THE RELATIONSHIP OF MENTAL WORKLOAD AND JOB STRESS IN ASSEMBLY OPERATORS AT PT. X YEAR 2024

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Abstract

The manufacturing industry often involves repetitive and monotonous work, especially in the assembly section. This job requires not only physical skills but also a significant mental workload. This research aims to analyze the relationship between mental workload and work stress in assembly operators at PT. X year 2024. This research uses quantitative methods. The data collection technique used in this research was the NASA-TLX questionnaire. The data analysis technique used is descriptive analysis. The research results show that mental workload has a positive relationship with work stress in assembly operators at PT. X in 2024. Based on the results of the questionnaire, data was obtained that 12 out of 30 workers experienced very high mental workload. Meanwhile, in terms of work stress, from the aspect of role ambiguity and role conflict, all respondents felt mild stress, in the qualitative overload aspect, 5 out of 30 workers experienced severe stress and the rest were moderate stress, while in the career development aspect, 1 person felt severe stress and the remaining 29 experienced moderate stress, finally the aspect responsibility towards others 4 people experienced severe stress and 26 others experienced mild stress.

Keywords: Mental Workload, Work Stress, Electronic Manufacturing

INTRODUCTION

Assembly operators play a crucial role in the manufacturing industry, tasked with installing and arranging various product components so that they function properly. Their expertise and skills are indispensable to ensure production quality and efficiency. Examples of assembly processes in the world of production include assembling electronic components on PCBs using solder in the electronics industry, installing buttons and zippers on clothes in the garment industry, and assembling machine components in automotive production (Mattsson, Fast-Berglund, Li, & Thorvald, 2020).

The job of an assembly operator does not only rely on physical skills, but also involves a significant mental workload. Mental workload is how much effort the mind has to make in carrying out a task that requires cognitive processing such as concentration, memory, decision making, and attention (Nugraha & Suprapti, 2023). The assembly operator's work must understand detailed technical instructions, monitor and adjust the production process according to established standards, and solve problems that may arise during the assembly process. Additionally, they need to maintain high concentration and focus to ensure that each

component is installed correctly and the final product meets the specified quality specifications.

High mental workload can trigger work stress which has an impact on employee productivity and well-being (Wijaya, 2018). When employees, including assembly operators at PT. X, facing constant mental pressure from tasks that are complex and require high concentration, they are prone to experiencing stress. This job stress can disrupt their focus, slow response to changes or problems on the production line, and even increase the risk of errors.

PT. X, as a large manufacturing company, recognizes the importance of the mental well-being of their employees. Especially for assembly operators, who play a direct role in assembling product components, their mental health plays a crucial role in maintaining the quality and sustainability of the production process. Company management has the responsibility to create a supportive work environment, where mental workload can be managed well through strategies such as training, psychological support, and balanced workload management.

Research conducted by Fahamsyah, (2017) shows that employees at CSSD experience mental workload which is divided into medium workload in 7 people and low mental workload in 4 people. This research also found a relationship between mental workload and the incidence of work stress, with 6 employees experiencing moderate work stress and 5 employees experiencing low work stress. Overall, the mental workload and work stress on employees is at a moderate level. It is recommended that employees make good use of rest time and exercise regularly to increase endurance.

Another study by Zetli, (2019) found that the average mental workload of elementary school teachers was 76.98, which is included in the heavy mental workload category. For junior high school teachers, the average mental workload is 67.99, including the medium category, and for high school teachers it is 66.89, also including the medium category. Meanwhile, lecturers have an average mental workload of 80.22, which is in the heavy category. The average work stress for elementary school teachers is 129.63 (74.08%), including the high category, for junior high school teachers it is 104.17 (59.52%), including the medium category, for high school teachers it is 109.40 (62 .51%), including the medium category, and for lecturers 131.33 (75.05%), including the high category.

This research adds to the literature on the relationship between mental workload and work stress, especially in the context of the manufacturing industry. These findings open opportunities for further research that could explore specific interventions that are effective in reducing mental workload and job stress. This research aims to analyze the relationship between mental workload and work stress in assembly operators at PT. X year 2024.

RESEARCH METHODS

This research uses quantitative methods. Quantitative methods are research approaches that focus on collecting and analyzing numerical data to explain, predict, or control certain phenomena. Quantitative research uses statistical and mathematical techniques to test hypotheses or answer research questions with the aim of obtaining results that can be generalized to a larger population (Caroline, 2019). The data collection technique used in this research is the NASA-TLX questionnaire with the following score groups:

Table 1. NASA-TLX scores

Workload Group	Mark
Low	0-9
Currently	10-29
Somewhat High	30-49
Tall	50-79
Very high	80-100

The object of this research is PT X electronics manufacturing company. The population of this research is assembly operators at PT. X. The sample for this research was taken using a simple random sampling technique of 30 people. The data analysis technique used is descriptive analysis. Descriptive analysis aims to describe or illustrate the characteristics of the data that has been collected in research, so that researchers can obtain a clear and detailed picture of the variables studied. aims to describe or illustrate the characteristics of the data that has been collected in research, so that researchers can obtain a clear and detailed picture of the variables studied (Agustianti et al., 2022).

RESULT AND DISCUSSION

Giving Ratings

Table 2. Rating Results Data

Objek	RATING					
	KM	KF	KW	P	TU	TF
1	60	60	70	80	90	70
2	60	50	60	80	90	70
3	50	70	80	90	100	40
4	60	70	80	90	100	70
5	50	60	80	100	70	30
6	50	80	80	100	60	10
7	50	70	80	100	70	40
8	60	70	70	90	90	30
9	50	50	80	80	70	40
10	50	50	80	80	70	40
11	50	80	70	70	70	40
12	50	50	50	50	50	50
13	50	50	70	100	50	20
14	50	70	60	80	90	40

| Objek	RATING					
	KM	KF	KW	P	TU	TF
15	50	100	70	100	100	20
16	60	70	80	90	90	80
17	50	80	80	80	80	90
18	40	80	100	80	100	30
19	60	70	80	70	80	50
20	60	80	100	90	70	60
21	80	70	100	80	100	80
22	60	80	100	90	70	70
23	80	70	100	80	100	80
24	50	100	70	100	100	20
25	50	50	70	90	90	50
26	50	90	90	90	50	90
27	10	70	70	80	70	50
28	10	70	70	80	70	60
29	50	90	90	80	80	100
30	50	40	70	80	90	50

Measurement of Weighted Workload (WWL) using the NASA-TLX Method

Table 3. Measurement Results using the NASA-TLX Method

Object	Value Product						Total	Mean	Category
	KM	KF	KW	P	TU	TF			
1	60	120	350	320	270	0	1120	74.667	High
2	60	100	300	320	270	0	1050	70	Tinggi
3	50	210	320	270	400	0	1250	83.333	High
4	60	210	320	270	400	0	1260	84	High
5	50	120	320	500	140	30	1160	77.333	High
6	100	320	240	400	60	10	1130	75.333333	High
7	50	210	400	400	140	0	1200	80	Very high
8	60	210	280	360	180	30	1120	74.667	Very high
9	50	150	240	320	280	0	1040	69.333	High
10	50	150	160	400	280	0	1040	69.333	High
11	50	400	210	140	280	0	1080	72	High
12	150	50	150	200	150	50	750	50	High
13	50	100	280	400	200	0	1030	68.667	High
14	100	280	180	320	180	0	1060	70.667	High
15	50	400	140	300	500	0	1390	92.667	Very high
16	60	140	320	450	180	80	1230	82	Very high

Object	Value Product						Total	Mean	Category
	KM	KF	KW	P	TU	TF			
17	50	160	240	400	160	180	1190	79.333	Tinggi
18	40	320	500	160	300	0	1320	88	High
19	60	280	400	140	240	0	1120	74.667	High
20	0	240	400	180	350	60	1230	82	Very high
21	0	210	500	80	300	240	1330	88.667	Very high
22	0	240	500	180	350	0	1270	84.667	Very high
23	0	280	300	80	500	160	1320	88	Very high
Very high	50	400	140	300	500	0	1390	92.667	Very high
Very high	100	100	210	450	270	0	1130	75.333333	High
26	0	360	180	270	100	360	1270	84.666667	Very high
27	0	280	140	80	350	150	1000	66.666667	Very high
28	0	280	140	80	350	180	1030	68.666667	High
29	0	270	180	160	240	500	1350	90	Very high
30	150	80	210	400	180	0	1020	68	Very high

Results of workload calculations using the NASA-TLX method for assembly operators at PT. X in 2024, it was found that 12 people had a very high workload and 18 people had a high workload.
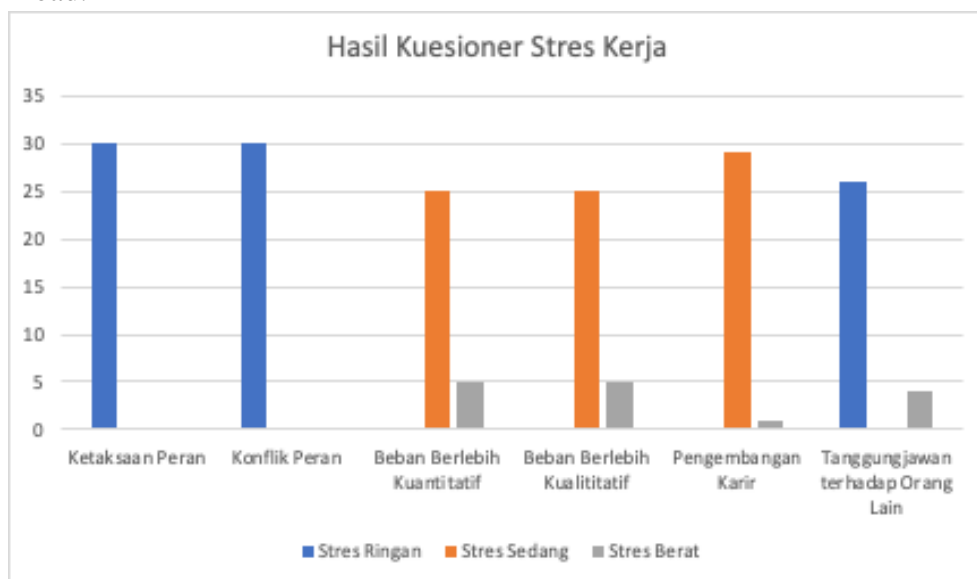
Graph 1. Results of the Job Stress Questionnaire

Based on the results of a questionnaire from 30 assembly operators at PT. X Year 2024 with six indicators, namely the role of the role, the role conflict, the excess quantitative burden, the excessive excess burden, career development, and responsibility for others it was found that the first and second indicators were the role of the role and the role conflict of all operators had mild stress, on the indicator The third and fourth results showed that 25 people had moderate stress and 5 people had severe stress. Then in the fifth indicator, it was found

that 29 people had moderate stress and 1 person had severe stress. In the last indicator, there were 26 people with mild stress and 4 people with severe stress.

Based on the research results, it was found that workload was related to work stress in assembly operators at PT. X year 2024. These results are supported by previous research conducted by Safitri, (2020) which states that there is a positive relationship between high workload and work stress levels, increasing workload tends to increase employee stress levels.

Human resources have an important role in a company, because through their performance, the company can achieve its goals. Competent and motivated employees can increase productivity, innovation and operational efficiency. They contribute to creating quality products, providing satisfactory service, and developing effective strategies (Pahira & Rinaldy, 2023). Good management of human resources also ensures that the company has the right workforce to face business challenges, maintain sustainability, and achieve desired growth. Human resources are not only the backbone of operations, but are also the key to realizing the company's vision and mission (Aula, Hanoum, & Prihananto, 2022).

To achieve maximum performance, companies need to pay attention to employee workload. A workload that is too high or too low can have a negative impact on employee productivity and well-being. Excessive workload can cause stress, fatigue and decreased work quality, while workload that is too low can cause boredom and dissatisfaction (Farida & Melinda, 2019). It is important for management to balance the number and complexity of assigned tasks, ensure that employees have the necessary resources and support, and allow sufficient time for task completion. By managing workload effectively, companies can improve employee performance, maintain their motivation and well-being, and achieve organizational goals more efficiently (Nurwahyuni, 2019).

Workload is the number of tasks or responsibilities that must be completed by an individual within a certain period of time, which can affect their well-being and performance (Ulya & Novendy, 2023). Workload can be seen from two main aspects, namely quantity and quality. Workload quantity refers to the number of tasks or volume of work that must be completed by an individual within a certain time period. such as how many documents must be processed, how many clients must be served, or how many products must be produced. Meanwhile, the quality of the workload is related to the complexity and level of difficulty of the task which includes standards or requirements that must be met in completing the work, such as the level of accuracy, creativity or technical expertise required. These two aspects are interrelated and can influence work stress levels, increasing the quantity or quality of workload without adequate support can cause higher pressure and fatigue in employees (Suryani, Muliawan, & Adiputra, 2020).

The workload can be felt by individuals according to their respective abilities and capacities. Each individual has different physical and mental limitations in dealing with the number and complexity of tasks given. By adjusting workloads based on individual abilities, companies can ensure employees remain productive and are not overburdened, which will ultimately help achieve maximum performance and organizational goals (Riznanda &

Kusumadewi, 2023). Several factors that influence workload according to Utomo, (2019) include:

a. Volume and complexity of tasks

The number and level of difficulty of tasks that must be completed can influence a person's workload level.

b. Time and pressure

Tight deadlines or pressure to complete tasks can increase the workload.

c. Available resources

The availability of resources such as time, energy, and tools required to complete a task can influence workload levels.

d. Experience and skills

A person's level of experience and skill in handling certain tasks can influence how much of a workload he or she feels.

e. Support and supervision

The level of support and supervision from superiors or coworkers can also influence a person's workload.

f. Work environment

Factors such as noise, distractions or conflict in the work environment can also influence workload levels.

Excessive workload will cause various negative impacts, such as high stress, physical and mental fatigue, decreased work quality, and decreased work satisfaction and motivation (Lestari & Fachrian, 2022). Stress is a physical, mental, or emotional response that occurs when someone faces demands or pressure that exceed their ability to cope effectively (Melo, Kawatu, & Tucunan, 2019). Work stress is a response that occurs when someone faces demands or pressure that exceed their ability to cope. Characterized by various physical, emotional, and behavioral symptoms, such as muscle tension, fatigue, inability to concentrate, mood changes, increased sensitivity, increased interpersonal conflict, and decreased motivation and performance (Mohune, 2018). Untreated stress can impact a person's ability to concentrate, make the right decisions, and complete tasks effectively. This can result in decreased productivity, poor work quality, and increased error rates. Apart from that, untreated stress can also affect an individual's physical and mental health, which in turn can worsen their performance (Rohman & Ichsan, 2021).

The consequences of stress can be reflected in three main dimensions: physical, psychological, and behavioral. Physically, untreated stress can produce symptoms such as headaches, sleep disorders, excessive fatigue, digestive disorders, and an increased risk of other diseases. On the psychological side, individuals experiencing stress are likely to experience feelings of anxiety, tension, or even depression, which can disrupt their overall mental well-being. The behavioral impact of stress is also significant, it can manifest in changes in eating patterns, increased consumption of alcohol or drugs, withdrawal from social interactions, or even aggressive behavior. Together, these impacts can damage a person's quality of life, health and social relationships, as well as interfere with performance and achievement of goals in daily life (Abdullah, 2015).

Thus, the research results show that there is a significant relationship between workload and work stress experienced by assembly operators at PT. X year 2024. High workload, both in terms of quantity and quality of tasks that must be completed within a certain time period because it can increase stress levels in operators which has a negative impact on their well-being and overall performance. Therefore, the management of PT X.

CONCLUSSION

The research results show that mental workload has a positive relationship with work stress in assembly operators at PT. X year 2024. Based on the results of the questionnaire, the data shows that 12 out of 30 workers experience very high mental workload. In terms of work stress, all respondents felt mild stress in the aspects of role ambiguity and role conflict. In the qualitative aspect of overload, 5 out of 30 workers experienced severe stress, while the rest experienced moderate stress. Regarding the career development aspect, 1 person experienced severe stress and 29 others experienced moderate stress. Finally, in the aspect of responsibility towards other people, 4 people experienced severe stress, while 26 others experienced mild stress. This data indicates that high mental workload tends to be associated with varying levels of work stress, especially in certain aspects that affect the mental well-being of assembly operators.

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