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Evaluation of the Workload of PPSDM Migas Refinery Operators on Organizational Effectiveness and Efficiency

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Abstract

This study evaluates the workload of refinery operators at PPSDM Migas and its impact on organizational effectiveness and efficiency using a descriptive qualitative with 8 key informants approach. Interviews show that operators handle a high and varied task load, including equipment operation, inspections, reporting, coordination, and troubleshooting especially during start-up, shutdown, and unstable operating conditions. The 3-team shift system, particularly night shifts, increases physical and mental strain due to reduced rest and the need for heightened alertness. Operators generally perceive the workload as heavy, driven by high responsibility and operational risks. Excessive workload contributes to increased human error, reduced vigilance, potential emergency shutdowns, and lower productivity. However, regular training and certification help enhance operator competence and support stable operations. Overall, the findings highlight that effective workload management through adequate staffing, improved shift arrangements, digitalized monitoring, and strengthened competencies is essential for maintaining organizational effectiveness and efficiency in refinery operations.

Keywords : workload, physical load, effectiveness, efficiency, PPSDM Migas

INTRODUCTION

The Oil and Gas Human Resources Development Center (PPSDM Migas) is a strategic institution under the Ministry of Energy and Mineral Resources that plays a role in providing training, certification, and competency development for workers in the oil and gas sector. In carrying out its operational functions, refinery operators play an important role because

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they are responsible for operating process equipment, controlling process variables, and ensuring the safety and smooth operation of the refinery (Istiqomah & Ma'rifatul Maghfiroh, 2022). The complexity of these tasks requires optimal workload management so that the performance of each individual and organization can be maximized (Larasanto et al., 2023)(Novia Riska Saputri et al., 2025). Workload is the process of determining the number of hours worked, used, and required by human resources to complete a job within a certain period of time(Monika & Murnawan, 2023)(Rhimba Prastita et al., 2025; Ryan L. Tobing & Haro, 2025).

According to government regulations, workload is the amount of work undertaken by a position or organizational unit, which is the result of multiplying the volume of work by the standard working hours. This workload analysis is conducted to measure and determine work effectiveness and efficiency and can be used as a basis for human resource planning (Permendagri No. 12, 2008). In the context of modern organizations, workload is a crucial factor that can affect productivity, effectiveness, and operational efficiency. An unbalanced workload can cause operator fatigue, reduce work accuracy, and increase the risk of operational failure(Paulus Belan Beribe & Hapsari Susilowati, 2022). If the workload assigned to employees is low, employee performance will improve, and conversely, if the workload felt by employees is high, employee performance will decline (Dwitha Ramdhani & Soraya, 2024).

Mental workload includes activities that require concentration, decision making, information processing, and responses to work pressure or stress (Raja et al., 2023). Workload evaluation is becoming increasingly important in the PPSDM Migas environment, given the dynamics of refinery processes, which are characterized by high-risk operations, the use of diverse technologies, and strict safety standards (Paulina et al., 2022). Systematic assessment is necessary to ensure that human resources, particularly refinery operators, are optimally placed, do not experience excessive workloads, and are able to work in accordance with standard operating procedures. In addition, workload analysis can assist management in formulating strategies for improving efficiency, human resource planning, and business process improvement (Pramesti et al., 2024).

Therefore, this study was conducted to evaluate the workload of PPSDM Migas refinery operators and analyze how these conditions affect organizational effectiveness and efficiency. The results of the study are expected to provide recommendations that can be used as a basis for decision-making related to work system improvements, task distribution, and sustainable human resource management. Similar studies show that workload is also related to workers' perceptions of safety, particularly in the oil and gas environment.

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LITERATURE ANALYSIS AND METHODOLOGY

This study uses a descriptive qualitative approach, which aims to gain an in-depth understanding of the workload of refinery operators on organizational effectiveness and efficiency. Qualitative research is a research method based on positivism philosophy and natural conditions, where the researcher is the key instrument, data collection is done using triangulation (combination) techniques, qualitative data analysis, and results that are more meaningful than generalizations (Ultavia et al., 2023). This approach was chosen because it is able to explore experiences, perceptions, and phenomena that occur in the work environment in a naturalistic manner. The research was conducted at the PPSDM Migas Refinery, which is an operational unit in oil and gas competency development. This refinery involves operators with routine tasks of operating process equipment, inspection activities, monitoring production variables, and complying with work safety standards. Informants were selected using purposive sampling, which is selection based on certain criteria relevant to the research. The informants consisted of:

- Refinery operators (senior and junior)
- Supervisors or shift leaders

Table 1. Respondent Data.

Responden	Age	Gender	Position	Period of work
Mochamad Rochim	45	Laki-laki	Distribution Operator	19 years old
Karmu	56	Laki-laki	Team Leader	17 years old
Rendi Oktaviasyah	24	Laki-laki	Team Leader	6 years old
Agung Andik	25	Laki-laki	Team Leader	6 years old
Rantam	57	Laki-laki	Operator	17 years old
Kasmito	45	Laki-laki	Operator	6 years old
Priyadi	56	Laki-laki	Operator	16 years old
Virgiawan Surya P	24	Laki-laki	Operator	6 years old

This study uses several data triangulation techniques to strengthen the validity of the findings, namely: In-depth Interviews aimed at exploring in detail the operator's experience related to workload, causal factors, challenges, and their impact on performance and safety; Field Observations conducted directly (can be moderately participatory) to observe operator work patterns, refinery operation processes, activity frequency, interactions between operators, and work environment conditions; and Documentation in the form of

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secondary data collection such as operational SOPs, work shift schedules, incident or near-miss reports, and operator job descriptions.

RESEARCH AND RESULTS

Interviews with refinery operators at the Oil and Gas Human Resources Development Agency (PPSDM Migas) revealed that the volume of work tends to be high and varied. Operators are responsible not only for operating the main process equipment but also for supporting activities such as daily inspections, recording operating parameters, coordinating with utility units, and monitoring work safety conditions. Several operators reported that the number of tasks often increases during shutdowns, start-ups, or unstable operating conditions. In these situations, work intensity increases significantly because operators must perform troubleshooting while ensuring process safety.



Figure 1. Refinery Operator Shift Schedule.

Operators work in three-team shifts, including the night shift. Findings indicate that the night shift carries a higher physical and mental burden, particularly due to the increased vigilance required during fatigue-prone hours (1:00 AM–4:00 AM). Several operators reported limited rest periods between shifts, particularly during the night shift, which impacts their physical readiness for work.

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Refinery Operator Workload

Work intensity is considered high, especially during emergencies, process anomalies, or scheduled maintenance. Psychologically, operators acknowledge the existence of work pressure due to the demands of maintaining process stability, adjusting variables so that products meet specifications, minimizing emergency shutdowns, and complying with Occupational Health and Safety (OHS) standards. In addition, the use of a Distributed Control System (DCS) requires high concentration in monitoring parameters at all times.

The interview results show that refinery operators face a wide variety of tasks, ranging from equipment operation, routine inspections, parameter recording, inter-departmental coordination, to troubleshooting, so that the high workload can increase the risk of fatigue and human error, especially in unstable operating conditions. The rotating work pattern with a 3-shift system also poses its own challenges, where night shifts are considered the most difficult and limited rest time can potentially reduce operator alertness. Rendi emphasized that work intensity increases significantly in emergency situations, start-ups, or shutdowns, which require extra focus on the Distributed Control System (DCS) panel and process equipment. If not managed properly, the mental pressure in these conditions can reduce productivity.



Figure 2. Interview with Source Priyadi

Priyadi pointed out the disparity between job demands and capacity, which manifested itself as an excessive workload due to high levels of responsibility and risk, while others considered it to be manageable as long as there were sufficient personnel. This

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emphasized the need for task distribution and proportional workload management. Organizationally, high workloads have been shown to increase the potential for human error, although effectiveness can be maintained through operator competence and training.

Organizational Effectiveness and Efficiency

The high volume and intensity of tasks have an impact on the operational effectiveness of refineries. Operators who work under high pressure tend to experience fatigue, which increases the possibility of human error, such as delays in detecting parameter changes or mistakes when performing standard operating procedures. However, improving competence through training and certification at PPSDM Migas has proven to be a factor that helps maintain effectiveness levels. Structured training and certification make operators more prepared and alert in dealing with various operating conditions.



Figure 3. Interview with Karmu informant.

Karmu explicitly stated that workload imbalance is a major precursor that directly causes disruption to internal team coordination, potential emergency shutdowns, and decreased productivity, while well-managed workloads support operational stability and rapid response. These findings emphasize the importance of workload management, which includes adjusting the number of workers, optimizing shift patterns, and utilizing digitalization for process monitoring so that organizational effectiveness and efficiency can continue to improve.

Excessive workload can reduce efficiency, for example:

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- Emergency shutdowns increase because operators need more time to check or recover processes.
- Productivity declines when operators experience fatigue during certain shifts.
- Coordination with utilities (Boiler, Water Treatment Plant, Power Plant, Fire Department) becomes less than optimal if operators are overloaded.

Conversely, when the workload is balanced and there are enough operators, operational processes run more smoothly and efficiency increases significantly.

The results of qualitative analysis show that workload is crucial to supporting organizational effectiveness and efficiency. Several things to note:

1. Adjusting the number of workers to operational needs, especially during turnaround or major maintenance periods.
2. Implementing work digitization, such as automatic monitoring applications to reduce manual administrative workload.
3. Intensive periodic training and competency certification to reduce mental stress when facing abnormal conditions.

A workload that is in line with capacity is a determining factor in the success of refinery operations. If the workload is too heavy, organizational performance indicators such as overall equipment effectiveness (OEE), emergency shutdown rates, and process stability tend to decline. Conversely, a well-managed workload supports the achievement of PPSDM Migas' objectives in providing professional and competitive refinery training and operational services.

CONCLUSION

From the results of qualitative analysis, it can be concluded that:

1. PPSDM Migas refinery operators face high workloads in terms of volume, working hours, and intensity.
2. This high workload has a direct impact on the effectiveness and efficiency of the organization, particularly in terms of safety, operational quality, and productivity.
3. Workload management through improvements to the shift system, optimization of the number of operators, and ongoing training is essential to maintain organizational performance.

RECOMMENDATIONS

1. Implement optimal workload management.

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2. Enhance competence and capability. This includes competency training and certification, and the development of standard operating procedures (SOPs).
3. Consider employee safety and welfare aspects.

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