Journal of Transactions in Systems Engineering
https://ijitis.org/index.php/JTSE
ISSN: 2806-2973
Volume 2, Issue 1
DOI: https://doi.org/10.15157/JTSE.2024.2.1.170-177
Received: 12.01.2024 Revised: 14.02.2024 Accepted: 22.02.2024

Productivity Analysis in a Garment Company Located in Albania

Silva Spahija*, Albana Leti, Elmira Dumishllari

Department of Textile and Fashion, Polytechnic University of Tirana, Albania
*sspahija@fim.edu.al

Abstract

Productivity is considered as the most important key for a company to have success and remain competitive in the market. It is also one of the most important indicators to find the points where a company should intervene for improvements to reach the final product. This paper presents a concrete analysis of productivity for a garment company in Albania, which produces workwear. The paper includes a 10-day study in the production line of workwear, and it analyses reasons for low productivity. Considering the level of productivity for every day of the study, we have given some recommendations to improve productivity.

Keywords: *Productivity, production target, line efficiency.*

INTRODUCTION

Productivity is an average measure of the efficiency of production. Productivity measures the ability to produce a good or service. More specifically, productivity is the measure of how specified resources are managed to accomplish timely objectives as stated in terms of quantity and quality [1]. Productivity plays an important role in any garment industry. There are various reasons for which the productivity decreases and there are many known methods to improve the productivity. Choosing a correct and effective method plays a crucial role [2].

The level of productivity in garment industry fluctuates because of different causes occurring during production process, such as: poor performance of the operator, nonunderstanding of work method from the operator, defects, absences, etc. [3]. Furthermore, there are different ways to improve productivity including: training of operators, data tracking systems, operator's motivation, conducting a work study, improving line balancing, minimizing time loss, design an ergonomically workplace, etc. [4].

This is a concrete analysis of productivity in a garment company in Albania. The company operates under a cut, make and trim model. It produces workwear and exports to Germany. The data of this study are part of the measurements of the company and are processed to explain the way the company produces its products. The calculations are done considering the basic time in seconds needed for every operator to finish every work operation.

In this research work, it has been briefly studied and analyzed the productivity of the garment company for 10 days. Appropriate calculations are done, based on the method that this company uses, highlighting main key points where it is needed the intervention to get higher level of productivity. The style of the product analyzed is very complicated and its production passes through a lot of operations. Also, we should consider that the operators are working with this model for the first time.

METHODOLOGY

The study is based on the analysis of the data from the technical schedule of the product, see table 1. On this basis we have calculated some main indicators, which helped us to go through the evaluation of productivity in the garment company.

Table 1. Technical Schedule of the workwear

No.	Processes	Sec/pair	Sec/120 pair	Operator 100%	Operator 80%	Work hours
1	2 small parts of collar	30	3600	0.13	0.16	1.25
2	Ornamental stitch	30	3600	0.13	0.16	1.25
3	Big part of collar	50	6000	0.21	0.26	2.08
4	Ornamental stitch	50	6000	0.21	0.26	2.08
5	Preparation of big collar.	50	6000	0.21	0.26	2.08
6	Collar	10	1200	0.04	0.05	0.42
7	Preparation of collar filet	60	7200	0.25	0.31	2.50
8	Fitting of collar	90	10800	0.38	0.47	3.75
9	Collar closure	90	10800	0.38	0.47	3.75
10	Placing of the collar	10	1200	0.04	0.05	0.42
11	Fixation of fraseline	140	16800	0.58	0.73	5.83
12	Joint of 2 pockets	50	6000	0.21	0.26	2.08
13	Closure of the pocket	60	7200	0.25	0.31	2.50
14	Liner placement	60	7200	0.25	0.31	2.50
15	Picket preparation	200	24000	0.83	1.04	8.33
16	Pocket prep., com. crack	460	55200	192	240	19.17
17	Big fluff placement	30	3600	0.13	0.16	1.25
18	Small fluff placement	30	3600	0.13	0.16	1.25
19	Triple of pocket fillet	40	4800	0.17	0.21	1.67
20	Triple of linen	20	2400	0.08	0.10	0.83
21	Triple of back part	30	3600	0.13	0.16	1.25
22	Triple arch of the spine	20	2400	0.08	0.10	0.83
23	Triple of sleeves	40	4800	0.17	0.21	1.67
24	Triple of zipper	100	12000	0.42	0.52	4.17
25	Triple of back part	30	3600	0.13	0.16	1.25
26	Triple of archway	30	3600	0.13	0.16	1.25
27	Preparation of pocket cap	50	6000	0.21	0.26	2.08
28	Fixation of pocket + ornamental stitch	50	6000	0.21	0.26	2.08
29	Pocket with linen	460	55200	1.92	2.40	19.7
30	Ornamental stitch of pocket filet	40	4800	0.17	0.21	1.67
31	Fixation of pocket linen	40	4800	0.17	0.21	1.67
32	Closure of pocket linen	20	2400	0.08	0.10	0.83
33	Sewing of two pockets	80	9600	0.33	0.42	3.33
34	Ornamental stitch	80	9600	0.33	0.42	3.33
35	Collar	10	1200	0.04	0.05	0.42
36	Pocket preparation	200	24000	0.83	1.04	8.33
37	Fixation + putting linen 2	55	6600	0.23	0.29	2.29
38	Closure of linen 2	55	6600	0.23	0.29	2.29
39	Putting of the linen	40	4800	0.17	0.21	1.67
40	Preparation of cap	25	3000	0.10	0.13	1.04
41	Return of the cap	30	3600	0.13	0.16	1.25
42	Ornamental stitch of the cap	25	3000	0.10	0.13	1.04
43	Fixation of the cap + ornamental stitch	30	3600	0.13	0.16	1.25
44	Joining linen with the body of the jacket	40	4800	0.17	0.21	1.67

45	Marking	10	1200	0.04	0.05	0.42
46	Triple of collar zipper	200	24000	0.83	1.04	8.33
47	Filet of zipper	50	6000	0.21	0.26	2.08
48	Fixation of zipper filet	50	6000	0.21	0.26	2.08
49	Putting the sample	80	9600	0.33	0.42	3.33
50	Fixation of flag	20	2400	0.08	0.10	0.83
51	Putting clamps of archway	35	4200	0.15	0.18	1.46
52	Ornamental stitch of clamps	35	4200	0.15	0.18	1.46
53	Fixation of elastic in clamp	35	4200	0.15	0.18	1.46
54	Fixation of elastic in archway	40	4800	0.17	0.21	1.67
55	Elastic band +fixation	30	3600	0.13	0.16	1.25
56	Preparation of elastic with linen	20	2400	0.08	0.10	0.83
57	Last side	200	24000	0.83	1.04	8.33
58	Preparation of sample, lateral elastic	20	2400	0.08	0.10	0.83
59	Inserting the lace + ornamental stitch	70	8400	0.29	0.36	2.92
60	Preparation of 4 filet of zipper	40	4800	0.17	0.21	1.67
61	Return of filet	20	2400	0.08	0.10	0.83
62	Fixation of zipper samples	120	14400	0.50	0.63	500
63	Fixation of 4 filet in the body of the jacket	200	24000	0.83	1.04	8.33
64	Putting the lateral zipper	380	45600	1.58	1.98	15.8
65	Collar	40	4800	0.17	0.21	1.67
66	Marking	20	2400	0.08	0.10	0.83
67	Return of zipper	120	14400	0.50	0.63	500
68	Ornamental stitch of zipper	200	24000	0.83	1.04	8.33
69	Putting the zipper	220	26400	0.92	1.15	9.17
70	Logo to the pocket	40	4800	0.17	0.21	1.67
71	Preparation of accordion pocket	120	14400	0.50	0.63	500
72	Fixing of pocket with zipper	100	12000	0.42	0.52	4.17
73	Lateral parts of the sleeves	120	14400	0.50	0.63	500
74	Ornamental stitch of lateral parts of sleeves	120	14400	0.50	0.63	500
75	Parts in the middle of the sleeves	40	4800	0.17	0.21	1.67
76	Ornamental stitch of sleeves	40	4800	0.17	0.21	1.67
77	Arm dart	20	2400	0.08	0.10	0.83
78	Ornamental stitch of dart	20	2400	0.08	0.10	0.83
79	Putting the sleeves	220	26400	0.92	1.15	9.17
80	Ornamental stitch of sleeves	120	14400	0.50	0.63	500
81	Fluff of the arm	60	7200	0.25	0.31	2.50
82	Fixation	40	4800	0.17	0.21	1.67
83	Fixation of arm fraseline	120	14400	0.50	0.63	500
84	Closure of sleeve	60	7200	0.25	0.31	2.50
85	Putting elastic in the hands of the jacket	400	48000	1.67	2.08	16.6

86	Putting the clip+ ornamental stitch.	140	16800	0.58	0.73	5.83
87	Joint of 3 clips	160	19200	0.67	0.83	6.67
88	Closure of clip+ sleeves	70	8400	0.29	0.36	2.92
89	Preparation of extra part in the back	60	7200	0.25	0.31	2.50
90	Added stitch in the back	60	7200	0.25	0.31	2.50
91	Back clip+ ornamental stitch	50	6000	0.21	0.26	2.08
92	Pocket square	20	2400	0.08	0.10	0.83
93	Chest pocket slit	40	4800	0.17	0.21	1.67
94	Sleeves pocket slit	25	3000	0.10	0.13	1.04
95	Horizontal pocket slit	20	2400	0.08	0.10	0.83
96	Marking of chest pockets	20	2400	0.08	0.10	0.83
97	Marking of bottom pocket	20	2400	0.08	0.10	0.83
98	Marking of fluff	20	2400	0.08	0.10	0.83
99	Putting of fluff + zipper	60	7200	0.25	0.31	2.50
100	Ironing of zipper pocket	20	2400	0.08	0.10	0.83
101	Ironing of fillet 4	50	6000	0.21	0.26	2.08
102	Ironing of side parts of the jacket	30	3600	0.13	0.16	1.25
103	Collar ironing	20	2400	0.08	0.10	0.83
104	Label placement	10	1200	0.04	0.05	0.42
105	Placement of buttons	60	7200	0.25	0.31	2.50
106	Travete	10	1200	0.04	0.05	0.42
107	Cleaning	120	14400	0.50	0.63	500
108	Control	100	12000	0.42	0.52	4.17
109	Packing	60	7200	0.25	0.31	2.50
110	Ironing of side parts of the jacket	30	3600	36.38	0.16	1.25
111	Collar ironing	20	2400	0.08	0.10	0.83
112	Label placement	10	1200	0.04	0.05	0.42
113	Placement of buttons	60	7200	0.25	0.31	2.50
114	Travete	10	1200	0.04	0.05	0.42
115	Cleaning	120	14400	0.50	0.63	500
116	Control	100	12000	0.42	0.52	4.17
117	Packing	60	7200	0.25	0.31	2.50
Tot.		870	145.5		45.46	3447

Referring to table 1, some important notes are as follows:

- Sec/piece are needed seconds to finish a specific process.
- Sec/120 pieces are needed seconds to realize the process and to accomplish the daily target of the company.
- Operator 100% is the operator working with full efficiency, which means he/she is using the time 100 % [3].
- Operator 80% means an operator who is not using the time effectively, which means loss of time [3].
- Work hours are the hours needed to finish the full production of 120 pieces, which is the daily target of the company.

There are in total 43 operators working in production line of workwear. Equation 1 depict the production line per day for different operations [5].

$$43 \text{ operations x } 480 \text{ minutes per day} = 20640 \text{ minute of production line.} \quad (1)$$

According to this calculation we can say that there are needed 145.5 minutes to produce this model, including all production processes. Furthermore, during 20640 daily minutes of production line can be finished and packed nearly 141 pieces of workwear. The daily target of production if the operators work with 100% efficiency, is 141 pieces. Based on it by using equation 2 we can calculate the production of the workwear per day [5].

$$141 \text{ pieces x } 80\% = 112 \text{ workwear must be produced every day.} \quad (2)$$

The allowances are calculated as 7% in case that they are subject to the policy of the company by using equation 3 [6].

$$112 \text{ men's jackets x } 0.07 = 8 \text{ pieces.} \quad (3)$$

During a shift/day for 480 minutes, there are produced 8 men's jackets less, because of 80% performance level. Based on this reasoning in total we can have 112 + 8 = 120 pieces. It has been seen that there are 120 pieces productivity target per day of the company for this model.

Afterward, below equations 4 until 6 has been used for calculation of the line productivity for 10-days during this research work [7-10].

$$\text{Line Productivity} = \frac{\text{Total minutes produced by line}}{\text{Total minutes of work}} \text{ x } 100\% \quad (4)$$

$$\text{Total minutes of work} = \text{Number of operators} + \text{Daily working hours.} \quad (5)$$

Standard processing time plays an important role in efficient production for a company.

$$\text{Efficiency} = \frac{\text{Produced quantity}}{\text{Production target quantity}} \text{ x } 100\% \quad (6)$$

RESULTS

In Table 2 shows the calculated data based on work measurements for the production line, during 10 days of the study, for workwear analysed. We can notice that the target of production is 1181 pieces, and the production line has produced 781 pieces, which means that the goal is not reached. Every day of the study there is a considerable difference in pieces produced.

The final objective of the company was to produce 1562 jackets for 26 days, which means that every day it should produce 120 men's jackets. For the first 10 days the company has produced 781 jackets which means that the daily productivity of the company is very low and not satisfying, so the company should increase productivity. If the company will produce every day according to the daily target, it could need only 13 days to finish the order. Including 1 day in the cutting sector and 2-4 days for export.

Table 2. Line productivity for 10-days of the study

Days of the study	Operators No	Line minutes	Target	Pieces produced	Line productivity
1	43	20,640	120	80	66%
2	42	20,160	117	77	65%
3	43	20,640	120	79	65%
4	41	19,680	115	69	60%
5	42	20,160	117	76	64%
6	43	20,640	120	81	67%
7	42	20,160	117	75	64%
8	43	20,640	120	83	69%
9	41	19,680	115	73	63%
10	43	20640	120	88	73%
Total	423	203,040	1181	781	65%

The level of productivity is below 80% and it is on average 65%, as it is shown in figure 1.

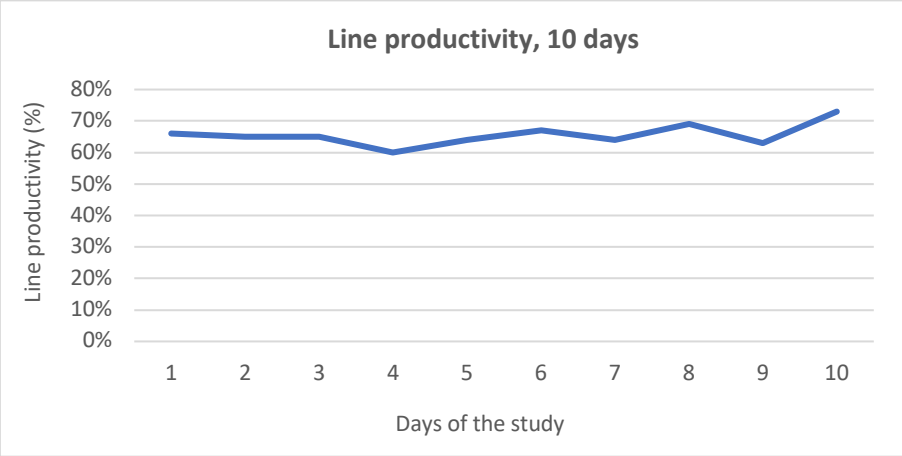

Figure 1. Line productivity for 10-days of the study.

Based on these results and what we have seen during the study, we have completed an internal analysis of reasons of low productivity, and we have given some recommendations. The reason of low productivity during the first day of the study is because of work overload in ironing process related to the fact that it is a new style. As a result, it was created a delay in sewing process and an imbalance between ironing and sewing sector. The recommendation in this case is to motivate the operator doing this process or to help her with another operator, to exceed the overload until the situation is stabilized.

In the second day of the study the low level of productivity generates from the operator working with overlock machine. It was noticed that the operator has worked with a low speed and the machinery has often got defects. So, in this case there is a time loss. It was suggested to compensate the loss of time by putting another operator in this process and to intervene immediately to repair the machine, because it is a very important process, which can be a barrier for other processes.

During the third day of the study the work has gone relatively well, except the defects from linen samples. The samples are cut again in the cutting sector, adapting them according to the right colour of the fabric. This brought a delay in the processes related to pockets. In this case

we recommended the managers to check the cut samples, after the cutting sector finished the cut process.

In the fourth day of the study the work is blocked in travete's process, because the operator was absent that day. It was recommended to put another operator in this process to achieve the target. It would be better to have at least 1-2 "Joker" operators (who know and can finish every process) and can help to go through the target of production.

During the fifth day of the study the work has gone relatively well, except the defect of elastic fixation to the archway. Operator has fixed a bigger length of the elastic in the archway and as a result there was created wrinkles at the bottom of the workwear. So, the process was repeated for the second time. In this case we have recommended the continuous control of the processes and the clear explanation of the process to the operator from the technician of the line.

During the day 6 and 8 of the study the work was satisfying. The operators have utilized effectively minutes of work. the recommendation in these cases was to motivate them to continue working with efficiency.

During day 7 and 9 the work is blocked to pocket cap operation and in marking sector. We recommended the operator to work with more concentration and accuracy in the marking sector, because if this sector generates defects, then the product will go with defects in packing. Continuous control is the main way, which prevents the defective product to pass to other processes. Even in this case it is necessary to have at least 1-2 Joker operators.

In the last day of the study the work has improved, because all the operators have worked with efficiency, with no defects. It was recommended support for operators, to express their opinion and continuous motivation.

CONCLUSION

According to the 10-day study in the sewing line we can conclude that there are many reasons which have influenced low productivity levels in the company, such as:

- Management, planning, line balance
- Necessary/unnecessary/mandatory interruptions, machinery defects
- Absences, permission from work, work leaves.
- Operator efficiency, experience, training
- Work distribution, overloading, organization.
- Psychological condition/ moral of the operator/ communication
- Conditions/ work environment
- Defects/ quality controls
- Repairs.

It is necessary for the company to do measurements regularly, by analysing and finding the reasons of low productivity, it can create an equilibrium of the work and can find methods to increase productivity. In this way the managers of the company will be able to solve unpredicted situations and to unblock the work. In this way, the production line can work normally and exploit in effective way production minutes, deliver in time the final product by achieving the goal of the company and ensuring profits.

CONFLICT OF INTERESTS

The authors would like to confirm that there is no conflict of interests associated with this publication and there is no financial fund for this work that can affect the research outcomes.

REFERENCES

[1] Yadav P., Marwah C.S. The Concept of Productivity. *International Journal of Engineering and Technical Research*, 2015; 3(5); 192-196.

[2] Rsubhashini R., Varghese N. Methods of Improving Productivity in Apparel Industry. International *Journal of Research and Engineering Science and Management*, 2021; 4(4); 130-141.

[3] Madhushanka H.K.G.C., Ekanayake E.M.P. and Padan A. Identification of factors affecting the productivity in apparel industry in Sri Lanka. *Proceedings of the 8-th Symposium on Applied Sciences, Business &Industrial Research*, Sri Lanka, 2016, pp. 66-70.

[4] Jaim S.A. (2022) Productivity of garment industry: various ways to improve it. Aditya Birla Fashion and Retail Limited, Bangalore, India.

[5] USAID. (2011) "Competitive Enterprise Development" Productivity toolkit for Garment Manufacturers in Albania.

[6] Zieliński J. Reliability of Work-Place in Clothing Production Process. *3rd International Textile, Clothing & Design Conference*, Dubrovnik, Croatia 2006, pp. 1-5.

[7] Ivan I., Boja C. and Ciurea C. Collaborative Systems Metrics. Bucharest: *ASE Publishing House*, 2007, pp. 20-25.

[8] Young A.M. (2007). The technical Writer's Handbook. Mill Valle"y, CA: University Science, USA.

[9] Ateequr Rehman Du.Y., Ramzan M.B., Shafiq M., Rasheed A., Naeem S., Savino M.M. Productivity Improvement through time study approach: A case study from an Apparel Manufacturing Industry in Pakistan. Procedia Manufacturing, 2019; 39; 1447-1454.

[10] Difference between minutes produced and minutes attended. Available at: https://www.onlineclothingstudy.com/2020/04/difference-between-minutes-produced-and.html#google_vignette. Accessed on 1st January 2024,