The mental workload of managerial employees at PT. X: Do gender, age and length of service matter?

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Abstract. This study explores one of the interesting psychological constructs in human resource management in companies, namely the mental workload, which has aspects of mental demands, physical demands, time demands, performance, effort levels and frustration levels. This study aimed to determine whether there was a significant difference in mental workload based on gender, age, and length of service in managerial employees at PT. X. The research method used in this study was quantitative, with a sample size of 107 respondents (85 males and 22 females). The instrument used for measuring mental workload variable was the National Aeronautics and Space Administration - Task Load Index (NASA-TLX) scale developed by Hart & Staveland (1988). T-tests and ANOVA were used to analyse the differences in gender, age, and length of service regarding the mental workload. This results showed that a significant difference was found in mental workload based on gender (t value = 2.005 with p = 0.048), but there is no significant difference in mental workload based on age (F = 0.326 with p = 0.723); only performance showed a significant difference based on length of service (F = 2.806 with p = 0.043). Mental demands, physical demands, temporal demands, effort, frustration level, and overall mental workload did not significantly differ based on the length of service. The limitations and recommendations for further research in the field of mental workload on managerial employees in companies more accurately, namely: The research was only conducted in one company. It needs to be undertaken in several specific companies. The amount of male and female participants needs to be balanced, and more specific theoretical and previous research support is required for the company field being studied.

Keywords: Mental workload; gender; age, length of service, managerial employee

1. Introduction

Mental workload is closely related to employee performance, where an appropriate mental workload will certainly produce optimal performance. According to Claessens et al. (2010, in Wulanyani [1], high workload causes increased effort and is generally associated with low performance. This statement indicates a mismatch between capacity and demands. This is clarified by the description of Matthews et al. (2000), which explains that mental workload leads to attention demands needed during cognitive tasks. Poor employee performance occurs because the workload is greater than the available resources.

ICoPHI 2024, November 02, Padang, West Sumatera, Indonesia

DOI 10.4108/eai.2-11-2024.2354575

Although there isn't a universally agreed-upon definition for this concept, the universal mental workload is determined by the difference in the amount of employee resources and the amount of task demands that need to be completed. Haga et al. [5], Hacker [6] and Attwood et al. [7] further mentioned that mental workload is the degree of processing capacity issued while performing tasks, and emerges during information processing by sensory organs. Information processing also involves perception and interpretation. Taking into account the different opinions, mental workload generally exists in every type of work caused by information processing. Several years back, there was a clear distinction between manual work and brain work. However, the boundary that separates these types of work is becoming increasingly blurred as manual work is believed to involve aspects of mental activities, namely information processing and decision-making [8].

People understand various aspects when asked about mental workload, including the amount of work that is burdensome, the presence of time pressure, the level of effort, the success of meeting demands, and the psychological and physiological consequences of the task. In addition, mental workload is often associated with the task's difficulty. So the workload assessment by one person may reflect his assessment of the task's difficulty, while another may reflect the level of effort that must be expended.

Mental workload is also related to underload and overload conditions. Underload will occur when, quantitatively, the mental demands on the task are rare, and qualitatively, the existing task demands are only superficial. Overload conditions will occur when there is no time pressure qualitatively. However, the mental demands are complex, and quantitatively, if the task is under time pressure and the mental demands are relatively frequent.

Widodo [9] states that various complex internal and external factors may influence the relationship between workload and work capacity. External workload factors originate from outside an employee, such as physical and mental tasks; work organization (length of work time, rest time, work shifts, work systems); work environment (physical, psychological, chemical, biological).

On the other hand, internal workload originates from within an employee due to reactions from external workloads, potentially becoming stressors, such as somatic factors (age, gender, body size, health conditions) and psychological factors (perception, motivation, satisfaction, belief, desire). According to Widodo [2], it can be concluded that mental workload is related to gender and age as an internal factor in the somatic factor category.

However, other studies did not find a significant relationship between gender, age and mental workload. Hao et al. [10] stated that we rarely found a significant effect of driving experience on the driver's driving performance, situation awareness, performance, and mental workload score. Budiman et al. also found no relationship between age and workload together with fatigue [11].

Likewise, Anwar and Mutiara [12], in their analysis of research results, stated that higher job-level employees experience higher mental workload than lower job-level employees. The analysis of variance results showed a significant difference in mental workload between different job-level positions. The descriptive analysis showed that mental workload increased with age groups. The correlation and regression analysis indicated that the age of employees significantly contributed to mental workload. The most significant contributors to the level of mental workload in the lower-level positions were physical demands and effort, whereas temporal demand was the most significant for the higher-level positions.

In several studies on age and length of service, Dearsya [13], in his research on operational employees of the Aircraft Freight Expedition (EMPU) company, found no relationship between age and length of service and work stress. However, there is a relationship between mental workload and work stress. Likewise, Hapsari et al. [14] found a reasonably strong relationship between mental workload and work stress in their research on Surakarta Customs Office employees. However, there is no relationship between age and working period with work stress.

2. Method

The research method used in this study was quantitative, with a sample size of 107 respondents (85 males and 22 females) of managerial employees of PT. X. The instrument used for measuring the mental workload variable was the National Aeronautics and Space Administration - Task Load Index (NASA-TLX) scale developed by Hart & Staveland [15]. NASA-TLX consists of six factors/dimensions: mental demand, physical demand, temporal demand, performance, effort and frustration level. The definitions for each dimension are shown in Table 1. The instrument used a Likert scale of 5-100 points with a range of 5 points. Data analysis used in this study was T-test and ANOVA to see differences in gender, age, and length of service regarding mental workload.

Table 1. Rating scale definitions for the six factors/dimensions of the NASA-TLX

Factors/Dimensions	Endpoints	Descriptions
Mental Demand	low/high	How much mental and perceptual activity was required (e.g. thinking, deciding, calculating, remembering, looking, searching, etc.)? Was the task easy or demanding, simple or complex, exacting or forgiving?
Physical Demand	low/high	How much physical activity was required (e.g. pushing, pulling, turning, controlling, activating, etc.)? Was the task easy or demanding, slow or brisk, slack or strenuous, restful or laborious?
Temporal Demand	low/high	How much time pressure did you feel due to the rate or pace at which the tasks or task elements occurred? Was the pace slow and leisurely or rapid and frantic?
Performance	good/poor	How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)? How satisfied were you with your performance in accomplishing these goals?
Effort	low/high	How hard did you have to work (mentally and physically) to accomplish your level of performance?
Frustration level	low/high	How insecure, discouraged, irritated, stressed, and annoyed versus secure, gratified, content, relaxed, and complacent did you feel during the task?

3. Result and Discussion

3.1 Respondent demographic

In a study conducted on 107 respondents, and the respondent demographic show at table 2. Respondent Demographic.

Table 2. Respondent Demographic

Name	Keterangan	Frequency	Percentage
Gender	Male	85	79,4%
	Female	22	20,6%
Age	25-35 Years Old	15	14%
	36-45 Years Old	49	45,8%
	45-56 Years Old	43	40,2%
Education	Academy's degree	7	6,5%
	Bachelor's degree	80	74,8%
	Master's degree	20	18,7%
Length of service	0-6 Months	13	12,1%
	6-12 Months	24	22,4%
	1-2 Years	45	42,1%
	> 2 Years	25	23,4%
Total		107	100%

In a study conducted on 107 respondents, the demographic profile showed a male gender dominance, where 79.4% of respondents were male, while females only comprised 20.6%. This indicates a significant gender imbalance in the population studied, with men dominating the work environment.

Age-wise, most of our respondents (45.8%) fell in the 36-45 age range, with another 40.2% in the 45-56 age group. This distribution suggests a potential for leadership development, as these age groups typically represent individuals with significant experience and responsibility in their roles.

When looking at education level, the majority of respondents, namely 74.8%, had a Bachelor's degree. As many as 18.7% of respondents had a Master's degree, while only a small number had a D3 education (6.5%). This shows that a Bachelor's degree is the most common education level among respondents, with a significant proportion also having postgraduate education.

Regarding tenure, 42.1% of respondents have been in their position for 1-2 years, while 22.4% have been there for 6-12 months. 23.4% of respondents have been in their position for more than 2 years, and another 12.1% have only been there for less than 6 months. This shows that there is quite a significant variation in tenure among respondents.

Regarding tenure at their current company, 73.8% of our respondents have been with their company for more than 4 years, indicating a stable and committed workforce. 25.2% have a tenure of 1-4 years, while only 0.9% have been with their company for less than a year.

Overall, the demographic profile and work experience of respondents show a dominance of males with middle age and higher education. Most respondents have stable work experience at their companies. These data provide an overview of the workforce composition in the organisation studied and can serve as a basis for developing better human resource policies.

3.2 Gender differences in mental workload

An independent T-test was conducted to analyze differences in mental, physical, time, performance, effort, and frustration needs based on gender. The results of the Levene test showed that all dependent variables met the assumption of homogeneity of variance, with a significance value (Sig.) greater than 0.05. Based on the results of the T-test, a significant difference was found in mental workload based on gender (t value = 2.005 with p = 0.048; p-value less than 0.05). Meanwhile, the independent T-test results on all mental workload variables showed no significant differences in all variables tested based on gender. This indicates that both men and women have relatively similar experiences and perceptions of mental, physical, time, performance, effort, frustration levels, and mental workload in the context of this study. This result supports Widodo’s opinion that mental workload is related to gender as an internal factor in the somatic factor category [9]. The detail show at table 3.

Table 3. Gender differences in mental workload

Gender	Mean	N	Std. Deviation
Male	69,1380	85	8,64005
Female	65,0303	22	8,25321
Total	68,2935	107	8,68525

3.3 Age differences in mental workload

The results of the Independent ANOVA test to analyze the differences in various dependent variables based on age show no significant difference in mental workload based on age ($F = 0.326$ with $p = 0.723$). As shown at table 4 can see that the detail.

Table 4. Age differences in mental workload

Age	Mean	N	Std. Deviation
25-35 Years old	68,4444	15	8,75746
36-45 Years old	67,5823	49	6,87713
45-56 Years old	69,0512	43	10,46796
Total	68,2935	107	8,68525

Of the various variables tested, the level of effort showed a significant difference based on age. In contrast, other variables, such as mental, physical, time, performance, and frustration levels, did not show significant differences. Anwar and Mutiara's opinion states that mental workload increased according to age group [12]. The correlation and regression analysis indicated that employees's age had a strong relationship and significantly affected mental workload.

3.4 Length of service differences in mental workload

Based on the results of the ANOVA test and the analysis, the only performance showed a significant difference based on length of service ($F = 2.806$ with $p = 0.043$). The detail showed at bellow table 5.

Table 5. Length of service differences in mental workload

Length of service	Mean	N	Std. Deviation
0-6 Months	68,4769	13	4,60047
6-12 Months	67,6250	24	7,06034
1-2 Months	69,1630	45	9,66160
> 2 Months	67,2747	25	10,03554
Total	68,2935	107	8,68525

Meanwhile, other variables, namely mental, physical, time, effort level, frustration level, and overall mental workload, did not significantly differ based on length of service. This result supports Hao et al. stated that we rarely found a significant effect of driving experience on the driver's driving performance, situation awareness, performance, and mental workload score [10].

4. Conclusion

Some conclusions that can be drawn based on the results obtained and the discussion conducted above are as follows: a significant difference was found in mental workload based on gender.

Male managerial employees at PT. X has a higher mental workload compared to female managerial employees; The results show no significant difference in mental workload based on the age of managerial employees at PT. X; The overall mental workload does not show a significant difference based on the length of service of managerial employees at PT. X.

This study still has several limitations that need to be improved and can be the basis for recommendations for further research in the field of mental workload on managerial employees in companies more accurately, namely: the research was only conducted in one company; it needs to be conducted in several specific companies; the number of male and female respondents is not balanced; more specific theoretical and previous research support is needed in the company field being studied.

Acknowledgments.

The author would like to thank the entire research team who have collaborated in completing this research.

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