Study of operations in sewing process of girls' pants

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ABSTRACT – REZUMAT

Study of operations in sewing process of girls' pants

The sewing labour that has a portion of up to 70% of the labour cost in the clothing production, creates a very effective cost component. That is why it is necessary to analyse the workflow in the sewing room better and use the optimum performance and productivity of the workers.
In this research rationalizations of girls' pants production are studied and the developed method is implemented in a middle-sized company in Aegean Region of Turkey. As a result, the productivity of balancing was increased by 6.53 % (from 93.07% to 99.6%). Due to done method development studies, the Total Sewing Time/Piece was been reduced to 20.92 minutes from 21.22 minutes. Before method development studies the theoretical number of workers need was 37 and the actual employed number of workers was 38 at the end of method development studies (MDS) and line balancing this number was been decreased to 35 workers. This girls' pants order was planned for 12 days of production, thus, in total 576 $ saving was provided by the utilization of the rationalized method. The benefits attained through the method development in the company base will globally contribute to the garment industry in the world in terms of the competitive power and the rise in the employment of the labour.

Keywords: *work-study, balancing of sewing line, clothing production, rationalization, need of workers*

Studiul operațiunilor în procesul de asamblare al pantalonilor pentru fete

Manopera de asamblare, ce reprezintă până la 70% din costul forței de muncă în producția de îmbrăcăminte, creează o componentă de cost foarte eficientă. De aceea, este necesar să se analizeze mai bine fluxul de lucru în secția de asamblare și să se folosească performanța și productivitatea optimă a lucrătorilor.
În această cercetare sunt studiate raționalizările producției de pantaloni pentru fete și metoda dezvoltată este implementată într-o companie mijlocie din regiunea Mării Egee a Turciei. Prin urmare, productivitatea a crescut cu 6,53% (de la 93,07% la 99,6%). Datorită studiilor de dezvoltare ale metodei efectuate, timpul total de asamblare/bucată a fost redus la 20,92 minute, de la 21,22 minute. Înainte de studiile de dezvoltare a metodei, numărul teoretic de lucrători necesar a fost de 37, iar numărul efectiv de lucrători angajați a fost de 38 la sfârșitul studiilor de dezvoltare a metodei (MDS), iar echilibrarea a condus la necesitatea unui număr de 35 de lucrători. Această comandă de pantaloni pentru fete a fost planificată pentru 12 zile de producție, astfel, în total, s-a asigurat o economie de 576 $ prin utilizarea metodei raționalizate. Beneficiile obținute prin dezvoltarea metodei în cadrul companiei vor contribui la nivel global în industria confecțiilor din lume, în ceea ce privește puterea competitivă și creșterea gradului de ocupare a forței de muncă.

Cuvinte-cheie*: studiul muncii, echilibrarea liniei de asamblare, producția de îmbrăcăminte, raționalizare, nevoia de lucrători*

INTRODUCTION

In garment production, a big part of workmanship is spent in the sewing room. When the labour cost of a product is analysed, it can be seen that 70–80% originates from the departments of preliminary preparation, sewing, intermediate ironing, yarn cutting and intermediate quality control. Since the sewing labour that has a portion of up to 70% creates a very effective cost component, it is necessary to analyse the workflow in the sewing room better and use the optimum performance and productivity of the workers. Thus, the companies should carefully deal with the labour savings, by paying the same attention to the other labour costs and must try to minimize the time, which product spends in the sewing room.
There are many studies on cutting production time by analysing assembly line systems. The first known formulation of an assembly line balancing problem has been made by Salveson [1] in 1955 years. It assigned a set of tasks I = {1,2,y,i,y,9I9} to linearly ordered workstations M = {1,2,y,k,y,m}. The objective is to assign all given tasks concerning precedence and cycle time constraints while minimizing the number of workstations required [1]. One study presented a management design approach to assembly line systems by considering both the cost and lead time under demand fluctuations; a positioning strategy (cycle time and number of stations) was discussed for a case in which the lead time is restricted [2]. In another study,0–1 integer-programming models were developed by using GAMS-CPLEX mathematical programming software for a numerical example to establish a balance of the assembly line with a minimum number of stations and resources [3]. The objective of another survey is to analyse research on

balancing flow lines within many different industrial contexts to classify and compare the means for input data modelling, constraints and objective functions used and the survey covers about 300 studies on line balancing problems [4]. In research, optimization is used to yield the maximum production rate by using reprocessing machine selection and design strategies. The results indicate that the proposed optimization methodology effectively yields the maximum production rate and presents the optimal selection range and the optimal adjustment size of the reprocessing machine, and the reprocessing accuracy affects the maximum production rate but has little effect on the optimal selection range and the optimal adjustment size [5].

The situation in many clothing production factories is different from automatic production skills where the final products are done by machines. The research done to optimize the production efficiency of assembly lines in the clothing industry mostly are focused on computer programming solutions. Chen et al. [6] had developed a grouping genetic algorithm (GGA), by using real data from garment factories, for the assembly line balancing problem of sewing lines with different labour skill levels in the garment industry. Some researchers developed a genetic optimisation approach to balance an apparel assembly line. The impact of a different level of skill inventory, non the assembly makespan was also investigated in order to find out the optimal number of task skills an operator should possess in the apparel assembly process [7]. The data collected by the researchers from a dress assembly line in a factory in China were used to build a simulation using Pro Model software and the production line could be changed, generating higher productivity and lower work in process. Another research presented the global competence Index "CI" by applying the Weighted Sum Model (WSM) [8]. Using a simple linear regression model, the global competence was modelled [9]. Thereafter, the model was validated and justified. The resulting performance indicator allowed to predict the global competence level, compare different balancing proposals and make the optimal choice.

According to the Ministry of Commerce of the Turkish Republic in the last 3 years among "The Top 20 Exported Chapters" the "Knitwear and Accessories" is 5th and "Non-Knitted Clothing and Accessories" is in 10th place [10]. In the 2018–2020 years the total export of Turkey is between 169.5 and 180.9 million dollars and the percentage of the total "Clothing and Accessories Export" is between 8.81–8.97% [10]. Because the garment production sector is of big importance to the Turkish economy the related study is on shortening the standard production time, so the profit of the companies may be raised.

In this study rationalizations of girls' pants production are studied and a developed method is implemented in the production of girls' pants in a middle-sized company in Aegean Region of Turkey. The current production method of the girls' pants in the sewing line was studied by the trial-and-error method in the form presented by the bandmaster and then was reorganized due to engineering studies.

MATERIAL AND METHODS

Material

The material of this research was the pants for the 14 years old girls, from 1×1 plain weave, 140 g/m^2, 100% cotton fabric. Technical details are given in figure 1. The model of the pants has two pockets and the pockets are very large looking like darning. There is a decoration aimed zipper in front of the model, and the belt is in a wiper form. There is an opportunity of adjusting the waist width that is specific to the user by shrinking the pants through the drawcord. The label of the firm and the washing instructors are on the same label and sewed inside the belt part of the girls' pants in the middle back.

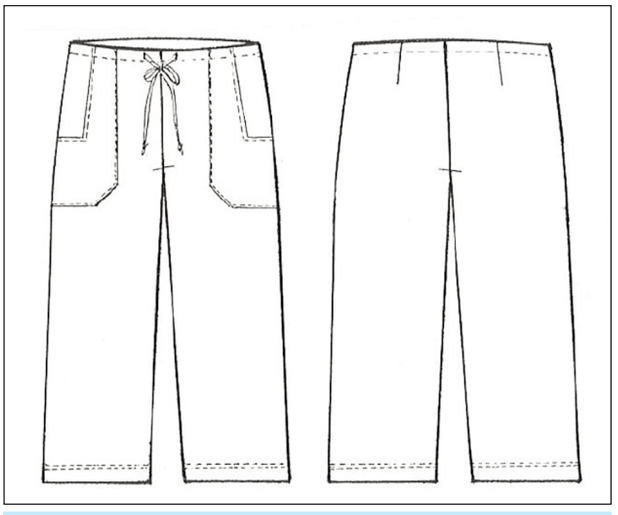

Fig. 1. Technical drawing of girls' pants [11]

Methods

The evaluation of the method in sewing operations is done, when the work-study and time measurements are applied through sewing operations of girls' pants. In this aspect, there is used six-step evaluation method that REFA has specified [12].

The present works were monitored and a work-study was done. Through the work-study, all working methods of the operators and the operations that belong to the sewing process were found. After the work-study time etude was applied and the time the operators consumed for each operation was determined. A Digital chronometer was used to measure each operation time. The measurements were done by applying both the continuous and one-shot measurement methods. The mean of the measurements was calculated and the distribution and the resting time were added as 20%. In the handwork operations, since the transport is done irregularly with flexible gaps, the time the workers spend for the transport of the goods was determined as 15% to 25% of "Measured time" through measurements, and the average of 20% was added. According to the work

and time etude data, saving time was fulfilled in the worker's moves, line balancing was enhanced, and by rationalization of the machine layout plans, it was aimed to shorten the time for the transportation and to make the material flow better. The girls' pants model studies for the related enterprise are calculated according to the following formulas:

$$Base\ time\ (Handwork) = Actual\ time + Distribution\ times = Measured\ time * 1.4 \quad (1)$$

$$Actual\ time = Measured\ Time + Transportation\ time = Measured\ time * 1.2 \quad (2)$$

$$Transportation\ time = 0.2 * Measured\ time \quad (3)$$

$$Distribution\ times = 0.2 * Measured\ time \quad (4)$$

$$Base\ time\ (sewing) = Actual\ time + Distribution\ times = Measured\ time * 1.2 \quad (5)$$

$$The\ Efficiency\ of\ the\ Balancing = \frac{Capacity * Total\ operation\ time * 100}{Number\ of\ the\ workers * Daily\ working\ time} \quad (6)$$

RESULTS AND DISCUSSION

Revealing the numerical expression of existing and reorganized line balancing after the work-study

According to the present working method in the company, it is seen that there is a waste of time in the job stream. The "Line Balancing" table shows the waste time of the operators as "Waste Time" in table 1 with bold numbers. The total of the lost times is 1325 min and this makes 22.08 hours per day.

If a good line balancing is applied and if there is no waste of time, it will be possible to produce 63 more pants (1328 : 21.22 = 62.6). When the performance of the present balancing is calculated:

- Daily production capacity: 800 pieces/day;
- Daily working time: 480 minutes/day;
- Total operation time: 21.22 minutes;
- Total number of workers: 38 people.

$$Efficiency\ of\ the\ Balancing = \frac{800 * 21.22 * 100}{38 * 480} = 93.07\%$$

The abbreviations used in this study are as follows:

- Method development studies – MDS
- Operation Number – Opn Nr
- Type of the Machine – TM
- Daily production quantity – DPQ
- Base Time – BT
- Necessary Time (minute) – NT (min)
- Necessary number of workstations and operators – NNWO
- Operator Number – Op Nr
- Total base time (minute) – TBT (min)
- Lost time (minute) – LT (min)
- Performance – Pr
- Measured operation time (seconds) – MOT (s)
- Hand iron – HI
- Handwork – HW
- Five threads overlock machine – 5TOM
- Three threads overlock machine – 3TOM
- Lock stitch machine – LSM
- Buttonhole stitch machine – BHSM
- Button stitch machine – BSM
- Two-needle lock stitch machine – 2NLSM
- Necessary number of machinery and workers – NNMW.

Table 1

WORK-STUDY OF COMPANY'S PRESENT SITUATION IN GIRLS' PANTS PRODUCTION AND LINE BALANCING [11]

Opn Nr	Operation name	TM	BT (min)	DPQ	NT (min)	NNWO	Op Nr	LT (min)	Pr (%)	MOT (s)
1	Marking the place of the pocket	HW	0.42	800	336	0.70	1	144	80	18
2	Pleating in two	HW	0.16	800	131	0.27	1	**13**	100	7
3	Marking for plaid overlap over pocked according to front pant	HW	0.89	540	231	1.48	2	**1**	95	38
			0.89	260		1.48	3	249	95	38
4	Marking with pattern over pocket seam place	HW	0.33	800	261	0.54	4	219	100	14
5	Pocket ironing with pattern	HI	0.92	400	368	1.53	5	**67**	70	46
			0.92	400	368	1.53	6	**112**	70	46
6	Pocket edging	HW	1.14	420	480	1.91	7	0	90	49
			1.70	280	477	2.84	8	**3**	70	73
			1.14	100	114	1.90	4	**105**	90	49
7	Pocket trimming seam	3TOM	0.17	800	136	0.28	9	344	90	9
8	Trim to pocked	LSM	0.84	570	479	1.40	10	**1**	80	42
			0.84	230	193	1.40	11	287	80	42
9	Turn trimming, pocket entry hemstitch and marking by cutting	LSM	1.20	400	480	2.00	12	0	80	60
			1.20	400	480	2.00	13	0	80	60

Table 1 (*continuation*)

Opn Nr	Operation name	TM	BT (min)	DPQ	NT (min)	NNWO	Op Nr	LT (min)	Pr (%)	MOT (s)
10	Stitching pocket from	LSM	1.30	365	475	2.17	14	**6**	100	65
	Profile and upper side		1.30	365	475	2.17	15	**6**	100	65
	To front pant		1.30	70	91	2.17	11	**196**	100	65
11	Seam pocket to pant by	LSM	1.40	340	476	2.33	16	**4**	95	70
	Hemming stitches from		1.40	340	476	2.33	17	**4**	95	70
	Sides		1.40	120	168	2.33	18	312	95	70
12	Closing front crotch	5TOM	0.72	665	479	1.20	19	**1**	80	36
			0.72	135	97	1.20	20	383	80	36
13	Marking placket preface	HW	0.23	800	187	0.39	21	293	90	10
14	Zipper fly uniting stitch	LSM	0.24	800	192	0.40	22	288	95	12
15	Marking placket fancy seam	HW	0.51	800	411	0.86	23	**69**	100	22
16	Placket fancy seam and front crotch hemstitch	LSM	0.70	685	480	1.17	24	0	90	35
			0.70	115	81	1.17	18	231	90	35
17	Marking dart place	HW	0.23	800	187	0.39	21	106	95	10
18	Dart stitch and hemming	LSM	0.80	600	480	1.33	25	0	85	40
			0.80	200	160	1.33	26	320	85	40
19	Front and back pant profile connecting seam	5TOM	1.04	460	478	1.73	27	**2**	90	52
			1.04	340	354	1.73	20	**29**	90	52
20	Back crotch seam	5TOM	0.40	800	320	0.67	9	**24**	100	20
21	Back crotch hemming	LSM	0.40	800	320	0.67	26	0	100	20
22	Inside trouser leg seam	5TOM	0.58	800	464	0.97	28	**16**	100	29
23	Trouser bottom seam	2NLSM	1.02	470	479	1.70	29	**1**	60	51
			1.02	330	337	1.70	30	143	60	51
24	Reverse pant	HW	0.21	800	168	0.35	31	312	90	9
25	Brand cutting	HW	0.09	800	75	0.16	3	**174**	90	4
26	Attach brand to waist	LSM	0.10	800	80	0.17	22	208	100	5
27	Cutting the pocket excess from the waist	HW	0.56	800	448	0.93	32	**32**	60	24
28	Marking of button and buttonhole place	HW	0.29	800	233	0.49	31	79	90	13
29	Opening of buttonhole	BHSM	0.36	800	288	0.60	33	192	95	18
30	Twisting of waist-band Seam	LSM	1.28	370	475	2.14	34	**5**	90	55
			1.62	295	478	2.70	35	**2**	60	81
			1.28	135	173	2.14	18	**58**	90	55
31	Button stitch	BSM	0.10	800	80	0.17	33	**112**	95	5
32	Cordon making seam	LSM	0.28	400	112	0.47	30	**31**	65	14
33	Cordon cutting	HW	0.19	540	101	0.31	22	**107**	85	8
			0.19	260	49	0.31	31	**30**	85	8
34	Cordon pass trough waistband	HW	1.16	400	464	1.93	36	**16**	65	58
			1.16	400	464	1.93	37	**16**	65	58
35	Knotting cordon ends and link	HW	0.63	760	479	1.05	38	**1**	50	27
			0.63	40	25	1.05	21	**81**	50	27
Total Sewing Time/Piece[1]: 21.22 min/piece Total Lost Time[2]: 1325 min										

Note: [1] it's calculated as the total of Base Times (BT) of all operations done for sewing of girls' pants and shown in the last line of table 1 and of table 3 as "min/piece"; [2] it's calculated as the total of Lost Times (LT) of all operators working for sewing of girls' pants and shown in the last line of table 1 and table 3 as "min".

Calculating the number of necessary machines and the workers for the production of girls' pants

The data relating to the operation time was given in table 1 according to the present job stream in the company, and the theoretically necessary number of machinery and workers in the current production of the girl pant line was calculated.

The number of machines (and workers) required was calculated according to the following equation:

$$Number\ of\ the\ required\ machinery\ (and\ workers) = \\ = \frac{Total\ operation\ time * Number\ of\ daily\ production}{Daily\ working\ time} \quad (7)$$

In the production of girls' pants, the theoretically need of machinery was calculated as 23.04 pieces and theoretically need for workers was find as 35.10 pieces.

The necessary machine and worker need according to the present line balancing

The necessary theoretical machine and worker need within the present working style, which was designed by line master in the company is shown in table 2.

Table 2

THE NECESSARY MACHINE AND WORKER NEED ACCORDING TO THE PRESENT LINE BALANCING

Necessary machines need		Necessary workers need	
Machine type	**Pieces**	**Workers**	**Pieces**
LSM	15	LSM	15
5TOM	5	5TOM	5
2NLSM	2	2NLSM	2
HI	2	HI	2
BSM	1	BSM+BHSM	1
BHSM	1	HW	12
Total	**26**	**Total**	**37**

Since the need for five thread overlock is 4.56 machines and the three thread overlock is 0.28 machines, a five thread overlock machine was converted to three thread. It is possible to sew all the overlock sewing with a total of five threads overlock. It is possible to do operations for both the buttonhole and button sewing by one qualified worker through the machines.

Rationalizing the job stream through method development studies

As a result of the time and motion studies, some inconvenient and unnecessary moves within the company's job stream were determined. Moreover, the insufficient use of the job loads by the masters causes financial losses that increase the cost. By removing these unnecessary motions and using the labour rationally a new line streaming study was suggested. As it is also seen in the line balancing table (table 3), as a result of method development, operation number 2 was removed because inadequacy of place is not present and it is more convenient to give them to sewing before the front sizes are folded. Operation number 3 is done by unfolding the piece that was folded and this means extra time. When the folding operation is removed, 6 seconds were saved in operation number 3. The operation time falls to 0.75 minutes from 0.89 minutes. As a result of the rationalizing studies in this working method, it can be seen in table 4. that the time needed for "Handwork" fell to 6.94 minutes from 7.24 minutes.

$$Efficiency\ of\ the\ Balancing = \\ = (800 * 20.92/35 * 480) * 100 = 99.6\%$$

As a result, the productivity of balancing was increased by 6.53%, from 93.07% to 99.6%.

Table 3

LINE BALANCING IN THE SEWING OF GIRLS' PANTS AFTER METHOD DEVELOPMENT STUDIES [11]

Opn Nr	Operation name	TM	BT (min)	DPQ	NT (min)	NNWO	Op Nr	LT (min)	Pr (%)	MOT (s)
1	Marking the place of the pocket	HW	0.42	800	336	0.70	1	144	80	18
2	Marking for plaid overlap over pocked according to front pant	HW	0.75	640	478	1.24	2	**2**	95	32
			0.75	160	119	1.24	1	**25**	95	32
3	Marking with pattern over pocket seam place	HW	0.33	685	224	0.54	3	256	100	14
			0.33	115	38	0.54	29	4	100	14
4	Pocket ironing with pattern	HI	0.92	278	256	1.53	3	0	70	46
			0.92	522	480	1.53	4	0	70	46
5	Pocket edging	HW	1.14	420	480	1.91	5	0	90	49
			1.70	282	480	2.84	6	0	70	73
			1.14	98	112	1.90	30	0	70	49
6	Pocket trimming seam	3TOM	0.17	800	136	0.28	7	344	90	9
7	Trim to pocked	LSM	0.84	570	479	1.40	8	**1**	80	42
			0.84	230	193	1.40	9	287	80	42
8	Turn trimming, pocket entry hemstitch and marking by cutting	LSM	1.20	400	480	2.00	10	0	80	60
			1.20	400	480	2.00	11	0	80	60
9	Stitching pocket from profile and upper side to front pant	LSM	1.30	365	475	2.17	12	**6**	100	65
			1.30	365	475	2.17	13	**6**	100	65
			1.30	70	91	2.17	9	196	100	65

Table 3 (*continuation*)

Opn Nr	Operation name	TM	BT (min)	DPQ	NT (min)	NNWO	Op Nr	LT (min)	Pr (%)	MOT (s)
10	Seam pocket to pant by hemming stitches from sides	LSM	1.40	340	476	2.33	14	**4**	95	70
			1.40	340	476	2.33	15	**4**	95	70
			1.40	120	168	2.33	16	312	95	70
11	Closing front crotch	5TOM	0.72	665	479	1.20	17	**1**	80	36
			0.72	135	97	1.20	18	383	80	36
12	Marking placket preface	HW	0.23	800	187	0.39	19	293	90	10
13	Zipper fly uniting stitch	LSM	0.24	800	192	0.40	9	**4**	95	12
14	Marking placket fancy seam	HW	0.51	800	411	0.86	20	69	100	22
15	Placket fancy seam and front crotch hemstitch	LSM	0.70	685	480	1.17	21	0	90	35
			0.70	115	81	1.17	16	231	90	35
16	Marking dart place	HW	0.23	800	187	0.39	19	106	95	10
17	Dart stitch and hemming	LSM	0.80	600	480	1.33	22	0	85	40
			0.80	200	160	1.33	23	320	85	40
18	Front and back pant profile connecting seam	5TOM	1.04	460	478	1.73	24	**2**	90	52
			1.04	340	354	1.73	18	**29**	90	52
19	Back crotch seam	5TOM	0.40	800	320	0.67	7	**24**	100	20
20	Back crotch hemming	LSM	0.40	800	320	0.67	23	0	100	20
21	Inside trouser leg seam	5TOM	0.58	800	464	0.97	25	**16**	100	29
22	Trouser bottom seam	2NLSM	1.02	470	479	1.70	26	**1**	60	51
			1.02	330	337	1.70	27	143	60	51
23	Reverse pant	HW	0.21	800	168	0.35	28	312	90	9
24	Brand cutting	HW	0.09	800	75	0.16	20	6	90	4
25	Attach brand to waist	LSM	0.10	800	80	0.17	16	151	100	5
26	Cutting the pocket excess from the waist	HW	0.56	800	448	0.93	29	**32**	60	24
27	Marking of button and buttonhole place	HW	0.29	800	233	0.49	28	79	90	13
28	Opening of buttonhole	BHSM	0.36	800	288	0.60	30	192	95	18
29	Twisting of waist-band seam	LSM	1.28	378	485	2.14	31	5	90	55
			1.62	300	486	2.70	32	6	60	81
			1.28	122	157	2.14	16	6	90	55
30	Button stitch	BSM	0.10	800	80	0.17	30	112	95	5
31	Cordon making seam	LSM	0.28	400	112	0.47	27	**31**	65	14
32	Cordon cutting	HW	0.19	540	101	0.31	19	**5**	85	8
			0.19	260	49	0.31	28	30	85	8
33	Cordon pass trough waistband	HW	1.16	400	464	1.93	33	**16**	65	58
			1.16	400	464	1.93	34	**16**	65	58
34	Knotting cordon ends and link	HW	0.63	760	479	1.05	35	**1**	50	27
			0.63	40	25	1.05	28	**5**	50	27
Total Sewing Time/Piece: 20.2 min/piece **Total Lost Time: 221 min**										

To complete the free time with a mission in line balancing, the operator that was sewing buttons and buttonholes was reinforced with a handcraft mission and one of the twin needle operator's free time was reinforced with an even sewing operation. As a result of line balancing, the number of even sewing staff fell from 15 to 14 persons.

Through the line balancing studies, it was possible to use the workers more productive, so the number of the workers was decreased. Before method development studies the theoretical need of workers was 37 and the actual used was 38 at the end of MDS and line balancing this number was decreased to 36.

The Total Lost Time from 1325 minutes fell to 221 minutes, so it was proved that it is possible to work losing almost no time on the sewing line. With done method development studies the Total Sewing Time/Piece was been reduced to 20.92 minutes from 21.22 minutes.

Economic benefit of the study

As a result, the productivity of balancing was increased by 6.53%, from 93.07% to 99.6%. Before method development studies the theoretical need for workers was 37 and the actual use was 38 at the end of MDS this number was decreased to 36 persons (table 4).

Table 4

THE NECESSARY WORKER NEED IN THE GIRLS' PANTS SEWING LINE AFTER MDS			
Machine type	**Worker need**	**Machine type**	**Worker need**
LSM	14	BSM+BHSM	1
3SOM+5SOM	5	2NLSM+LSM	2
HI+HW	2	HW	12
Total worker need: 36			

In the Aegean region of Turkey payment given to workers in the textile and garment industry is mostly near minimum wage. The minimum wage for the 2021 year for Turkey, Romania and Bulgaria was given in table 5 [13–15]. In Turkey, the monthly cost of the determined minimum wage employee to the employer is 4 thousand 203.56 Turkish lira, approximately 517 US $. When the payment for an hour is 3 $/hour (payment average in Turkey), the savings in terms of money is 8 hours * 3 $ * 2 people= 48 $/day. This girl pants order was planned for twelve days of production, thus, in total, 12 days * 48 $ = 576 $ saving was provided by done rationalizations.

Table 5

THE MINIMUM WAGE FOR THE 2021 YEAR FOR TURKEY, ROMANIA AND BULGARIA			
Country	**Minimum Wage**	**US $/ month**	**US $/ hour**
Bulgaria	650 Leva [15]	387	2.2
Romania	1.386 Lei [14]	340	1.93
Turkiye	2826 Turkish lira [13]	348	1.98

CONCLUSION

In this study, by using MDS the productivity of balancing was increased from 6.53% to 99.6%, and "Total Lost Time" from 1325 minutes fell to 221 minutes. Before method development studies the actually used workers was 38 and at the end of MDS, this number was decreased to 36 persons.

Today's competitive state requires the garment industry to take serious precautions. Since it is possible to increase the competition power by preventing the waste of materials and labour, the garment companies should prioritize the saving efforts.

It is useful to emphasize the necessity of minimizing the cost by increasing the labour performance and decreasing the production span since the garment industry is a labour centred sector.

The garment industry that is careful about the developments in the world and parallel with them can extend the operating periods by turning the profit it gets into the technological investments, that will enable the production of the goods that provide added value. The garment industry of Turkey can extend its leadership in making the country's economy more powerful to reach the economic level of the developed countries by creating international brands and reserving funds for the marketing by developing strategies, that are parallel to these investments.

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