MIX: Jurnal Ilmiah Manajemen

Management Scientific Journal
ISSN (Online): 2460-5328, ISSN (Print): 2088-1231
https://publikasi.mercubuana.ac.id/index.php/jurnal_Mix

The Role of Employee Regrouping and Expertise Outsourcing as Intervening Variables in the Relationship of the Crisis Period: Lessons Learned from the Suralaya Power Generation Unit

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ABSTRACT

Objectives: *This study investigates the effects of crisis management, particularly in the context of the COVID-19 pandemic, on expertise outsourcing and production efficiency at PLTU Suralaya.It explores how the pandemic reshaped employee regrouping and outsourcing practices to maintain operational continuity. While outsourcing specialized expertise is increasingly common, limited empirical evidence exists on its effectiveness during crises. Poorly managed outsourcing can lead to inefficiencies, increased costs, and reduced productivity. The study assesses optimal integration between in-house teams and outsourcing partners, evaluating selection criteria, collaboration effectiveness, and crisis resilience strategies.*
Methodology: *This study's use of the entire population of PT. Indonesia Power Suralaya's Generation Division ensures data accuracy, eliminates sampling bias, and enhances the reliability of findings. This method enables a thorough examination of internal dynamics, ensuring that the findings are more relevant and tailored to the organization's unique context.*
Findings: *Statistical analysis revealed significant positive effects of the pandemic on employee productivity (path coefficient: 0.320), employee regrouping (0.500), and expertise outsourcing (0.448). Both regrouping and outsourcing positively influenced productivity, highlighting their crucial role in crisis management.*
Conclusion: *To enhance productivity, companies should adopt strategic regrouping and outsourcing processes, ensuring Human Resources professionals are equipped with the right skills, resources, and technology. These findings offer actionable insights for navigating crises and ensuring operational resilience. This research contributes to the understanding of crisis management, outsourcing, and employee productivity, emphasizing their strategic role in sustaining business continuity and efficiency during disruptions.*

Keywords*: The Crisis Management; Productivity; Employe Regrouping; Outsourcing Expertise.*

Submitted: 31-08-2024	Revised: 11-03-2025	Accepted: 11-03-2025

Article Doi:
http://dx.doi.org/10.22441/jurnal_mix.2025.v15i1.017

p-ISSN: 2088-1231
e-ISSN: 2460-5328

INTRODUCTION

Productivity in production activities is defined as the ratio of output to input, serving as a measure of how efficiently resources are utilized to achieve optimal outcomes (Ciftci et al., 2023; Singh & Chaudhary, 2022). It is a key benchmark for evaluating the success of industries in producing goods or services (Shoeibi, 2023; Sugathan, 2019). Productivity can be assessed through two primary standards: physical productivity, which focuses on the quantity and quality of products, and value productivity, which evaluates intangible factors such as employee capabilities, attitudes, discipline, motivation, and commitment (Alam et al., 2018; Suseno, 2023). In the context of power generation, productivity is measured by a plant's ability to meet the electricity demands of the grid, regulated by load management divisions (Zhang et al., 2021; Illahi et al., 2022). This highlights the importance of operational efficiency in ensuring consistent energy supply.

Outsourcing, or contracting, is a common practice in industries to reduce costs and focus on core operations (Masath et al., 2022; Suseno et al., 2019). Contractors often specialize in specific tasks, leveraging their expertise, advanced technologies, and research and development investments to deliver high-quality services (Lok et al., 2021; Maulidia et al., 2019). However, the COVID-19 pandemic has disrupted traditional outsourcing models, particularly in critical sectors like power generation. Travel restrictions and supply chain bottlenecks have made it challenging to bring in external experts for periodic maintenance, exposing vulnerabilities in relying heavily on outsourcing (Zhou et al., 2021; Sayed et al., 2021). This has underscored the need for alternative strategies, such as developing in-house expertise or leveraging technology, to ensure operational continuity during crises (Canas-Carreton & Carrion, 2020).

To maintain the stability of the electricity system, adjustments must be made to the electricity supply from power generation sources, so that many sources of electricity have to be reduced and even units have to be stopped (PLTU Suralaya Production, 2020), see figure 1.

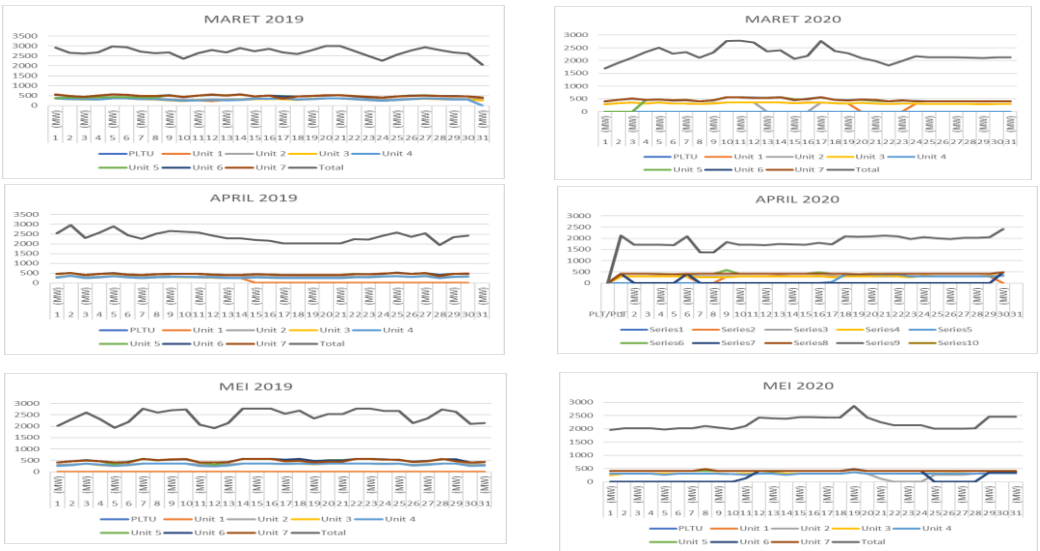

Figure 1 Comparison of the output load of PGU Suralaya from March to May 2019 and 2020
Source: PLTU Suralaya Production (2020)

p-ISSN: 2088-1231
e-ISSN: 2460-5328

Human resource management (HRM) plays a critical role in addressing these challenges. Effective HRM ensures that organizations have the right quantity and quality of human resources to adapt to changing circumstances (Suseno & Basrowi, 2023). Strategic human resource planning involves analyzing and identifying workforce needs, addressing potential shortages or excesses, and developing recruitment and training programs to build a resilient workforce (Stanimirović & Pribaković Brinovec, 2022, Saefullah et al.2025). The pandemic has highlighted the importance of such planning, particularly in developing in-house expertise to mitigate the risks associated with outsourcing.

The Suralaya Power Generation Unit (PGU), owned by PT. Indonesia Power, is a critical infrastructure in Indonesia's energy sector. With seven coal-fired units—four with a capacity of 400 MW each and three with 600 MW each—it has a total installed capacity of 3400 MW, making it the largest power plant under PT Indonesia Power's management (PLTU Suralaya Production, 2020). The COVID-19 pandemic significantly impacted Suralaya PGU, as reduced economic activity led to a sharp decline in electricity demand. This forced the plant to adjust operations, reduce output, and even shut down units to maintain system stability. These disruptions exposed vulnerabilities in supply chains, particularly in procuring materials and spare parts, which are often imported (Ghorbani et al., 2020).

A critical research gap lies in understanding how power plants like Suralaya PGU can integrate outsourcing and in-house expertise to ensure uninterrupted operations during crises. This includes evaluating criteria for selecting outsourcing partners and assessing the effectiveness of collaborations between in-house teams and contractors (Yang et al., 2020; Wulandari et al. 2024). The pandemic has highlighted the need for resilient operational models that can adapt to global disruptions while maintaining energy supply. For instance, the inability to bring in external experts for periodic maintenance due to travel restrictions has emphasized the importance of developing in-house capabilities and leveraging technology to address maintenance challenges (Yang et al., 2020).

Power plants are essential for modern societies, providing electricity for homes, businesses, and public services. Ensuring their operational continuity during global disruptions, such as the COVID-19 pandemic, is vital for societal resilience. The pandemic has exposed significant vulnerabilities in global supply chains, particularly those critical for the maintenance and operation of power plants (Ghorbani et al., 2020). Addressing these vulnerabilities is crucial for developing more robust supply chains and ensuring the long-term sustainability of energy infrastructure.

This research aims to fill these gaps by investigating how Suralaya PGU adapted its operations and maintenance strategies during the pandemic. The study also considers the socio-economic impacts of the pandemic on communities near Suralaya PGU, including changes in employment, health outcomes, and access to electricity. By addressing these aspects, the research provides a holistic understanding of the challenges and opportunities faced by energy infrastructure during global disruptions.

Beyond immediate crisis response, this research contributes to the broader discussion on sustainable practices and long-term planning in the energy sector. It highlights the need for resilient, self-sufficient operational models that can withstand global disruptions while ensuring uninterrupted energy supply. By examining the interplay between outsourcing, in-house expertise, and crisis management, the study offers valuable insights into strategic planning and resilience building in critical infrastructure sectors.

The study addresses a critical gap in the literature by exploring how coal-fired power plants like Suralaya PGU can balance outsourcing and in-house expertise to maintain

p-ISSN: 2088-1231
e-ISSN: 2460-5328

operations during crises. It also investigates the socio-economic impacts of the pandemic on surrounding communities, providing actionable insights for enhancing the resilience of energy infrastructure in times of global disruption. This research contributes to the broader discourse on sustainable practices, emphasizing the need for resilient and self-sufficient operational models in the energy sector.Beyond immediate crisis response, this research could contribute to the broader discussion on sustainable practices and long-term planning in the energy sector. By addressing the challenges of maintaining power plant operations during disruptions, the study may highlight the need for sustainable, resilient, and self-sufficient operational models.

LITERATURE REVIEW

1. The Impact of the COVID-19 Pandemic on the Productivity of PGU Suralaya.

The influence of the pandemic on workplace productivity has indeed presented a significant case for understanding the broader impact of social forces on organizational operations and management. This crisis context has illuminated the intricate ways in which external societal changes can directly affect internal organizational dynamics, productivity, and ultimately, the bottom line (Suseno, 2019; King & Frederickson, 2021). The pandemic situation has resulted in quarantine and social restrictions, leading to a decrease in work productivity and an increase in stress, anxiety, and family livelihood concerns (Esquivel et al., 2023). The occurrence of the pandemic has provided an opportunity for all companies to analyze various factors affecting construction workforce productivity, posing a threat to production failure (Quezon & Ibanez, 2021) & (Setiadi et al., 2022). This pandemic has established a connection between productivity and the onset of a pandemic, endangering workers in adverse situations (Costa Melo et al., 2023; Suseno 2023). Subsequently, the impact of the pandemic on productivity at PGU Suralaya poses challenges for employees to develop online productivity. The state of the art in addressing the impact of the COVID-19 pandemic on the productivity of facilities like PGU Suralaya involves a multi-faceted approach that integrates technological innovations, strategic management adaptations, and a deeper consideration of socio-economic dynamics. This comprehensive approach is essential for navigating the challenges presented by the pandemic and positioning power generation units for resilience in the face of future crises.

H_1: It is suspected that there is an influence of the COVID-19 pandemic on the productivity.

2. The Impact of the COVID-19 Pandemic on Employee Regrouping

The influence of the pandemic on employee regrouping brings about unique challenges stemming from concerns brought about by the pandemic era within organizations, highlighting the role of emotional intelligence that managers and company leaders possess in terms of their social skills and intervention patterns that provide support et al. 2023). Ultimately, human resources significantly affect Employee Engagement (EE), leading to the conclusion that EE is a significant predictor of employee performance in the SME sector in facing the pandemic (Nkansah et al. 2023).

The COVID-19 pandemic has brought about peril in various aspects of people's lives worldwide, posing a threat to public health and crippling economies, causing global concerns and affecting employee turnover intentions and exits (Moyo, 2020) & (Ipsen et al., 2021). Drawing from findings in behavioral science and theories related to public health

p-ISSN: 2088-1231
e-ISSN: 2460-5328

interventions from various sources for various institutional actions and employee behavior change interventions (Suseno and Dwiatmadja, 2016; Lee et al., 2021), it can analyze the impact of employee compensation and training on a company's financial performance and assess decision-making processes related to both human resource aspects before and during the pandemic (Mahssouni et al., 2022). Furthermore, the relationship between productivity, emerging health issues, and adverse situations can jeopardize employees in their work routines (Costa Melo et al., 2023) & (Galanti et al., 2021). The pandemic era has affected the regrouping of employees in the Suralaya Power Plant company, leading to cooperation setbacks and employees working online among various parties within the company.

H_2. It is suspected that there is an influence of the COVID-19 pandemic on employee regrouping.

3. The Impact of the COVID-19 Pandemic on Expertise Outsourcing

The influence of the pandemic on expertise outsourcing lies in the importance of employee turnover as it affects a company's survival, even though the research is broader (Deegahawature & Lakmali, 2021). As a result of the pandemic, all companies evaluate their interconnectedness with cause-and-effect relationships in the problems that arise. Therefore, there are alternative agile outsourcing providers that are most suitable with the aim of obtaining relative solutions in the face of ideal solutions during the pandemic (Goker, 2021; Suseno & Mukhlis, 2023).

Based on recent literature on new institutional business strengths, defined as strengths flowing from the positions of business actors deeply rooted in the provision of public social services (Suseno et al. 2022; Mercille & O'Neill, 2022), historical cases illustrate common features of the outsourcing and offshoring model and literature reviews provide instructive examples of how model features could potentially influence the future of remote work post-pandemic (Erickson & Norlander, 2022; Mahpudin & Suseno, 2023). The pandemic seems to offer a better future solution by working digitally, making it easier for stakeholders and employees to collaborate.

H_3. It is suspected that there is an influence of the COVID-19 pandemic on expertise outsourcing.

1. The Impact of Employee Regrouping on the Productivity of Suralaya Power Plant (PLTU Suralaya)

The influence of employee regrouping on work productivity is substantial. Employee needs have an impact on various aspects of employee productivity, including problem-solving skills, employee effectiveness, efficiency, as well as innovation and creativity (Eneji Samuel & Eyong, 2021) & (Fry et al., 2021). There is a connection between workplace conflicts and negative employee productivity, and macro-level tools are utilized to investigate whether workplace politics mediate the relationship between workplace conflicts and employee productivity (Suseno et al., 2022). Meanwhile, workplace conflicts significantly predict employee emotional stability and employee productivity (Adeyemi, 2022 & Khasanov et al., 2021).

Furthermore, the impact of the relationship between managers and employees should not be underestimated in relation to employee performance and productivity because it also

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e-ISSN: 2460-5328

affects organizational performance (Dlamini et al., 2022). Employee productivity can be achieved when human resources are capable of taking responsibility for completing tasks or assignments (Prawiro & Robin, 2023). As managers, encouraging employee productivity requires efforts to ensure that employees are highly valued and appreciated for their diligent performance and motivation (Bhadoria & Marwaha, 2020) & (Hidayati et al., 2020). Employee regrouping affects work productivity at PLTU Suralaya, potentially disrupting employees' ability to enhance their creative work productivity.

H_4. It is suspected that there is an influence of employee regrouping on the productivity.

5. The Impact of Outsourcing Expertise on Productivity.

To understand the influence of outsourcing, organizational commitment, and employee satisfaction on the performance of outsourced employees in the Ministry of Public Works and Public Housing (Pawirosumarto et al., 2020) & (Sidik et al., 2020). This demonstrates that over time, the dimensions of outsourcing affect organizational learning differently (Magelssen et al., 2016; Maskudi et al. 2024).

Employees who do not adapt to more productive companies tend to engage in outsourcing. When adjusted for the company's fixed effects, the results indicate that international outsourcing from core functions decreases, while domestic outsourcing from support functions increases (Mohlmann & L.F. de Groot, 2010; Sadeghian et al., 2020). The presence of outsourcing companies can nurture, develop, and produce productive employees, enabling them to achieve desired outcomes. Therefore, expertise in outsourcing can have an impact on the productivity of the Suralaya Power Plant.

H_5. It is suspected that there is an influence of outsourcing expertise on the productivity of the Suralaya Power Plant.

METHOD

This research employs a survey method with a quantitative correlational approach to analyze the relationship between various variables. Correlation is used to measure the extent to which changes in one variable are related to changes in other variables. This study encompasses the entire population of employees in the Generation Division of PT. Indonesia Power Suralaya, totaling 100 individuals. The decision to use the full population as the research sample is based on methodological and practical considerations that enhance the validity and reliability of the findings. By including all employees, this study eliminates potential biases associated with random sampling, ensuring that the collected data accurately represents the entire population. This representativeness is crucial for precisely analyzing relationships between variables, as it fully captures the characteristics and variations within the population.

Utilizing the entire population is also an efficient and practical approach, particularly given the relatively small sample size. Moreover, it minimizes the risk of sampling errors, which commonly occur when only a subset of the population is selected. This methodological advantage enhances the reliability of the research results and strengthens their applicability within the specific context of PT. Indonesia Power Suralaya. The primary objective of this study is to examine the specific dynamics within PT. Indonesia Power Suralaya’s Generation Division. By incorporating the entire population, the study allows for a more comprehensive

p-ISSN: 2088-1231
e-ISSN: 2460-5328

and contextual analysis, accurately reflecting the organizational reality. Given the complexity and specificity of the company's operational environment, this approach ensures a deeper understanding of internal dynamics.

To further enhance the accuracy of the analysis, the employee population is stratified based on key criteria, including job roles—operators, technicians, supervisors, and managers—as well as work experience categories of less than 5 years, 5–10 years, and more than 10 years. This stratification guarantees that all subgroups within the population are proportionally represented, reducing bias and improving the quality of data analysis. Consequently, the study not only captures the entire workforce but also accounts for internal variations in job functions and experience levels, leading to more precise and meaningful insights.Data from the respondents are used to conduct statistical analyses to test the hypotheses formulated in this research.

This study focuses on four primary variables: Pandemic Covid-19 (X_1), the operational definition encompasses these characteristics and their implications for the electricity generation crisis, focusing on how the pandemic has influenced operational capacity, supply chain integrity, demand for electricity, financial stability, and regulatory compliance in the sector (Ghorbani et al., 2020; Suseno, 2024). The Employee Regrouping variable (X_2) is operationally defined as the strategic reallocation, reassignment, or restructuring of employees within the electricity generation sector, particularly in response to the operational challenges posed by the COVID-19 pandemic. This variable captures the organizational adjustments made to maintain or enhance operational efficiency, ensure health and safety, and adapt to the changing demands and constraints of the electricity generation environment during the crisis (Zhou et al., 2021; Mustofa et al. 2023).

In the framework of this study, Expertise Outsourcing (X_3) is operationally defined as the practice of contracting external entities or specialists to perform specific tasks, provide expertise, deliver services that are beyond the current capabilities or capacities of the in-house staff within the electricity generation sector, especially as a strategic response to the complexities and demands introduced by the COVID-19 pandemic or crisis situation. This variable captures the extent and manner in which electricity generation companies leverage external resources to supplement their operational, technical, managerial needs during the crisis.

Employee productivity (Y). can be operationalized through various dimensions quantity of work, time management, initiative and creativity, teamwork and collaboration, and adaptability (Allstrin et al., 2022; Saefullah et al. 2025).

The software used to process data in this research uses Smart PLS 3.2.9 (Ghozali, 2021). the choice of Smart PLS 3.2.9 is justified by its ability to provide robust and flexible analytical capabilities, making it an ideal tool for this research. Its suitability for exploratory studies, ability to handle complex models, and capacity to test hypotheses without requiring a fully established theoretical foundation ensure that the findings are both reliable and actionable. This methodological approach not only enhances the validity of the research but also contributes to the development of new theoretical insights in the field of crisis management and operational resilience in the energy sector. By leveraging Smart PLS 3.2.9, this research ensures methodological rigor while addressing the unique challenges of studying operational resilience and outsourcing practices in the energy sector during crises.

p-ISSN: 2088-1231
e-ISSN: 2460-5328

RESULTS AND DISCUSSION

Result

Descriptive respondent profile

Based on the data in Figure 1, it can be concluded that the majority of respondents fall within various age ranges. Specifically, there were 46 respondents (46%) aged 20 to 29 years, 30 respondents (30%) aged 30 to 39 years, 1 respondent (1%) aged 40 to 49 years, and 23 respondents (23%) aged 50 to 59 years. This indicates that the survey sample includes a diverse age group, with the 20-29 age group being the largest, presented in Figure 1.

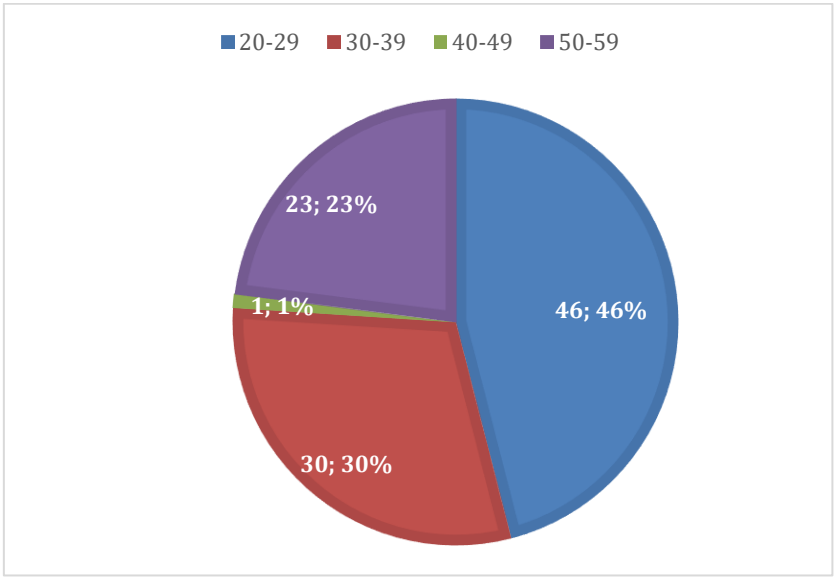

Figure 1 Profile of Respondent

In Table 1, shows the results of the education levels of respondents who were part of the survey sample. The results reveal variations in respondents' education levels, providing important insights within the context of this study. Specifically, four primary levels of education were observed in the respondent sample. The Master's level of education, which represents the highest level of postgraduate education, was represented by 3 respondents, accounting for approximately 3% of the total sample. This indicates that a small number of respondents possess a very high level of education.

Table 1 Characteristics of Respondents Based on Education Level

Education Level	Frequency	Percentage (%)
S2	3	3
S1	20	20
D3	43	43
SMA/SMK	34	34
Amount	100	100

p-ISSN: 2088-1231
e-ISSN: 2460-5328

The Bachelor's education level, typically associated with a bachelor's degree, was represented by 20 respondents, making up roughly 20% of the total sample. This highlights that the majority of respondents hold a bachelor's education level. Furthermore, the diploma education level, which may refer to a diploma or a lower-level higher education program, was represented by 43 respondents, constituting around 43% of the total sample. This suggests that the majority of respondents have an education level below that of a bachelor's degree.

Table 2 provides insight into the work experience of the sample respondents. The data suggests that the majority of respondents, approximately 65%, have between 1 and 9 years of work experience. Additionally, approximately 11% of respondents reported having 10 to 19 years of work experience. Around 8% of the respondents had 20 to 29 years of work experience, while approximately 16% of all respondents had accumulated 30 to 39 years of work experience.

Table 2 Characteristics of Respondents Based on Years of Work

Years of Work	Frequency	Percentage (%)
1-9	65	65
10-19	11	11
20-29	8	8
30-39	16	16
Total	100	100

Test Model

The outer loading value varies between 0 and 1. The higher the outer loading value, the greater the indicator's contribution to the construct being measured. In most cases, significant values are usually considered to be values above 0.7. This means that the indicator strongly and reliably measures the same construct as presented in Figure 1.

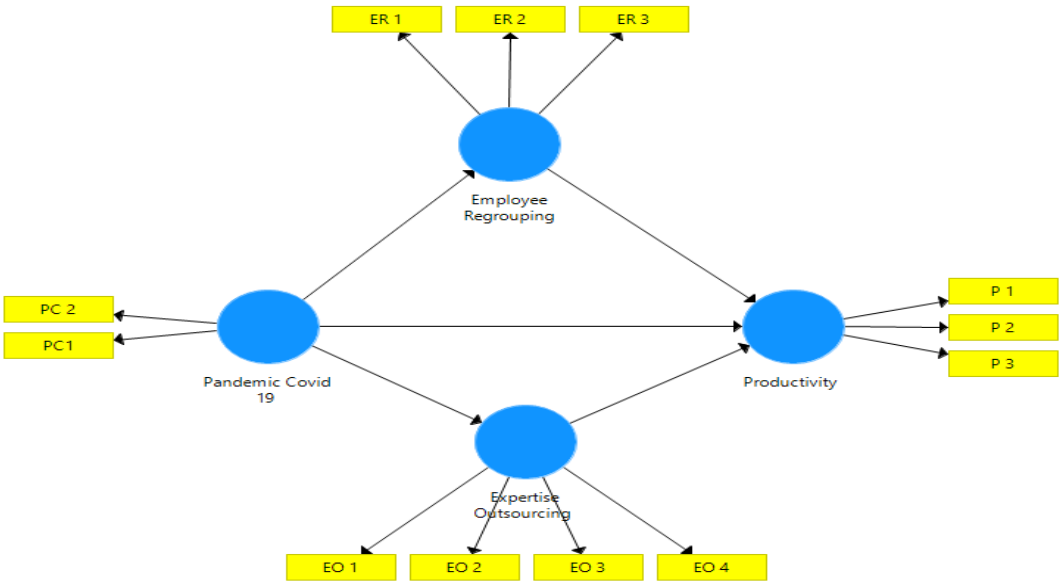

Figure 2 Outer loading value

p-ISSN: 2088-1231
e-ISSN: 2460-5328

Meanwhile, convergent validity is an important aspect of construct validity, which assesses the extent to which indicators that are supposed to measure the same construct actually do so. In other words, if the outer loading value of all indicators in one construct is greater than 0.7, this indicates that these indicators have a significant contribution in measuring each construct, which can be observed in Table 3.

Table 3 Outer Loading Values Model

	Expertise Outsourcing	Covid-19 Pandemic	Employee Productivity	Employee Regrouping
EO1	**0,729**			
EO2	**0,799**			
EO3	**0,714**			
EO4	**0,804**			
CP1		**0,782**		
CP2		**0,779**		
EP1			**0,800**	
EP2			**0,785**	
EP3			**0,726**	
ER1				**0,735**
ER2				**0,758**
ER3				**0,802**

Validity Test

Outer loading is a crucial statistical metric that quantifies the relationship strength between specific indicators and the underlying construct they are intended to measure. It is a key component of both exploratory and confirmatory factor analysis. The value of outer loading ranges from -1 to 1, where values closer to 1 indicate a stronger association between the indicator and the construct, signifying that the indicator effectively measures the construct.

For an indicator to demonstrate strong convergent validity—meaning it correlates well and is consistent with the construct it aims to measure—its outer loading value should exceed 0.7. Achieving this threshold suggests that the indicator has a robust correlation with the construct, affirming its validity in reflecting the construct accurately, as illustrated in Table 3. This criterion ensures that the indicators used in the analysis are both relevant and reliable for the constructs under investigation.

Table 4 Nilai Average Variance Extracted (AVE)

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Expertise Outsourcing	**0,761**	**0,770**	**0,847**	**0,582**
Covid-19 Pandemic	**0,359**	**0,359**	**0,757**	**0,609**
Employee Productivity	**0,658**	**0,660**	**0,814**	**0,594**
Employee Regrouping	**0,647**	**0,652**	**0,809**	**0,586**

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e-ISSN: 2460-5328

Reliability Test

Reliability test results have an important role in research because they aim to prove the level of accuracy, consistency, and precision of the instruments used in measuring a construct. In this research, reliability was measured using two methods, namely composite reliability and Cronbach's alpha measurements. The values resulting from these two methods are then compared with the "rule of thumb" value, which is commonly used in research, namely that the expected reliability value is greater than 0.7. The results of this reliability calculation can be found in Table 5, which will provide a clearer picture of the extent to which the instrument used is reliable in measuring the construct being studied. Thus, the results of this reliability test are an important step in validating the research instrument and ensuring that the data obtained has an adequate level of reliability for further analysis. The reliability test is intended to prove the accuracy, consistency, and precision of the instrument in measuring the construct.

Table 5 Cronbac's Alpha dan Composite Realibity

	Cronbach's Alpha	Composite Reliability
Expertise Outsourcing	**0,761**	**0,847**
Covid-19 Pandemic	**0,359**	**0,757**
Employee Productivity	**0,658**	**0,814**
Employee Regrouping	**0,647**	**0,809**

However, there is a Cronbach's alpha value of less than 0.70 for the employee productivity, employee regrouping, and COVID-19 pandemic variables, while the composite reliability value is greater than 0.70.

Hypothesis test

Table 6 presents the results of the hypothesis testing that was carried out in the research. The inner model is a concept that may be used in data analysis, especially in the context of statistical modeling. So, Table 7 is the place where the results of the hypothesis test are displayed in detail, such as the P-values and T-statistics for each hypothesis tested. So, in this research, P-values are used as criteria to determine whether the research hypothesis can be accepted or not, with a threshold value of 0.05. The results of the hypothesis test are then displayed in Table 7, which is part of the inner model, to provide a more detailed understanding of whether the hypotheses support the findings in the research data or not.

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e-ISSN: 2460-5328

Table 6 Coefficient (Original Sample), Standard Eror dan T- Statistics

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Information
Covid-19 Pandemic -> Employee Productivity	0,320	0,320	0,067	4,786	**0,000**	**Significant**
Covid-19 Pandemic -> Employee Regrouping	0,500	0,501	0,097	5,137	**0,000**	**Significant**
Covid-19 Pandemic -> Expertise Outsourcing	0,448	0,451	0,114	3,911	**0,000**	**Significant**
Employee Regrouping -> produktivitas karyawan	0,368	0,367	0,086	4,309	**0,000**	**Significant**
Expertise Outsourcing -> Employee Productivity	0,219	0,218	0,082	2,684	**0,008**	**Significant**

In this study, we conducted hypothesis testing using Partial Least Squares Structural Equatio Modeling (PLS-SEM) through Smart PLS 3.2.9, with a specific focus on examining mediating (intervening) effects. Hypotheses 2 and 4 were tested as path intervening tests, which assess whether certain variables mediate the relationship between independent and dependent variables. Similarly, Hypotheses 3 and 5 were also tested as intervening tests to evaluate the presence and significance of mediating effects within the proposed model.

The analysis of each hypothesis in table 6 is as follows:

H_1: This hypothesis tests the relationship between the COVID-19 pandemic variable (X) and employee productivity (Y). The analysis results show that the path coefficient value between X and Y is 0.320, which means it has a positive relationship. In addition, the statistical T value obtained is 4.786, which is greater than the T table value (1.989), indicating that this relationship has a significant effect. In addition, a P value of 0.000 indicates that this relationship is very statistically significant.

H_2: This hypothesis tests the relationship between the COVID-19 pandemic variable (X) and employee regrouping (Z1). The analysis results show that the path coefficient value between X and Z1 is 0.500. The statistical T value obtained is 5.137, which is greater than the T table value (1.989), indicating that this relationship has a significant effect. In addition, the P value of 0.000 indicates that this relationship is very statistically significant.

H_3: This hypothesis tests the relationship between the COVID-19 pandemic variable (X) and expertise outsourcing (Z2). The analysis results show that the path coefficient value between X and Z2 is 0.448. The statistical T value obtained is 3.911, which is greater

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than the T table value (1.989), indicating that this relationship has a significant effect. In addition, the P value of 0.000 indicates that this relationship is very statistically significant.

H_4: This hypothesis tests the relationship between the employee regrouping variable (Z1) and employee productivity (Y). The analysis results show that the path coefficient value between Z1 and Y is 0.368. The statistical T value obtained is 4.309, which is greater than the T table value (1.989), indicating that this relationship has a significant effect. In addition, the P value of 0.000 indicates that this relationship is very statistically significant.

H_5: This hypothesis tests the relationship between the expertise outsourcing variable (Z_2) and employee productivity (Y). The results of the analysis show that the path coefficient value between Z_2 and Y is 0.219, which means it has a positive relationship. The statistical T value obtained is 2.684, which is greater than the T table value (1.989), indicating that this relationship has a positive effect. In addition, the P value of 0.008 indicates that this relationship is statistically significant, although the level of significance is not as strong as in the previous hypothesis.

In the overall analysis, it can be concluded that all hypotheses (H_1, H_2, H_3, H_4, and H_5) show a significant relationship between the variables tested in this study. Hypotheses H_1, H_2, H_3, and H_4 have a very high level of significance (P value = 0.000), while hypothesis H_5 has a slightly lower level of significance (P value = 0.008). This shows that the COVID-19 pandemic, employee regrouping, and expertise outsourcing have a significant influence on employee productivity.

Discussion

First hyphotesis, the effect of the crisis management such as the COVID-19 pandemic on employee productivity. The results of this research show that the COVID-19 pandemic has a significant influence on employee productivity. This is proven by the path coefficient value between the the crisis management such as COVID-19 pandemic (X) and employee productivity (Y) of 0.320, which has a positive value. In addition, the statistical T value of 4.786 is greater than the T table value of 1.989, indicating that this relationship is statistically significant. The P value reaching 0.000 also confirms the significance of this relationship. Therefore, the hypothesis that the crisis management such as the COVID-19 pandemic has a positive effect on employee productivity can be accepted. The results of this study are consistent with previous findings by Mahssouni et al. (2022), which state that the crisis management such as the COVID-19 pandemic can reduce conventional offline business activities but can also encourage the growth of innovative online-based businesses. Research by Kurdy et al. (2023), which is similar to the research of Suseno et al. (2022), also supports this conclusion by showing that businesses from various industries can improve their employees' performance while working from home. Several business sectors that have continued to exist during the pandemic, such as education, grocery retail, and online goods delivery businesses, have also been highlighted. In the context of PGU Suralaya, the crisis management such as the COVID-19 pandemic has not stopped their employees from continuing to work optimally and maintaining productivity. This allows the company to continue to meet the demand for electrical power needed during the pandemic.

p-ISSN: 2088-1231
e-ISSN: 2460-5328

The second hypothesis demonstrates a significant impact of the crisis management such as the COVID-19 pandemic on employee regrouping. This is evident from the path coefficient value between the COVID-19 pandemic (X) and employee regrouping (Z_1), which is 0.500. Furthermore, the statistical T-value obtained, 5.137, significantly exceeds the T-table value of 1.989, indicating a statistically significant influence in this relationship. The P-value of 0.000 further confirms the significance of this association. Consequently, we can accept the hypothesis that the crisis management such as the COVID-19 pandemic positively affects employee regrouping (Z_1). These findings align with previous research by Machado & Davim. (2022), which concluded that deviations from regular working hours (e.g., 4 weeks of work followed by 2 weeks of rest) have an impact on employee performance. They also emphasized that individual factors perceived by employees significantly influence their performance during changes in working hours brought about by the crisis management such as the COVID-19 pandemic.

In Moyo (2020), a shift in employee regrouping occurred during the crisis management such as the COVID-19 pandemic, with teams being divided into two groups while preserving employee skills to meet performance targets (Suseno, 2023). This finding is consistent with the research of Deegahawature & Lakmali. (2021), which demonstrates a sudden increase in employee turnover within a manufacturing company during the turbulent environment created by COVID-19.

The results of the third hypothesis testing indicate that the crisis management such as the Covid-19 pandemic indeed affects Expertise Outsourcing. This is evident in the path coefficient value between the Covid-19 Pandemic (X) and Expertise Outsourcing (Z_2), which stands at 0.448. Furthermore, the obtained statistical T-value, 3.911, significantly exceeds the T-table value of 1.989, signifying a statistically significant influence in this relationship. The P-value, which reaches 0.000, further corroborates the significance of this association. Consequently, we can accept the hypothesis that the Covid-19 Pandemic positively influences Expertise Outsourcing (Z_2).

However, it's important to note that the findings of this study do not align with the research conducted by Tsai et al. (2021), which suggests that experience carries the greatest weight, accounting for 33.83%, in the selection of outsourcing personnel, surpassing other factors such as skills, education, and salary. This indicates that, according to Tsai et al. (2021), experience plays the most critical role in the selection of outsourcing personnel.

In the context of this research, Aryatama (2020) also concurs with Saefullah et al. (2024) by emphasizing the necessity of adapting the selection of outsourcing expertise to the unique circumstances of the Covid-19 pandemic. Therefore, the selection process must take into consideration the company's specific criteria, where outsourcing expertise in human resources must possess a solid foundational knowledge and expertise, complemented by access to the latest tools and technology.

The results of the fourth hypothesis test reveal a significant relationship between employee regrouping and employee productivity. This is substantiated by the path coefficient value of 0.368 between employee regrouping (Z_1) and employee productivity (Y). Furthermore, the statistical T-value of 4.309 surpasses the critical T-table value of 1.989, indicating a statistically significant effect. The P-value of 0.000 further confirms the significance of this relationship. Therefore, we accept the hypothesis that Employee Regrouping (Z_1) has a significant positive impact on employee productivity (Y).

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These findings align with prior research conducted by Mutegi et al. (2023), which suggests that work shifts and the work environment exert a significant influence on employee productivity. This implies that team divisions with employees possessing the requisite skills and abilities can sustain employee productivity in alignment with the company's defined targets. Moreover, employee productivity and its role in profit generation have a substantial impact on salary levels, while employee participation only affects salaries when paired with high levels of employee productivity (Gong et al., 2023) and (Suseno, 2019).

Additionally, research by Mehmood. (2021) and Suseno & Basrowi (2023) indicates that workplace internet free time positively and significantly influences employee engagement, though its impact on employee productivity is positive but not statistically significant.

The results of the fifth hypothesis test demonstrate a significant impact of Outsourcing Expertise on employee productivity. The coefficient value of Competency (X_2) on employee productivity (Y) is 0.219, indicating a positive influence in this relationship. Furthermore, the obtained statistical T-value of 2.684 surpasses the critical T-table value of 1.989, confirming a statistically significant and positive influence. The P-value, nearly zero (0.008), further affirms the significance of this relationship. Thus, we can conclude that the hypothesis stating that Expertise Outsourcing (Z_2) has a positive effect on employee productivity (Y) is valid.

These findings align with the research by Broedner et al.(2009), which emphasizes that decision-making processes should take into account factors such as cost efficiency, transaction cost analysis, as well as the development of competency and innovation capabilities. Similarly Samuel & Eyong. (2021) and Suseno (2023), highlight the importance of management in evaluating individual learning needs among employees and addressing these needs to enhance workforce productivity. Furthermore, research conducted by Lee et al. (2021) and Suseno. (2019) suggests that outsourcing influences job satisfaction, which is consistent with the present study's findings, indicating that Expertise Outsourcing workers with advanced knowledge, skills, and technological support can positively impact the productivity of the Suralaya PGU plant.

CONCLUSION

In the context of PGU Suralaya, the crisis management such as the COVID-19 pandemic has not deterred its employees from maintaining optimal work performance and productivity. This resilience has enabled the company to continue meeting the increased demand for electrical power during the pandemic. During the COVID-19 pandemic, there were changes in employee deployment, resulting in the division of the workforce into two teams. However, these teams managed to retain and enhance their skill sets, ensuring that performance targets remained attainable.

In the context of this research, it underscores the critical importance of aligning the selection of outsourcing expertise with the unique challenges posed by the crisis management such as the COVID-19 pandemic. Consequently, the selection process must take into account the specific criteria set by the company. To ensure that the human resources involved in outsourcing possess an adequate knowledge base and expertise, they should also be equipped with the latest tools and technology. This combination is essential to maintaining both productivity and service quality.

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e-ISSN: 2460-5328

The research findings reveal that outsourcing significantly impacts job satisfaction. This finding is supported by the fact that employees with proficient outsourcing expertise, encompassing knowledge, skills, and advanced technology, can make a positive contribution to productivity within the PGU Suralaya plant environment.

This study addresses a significant gap in the literature by exploring how coal-fired power plants, such as Suralaya PGU, can effectively balance outsourcing and in-house expertise to maintain operations during crises. While existing research has focused on operational efficiency, environmental impacts, and socio-economic effects of power plants, there is limited empirical evidence on how global disruptions like the COVID-19 pandemic affect the integration of outsourcing and internal capabilities. This research contributes to the theoretical understanding of crisis management in the energy sector, particularly in the context of resource-dependent industries. This study not only advances theoretical knowledge on crisis management, resilience, and sustainability in the energy sector but also provides practical solutions for power plants and policymakers. By addressing the challenges of maintaining operations during global disruptions and integrating socio-economic considerations, the research offers a comprehensive framework for building resilient, sustainable, and self-sufficient energy infrastructure. These insights are crucial for ensuring the long-term viability of power plants and the well-being of the communities they serve.

Future research should focus on refining selection criteria for outsourcing partners, emphasizing adaptability, technological proficiency, and crisis readiness in contracts. Additionally, studies should explore how leadership styles and decision-making processes impact the effectiveness of crisis management strategies, particularly in outsourcing and workforce deployment. These efforts will enhance resilience and productivity during disruptions.

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