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BIG DATA INTEGRATION IN ANALYZING EFFICIENCY-DRIVEN LAYOFFS IN INDONESIA: A STATISTICAL MODELING APPROACH

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ABSTRACT

This study examines efficiency-driven mass layoffs in Indonesia, particularly in the post-COVID-19 period, when efficiency discourse has increasingly been used to justify workforce reductions. The study addresses a gap in the literature by integrating Critical Discourse Analysis (CDA), Discourse Network Analysis (DNA), and Structural Equation Modeling (SEM) within a single analytical framework. This integration constitutes the main novelty of the study, as previous research has generally examined layoffs from separate legal, economic, or organizational perspectives rather than combining discursive, relational, and causal dimensions. Data were collected from 30 documents consisting of news reports, policy-related texts, and public discourse materials identified through internet-based searches, complemented by Focus Group Discussions with affected employees, HR personnel, and policy experts, as well as a survey of 100 respondents conducted over one week using snowball sampling. The results show that governance and regulation, as well as technology and innovation, significantly influence efficiency, which in turn significantly increases the likelihood of mass layoffs. Efficiency also mediates the relationship between governance, technology, and layoffs. The study contributes by offering an integrated empirical framework for understanding how layoff decisions are shaped not only by organizational considerations but also by discourse and policy environments. Practically, the findings suggest the need for layoff management policies that emphasize regulatory transparency, accountability, legal certainty, and social protection for workers. A limitation of this study is its reliance on a relatively limited qualitative document set and non-probability survey sampling, which may restrict generalizability. Nevertheless, the findings provide useful evidence for designing more balanced efficiency policies that protect both organizational sustainability and worker welfare.

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1. INTRODUCTION

The phenomenon of mass layoffs based on operational efficiency has become an alarming trend in both global and national labor markets. In recent years, waves of mass layoffs have impacted various industrial sectors, from technology to manufacturing, with operational efficiency cited as the primary justification [1], [2]. In Indonesia, this trend has intensified post-COVID-19, with over 10,000 workers in the technology and startup sectors experiencing layoffs between 2022 and 2023 [3]. Understanding and addressing this phenomenon has become increasingly urgent, as operational efficiency remains a legitimate business need. Although efficiency is often viewed as necessary for organizational sustainability, the implementation of layoffs under this rationale frequently raises concerns regarding worker protection, fairness, and long-term socio-economic consequences.

Mass layoffs based on efficiency, if not managed properly, lead to multifaceted issues. Firstly, from an employment perspective, they contribute to higher unemployment rates and instability in the labor market [4]. According to the Central Statistics Agency (2023), the unemployment rate in Indonesia reached 5.32% in February 2023, with significant contributions from sectors affected by mass layoffs [5]. Secondly, from an organizational perspective, poorly managed mass layoffs can damage the company's social capital, reduce the productivity of remaining employees, and create a "survivor syndrome" that negatively impacts long-term performance [6], [7]. Thirdly, from a social perspective, mass layoffs create a negative public narrative about industrial relations, which can affect public trust in business and government institutions [8], [9].

These challenges are further exacerbated by the limited analytical frameworks available to understand and manage efficiency-based layoff policies. Conventional approaches tend to focus on economic and legal aspects, neglecting the discursive and structural dimensions that shape such policies [10]. In addition, the existing literature still provides limited quantitative modeling that explains how governance and regulation, technology and innovation, and efficiency interact in shaping mass layoff decisions. Given this gap, the need for a more comprehensive analytical approach has become more apparent. This study examines how efficiency discourse and network structure influence mass layoff policies and proposes a comprehensive analytical framework to prevent uncontrolled mass layoffs.

To answer the research question, this study adopts an interdisciplinary approach that integrates Critical Discourse Analysis (CDA), Network Structure Analysis, Discourse Network Analysis (DNA), and Structural Equation Modeling (SEM). This approach not only serves as the theoretical foundation but also provides a comprehensive strategy for addressing the complexity of the efficiency-based mass layoff phenomenon. It enables a thorough exploration of the discursive, structural, and causal dimensions of efficiency-based layoff policies. This study also differs from Ridho and Azizah [3], which examined mass layoffs in the startup sector using a mixed-method approach with SEM. While that study focused primarily on identifying factors related to layoffs in a specific sector, the present study develops a broader framework by integrating governance and regulation, technology and innovation, efficiency, and mass layoffs within a single analytical model, supported by discourse and network analysis.

Critical Discourse Analysis will be used to explore how the discourse of efficiency is constructed and disseminated in both organizational and public contexts. By analyzing policy documents, corporate communications, media coverage, and social media conversations, this study will identify discursive patterns that shape the understanding and legitimization of efficiency-based mass layoff policies [11]. Network Structure Analysis will be applied to understand how efficiency-based layoff policies are influenced by and impact social and professional networks. By mapping the relationships among policymakers, corporate executives, employees, and other stakeholders, this research will identify structural patterns that facilitate or hinder the implementation of layoff policies [12]. Big Data Analytics will be employed to analyze large volumes of data from various sources, including social media, online news, company reports, and labor statistics [13]. By applying sentiment analysis, text mining, and data visualization techniques, this study will identify trends, patterns, and anomalies in the public and organizational discourse regarding efficiency-based mass layoffs [14].

Finally, SEM will be used to identify causal relationships between factors that influence efficiency-based layoff policies. By integrating data from discourse analysis, network structure analysis, and big data, the SEM model will uncover how economic, managerial, technological, and social factors interact to shape layoff decisions and their impacts [3]. Therefore, the novelty of this study lies in the integration of discourse analysis, network analysis, and causal statistical modeling in one framework to explain efficiency-driven mass layoffs in Indonesia. The integration of these four analytical approaches is expected to result in a

comprehensive analytical framework that is not only descriptive but also actionable, providing a strategy for understanding, predicting, and preventing uncontrolled mass layoffs.

2. RESEARCH METHODS

2.1 Research Design

This study employs an exploratory, descriptive, and explanatory research design with a mixed-methods approach, combining qualitative and quantitative techniques. The research aims to map out and understand the phenomenon of efficiency-based mass layoffs (PHK) in Indonesia. The study integrates Critical Discourse Analysis (CDA), Discourse Network Analysis (DNA), and Structural Equation Modeling (SEM) to explore the discourse, network structures, and causal relationships influencing the implementation and impact of efficiency-based mass layoffs.

The research design is structured to address the research objectives in an iterative manner, starting with data collection and qualitative analysis, followed by hypothesis testing and quantitative modeling. The ultimate goal is to build a comprehensive framework that can inform both academic understanding and policy formulation on the topic. The qualitative stage was used to identify dominant narratives, actors, and relevant policy issues related to efficiency-driven layoffs, while the quantitative stage was used to test the causal relationships among the variables generated from the earlier stage. In this study, the measurement model was treated as reflective, as each indicator was assumed to reflect its respective latent construct, namely Governance and Regulations (X1), Technology and Innovation (X2), Efficiency (Y1), and Mass Layoffs (Y2).

2.2 Data Sources

Data for this study will be collected from multiple sources to ensure comprehensive coverage of the topic. The sources include:

1. Web Crawling: The study collected 30 documents consisting of online news articles, policy-related documents, and digital public discourse materials related to efficiency and mass layoffs in Indonesia. The documents were identified through manual internet searches using keywords such as “efficiency policy,” “mass layoffs,” “PHK,” “restructuring,” and “labor efficiency” on publicly accessible websites and digital news platforms. The data extracted from these documents included the names of actors, institutional affiliations, statements, dominant narratives, and positions toward efficiency-driven layoffs. These materials were used as the basis for Critical Discourse Analysis (CDA) and Discourse Network Analysis (DNA).
2. Focus Group Discussions (FGDs): FGDs were conducted with key stakeholders, including employees affected by PHK, policy experts, and representatives from labor unions. The purpose of the FGDs was not only to validate the issues identified from the document analysis, but also to refine the variables, indicators, and relationships among constructs to be tested in the quantitative model. Thus, the FGD stage functioned as an important bridge between the qualitative and quantitative phases of the study.
3. Surveys: Surveys were distributed to employees affected by mass layoffs in various companies across Indonesia. The surveys were designed to collect quantitative data on perceptions, attitudes, and impacts of PHK policies, as well as on variables identified in previous stages of the research. The survey involved 100 respondents and was conducted over a period of one week. The sampling technique used was snowball sampling, in which the initial respondents were identified from networks of affected workers and professional contacts, and were then asked to refer other respondents with similar experiences related to layoffs.

2.3 Data Collection Techniques

1. Web Crawling: Data were collected from publicly accessible online sources, including digital news portals, public policy documents, and other relevant web-based materials discussing efficiency-driven layoffs. Each document was reviewed and selected based on its relevance to the topic, clarity of actor statements, and connection to the issue of efficiency as a justification for layoffs. A total of 30 documents were retained for further analysis.

2. Discourse Network Analysis (DNA): Data from web crawling will be analyzed to identify key actors, statements, and sentiments using software like Visone.
3. Focus Group Discussions (FGDs): Conducted to refine variables identified through DNA and gather expert opinions. In this study, FGDs were used to explore participants' experiences, interpretations, and evaluations of efficiency-driven layoffs. The information obtained from participants was then used to sharpen construct definitions, confirm the relevance of indicators, and improve the clarity of the survey instrument before quantitative data collection was conducted.
4. Surveys: Distributed to employees affected by PHK, using snowball sampling to ensure a diverse range of participants. The survey instrument used a structured questionnaire covering four main latent variables, namely Governance and Regulations (X1), Technology and Innovation (X2), Efficiency (Y1), and Mass Layoffs (Y2). The questionnaire items were derived from the results of document analysis and FGDs.

2.4 Data Analysis

1. Critical Discourse Analysis (CDA): This qualitative technique was used to analyze the 30 collected documents, focusing on how the concept of efficiency is framed within policy documents, news articles, and public discourse. CDA will examine how language, power, and ideology interact to shape public understanding of mass layoffs. The aim is to identify the narratives that justify or challenge the legitimacy of mass layoffs based on efficiency [15], [16].
2. Discourse Network Analysis (DNA): DNA was used to provide a structural mapping of the relationships between key actors and concepts related to efficiency and layoffs [17]. The analysis helped visualize the network of stakeholders involved in PHK policies and identify patterns in the discourse that shape decision-making. The Visone software will be used to perform DNA, identifying key actors, relationships, and sentiment within the discourse [18], [19].
3. Structural Equation Modeling (SEM): SEM was selected because this study aims to test simultaneous and interrelated causal relationships among latent variables, rather than examining each relationship separately. SEM is particularly suitable for this research because it allows the integration of multiple constructs generated from the qualitative stage into one structural model, while also accounting for measurement error and indirect effects. Using WarpPLS software, SEM was used to test the hypotheses developed earlier in the study. The SEM model in this study integrates the variables Governance and Regulations (X1) and Technology and Innovation (X2) as exogenous constructs, Efficiency (Y1) as a mediating endogenous construct, and Mass Layoffs (Y2) as the final endogenous construct.

   The structural model can be expressed in the following equations:

$$\mathrm{Y1} = \beta 1\mathrm{X1} + \beta 2\mathrm{X2} + \varepsilon 1,$$
$$\mathrm{Y2} = \beta 3\mathrm{X1} + \beta 4\mathrm{X2} + \beta 5\mathrm{Y1} + \varepsilon 2,$$

   where:
   Y1 = Efficiency;
   Y2 = Mass Layoffs;
   X1 = Governance and Regulations;
   X2 = Technology and Innovation;
   $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, and $\beta 5$ = path coefficients;
   $\varepsilon 1$ and $\varepsilon 2$ = error terms.

This includes evaluating the relationships between variables such as the discourse on efficiency, network structure, and their effects on mass layoffs. The outer model in this study was specified as reflective and evaluated through factor loadings, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's Alpha to ensure convergent validity and internal consistency reliability. The inner model (structural model) was assessed through path coefficients, R-squared, Q-squared, and Variance Inflation Factor (VIF) values to examine predictive power, model fit, and multicollinearity. Bootstrapping was used to test the significance of path coefficients, and mediation was analyzed to understand how variables influence each other [20], [21].

The statistical representation of the measurement model can be written as follows:

$$x = \Lambda x\, \xi + \delta$$
$$y = \Lambda y\, \eta + \varepsilon$$

where:
x = observed indicators of exogenous constructs;
y = observed indicators of endogenous constructs;
Λx and Λy = loading matrices;
ξ = exogenous latent variables;
η = endogenous latent variables;
δ and ε = measurement errors.

The combination of these analytical techniques enabled a comprehensive understanding of how efficiency-based mass layoffs are shaped by discourse and network structure, and provided valuable insights into the policy implications for managing such layoffs more effectively.

3. RESULTS AND DISCUSSION

3.1 Critical Discourse Analysis (CDA)

In this phase of the study, Critical Discourse Analysis (CDA) was conducted on the web-crawled data to examine how the concept of efficiency is framed in relation to mass layoffs (PHK). Over 30 articles and sources, including news reports, policy documents, and social media discussions, were analyzed. These documents primarily centered on the justifications for mass layoffs based on efficiency and operational needs. The goal was to identify how language, power, and ideology shape public perception of the legitimacy of these policies.

Through CDA, several key actors and organizations emerged in the discourse on efficiency-based mass layoffs. Prominent actors included corporate leaders, government officials, labor unions, and academic experts, with companies in the technology sector and state-owned enterprises frequently cited in discussions. These actors played an active role in either supporting or challenging the policies of mass layoffs based on efficiency. The analysis identified two main narratives in the discourse:

1) The Pro-Efficiency Narrative, which framed layoffs as necessary to maintain competitiveness and business survival in an increasingly challenging market.
2) The Anti-Efficiency Narrative, led by labor unions and some political figures, which highlighted the negative social consequences, such as rising unemployment and deteriorating worker welfare, due to mass layoffs.

This examination of how efficiency and layoffs are linguistically framed reflects a clear pattern where companies tend to justify layoffs using terms like “streamlining”, “cost-cutting”, and “restructuring”, while labor advocates use phrases such as “unjust termination”, “worker exploitation”, and “sacrifice”. This framing was found to be influenced by neoliberal ideologies that prioritize economic efficiency over worker stability.

3.2 Discourse Network Analysis (DNA)

Following the Critical Discourse Analysis (CDA), Discourse Network Analysis (DNA) was conducted using the Visone software to map the relationships and interactions between the key actors identified in the CDA phase. The DNA analysis produced a visual network map that reveals the connections between various actors and the issues they are discussing in relation to efficiency-based mass layoffs.

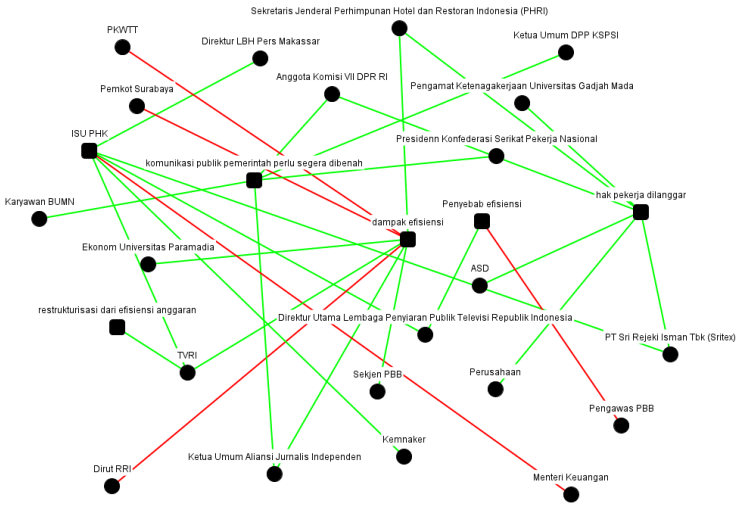

Figure 1. Output Discourse Network Analysis (DNA)

In the resulting network (as seen in Fig. 1), key actors such as corporate leaders, government officials, and labor unions are represented by nodes. The edges (lines connecting nodes) show the relationships between these actors, either in support of or against the efficiency discourse. Green lines represent positive relationships, where actors agree on a certain aspect (such as supporting efficiency in mass layoffs), while red lines indicate negative relationships, where actors oppose or criticize efficiency-based layoffs.

The network map shows that some actors, such as government officials and corporate leaders, are closely linked to the efficiency discourse. These actors are actively involved in defining the legitimacy of mass layoffs as part of business efficiency. On the other hand, labor unions, workers' representatives, and some academics are positioned in opposition to this discourse, emphasizing the negative social impact of mass layoffs, such as unemployment and reduced employee morale. The network illustrates how the pro-efficiency actors are well-connected and influential, whereas the anti-efficiency actors are more fragmented but still play a crucial role in challenging the dominant discourse.

The analysis further highlights that key organizations such as Karyawan BUMN (state-owned enterprises), the Secretary-General of the United Nations, and the President of the National Workers' Union Confederation (KSPN) have more central positions within the network. These positions reflect their significant influence in shaping the discourse on efficiency and layoffs, as they have substantial interactions with other actors in the network. In contrast, actors like the President Director of the Public Broadcasting Institution and PT Sri Rejeki Isman Tbk (Sritex) have relatively isolated positions, suggesting that their involvement in the discourse is more specific to their industry or role.

This Discourse Network Analysis (DNA) allows us to visually capture the complexity of the relationships between actors in the efficiency-based layoff discourse and illustrates how certain actors are more influential in shaping the narrative. The map provides valuable insights into the power dynamics in the policy-making process and identifies areas of agreement and conflict within the discourse.

The network map's results are significant in understanding how discourse surrounding efficiency-based mass layoffs is constructed and reinforced by key actors and how they shape the decision-making process. By identifying these relationships, we can better understand the potential for policy change or reform in the context of mass layoffs based on efficiency.

3.3 Focus Group Discussions (FGDs)

After conducting Critical Discourse Analysis (CDA) and Discourse Network Analysis (DNA), the next step was to gain more real-world insights into the phenomenon of efficiency-driven mass layoffs through Focus Group Discussions (FGDs). These discussions were held with a diverse group of participants, including employees who had been impacted by PHK, government contract workers, HRD personnel from various companies, and academics. The objective was to gather qualitative feedback on the causes and impacts of efficiency-driven layoffs, and to further refine the variables identified in the CDA and DNA phases.

The results of the FGDs revealed a crucial finding: the underlying cause of the mass layoffs was related to changes in government policy priorities. Participants noted that efficiency had increasingly become the top

priority for both government and private sector decision-makers. This shift in priorities often resulted in cost-cutting measures, which included laying off employees to meet new targets and expectations. According to the discussion, efficiency was frequently justified as necessary for business survival, yet it was often implemented without considering its social consequences, particularly for employees.

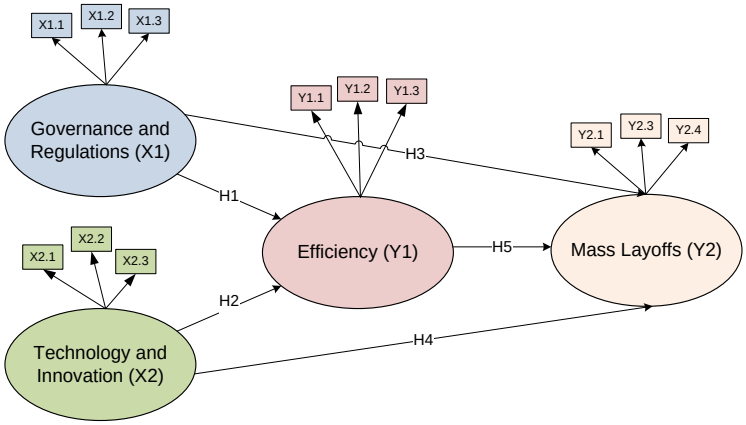

Figure 2. Conceptual Framework

As a result of the FGD discussions, the following variables were identified as key factors influencing efficiency that lead to mass layoffs:

1. Governance and Regulations (X1):

   X1.1: Regulatory Transparency: The lack of transparency in regulations often leaves room for misinterpretation and inconsistent application of policies, leading to unequal treatment of employees in layoff decisions.

   X1.2: Governance Accountability: There is a need for greater accountability in how efficiency policies are implemented, ensuring that decisions are justified and transparent.

   X1.3: Legal Certainty: Legal certainty is crucial for ensuring that both employers and employees are protected under the law during restructuring or layoff processes.

2. Technology and Innovation (X2):

   X2.1: Digitalization of Public Services: The digital transformation of public services is seen as a driving force behind operational efficiency, but also creates a disconnection between workers and their roles, especially in sectors where digital skills are limited.

   X2.2: E-Government Systems: The implementation of e-government systems has been associated with increased operational efficiency but has also contributed to reduced jobs in sectors that are transitioning to more automated systems.

   X2.3: Utilization of the Internet of Things (IoT): The use of IoT in industries has resulted in automation, which leads to reduced demand for labor, especially for tasks that were previously handled manually.

3. Efficiency (Y1):

   Y1.1: Budget Allocation: The reallocation of financial resources to more “efficient” sectors often results in reduced funding for labor, leading to mass layoffs.

   Y1.2: Reduction in Infrastructure Costs: Efforts to reduce infrastructure costs often involve downsizing the workforce or cutting non-essential roles.

   Y1.3: Procurement: Streamlining procurement processes and reducing expenditures often leads to workforce reductions as companies aim to maintain profitability.

4. Mass Layoffs (Y2):

   Y2.1: Reduction of Labor Costs: Mass layoffs are viewed as a strategy to reduce labor costs and improve the bottom line for businesses.

Y2.2: Outsourcing: Many companies are increasingly turning to outsourcing as a cost-cutting measure, leading to the termination of in-house employees in favor of cheaper labor from third-party vendors.

Y2.3: Organizational Restructuring: Organizational restructuring is frequently cited as a reason for mass layoffs, as companies attempt to streamline operations to enhance efficiency.

The FGD results were instrumental in identifying the key factors driving the efficiency narrative and its direct connection to the decision to lay off workers. These insights were used to refine the variables and indicators that will be included in the survey questionnaire for quantitative data collection. Furthermore, the FGDs also highlighted the need for a more comprehensive policy that takes into account the social impact of efficiency-driven layoffs, with particular emphasis on transparency, accountability, and legal certainty.

In summary, the FGD process allowed for a deeper understanding and refinement of the variables identified in the earlier stages of the research. The discussions provided valuable qualitative input on the consequences of efficiency-based layoffs and reinforced the importance of considering the social, legal, and economic dimensions when implementing such policies. The results from the FGDs will guide the next phase of the research, which involves survey data collection and statistical analysis.

3.4 Structural Equation Modeling (SEM)

In this phase, the study employed a survey to collect quantitative data that could be integrated into the Structural Equation Modeling (SEM) framework. The survey was conducted using a snowball sampling technique, ensuring that diverse perspectives were included in the dataset. Respondents consisted of individuals directly affected by layoffs (PHK), government contract workers (tenaga honorer), Human Resources (HRD) personnel from several companies, academics, and members of the general public. This diversity of respondents ensured that the dataset reflected the multifaceted dimensions of efficiency-driven layoffs, including economic, organizational, legal, and social aspects.

After collecting the survey data, the researchers used the WarpPLS approach to estimate the parameters of the model. Before estimating the parameters, it was necessary to ensure the validity and reliability of each questionnaire item for each variable. The validity test ensured that the research data were accurate, while the reliability test verified that the instruments used were consistent in measuring the variables. All variables were tested and confirmed to be valid and reliable. Therefore, it can be concluded that all variables Governance and Regulations (X1), Technology and Innovation (X2), Efficiency (Y1), and Mass Layoffs (Y2) were suitable for further modeling and hypothesis testing.

Table 1. Measurement Model Evaluation

Variable	Indicator	Loading Factor	*p*-value	Conclusion
Governance and Regulations (X1)	Regulatory Transparency	0.823	<0.001	Significant
	Governance Accountability	0.811	<0.001	Significant
	Legal Certainty	0.789	<0.001	Significant
Technology and Innovation (X2)	Digitalization of Public Services	0.758	<0.001	Significant
	E-Government Systems	0.733	<0.001	Significant
	Utilization of the Internet of Things (IoT)	0.721	<0.001	Significant
Efficiency (Y1)	Budget Allocation	0.745	<0.001	Significant
	Reduction in Infrastructure Costs	0.732	<0.001	Significant
	Procurement	0.722	<0.001	Significant
Mass Layoffs (Y2)	Reduction of Labor Costs	0.814	<0.001	Significant
	Outsourcing	0.801	<0.001	Significant
	Organizational Restructuring	0.768	<0.001	Significant

***Data source**: processed by researchers*

Based on Table 1, it can be concluded that all the latent variables have good and reliable indicators. The best indicator for forming the Governance and Regulations variable is Governance Accountability (X1.2), with the highest loading factor of 0.811. The Technology and Innovation variable is most significantly

shaped by Digitalization of Public Services (X2.1), which has the highest loading factor of 0.758. For Efficiency (Y1), the most dominant indicator is Budget Allocation (Y1.1), with a loading factor of 0.745. Finally, for Mass Layoffs (Y2), the best indicator is Reduction of Labor Costs (Y2.1), which has the highest loading factor of 0.814.

After that, the parameters that show a causal relationship to other latent variables were evaluated. A causal relationship is declared insignificant if the p-value is <0.05. Table 2 is a summary of the coefficient calculation results in the WarpPLS analysis.

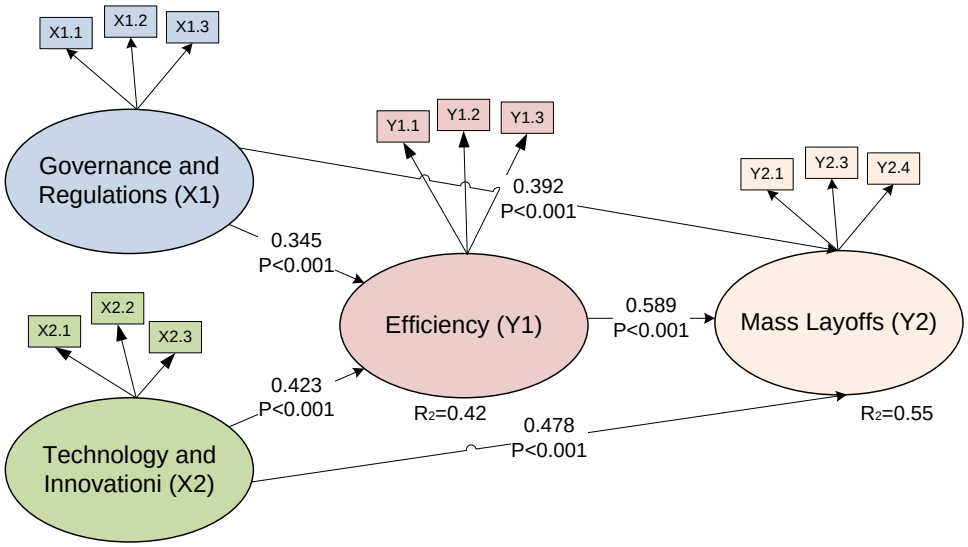

Figure 3. Direct Effect

Table 2. Results of Estimation and Direct Effect Test

Hypothesis	The effect between latent variables			Coefficient	p-value	Conclusion
	Predictor	→	Response			
H1	Governance and Regulations (X1)	→	Efficiency (Y1)	0.345	<0.001	Significant
H2	Governance and Regulations (X1)	→	Mass Layoffs (Y2)	0.423	<0.001	Significant
H3	Technology and Innovation (X2)	→	Efficiency (Y1)	0.392	<0.001	Significant
H4	Technology and Innovation (X2)	→	Mass Layoffs (Y2)	0.478	<0.001	Significant
H5	Efficiency (Y1)	→	Mass Layoffs (Y2)	0.589	<0.001	Significant

3.4.1 Relationship between Governance and Regulations on Efficiency

The results indicate that Governance and Regulations (X1) is positively associated with Efficiency (Y1) ($\beta = 0.345$; $p < 0.001$). This suggests that respondents who perceived stronger regulatory transparency, accountability, and legal certainty also tended to perceive higher organizational efficiency. This finding is consistent with the argument that well-defined governance arrangements can improve coordination, reduce ambiguity, and support more efficient allocation of organizational resources. In the context of efficiency-driven layoffs, governance appears to function not merely as a legal framework, but also as an institutional mechanism that shapes how efficiency is defined and implemented. This interpretation aligns with broader governance literature that views institutional clarity and accountability as enabling conditions for more effective organizational processes, although the current study cannot claim a definitive causal effect due to its cross-sectional design.

3.4.2 Relationship between Governance and Regulations on Mass Layoffs

Governance and Regulations (X1) is also positively associated with Mass Layoffs (Y2) ($\beta = 0.423$; $p < 0.001$). Rather than implying that governance directly causes layoffs, this result suggests that stronger perceptions of regulatory and governance arrangements are linked to stronger perceptions that layoffs are institutionally justified or procedurally enabled. One possible explanation is that formal

restructuring rules, legal frameworks, and efficiency mandates can provide organizations with a basis for implementing workforce reductions in ways perceived as legitimate. This result should therefore be interpreted carefully: governance may operate as an enabling or legitimizing context for layoffs, not necessarily as a normative driver of worker dismissal.

3.4.3 Relationship between Technology and Innovation on Efficiency

Technology and Innovation (X2) is positively associated with Efficiency (Y1) ($\beta = 0.392$; $p < 0.001$). This indicates that higher perceptions of digitalization, e-government systems, and IoT utilization are related to higher perceptions of efficiency. The result is theoretically plausible because digital systems are often associated with automation, process simplification, and reduction of operational waste. Compared with previous literature on digital transformation and administrative efficiency, this finding supports the view that technology functions as an organizational resource that can enhance speed, coordination, and cost-effectiveness.

3.4.4 Relationship between Technology and Innovation on Mass Layoffs

Technology and Innovation (X2) is positively associated with Mass Layoffs (Y2) ($\beta = 0.478$; $p < 0.001$). This suggests that respondents who perceived greater technological and innovative change also tended to perceive a higher likelihood of layoffs. This result is in line with arguments that automation and digital substitution may reduce demand for labor in routine or administrative functions. However, the result should not be interpreted as evidence that technology inevitably leads to layoffs. Rather, it indicates that in the current sample, technology is perceived as being closely linked to labor rationalization strategies. This interpretation is also consistent with studies that describe technological innovation as potentially improving efficiency while simultaneously creating displacement risk for certain groups of workers

3.4.5 Relationship between Efficiency and Mass Layoffs

Efficiency (Y1) is positively associated with Mass Layoffs (Y2) ($\beta = 0.589$; $p < 0.001$), representing the strongest structural relationship in the model. This means that stronger perceptions of budget rationalization, infrastructure cost reduction, and procurement streamlining are linked to stronger perceptions of layoffs. In substantive terms, efficiency appears to be the most immediate structural channel through which labor reduction is understood in the current study. This finding reinforces the central argument of the paper: layoffs are not merely labor events, but are embedded in broader efficiency narratives and managerial practices.

Table 3. Results of Indirect Effect Test

Mediation Effect	Coefficient	*p*-value
X1→Y1→Y2	0.269	<0.001
X2→Y1→Y2	0.291	<0.001

3.4.6 The Indirect Effect of Governance and Regulations on Mass Layoffs with Efficiency as a Mediator

Table 3 indicates that Efficiency (Y1) mediates the relationship between Governance and Regulations (X1) and Mass Layoffs (Y2) ($\beta = 0.269$; $p < 0.001$). This means that part of the relationship between governance and layoffs is associated with the role of efficiency as an intervening construct. In other words, governance and regulation are linked to layoffs partly because they are linked to how efficiency is defined, pursued, and evaluated within organizations. This result suggests an indirect structural pathway, not a confirmed causal mechanism.

3.4.7 The Indirect Effect of Technology and Innovation on Mass Layoffs with Efficiency as a Mediator

Efficiency (Y1) also mediates the relationship between Technology and Innovation (X2) and Mass Layoffs (Y2) ($\beta = 0.291$; $p < 0.001$). This indicates that technology and innovation are associated with layoffs partly through their association with efficiency. Technological systems may not be linked to layoffs only because of automation itself, but also because they strengthen organizational emphasis on cost reduction, speed, and process rationalization. This result supports the view that efficiency is a key interpretive mechanism connecting innovation and labor reduction in the present model.

Table 4. Model Feasibility

Quality Indices	Statistic	Criterion	Conclusion
Average path coefficient (APC)	0.332, p <0.001	Significant if p <0.05	Significant
Average R-squared (ARS)	0.480, p <0.001	Significant if $p < 0.05$	Significant
Average adjusted R-squared (AARS)	0.476, p <0.001	Significant if $p < 0.05$	Significant
Average block VIF (AVIF)	1.172	acceptable if AVIF ≤ 5, ideally AVIF ≤ 3.3	Ideal
Average full collinearity VIF (AFVIF)	1.535	acceptable if AFVIF ≤ 5, ideally AFVIF ≤ 3.3	Ideal
Tenenhaus GoF (GoF)	0.541	small if GoF ≥ 0.1, medium if GoF ≥ 0.25, large if GoF ≥ 0.36	Large
Sympson's paradox ratio (SPR)	1.000	acceptable if SPR ≥ 0.7, ideally SPR = 1	Ideal
R-squared contribution ratio (RSCR)	1.000	acceptable if RSCR ≥ 0.9, ideally RSCR = 1	Ideal
Statistical suppression ratio (SSR)	1.000	acceptable if SSR ≥ 0.7	Acceptable
Nonlinear bivariate causality direction ratio (NLBCDR)	1.000	acceptable if NLBCDR ≥ 0.7	Acceptable

Table 4 above shows the results of the analysis and the values to measure the feasibility of the model. It is obtained that the APC test with a value of 0.332 meets the Significant criteria if $p < 0.05$, Thus, the results are said to be significant. Besides that, ARS with a value of 0.480 meets the Significant criteria if $p < 0.05$. Therefore, the results are also significant. AARS with a value of 0.476 also meets the Significant criteria if $p < 0.05$ making the results significant. In addition to that, AVIF with a value of 1.172 already fulfills the ideal AVIF criteria by ≤ 3.3, thus the results are ideal. This also happens in AFVIF with a value of 1.535, which meets the ideal AVIF criteria by ≤3.3. The GoF value is 0.541 and is included in the big category. Not only that, SPR with a value of 1.000 has fulfilled the ideal criteria of SPR = 1, thus the results are said to be ideal. RSCR is ideal because, with a value of 1.000, it has fulfilled the criteria of ideal RSCR = 1. Then, SSR with a value of 1.000 also meets the criteria of acceptable if SSR ≥ 0.7, wherein this study, SSR is known to be acceptable. NLBCDR with a value of 1.000 meets the criteria of acceptable if NLBCDR ≥ 0.7. Based on the results of the overall model feasibility test, all criteria have reached the expected value limit or have met the critical limits of the recommended Goodness of Fit indices. Therefore, the results of this modeling can be accepted. It can be stated that this test produces good confirmation of variables as well as causality relationships between variables. Henceforth, the overall model tests show good results, which means that empirical data (field data) have supported the theoretical model developed in this study.

From a policy perspective, the findings imply that efficiency-based layoff management should not rely solely on cost-reduction logic. Policymakers should strengthen regulatory transparency, governance accountability, and legal certainty so that organizational restructuring does not become an unchecked justification for labor reduction. In practical terms, at least three policy directions can be considered: first, requiring transparent disclosure of the efficiency rationale and decision criteria used in layoff processes; second, mandating social impact assessment and worker consultation before large-scale restructuring is implemented; and third, promoting retraining, redeployment, and transition-support schemes when technological upgrading is likely to reduce labor demand. These measures would help balance organizational efficiency goals with worker protection and social sustainability.

For organizations, the findings suggest that efficiency programs should be accompanied by fair communication, procedural accountability, and workforce transition planning. Technology adoption should be framed not only as a labor-saving strategy but also as an opportunity for reskilling and role transformation. Without such measures, efficiency-oriented restructuring may generate short-term cost savings but weaken trust, morale, and long-term institutional legitimacy.

4. CONCLUSION

This study presents a comprehensive analytical framework for understanding efficiency-driven mass layoffs, particularly in the post-COVID-19 context of Indonesia. The findings indicate that governance and regulatory conditions, as well as technology and innovation, are significantly associated with organizational efficiency and mass layoffs within the proposed model. Additionally, the study reveals that efficiency mediates the relationship between governance, technology, and mass layoffs, highlighting the importance of efficiency as a key explanatory mechanism in the model. However, these findings should be interpreted as evidence of structural associations rather than definitive causal relationships, since the study relies on cross-sectional data and a non-probability sampling approach.

In practical terms, the findings suggest that efforts to manage or reduce the risk of mass layoffs should not rely solely on cost-efficiency considerations. Policymakers and organizations need to promote more human-centered efficiency policies by strengthening regulatory transparency, governance accountability, and legal certainty in layoff-related decision-making. In addition, technology adoption should be accompanied by workforce adjustment strategies such as reskilling, redeployment, job redesign, and productivity improvement programs, so that innovation can enhance efficiency without necessarily reducing the workforce. Therefore, this study contributes to the literature by offering an integrated framework for examining efficiency-driven layoffs from discursive, structural, and quantitative perspectives. The results also provide an empirical basis for developing more balanced policies that consider not only organizational efficiency, but also worker protection and social sustainability. Future research is recommended to use longitudinal designs, broader samples, and additional external variables in order to examine these relationships more robustly.

Author Contributions

Aisyah Aryandani: Conceptualization, Methodology, Writing-Original Draft, Data Curation, Validation. Kukuh Tondoyekti: Investigation, Formal Analysis, Writing-Review and Editing, Project Administration. All authors discussed the results and contributed to the final manuscript.

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Declarations

The authors declare no competing interests.

Declaration of Generative AI and AI-assisted Technologies

Generative AI tools (e.g., ChatGPT) were used solely for language refinement, including grammar, spelling, and clarity. The scientific content, analysis, interpretation, and conclusions were developed entirely by the authors. All final text was reviewed and approved by the authors.

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