A Mental Workload Assessment of Jeepney Drivers on the Tanay-Siniluan Route in Tanay, Rizal

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Abstract

This study shows the assessment of mental workload for jeepney drivers in Tanay, Rizal. This aims to observe the bottleneck and evaluate jeepney drivers' circumstances that affect their mental workload and identify the factors influencing the mental workload of the jeepney drivers while on duty. The researchers applied Slovin's Formula to get the correct sample size appropriate for the study. The mental workload of the jeepney drivers was assessed through the use of NASA-TLX (National Aeronautics and Space Administration Task Load Index) with six subscales such as mental demand, physical demand, temporal demand, performance, effort, and frustration. The six-step measurements in NASA TLX were also used in this study, i.e., weighting, provision rating, scoring, weighted workload (WWL), weighted workload score, and scoring interpretation. In accordance with the gathered data, the research shows that the indicator physical demand (PD), with a score of 351.46, which is in the very high category on the scale, is the most dominant factor among all the other indicators, and frustration level, with a score of 98.33, will be the least contributor factor among the remaining five indicators. Furthermore, the one-way analysis of variance (ANOVA) was used by the researchers to compare the means of two or more independent variables and to see if there is statistical evidence that the related population means differ significantly. Findings conclude that physical demand is the most prominent among all the indicators and the leading contributor to the mental workload of the jeepney drivers that drive trips along the Tanay-Siliuan route.

Keywords
NASA Task Load Index (TLX), Weighted Workload (WWL), Mental Workload (MWL), and Jeepney Drivers.

1. Introduction
Jeepneys, or jeeps, were considered to be the backbone of the transport system in the Philippines. And yet, jeepney drivers are perceived to have the lowest socio-economic standing (Güss & Tuazon, 2008), regardless of the fact that they are the substantial mode of transport across any municipality in the Philippines. Due to the vast number of jeepneys and jeepney drivers on the road at all hours of the day and night, jeepneys are commonly recognized as the most common and least expensive method of transportation in the Philippines.

Driving a vehicle is a complicated task that can involve significant shifts in mental workload. Drivers must process a lot of information coming from outside the vehicle, such as traffic intensity, traffic signs, and so on, because people interconnection, entertainment devices, and navigation systems increase the amount of incoming data inside the vehicle. This signifies that the increased availability of information necessitates an increase in the demand for visual and auditory resources, which has a direct impact on mental workload. Such laborious tasks experience heavy and demanding workload, both physically and mentally. Not to mention that both types are relatively connected and intertwined with one another. In ergonomics and human factors, mental workload is described as a notion that is used to evaluate the contributory factors of workload (Hoedemaeker, 2002).

A mental workload analysis assesses and measures an individual's mental demand capability during an activity. Thus, mental workload can be expressed in subjective experience, performance, and physiological manifestations. The gravity of the mental workload that workers or task-doer experience is presumed to have a significant influence towards the key and principal obstacles in attaining aptitude and effective performance which plays on the account of failure or inability to perform and solve problems (Grigg and Garrett, 2012). Heavy mental workload can also cause the task-doer to commit more frequent mistakes and errors, causing a direct negative effect to the quality and efficiency of the task process.

According to an article that was published and made public by the World Health Organization (WHO), 1.35 million people lost their lives in traffic accidents in 2018. Furthermore, figures from the Philippines show that 12,000 Filipinos die on the roads each year. The statistics for Metro Manila are more alarming – vehicle accidents have increasing, twice from 2007 to 2018. Hence, this research study aims for the researchers to provide a comprehensive assessment and measurement of the mental workload of the jeepney drivers operating trips along the route of Tanay-Siniluan, Rizal, Philippines. The researchers intend to determine which factor poses the major bottleneck in the day-to-day mental workload of the jeepney drivers and if there's an existing correlation between the working hours of the workers and the prevailing mental workload factor.

To execute and quantify a subjective mental workload assessment, the researchers utilized the NASA Task Load Index. This technique involves the process of using six (6) different dimensions such as mental demand, physical demand, temporal demand, performance, effort, and frustration. The NASA-TLX questionnaires were distributed in both physical and digital means, randomly to the jeepney drivers navigating along the Tanay-Siniluan route in Rizal, Philippines whose age ranges from 20 years old and above, both male and female, and typically works from at least four (4) to ten (10) hours.

1.1 Objectives

This study aims to observe the constraints, assess the occurrences of jeepney drivers that affect their mental workload, and identify the factors affecting the mental workload of jeepney drivers while on duty. The NASA-TLX (National Aeronautics and Space Administration Task Load Index) was used to assess the mental workload of the jeepney drivers, which has six components such as mental demand, physical demand, temporal demand, performance, effort, and frustration. Furthermore, the objective of this study is to identify the primary significant contribution to the mental workload of jeepney drivers who transit along the Tanay-Siniluan route.

2. Literature Review

According to Cain (2007), the term workload was not common until 1970's. In his study, the workload is a mental construct, latent variable or possible intervening variable. It is stated that the mental workload is the portion of operator information processing capacity or resources that is actually required to fulfill system demands. In essence, mental workload defines the existing gap between a task's workload requirements and a man's cognitive limit in a working environment (Daulay and Noviasari, 2018).

Wilson (2019) stated that the study of mental workload is one of important variables in psychology, performance rating and ergonomics. It is directly related to a worker's ability to perceive information, make decisions and reaction time and reflex (Indrawati et al., 2018). A well-thought workload management that capitalizes the employees' capability and recognizes their limitations could create a significant contribution to their productivity and efficiency (Bernseneva, et al., 2014). Assessments of mental workload of drivers could aid them to be aware and properly handle their workload when driving. positively helping them to improve their performance and avoid unfortunate work injury and accidents (Prabaswari, et al., 2020).

To determine the mental workload of drivers, Brookhuis (2008), conducted driving simulations using physiological measures. The simulation of driving enables the study of realistic conditions that provide data without putting a person in danger. In the findings of the paper, it is important that the driver's mental workload should be optimal. This ranges from not being too high and not being too low to ensure the adequate performance for driving. In this scenario, the driver will have enough mental workload to stay vigilant while not being comfortable to let their guard down and cause mistakes in the road.

It is commonly known that the Jeepney drivers have different mental workloads. In the study made by Aquino (2017), it is stated that due to the different mental workloads, the jeepney drivers show a state of poor cognition, poor sleep and mental stress. It is also important to note that the location or the time they're in duty affect the result of the study. Another factor that stands out due to the current result is the location where the study was conducted. Urban areas tend to have a more stressful environment that affects the mental capacity of a person.

Another take for the current topic is how the COVID-19 Pandemic affected the experiences of the Filipino jeepney drivers. In a quality study made by Ranis (2021), jeepney drivers now have to be more careful not just on the road but also with the interaction of all their passengers. Due to this kind of mental workload, a lot of jeepney drivers use different types of coping mechanisms that will allow them to earn money and stop driving jeepneys. The study states that even without the COVID-19 pandemic, the jeepney drivers already have heavy mental workloads as they have to endure the heat and traverse heavy traffic while making sure that they're driving safely.

To improve the condition of the jeepney drivers, a study was conducted by Coz (2015) that focuses on the ergonomic study on jeepney driver's workplace. In their findings, it is stated that the current jeepneys are inadequate and not ergonomically made for a driver based on anthropometric measures using the average Filipino workers. The authors recommended four improvements for the specified vehicle components. It consisted of a driver's seat, steering wheel, windshield and entrance. These kinds of factors must be taken into consideration in order to manage the mental workloads of a person. It can dictate the performance level of the jeepney drivers.

Another take on the driver's workload was made by Bongiorno (2017) that takes the different traffic flows as an influence from the road environment that adds to the workload that the said driver can get. They used methods such as monitoring some of the physiological parameters such as the eye movements and galvanic skin resistance. The research states that understanding the workload of the drivers is a useful way of increasing the safety of the road. A way to minimize the workload of the drivers is also by increasing the visibility of the road, having better road geometry and good control of traffic. They suggested that there should be more evidence to know the cause of higher stress that can be used as a basis on what kind of road improvement is needed.

With the increase of mental workload, it is important to take into consideration the effect of it on the fatigue conditions of the jeepney drivers. According to Borres (2019), this effect on the safety of the passenger decreases as the fatigue and mental workload adds up together. The results from the research shows that there is a huge relationship between the fatigue condition of the drivers with the environment and similar factors that add up to the mental workload of the said jeepney drivers. With their findings, they suggested a smart watch that monitors the fatigue level and tracking that helps to relieve the potential workloads that the jeepney driver gets.

The capabilities of the driver to cope up with the mental workload has a relationship with their current fitness. In the analysis made by Pantig (2012), a lot of jeepney drivers don't visit doctors for checkup. Their survey yields a 61.25% "no" answer from the question "do you visit a doctor for checkup". The main reason that drivers don't visit the doctor is because it costs too much. Due to this, the health and mental workload of the drivers are being added since they have to be more careful and they are more prone to sickness or illness.

According to Seva (2011), the jeepney is the most popular means of transportation in the Philippines. Due to this reason, they conducted research that focuses on the workplace efficiency improvement of jeepney drivers in Metro Manila. In their findings, they stated that the jeepney drivers in Metro Manila were likely to suffer from musculoskeletal discomfort. It happens due to poor design of their workspace that results in them having awkward driving posture for them. In their study, they are proposing a re-designing of the workspace in order to limit the negative effect of constant sitting that they do. In this way, the capacity of the driver to process mental workload will increase thus resulting in workplace efficiency increase.

In tackling mental workloads for drivers, it is important to note their attention for road safety. A study was conducted by Gozar (2008), that even a billboard advertisement can greatly affect the driver's attention. It correlates to the ability of the driver to be safe while driving. It is usually those who are in the city or jeepney drivers that travers highways.

In their survey, 83% of their respondents tend to be distracted in their driving due to these billboards. Adding the mental workload, this tends to increase the danger of the passengers and the driver itself.

According to Meteier (2021), the development of vehicles not only limits the driver to the main driving task and allows them to do secondary tasks. They put people in the required condition and monitor them with different types of scenarios. However, it is stated that the addition of a secondary can increase the mental workload that the driver gets and has the potential to decrease the performance of the said driver. It is also important to note that they have found that even verbal tasks can also add mental workload to the driver.

In the research made by Paxion (2014), he correlates the relationship of mental workload and driving together. His research aims to identify the common representative measures of subjective and objective mental workload when it comes to driving in order to understand how the subjective and objective levels of mental workload affects the performance of the driver. The effect of experience of the driver itself can affect the level of the mental workload that a driver has. In his study, the early-trained drivers tend to have a higher subjective workload compared to drivers that are more experienced in the field. Another factor is the physiological indicators that increase the mental workload of a driver. In summary, the paper found that the increase of mental workloads affects the novice drivers as they are usually overwhelmed by the task on hand. To cope up with this, the paper found that in order to compensate for being overwhelmed with their mental workload, drivers tend to lower their speed. Overall, the study made by Paxion discussed that the biggest factors to the mental workload of a driver is the complexity of the situation, the physiological measures and lack of experience.

In Sugiono (2017) research, there has been an impact of road condition complexity on driving workload using subjective measurement from NSA TLX. Their findings suggest that the NSA TLX can be utilized to measure subjective mental workload on drivers crossing different types of roads. They stated that the main cause of high mental workload is having mental demand frustration. Sugiono suggested that there should be an improvement of infrastructure, innovation for safety and better transport regulations.

According to Lansdown (2018), the mental workload is related to the effort required from the driver to meet the additional task on hand. As such, evaluating workload is an important component when it comes to system design and analysis. The paper stated that when measuring workload, the technique must have high reliability with high sensitivity and low intrusiveness on the primary task. The authors suggested the NASA-TLX since it is a widely used technique in driving research.

Jeepneys were viewed as the "backbone of Philippines public transportation" (Biona, et al., 2017) and its drivers' mental condition must be given proper attention and evaluation. Based on the observation of the researchers, a lot of related literature should be done again to test their accuracy. There are some gaps regarding the factors on what adds to the mental workload of the drivers. The researcher aims to fill this gap and recommend information on handling the mental workloads. NASA-TLX will be used as a method as it produces useful outputs when systematically and conventionally utilized (Hancock & Meshkati, 1988).

3. Methods

This cross-sectional research was conducted with the purpose of providing an effective assessment of the mental workload that was carried by the jeepney drivers around the age of 20 and above with routes going around Tanay-Siniluan in the municipality of Tanay in the province of Rizal, Philippines.

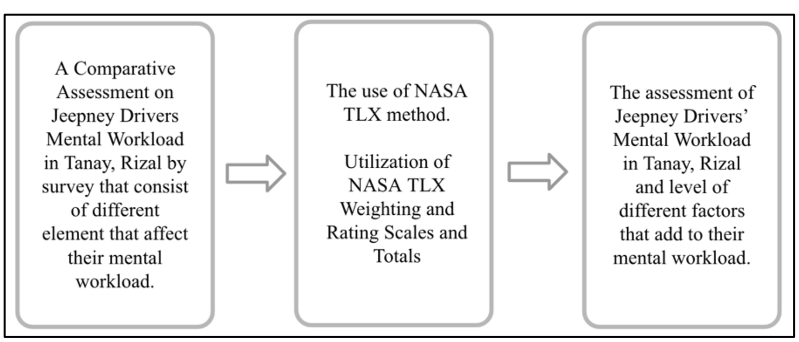

Figure 1. Research Paradigm

Input. The researchers will use an online and offline survey to collect the data regarding the comparative mental workload assessment on jeepney drivers' mental workload in the Tanay-Siniluan route in Tanay, Rizal. The use of social media and printing physical copies will be the method used to spread the survey. The survey contains different questions that tackle the aspects that affect the mental workload of the jeepney drivers.

Process. With the data gathered from the survey, the researchers will utilize NSA-TLX techniques in order to process the results from the input. Several studies have verified and recommended the face validity and reliability of utilizing NASA-TLX techniques to assess and measure mental workload. It is important to note that the process has at least utilized the NASA-TLX weighting and rating scales and totals.

Output. After using techniques from NSA-TLX, the researchers aim to have the necessary data to conclude which indicator or factor contributes the heaviest weight to the stress and mental workload of the jeepney drivers on the Tanay-Siniluan route in Tanay, Rizal on an everyday basis. The output dictates the findings of the research and should be used as the main factor in the suggestions that can be made

3.1 Data Gathering Tool

To provide a comprehensive and direct assessment of the mental workload of the jeepney drivers, the researchers have utilized NASA-TLX (National Aeronautics and Space Administration Task Load Index). This method comprises six subscales or indicators: mental demand, physical demand, temporal demand, performance, effort, and frustration. A study conducted by Mohammadi, et al. (2013), has proven and approved the face validity and reliability of the NASA-TLX method. This method involves the following step measurements:

3.1.1 Weighting

This involved the process where the participants were asked to accomplish pairwise comparisons in the provided questionnaire. The answers were then tallied and were used as a weight for each indicator of the mental workload. Table below shows the comparison of the indicators.

$$\text{Resulting Weight} = \text{Mental Demand (MD)} + \text{Physical Demand (PD)} + \text{Temporal Demand (TD)} + \text{Performance (OP)} + \text{Effort (EF)} + \text{Frustration Level (FR)} \quad (1)$$

3.1.2 Provision Rating

This involved the process where the participants were asked to provide a numerical rating per each indicator based on their subjective experience and judgment on how each indicator had burdened their workload.

3.1.3 Scoring

This involved the process where the researchers multiplied the collected and computed the weight by the provision rating of its respective indicator. This resulted in six value scores for the six indicators.

$$Rating\ Scale = Rating \times Resulting\ Weight \quad (2)$$

$$Mean\ of\ Weighted\ Workload\ (WWL) = RatingScale \div Resulting\ Weight \quad (3)$$

3.1.4 Weighted Workload (WWL)

This involved the process where the researchers have computed the sum of all the score values of the six indicators. This sum is described as the weighted workload.

3.1.5 Weighted Workload Score

This involved the process where the researchers have calculated the total average of the computed weighted workload.

3.1.6 Scoring Interpretation

This involved the process where the researchers interpreted the quantitative data into narrative descriptions. The score interpretation for NASA-TLX was shown in Table 1 below:

Table 1. Score Interpretation of NASA Task Load Index (TLX)

Weight	Scale
Low	0-9
Medium	10-29
Rather High	30-49
High	50-79
Very High	80-100

Source: *IOP Conference Series: Materials Science and Engineering*

4. Data Collection

The registered number of the target total population in this study is 100 jeepney drivers which includes jeepney drivers around the age of 20 and above with the route going around Tanay-Siniluan. In order to properly obtain the appropriate sample size for this study, the researchers have applied the Slovin's Formula upon the sample size calculation.

$$n = \frac{N}{1+Ne^2} \tag{4}$$

Where,

n = sample size
N = Total Population
e = margin of error

The researchers have successfully gathered 82 respondents and allowed the study to have 95% of confidence level and 4.61% margin of error. The respondents who participated in the study were chosen through random sampling technique.

4.1 Statistical Analysis

The gathered data have also undergone statistical analysis using the Minitab statistical software version 19. One-way ANOVA was performed to determine if there are unusual data points, sufficient sample size, data normality and generally assesses if the means are significantly different. The data was also graphed into boxplot to display any possible existence of outliers and the variability of sample distributions. Pairwise Pearson correlation was also done to identify and recognize data groups that possess features that are highly correlated.

5. Results and Discussions

The researchers have the data acquired utilizing Slovin's Formula, which yielded the required sample size population (n = 82). The demographic profile of jeepney drivers along the Tanay-Siniluan route. The male has a frequency of 78 with a percentage of 95%, while the female has a frequency of 4 with 5%. The age range of 31–40 has the largest frequency of participants with 30.5%, followed by 41–50. The researchers will use the data obtained to determine the respondents' feedback regarding their mental workload.

5.1 Numerical Results

The working hours of the jeepney drivers are 8–10 hours of their vice versa route on the Tanay-Siniluan, with 45.1%. This is longer than the 4–6 and 6–8 average working hours. This data is obtained to be able to correlate the average working hours to the mental workload indicators (Table 2).

Table 2. Weighted Individual Workload Scores

Weighted Workload Weight (WWL)	
Category	**Average Score**
Mental Demand	145.24
Physical Demand	351.46
Temporal Demand	117.12
Performance	167.56
Effort	289.10
Frustration Level	98.33

Average	**74.69**
Score Interpretation	**High**

As shown in Table 2 above, the weighted individual workload score describes the average score of each indicator, which provides a burden on the mental workload of the jeepney drivers. Thus, the data estimates utilizing the NASA TLX equation show that physical demand (PD) is the major factor contributing to bottlenecks. That means the jeepney drivers need more physical exertion than is generally required to perform their tasks. With 6–8 hours of work per day, the driver's actions are limited in completing their role. The group score result is presented above, with an average score of 74.69, which corresponds to a "High" score interpretation. Hence, Physical Demand (PD) indicates that it has a significant impact on a jeepney driver's mental workload and ability to work (Figure 2).

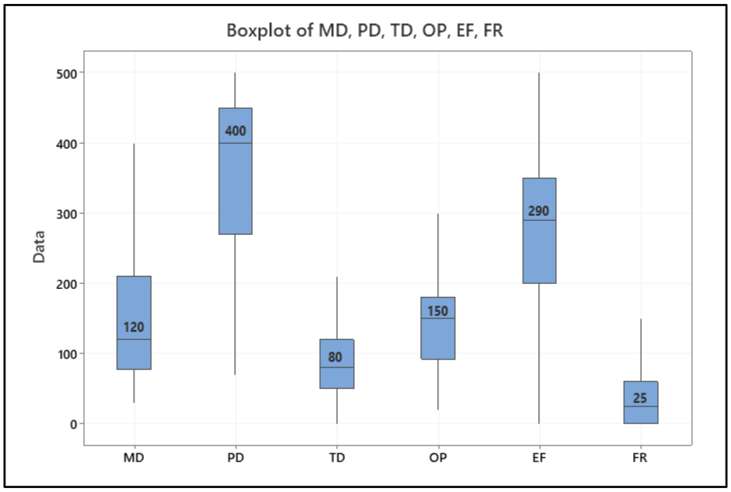

Figure 2. Jeepney Drivers Boxplot Analysis of Mental Workload

The boxplot of average mental workload scores that is shown in Figure 2, resulted with the median mental demand (MD) is 120, the physical demand (PD) is 400, the temporal demand is 80, the performance (OP) is 150, the effort (EF) is 290, and the frustration level (FR) is 25. Physical demand is the most significant source of mental workload for jeepney drivers' activities (PD) (Table 3).

Table 3. Analysis of Variance of Mental Workload

Source	**DF**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**
Factor	5	5520235	1104047	135.08	0.000
Error	466	3808784	8173		
Total	471	9329019			

The researchers were able to use One-Way ANOVA as shown in Table 3 to provide meaningful comparisons for the mental workload of the respondents. Since the p-value of the mental workload among jeepney drivers is less than the significance level, the null hypothesis is rejected because the p-value is less than the significance level. The researchers conclude that the mental workload impacts the jeepney driver.

In Tukey's simultaneous chart, it shows that Physical Demand (PD) – Mental Demand (MD), Effort (EF) – Mental Demand (MD), Performance (OP) – Temporal Demand (TD), Effort (EF) – Temporal Demand (TD), and Effort (EF) – Performance (OP) do not contain zero. All of these factors that are mentioned are confidence intervals that do not contain zero and indicate a mean difference that is statistically significant (Table 4).

Table 4. Analysis of Variance of Mean versus Average Working Hours per day

Source	**DF**	**Adj SS**	**Adj MS**	**F-Value**	**P-Value**

Average Working Hours per day	2	87.89	43.95	0.37	0.694
Error	78	9353.21	119.91		
Total	80	9441.10			

Table 4 has a P-Value of 0.694 for mean versus average working hours per day. These indicate that the null hypothesis is not rejected and that the indicator of mental workload and working hours are not statistically significant. The findings indicate that working hours have no effect on the mental health of jeepney drivers.

The interval plot resulted with the highest mean regarding the working hours of the jeepney drivers. It shows that 4-6 hours of working has the lowest mean with 72.56 and 6–8 hours has the highest mean with 76.38. The boxplot analysis utilizing the mean against the average working hours of the jeepney drivers was used to examine and compare the central tendency and variability of the distributions, as well as seek out outliers.

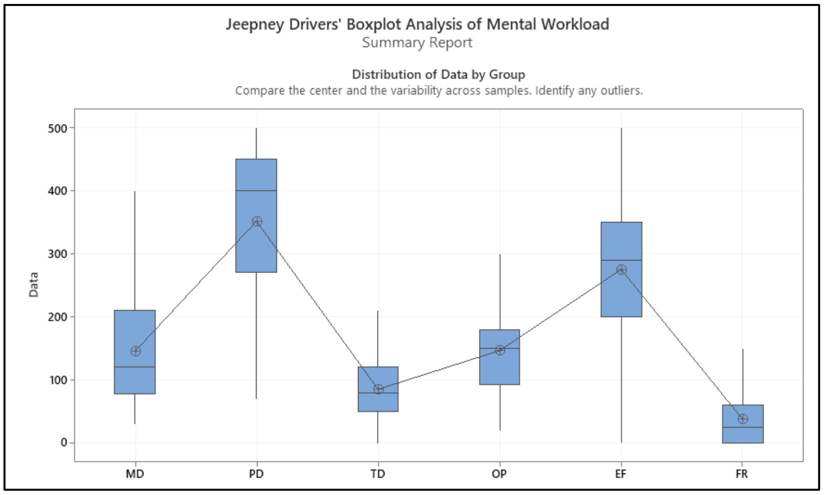

Figure 4. Jeepney Drivers' Boxplot Analysis of Mental Workload

Table 5. Statistics Report for Mental Workload of Jeepney Drivers

Statistics	Mental Demand (MD)	Physical Demand (PD)	Temporal Demand (TD)	Performance (OP)	Effort (EF)	Frustration Level (FR)
N	82	82	76	76	82	74
Mean	145.24	351.46	85.263	146.58	275	37.297
StDev	85.248	132.82	53.153	67.755	116.08	44.331
Minimum	30	70	0	20	0	0
Maximum	400	500	210	300	500	150

Table 5 and Figure 4 shows the boxplot summary report of the weighted individual scores of the jeepney drivers. The distribution of data by group shows that there are no outliers that appear in the chart. The summary report contains the statistics for each indicator.

Table 6. Mental Workload Six Indicator's Correlation Matrix

	Mental Demand (MD)	Physical Demand (PD)	Temporal Demand (TD)	Performance (OP)	Effort (EF)
Physical Demand (PD)	0.017	.	.	.	.
Temporal Demand (TD)	0.047	-0.069	.	.	.

Performance (OP)	0.013	-0.069	-0.092	.	.
Effort (EF)	-0.177	0.295	0.038	0.070	.
Frustration Level (FR)	0.179	-0.214	-0.309	0.033	-0.400

Table 6 presents the correlation matrix of the weighted scores of each individual. The correlation between the indicators of Effort (EF) and performance (OP) is 0.070, which indicates that there is a relationship between the variables. Temporal Demand (TD) and Physical Demand (PD) with -0.069, Performance (OP) and Temporal Demand (TD) with -0.092, and Frustration Level (FR) and Effort (EF) with -0.400 indicates a negative relationship between variables that indicates that as the Mental Demand (MD) up until to Effort (EF) increases, the Frustration Level decreases (Table 6-7).

Table 7. Pearson Pairwise Correlation

Workload 1	**Workload 2**	**N**	**Correlation**	**95% for Cl for ρ**	**P-Value**
Physical Demand	Mental Demand	82	0.017	(-0.201, 0.233)	0.880
Temporal Demand	Mental Demand	76	0.047	(-0.180, 0.270)	0.687
Performance	Mental Demand	76	0.013	(-0.213, 0.238)	0.911
Effort	Mental Demand	82	-0.177	(-0.379, 0.042)	0.112
Frustration Level	Mental Demand	74	0.179	(-0.052, 0.391)	0.128
Temporal Demand	Physical Demand	76	-0.069	(-0.290, 0.159)	0.552
Performance	Physical Demand	76	-0.069	(-0.290, 0.159)	0.556
Effort	**Physical Demand**	**82**	**0.295**	**(0.083, 0.481)**	**0.007**
Frustration Level	Physical Demand	74	-0.214	(-0.422, 0.015)	0.067
Performance	Temporal Demand	72	-0.092	(-0.317, 0.142)	0.440
Effort	Temporal Demand	76	0.038	(-0.189, 0.261)	0.744
Frustration Level	**Temporal Demand**	**70**	**-0.309**	**(-0.508, -0.080)**	**0.009**
Effort	Performance	76	0.070	(-0.158, 0.290)	0.550
Frustration Level	Performance	68	0.033	(-0.207, 0.269)	0.791
Frustration Level	**Effort**	**74**	**-0.400**	**(-0.576, - 0.189)**	**0.000**

The P-Value of each paired indicator is shown in Table 7, and it is a positive number. The correlation coefficient will be statistically significant if the P-Value is less than 0.05. The correlation matrix demonstrates that the Pearson correlation coefficients are statistically significant only for three (3) pairwise indicators: Effort (EF) and Physical Demand (PD) (0.007) indicates that a decrease in effort results in an increase in physical demand; Frustration Level (FR) and Temporal Demand (TD) (0.009) indicates that an increase in frustration level results in a decrease in temporal demand; and Frustration Level (FR) and Effort (EF) (0.000) indicates that an increase in frustration level results in a decrease in the effort. The Pearson pairwise correlation, which the researchers used to assess the relationships between variables of the six indicators, is shown above.

6. Proposed Improvements

In accordance with the aforementioned findings established and discussed, the researchers would like to cite the following improvements:

1. A systemized shifting hours for all the drivers. For example, creating a well-organized 4 sets of 6 hours shifts or 3 sets of 8 hours shifts to cover the 24-hour period a day. This is to ensure that the drivers maintain standard working hours, and do not physically overwork themselves. This could also cause good significant changes to the physical demand they experience. However, the willingness of the jeepney drivers to reduce their working hours must be considered in relation to their need to satisfy and meet their individual boundary rate or revenue quota.

2. Having sufficient rest break intervals during their working hours. This would allow drivers to be able to have a window period to catch their breath and have an ample amount of time to rest their physical body temporarily from exerting effort to execute their tasks. This could improve their discomfort and the strain caused by the continuous physical effort demanded by the tasks required to perform their jobs.

3. A proposal to redesign the jeepney models with regards to its extensive vibration caused by the engine and the force needed to be exerted by the drivers on the steering wheel, pedals, and gear shift as such factors has the ability to cause a direct effect to the drivers' discomfort and physical demand upon performing the task. This is also in relation with the data gathered which showed that the physical demand (pushing, pulling, turning, controlling, etc.) contributes the most in the mental workload that the jeepney driver's experiences.

4. Application of further jeepney modifications designed by Coz, et al. (2015) to improve the workspace and working conditions of the drivers. This includes modification of the driver's seat into a seat that is more properly contoured for their buttocks and back rest, with dimensions to properly accommodate the drivers and a head rest as majority of the jeepneys doesn't include a head rest. Furthermore, they have also proposed to increase the height of the windshield as the usual jeepney windshield size is very narrow and cause backaches for the jeepney drivers for they have to frequently bend forward to properly observe traffic lights or call passengers.

For future studies, the researchers recommend looking into ways to better improve the mentioned extensive vibrations such as engine age, fuel used, weight capacity or the overall build of the engine. Future researchers can also take into account the amount of force that is required in the driving controls. Aside from this, further studies can also consider a wider scope of limitations and greater quantity of sample size to attain and acquire a greater representation of data.

7. Conclusion

This study was conducted by the researchers in order to provide a comprehensive assessment and measurement on the jeepney driver's mental workload on Tanay-Siniluan route while they are on their duty and determine which factor poses as the major bottleneck in the day-to-day mental workload of the jeepney drivers. Thus, the correlation between the indicators and the average working hours shows statistically significant data with Effort (EF), Physical Demand (PD), and Performance (OP). The correlation matrix for mental workload indicators displays p-values less than 0.05 for three (3) indicators: effort (EF) and physical demand (PD), frustration level (FR) and temporal demand (TD), and frustration level (FR) and effort (EF). In accordance with the gathered data, the research shows that the indicator physical demand (PD) with the score of 351.46, which is on the very high category on the scale, is the apparently the most dominant factor among all the other indicators. This indicates that the volume and magnitude of the physical demand necessary to accomplish the task is very high and can be considered as the major contributor to the mental workload of the jeepney drivers on the mentioned scope. On the other hand, the frustration level with the score of 98.33, although still on the high category of the scale, has the lowest score and indicates that the insecurity, stress and irritation felt by the drivers upon the duration of the completion of task is the least contributor to the mental workload the jeepney drivers have experienced on performing their jobs.

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