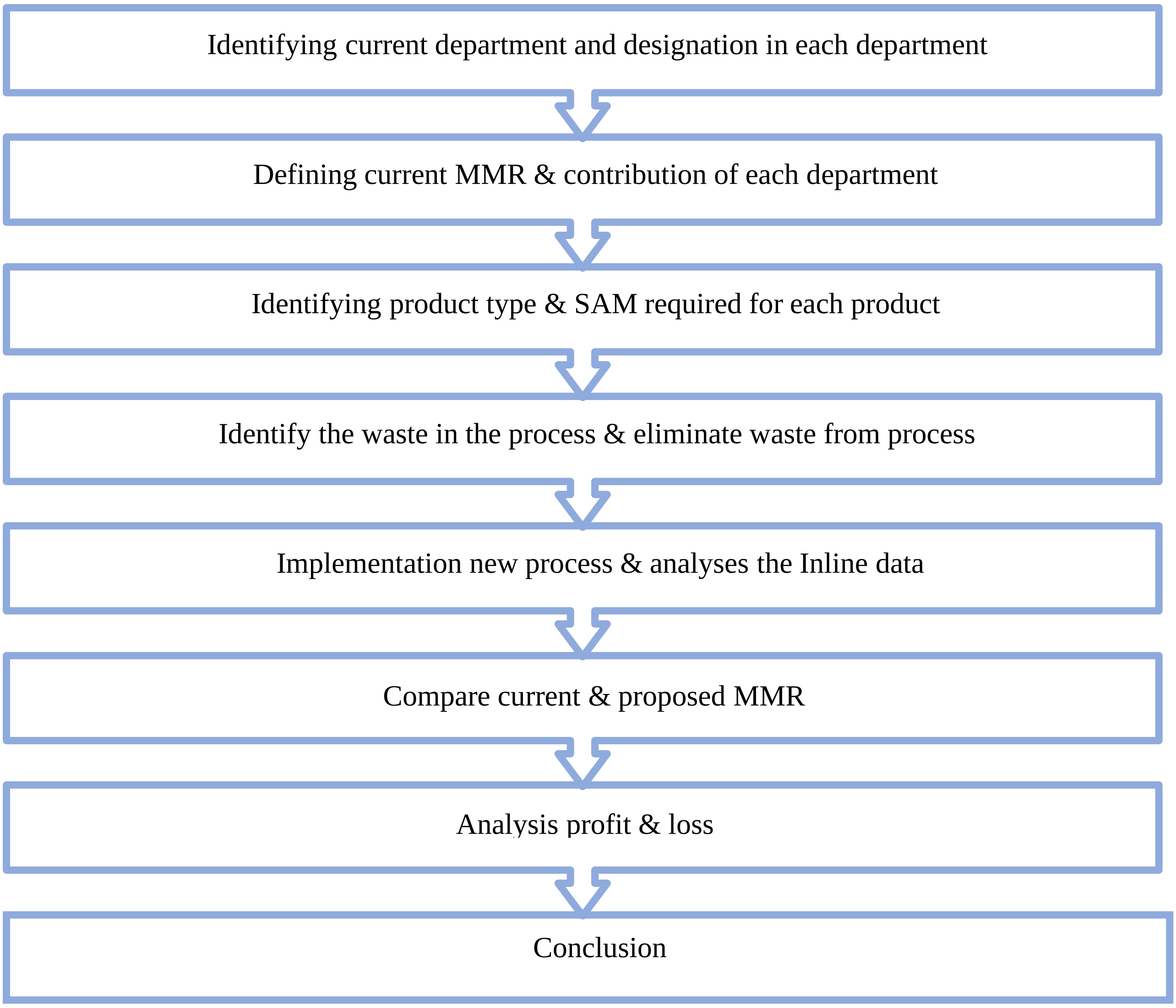

Figure 2: Methodology

IV. DATA ANALYSIS

a. Manpower type & strength

The total manpower of this factory is divided into two major group, Direct Manpower (Operator) & Indirect (Non-Operator & Staff). it has been found the manpower present in the factory is 721. Out of this 721 manpower, indirect manpower are 378 & direct manpower are 343. In this factory 48% is in direct manpower & 52% is indirect manpower.

Type of manpower & strength

Manpower Type	Strength	Percentage
Direct	343	48%
Indirect	378	52%
Total	**721**	

Table 4: Type of manpower & strength

DOI: 10.17148/IARJSET.2024.11116

This indirect manpower strength, It further can be divided into two major groups. One type is staff indirect manpower & another type is non-operator indirect manpower. Available staff in the factory was 56, which was 15% of Indirect manpower & 322 were non-staff (Helper, trimmer, Checker, Packing & other), which was 85% of total indirect manpower.

Indirect Manpower Type	Strength	Percentage
Staff	56	15%
Non- staff	322	85%
Total	**378**	

Table 5: Type of indirect manpower

b. Consolidate data for department-wise Man-Machine contribution

Department	Staff	Non-staff & operator	Total	Percentage
Stitching	0.044	1.359	1.402	66.71%
Packing	0.020	0.350	0.370	17.61%
Checking	NA	0.213	0.213	10.12%
Quality	0.052	NA	0.052	2.50%
Store	0.006	0.017	0.023	1.11%
Maintenance	0.017	NA	0.017	0.83%
IE	0.015	NA	0.015	0.69%
Electrical	0.009	NA	0.009	0.42%
TOTAL	**0.163**	**1.939**	**2.102**	

Table 6: Department-wise man-machine contribution to MMR

The total contribution of indirect manpower (Staff) is 0.163. The total Contribution of Non-staff & operators is 1.939. The total MMR of the factory is 2.102.

c. Operational Machine

Operational machine is divided into three part. These machines are below

Type Of M/C	Operational M/C
Fuse / Heat transfer machine	14
Sewing machine	296
Snapping Machine	33
Grand Total	**343**

Table 7: Type of Machine available

Product category After analyzing the financial year data of the factory. It has been found that the factory produces 22 different types of products. Out of these 22 products, 3 products have consumed 81% of the total SAM requirement of the factory. So this project's aim is to work on those products.

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d. Consolidate data of product-wise quantity & SAM required

Product	Pictorial View Of Product	Production qty	Req. SAM	Produced qty percentage	SAM reqd. Percentage
Sleepsuit		29,65,005	1,56,38,156	33.95%	45.97%
Bodysuit		27,03,025	72,04,961	30.95%	21.18%
Romper		11,00,983	48,24,621	12.61%	14.18%
Other		19,64,573	63,48,837	22.49%	18.66%
Total		**87,33,586**	**3,40,16,574**	**100.00%**	**100.00%**

Table 8: Product-wise Pieces produced & SAM involved

It has been found that there are three major products that have major contributions to the production quantity & the SAM requirement. The major product are Sleep suit, Bodysuit, Romper & other

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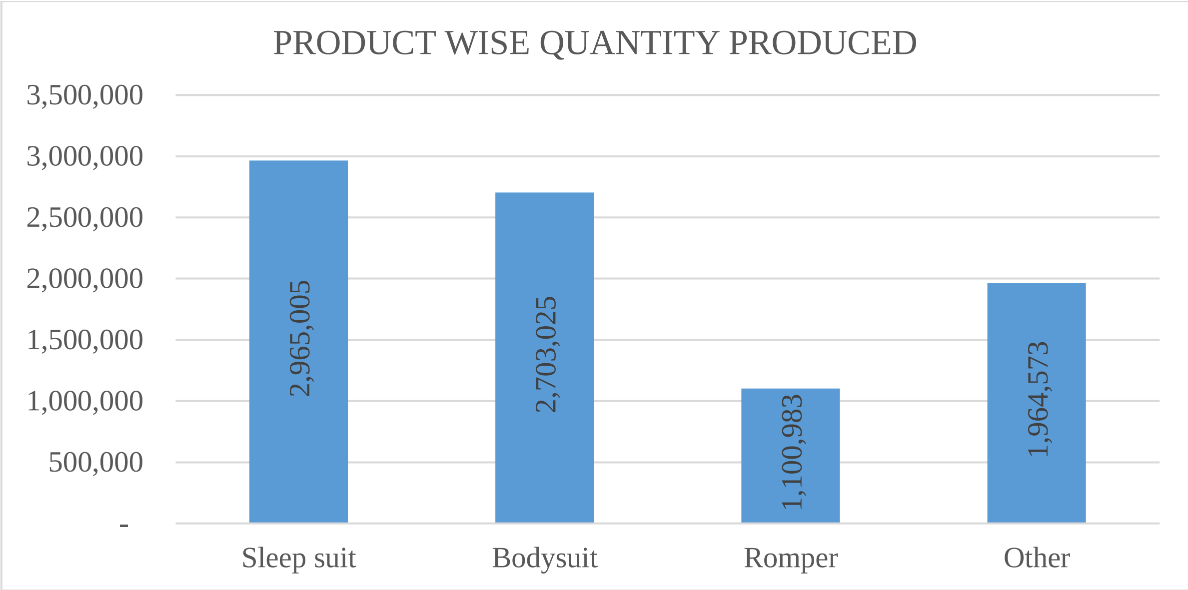

Figure 5: Product-wise quantity produced

The production quantity of the sleep-suit is 2965005 pcs, the Body-suit is 2703025, the Romper is 1100983 pcs & others are 1964573 pcs.

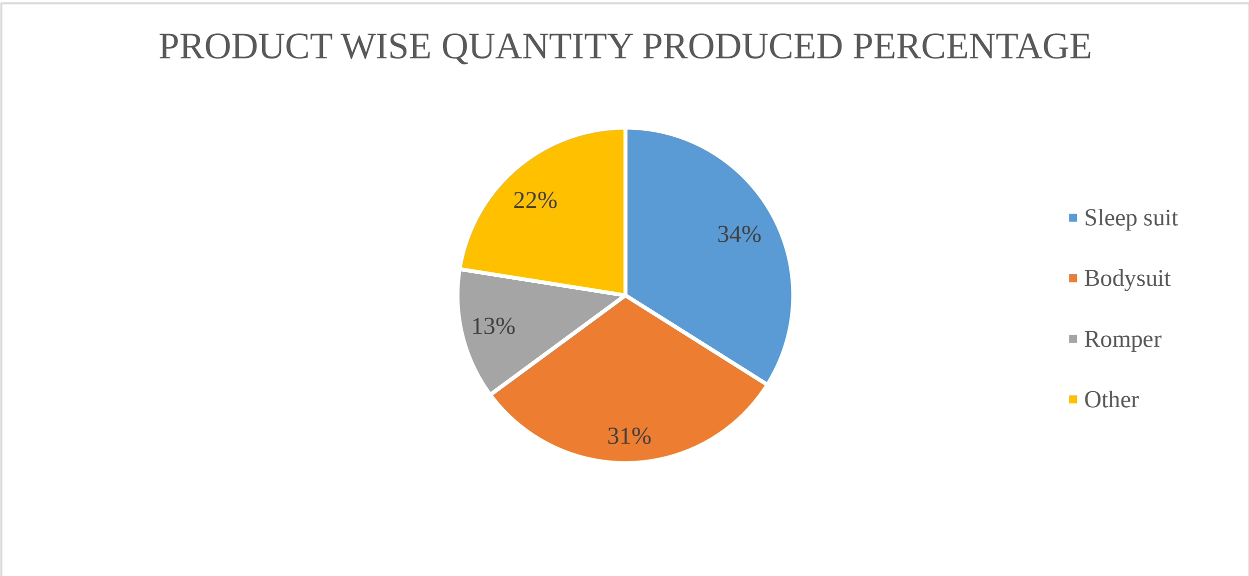

Figure 6: Product Wise Quantity Produced Percentage

Sleep-suit products produce 34% of the total produced quantity, Bodysuit products produced 31% of the total produced quantity, Rompers produced 13% of the total produced quantity & 22 % is another product.

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Figure 7: Product Wise Required SAM

It has been found that to complete the sleep-suit order total SAM required is 15638156 min, for the body-suit is 7204961, for the Romper is 4824621 & for others is 6348837 min.

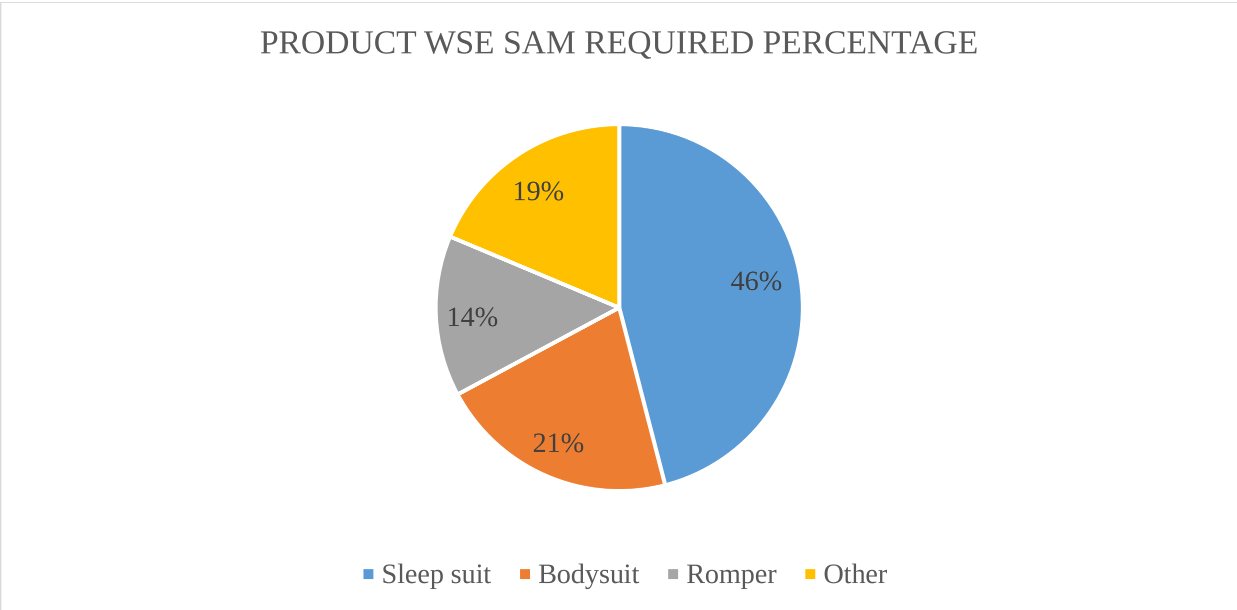

Figure 8: Product Wise SAM Required Percentage

Sleep-suit products required 46% of the total SAM requirement, Bodysuit products required 21% of the total SAM requirement, Romper required 14% of the total SAM requirement and other products required 19 % of the total SAM requirement of the factory.

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e. Product-wise line requirement

Procedure	SLEEPSUIT	BODYSUIT	ROMPER
SAM required	15638156	7204961	4824621
Quantity produce	2965005	2703025	1100983
Average SAM	6.2	2.8	5.2
Efficiency %	50.00%	50.00%	50.00%
Manpower/line	26	14	24
Avg production/day/line	1132	1350	1246
Total line	18	18	18
Line required % / product	46.0%	21.2%	14.2%
Line required/ product	8	4	3
AVG manpower/product	215	53	61

Table 9: Product-wise line requirement

In the factory, there are a total of 18 lines present. With the SAM requirement percentage, the line requirement for each product was determined. For Sleep-suit, it has been found that there are a total of 8 lines that would be operational, which consist of 215 manpower.

For Bodysuit there was 4 line operational, which consisted of 53 manpower. For Romper 3 machine will be operational, which requires 61 manpower.

f. Product-wise material flow

Although a product has a different type of style & goes through a different type of operation it has been found that there are a few zones by which a product needs to go through so that it can complete its process called a similar group of products. Below it shows the material flow of Sleep-suit, Bodysuit & Romper.

i.Product Flow of Sleep-suit

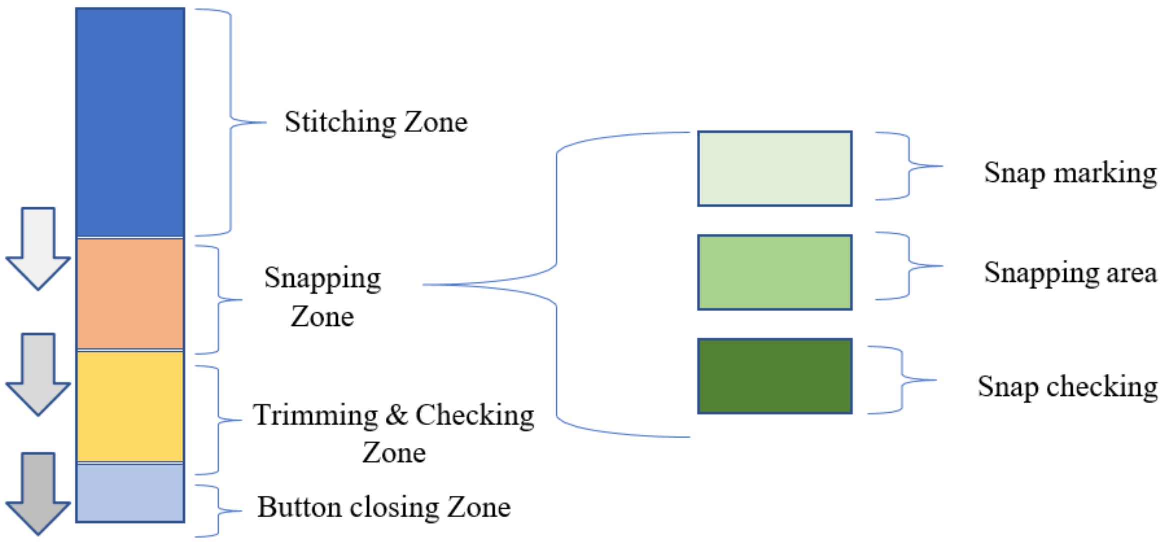

Figure 9: Product flow of sleep-suit

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ii.Product Flow of Body-suit

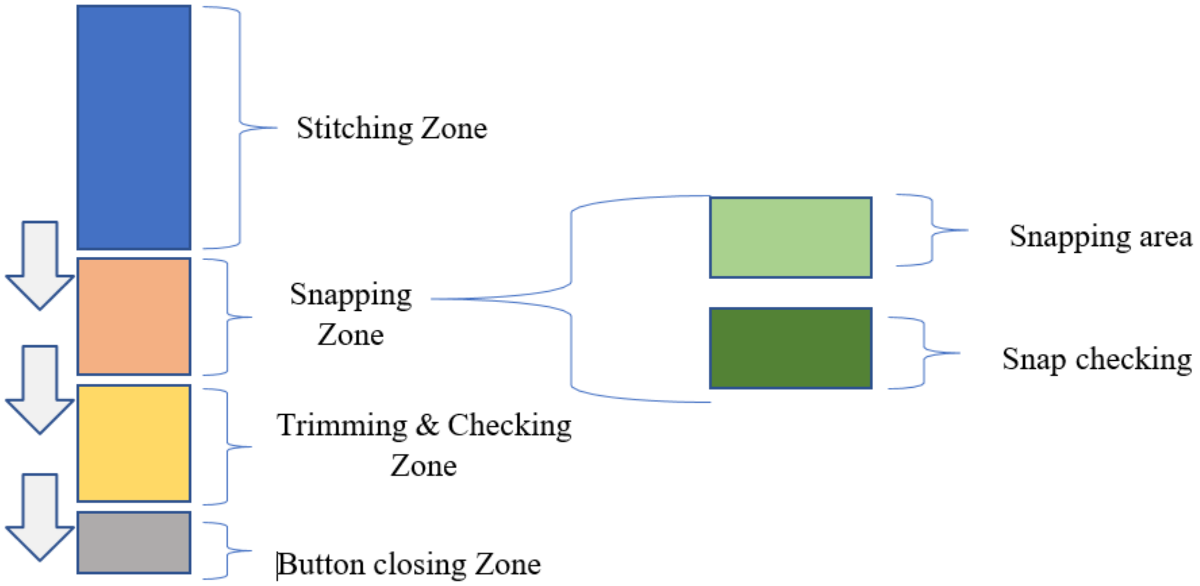

Figure 10: Product flow of Body-suit

iii.Product Flow of Romper

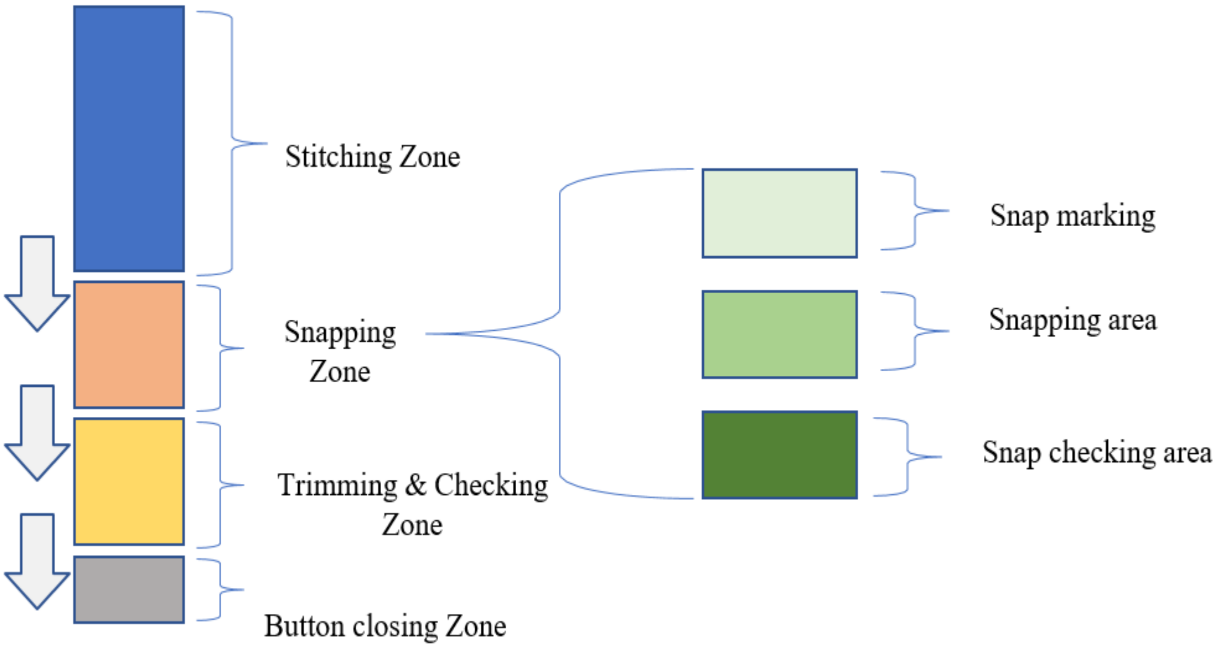

Figure 11: Product flow of Romper

From all the material flow of the product it has been observed that after snapping is completed there is a snap-checking process is used. After the Snap checking it goes to the trimming & checking zone, where each product again goes through checking. So Snap checking it identified as an over-process (Muda).

The primary focus of the project is to remove the manpower in the snapping area, as it has been found snap marking & snap checking area are not value-added activities. So it is a kind of waste in the process.

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g. Snap marking & Snapping Process

i.Snapping process of sleep-suit:

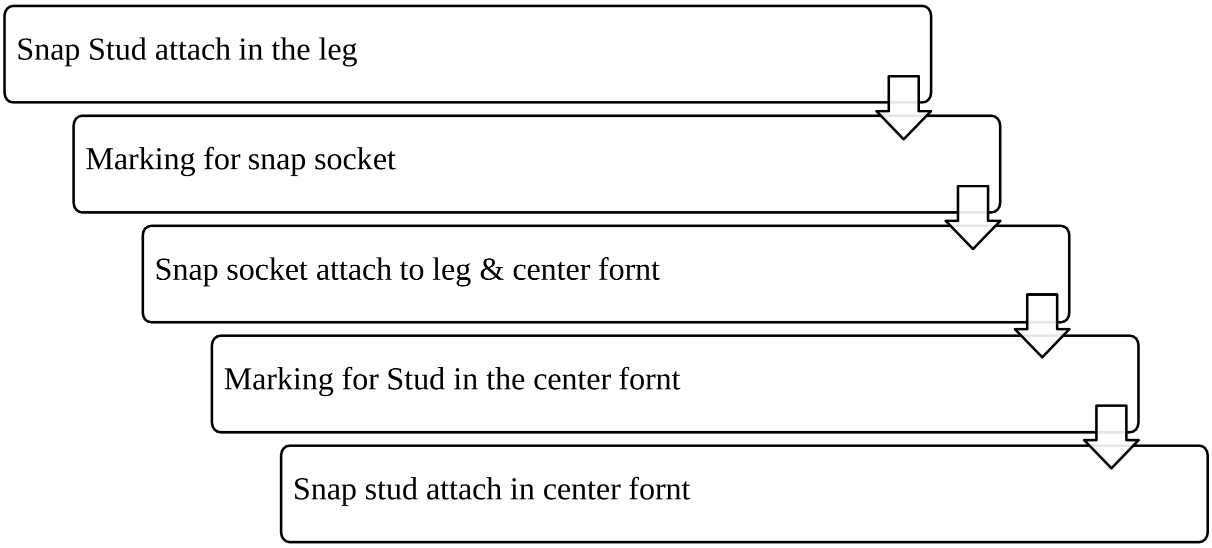

Figure 12: Snapping process of sleep-suit

ii.Snapping process of Body-suit

Does not required any snap marking process.

iii.Snapping process of Romper

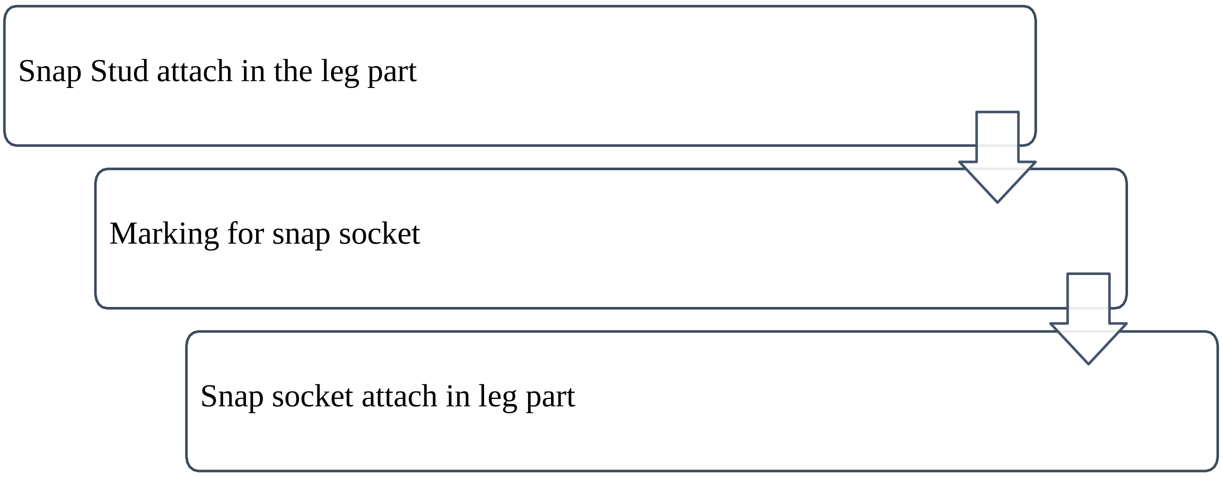

Figure 13: Snapping process of Romper

The aim is to remove the snap checker from the process. We have incorporated the marking in the machine to remove the snap marker.

The number of snaps is varied as per the size of the product. So for each size, the distance between two snaps is also varied. Before starting one size a marking is to be placed in the snapping machine to avoid unnecessary error.

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4.8. Snap distance between button & machine modification

Figure 14: Snap distant between button

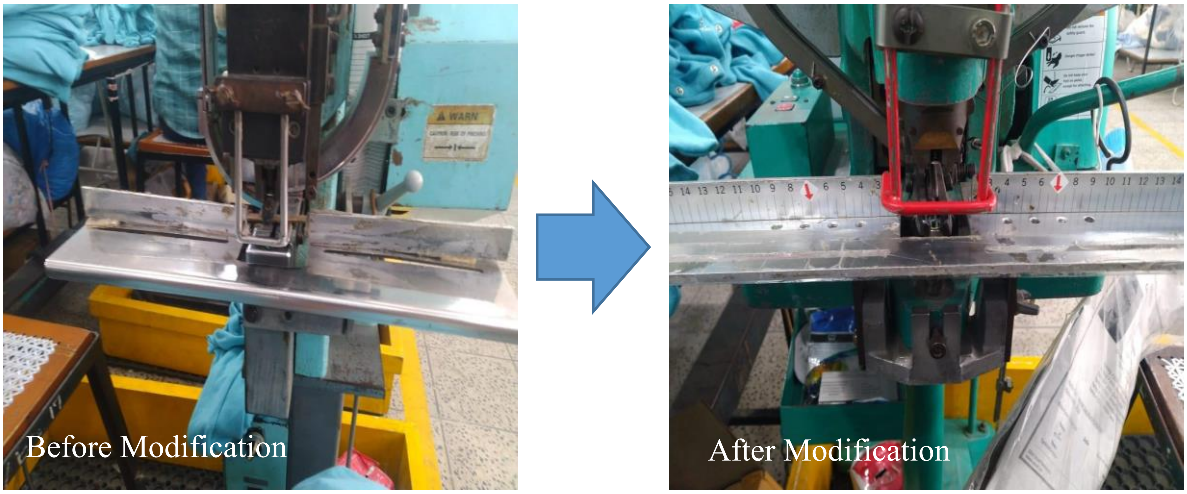

Figure 15: Snapping machine modification

4.9.Consolidate data

4.9.1. Snapping Output without Snap marker for sleep-suit

Snapping Output without Snap marker for sleep suit							
Day	Line	Stitch output	Snapping Output	Difference	Productivity	Reject	Defective%
Day 1	A	1007	818	189	81%	9	1%
Day 2	A	1001	840	161	84%	6	1%
Day 3	A	1010	865	145	86%	5	1%
Day 4	A	1009	843	166	84%	5	1%
Day 5	A	1018	902	116	89%	4	0%
Day 6	A	1014	900	114	89%	4	0%
Day 7	A	1015	912	103	90%	3	0%
Day 8	A	1016	922	94	91%	3	0%
Day 9	A	1001	941	60	94%	3	0%
Day 10	A	1013	950	63	94%	3	0%
Day 11	A	1017	958	59	94%	2	0%
Day 12	A	1013	970	43	96%	2	0%

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Table 10: Consolidate data: Snapping Output without Snap marker for sleep-suit

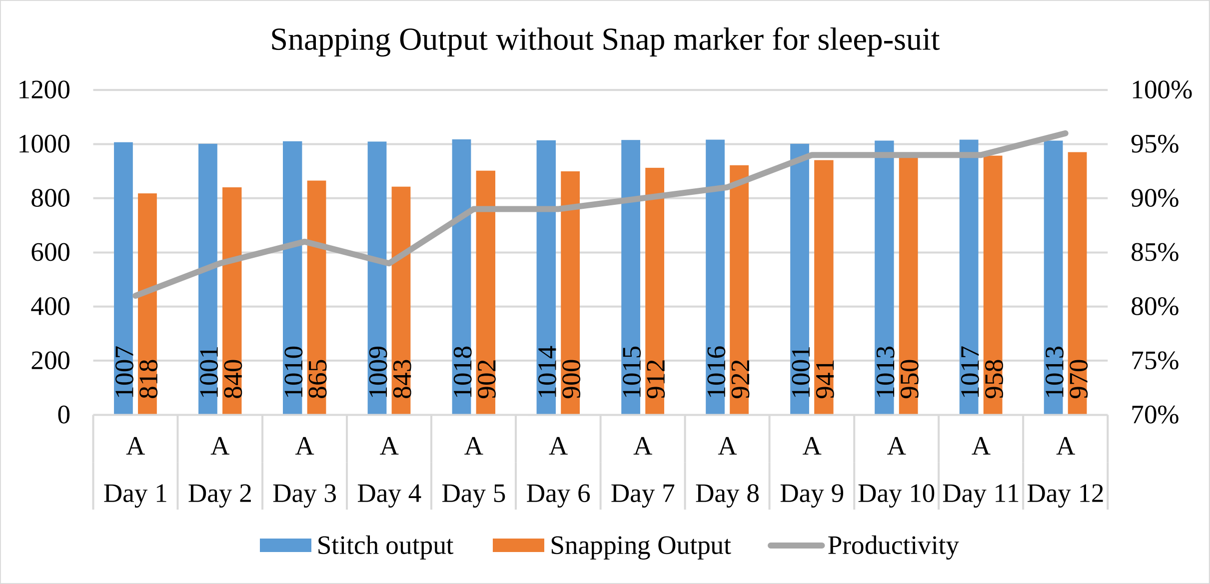

Figure 16: Stitching O/P, Snap O/P & productivity for sleep-suit

Observation:
It has been found that as the operator used to the new process, the productivity of the line has been increased. Initially, productivity was 81% but after 1 week of rigorous follow up the productivity has been increased & go up to 96%.
• As productivity has increased the line output also increased.
• Maximum reject has been found when the size change has happened.

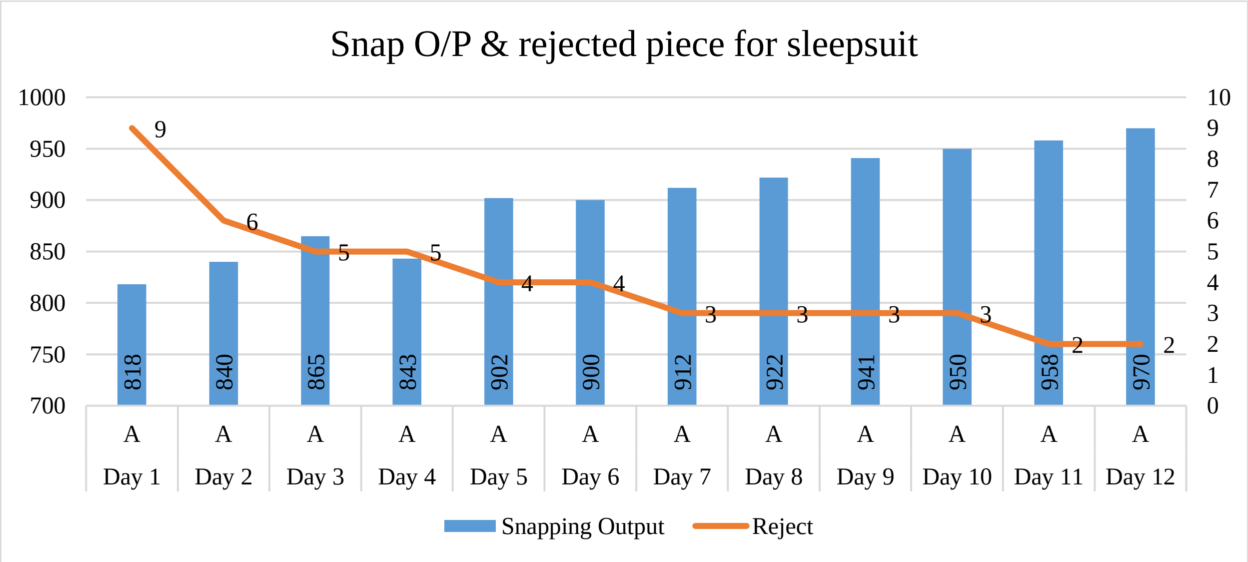

Figure 17: Snap O/P & rejected piece for sleep-suit

Observation:
• At the initial stage of the implementation, the number of rejected pieces was 9 pieces/ shift. But with the training & positive mindset of the snapping operator the number of rejected pieces has been reduced to 2 pieces/ shift.
• As the rejected piece has been reduced the snapping output has been increased.
• Maximum reject has been found when the size change has happened.

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4.9.2. **Snapping Output without Snap marker for Romper**

Table 11: Consolidate Data Snapping Output without Snap marker for Romper

Snapping Output without Snap marker for Romper							
Date	Line	Stitch output	Snapping Output	Difference	Productivity	Reject	Defective %
Day 1	C	1063	910	153	86%	9	1%
Day 2	C	1067	925	142	87%	6	1%
Day 3	C	1061	936	125	88%	5	1%
Day 4	C	1085	952	133	88%	5	1%
Day 5	C	1066	950	116	89%	4	0%
Day 6	C	1069	976	93	91%	4	0%
Day 7	C	1068	1000	68	94%	3	0%
Day 8	C	1072	991	81	92%	3	0%
Day 9	C	1072	1014	58	95%	3	0%
Day 10	C	1075	1035	40	96%	3	0%
Day 11	C	1061	1028	33	97%	2	0%
Day 12	C	1063	1039	24	98%	2	0%

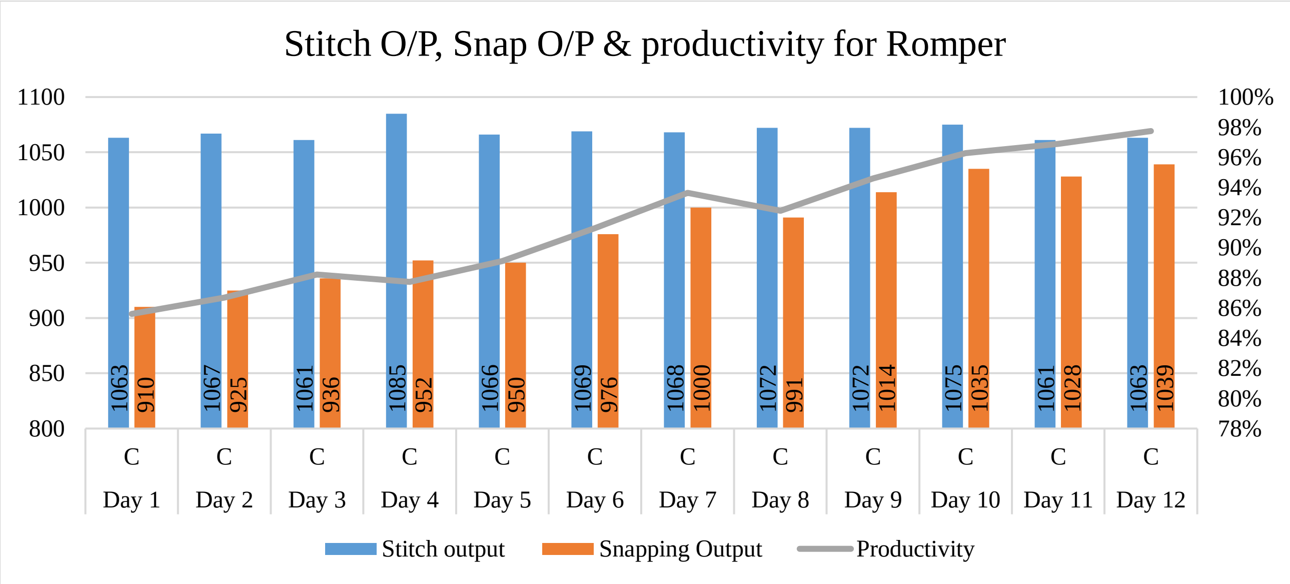

Figure 18: Stitch O/P, Snap O/P & productivity for Romper

Observation:

• It has been found that as operators used to the new process, the productivity of the line has been increased. Initially productivity was 86% but after 1 week of rigorous follow up the productivity has been increased & go up to 98%.

• As productivity has increased the line output also gets increased.

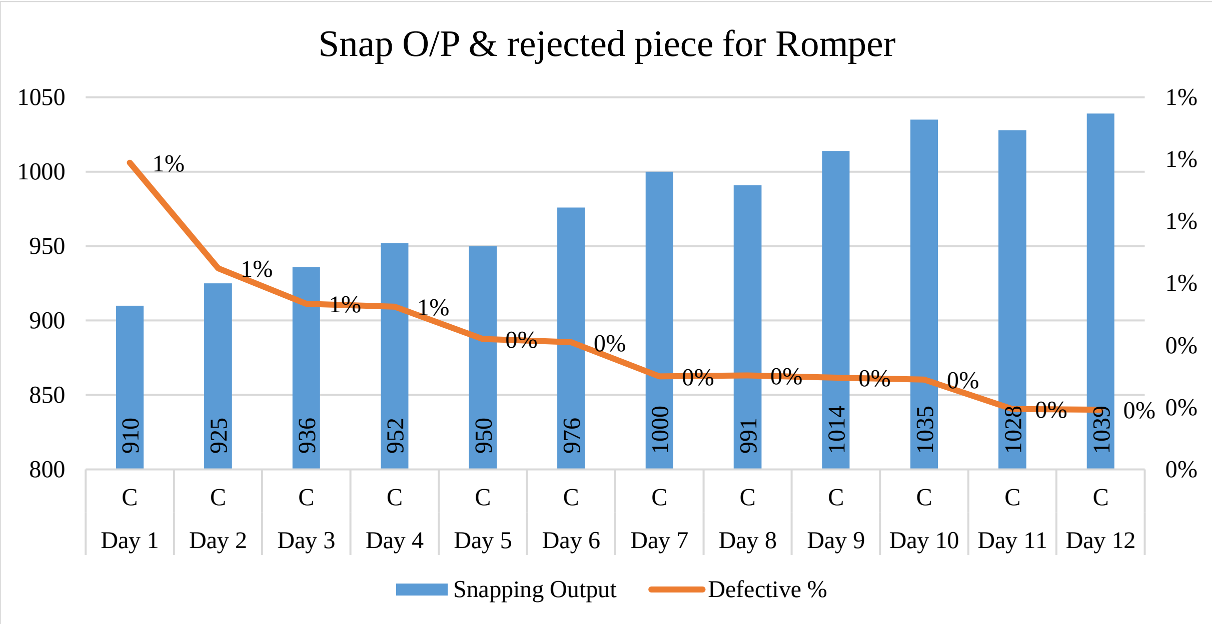

Figure 19: Snap O/P & rejected piece for Romper

Observation:

• At the initial stage of the implementation, the number of rejected pieces was 9 pieces/ shift. But with the training & positive mindset of the snapping operator the number of rejected pieces has been reduced to 2 pieces/ shift.

• As the rejected piece has been reduced the snapping output has been increased.

V. SNAP CHECKING OUTPUT & REJECTION PERCENTAGE

a. Consolidate data of Snap checking output & rejection percentage for Sleep-suit

Stitch O/P vs Snap Checking output & Reject percentage in Sleep-suit					
Date	Line	Stitch output	Snap Checking Output	Reject	Average %
Day 1	A	984	980	4	0.41%
Day 2	A	1020	1015	5	0.49%
Day 3	A	1001	998	3	0.30%
Day 4	A	1014	1011	3	0.30%
Day 5	A	1020	1019	1	0.10%
Day 6	A	1010	1007	3	0.30%
					0.31%

Table 12: Consolidate data of Snap checking output & rejection percentage for Sleep-suit

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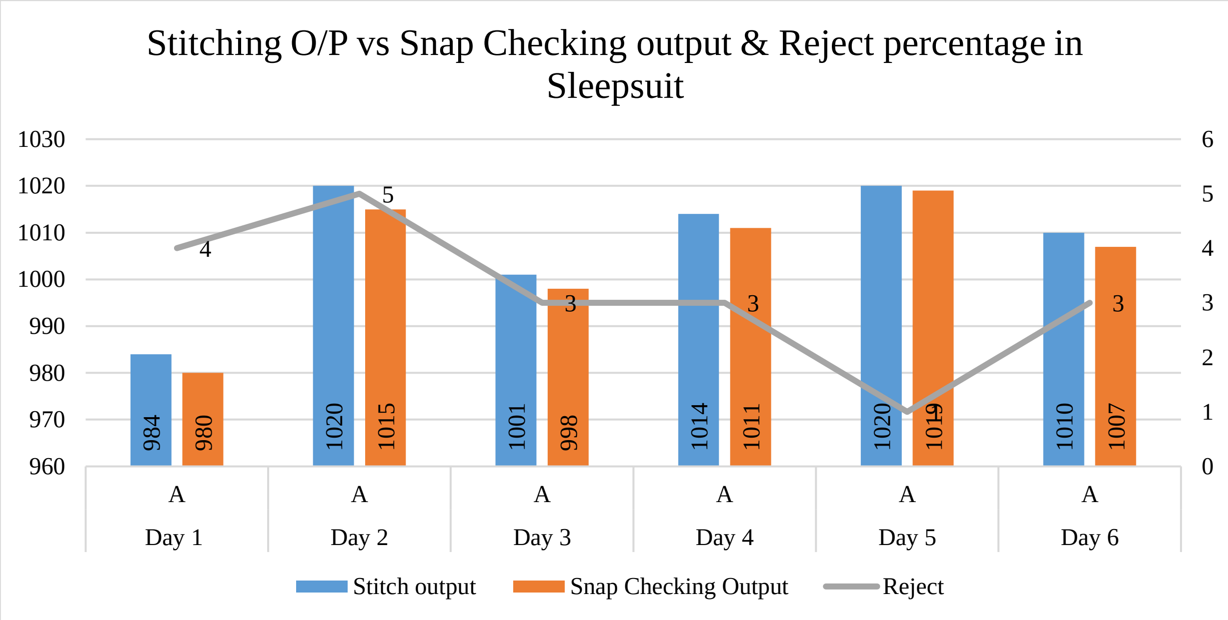

Figure 20: Stitching O/P vs Snap Checking output & Reject percentage in Sleep-suit

Observation

- The average rejection found by the snap checker is 3 pieces/shift. The maximum reject found is 5 pieces /shift.
- The average percentage of rejection found in sleep-suit is 0.31%.

b. Consolidate data of Snap checking output & rejection percentage for Bodysuit

Stitch O/P vs Snap Checking output & Reject percentage in Bodysuit					
Date	Line	Stitch output	Snap Checking Output	Reject	Average %
Day 1	D	1120	1118	2	0.18%
Day 2	D	1128	1125	3	0.27%
Day 3	D	1115	1113	2	0.18%
Day 4	D	1135	1133	2	0.18%
Day 5	D	1125	1122	3	0.27%
Day 6	D	1130	1127	3	0.27%
					0.22%

Table 13: Consolidate data of Snap checking output & rejection percentage for Body-suit

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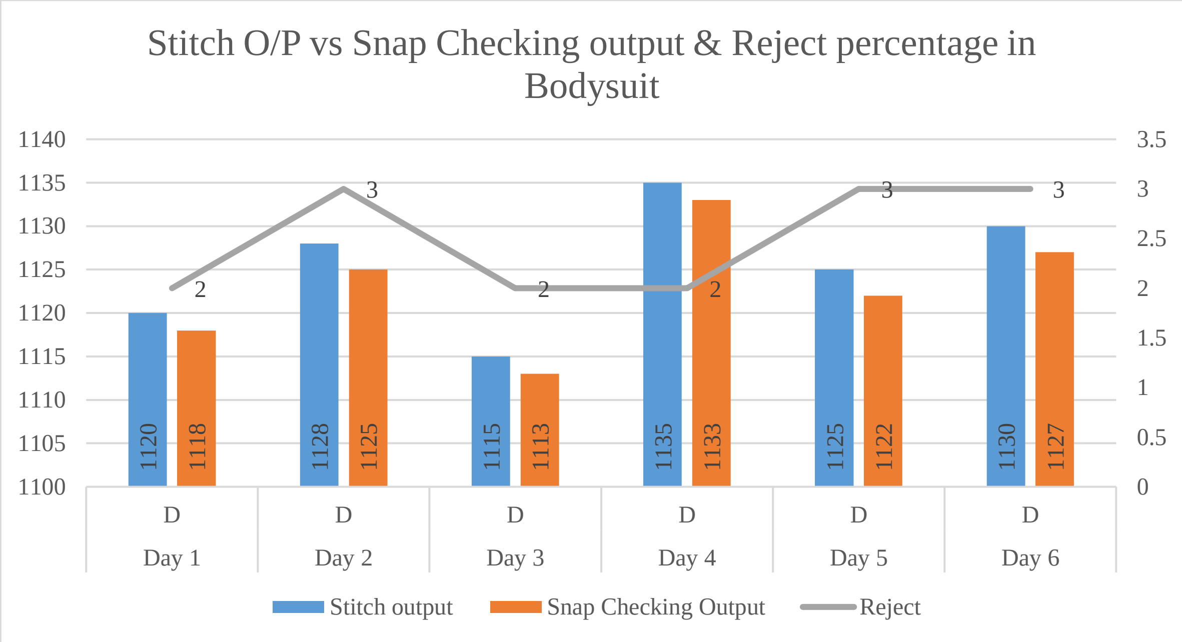

Figure 21: Stitch O/P vs Snap Checking output & Reject percentage

Observation

- Average rejection found by the snap checker is 3 (= 2.5) piece/shift. Maximum reject found is 3 pieces /shift.
- Average percentage of rejection found in sleep-suit is 0.22%.

c. Consolidate data of Snap checking output & rejection percentage for Romper

Stitch O/P vs Snap Checking output & Reject percentage in Romper					
Date	Line	Stitch output	Snap Checking Output	Reject	Average %
Day 1	E	1015	1013	2	0.20%
Day 2	E	1017	1014	3	0.29%
Day 3	E	1015	1013	2	0.20%
Day 4	E	1012	1009	3	0.30%
Day 5	E	1010	1008	2	0.20%
Day 6	E	1010	1009	1	0.10%
					0.21%

Table 14: Consolidate data of Snap checking output & rejection percentage for Romper

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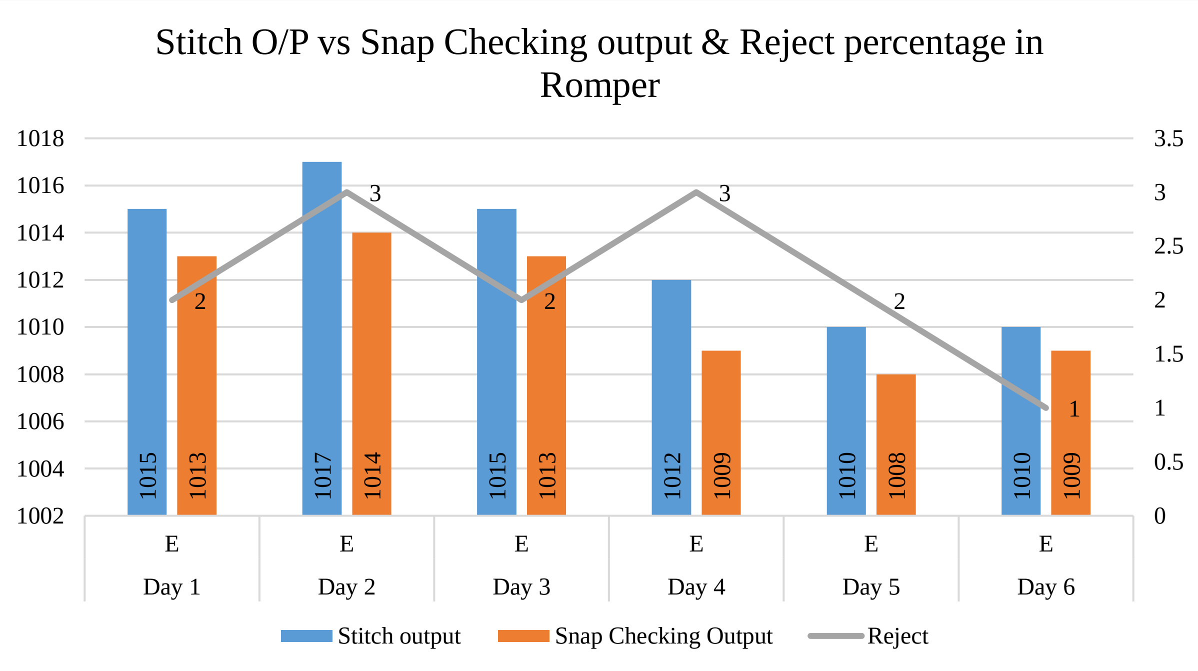

Figure 22: Stitch O/P vs Snap Checking output & Reject percentage in Romper

Observation

• The average rejection found by the snap checker is 3 pieces/shift. The maximum reject found is 3 pieces /shift. The minimum is 1 piece/shift.

• The average percentage of rejection found in sleep-suit is 0.21%.

VI. RESULTS

6.1. Snap marker

After removing the snap marker from sleep-suit & romper the output of the line get effected. Productivity of the snapping zone decreased by 19% for sleep-suit & 14% for Romper.

However After two week of implementation productivity goes 81% to 96% for sleep-suit & goes 86% to 96% for romper.

• At the initial stage of the implementation, the number of rejected piece was 9 piece/ shift. But with the training & positive mind set of the snapping operator the number of rejected piece has been reduced to 2 piece/ shift.

• As the rejected piece has been reduced the snapping output has been increased.

6.2. Snap checker

It has been found that there is only 0.31% rejected pieces for sleep-suit, for Body-suit it has been found only 0.21% & for Romper it has been found 0.22% has been found by the snap checker.

• 0.3% reject is very minimum & could not have huge effect on the AQL level of the Order.

• Snap checking work is distributed between Checker & Button closing manpower.

With the discussion with the factory Head, Production manager & IE manager, Snap checking process is eliminated from the line. The designation of the SNAP CHECKER & SNAP MARKER has been removed from the total manpower list.

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VII. CONCLUSION LIMITATION AND SCOPE OF FURTHER STUDY

7.1. Conclusion

Reducing the over-processing of the material the same output has been come from the line with the lesser manpower. Manpower of the stitching & checking department has been minimized.

Department	Initial	Final	Initial MMR	Final MMR
Operational machine	343	343		
Checking manpower	73	54	0.21	0.16
Electrical manpower	3	3	0.01	0.01
IE manpower	5	5	0.01	0.01
Maintenance manpower	6	6	0.02	0.02
Packing manpower	127	127	0.37	0.37
Quality manpower	18	18	0.05	0.05
Stitching manpower	481	462	1.40	1.35
Store manpower	8	8	0.02	0.02
Total manpower	**721**	**683**	**2.10**	**1.99**

Table 15: Initial & final department contribution on MMR

Initial manpower was 721. After the new process implementation, the current manpower is 683.

Majorly two departments have been affected by the new process checking department & stitching department. Initially, the manpower of the checking department is 73 & final manpower is 54. The initial manpower of the stitching department was 481 & final manpower is 462. Altogether there is a total 38 manpower reductions. This helped to optimize the MMR from 2.01 to 1.99.

The average salary of individual manpower was – Rs.13000/ month.

Cost savings	
Average salary (in Rs.)	13,000
Manpower reduction	38
Monthly savings (in Rs.)	494,000
Yearly savings (in Rs.)	5,928,000

Table 16: Cost savings: outcome of the project

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7.2. Utilization of Manpower

This 38 manpower will be utilized in the new line. The company had decided to run two new lines of Bodysuit. Where they used this manpower. They have to go through a rigorous training program to turn them into a sewing operator.

Normally a Bodysuit line has 14-16 sewing operators (as per design). Apart from that there was a requirement of 1 snapper & 2 trimmers & checker. Together one bodysuit line required 17-19 manpower. So company had planned to make the training program in such a way as to make the manpower multi-skilled.

7.3. Limitation

- Operators were used to the previous working process and there was resistance to learning the new working process. This will take a longer time to get the desired results after implementation.
- Once snap-checking tasks are distributed to the checker, they forget to do the additional work.

7.4. Further scope

- Can check the manpower requirement of rest of the department & products.
- Can improve the other KPIs of the factory.

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