

The Effect of Training, Motivation, and Work Engagement on Employee Performance through Job Satisfaction as a Mediation Variable in Generation Z Employees in Batam Manufacturing Companies

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Abstract

Generation Z now dominates Indonesia's workforce, yet national labor data show this group accounts for a disproportionate share of unemployment, while manufacturing companies in Batam City continue to report high turnover, fluctuating production quality, and low engagement among young employees, indicating that training, motivation, and work engagement have not been optimally managed to drive performance. This study aims to analyze the influence of training, work motivation, and work engagement on employee performance through job satisfaction as a mediating variable in Generation Z employees in Batam City manufacturing companies, grounded in Job Demands-Resources (JD-R) Theory and Self-Determination Theory (SDT) which explain the importance of job resources and the fulfillment of psychological needs in improving employee performance. The approach used is explanatory quantitative using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method using SmartPLS 4.0 software. Data was obtained from 250 respondents who were selected through purposive sampling techniques. The results of the study show that training, work motivation, and work engagement have a positive and significant effect on job satisfaction and employee performance. In addition, job satisfaction has been shown to have a positive and significant effect on employee performance and acts as a partial mediator in the relationship between training, work motivation, and work engagement on employee performance. These findings confirm that improving the performance of Generation Z employees requires an integrated strategy that includes competency development, motivation strengthening, and increased work engagement to create sustainable job satisfaction.

INTRODUCTION

Human resource performance is widely recognized as the most fundamental determinant in achieving a sustainable organizational competitive advantage, both in the context of the global economy and in developing countries that are transitioning to further industrialization (Elrehail et al., 2020; Katebi et al., 2022). At the national level, Indonesia is facing a unique strategic momentum, a report by the Indonesian Ministry of Manpower noted that Indonesia's workforce grew by 7.56 million people or 5.39 percent in the 2021–2023 period, an expansion that brings with it new complexities in managing human resources across generations (Ministry of Manpower of the Republic of Indonesia, 2023). This demographic transformation of the labor force reached an inflection point that could not be ignored when the Central Statistics Agency (BPS, 2024) noted that the number of people aged 15 to 34 years in Indonesia has reached 89.03 million people or equivalent to 32 percent of the total population of 281.6 million people, making Generation Z, those born in the range of 1997 to 2012 the most dominant demographic group in the current national job market. The urgency of attention to this segment was further strengthened when data

from the National Labor Force Survey (Sakernas) in February 2024 revealed that Gen Z accounted for 70 percent of the total national unemployment which reached 7.46 million people (Central Statistics Agency, 2024), a demographic paradox that indicates the existence of *Mismatch* structural between the generational characteristics of the workforce and the adaptation capacity of the company's HR management. As *Digital Natives* oriented towards meaningfulness, accelerated self-development, and work-life balance, Generation Z demands a management approach that is fundamentally different from previous generations (Janssen & Carradini, 2021, Pózner & Kozák, 2025). If the company fails to adapt, the real risk is a decrease in productivity, a high number of *Turnover*, and the erosion of competitive advantage becomes an inevitable consequence (Jayathilake et al., 2021; Zahra et al., 2025).

Batam City as a free trade zone with more than 1,300 active companies and economic growth of 7.04 percent in 2023 which also exceeds national economic growth of 5.05 percent, represents an ideal and critical empirical laboratory to examine the performance of Generation Z employees in a high-intensity manufacturing environment (Central Statistics Agency, 2024). Batam's manufacturing sector absorbs 44.07 percent of the city's workforce and operates under the pressure of international standards of productivity and quality standards as part of the global supply chain (BP Batam, 2024). But behind this impressive growth, field findings indicate that there is a persistent gap between Generation Z's productive potential and the realization of their actual performance, high turnover rates, fluctuations in production quality, and low levels of young employee engagement are empirical issues that have not been systematically resolved (Karolina & Saryatmo, 2024; Waworuntu et al., 2022). This condition indicates that the current HR management program has not been able to optimize the three critical dimensions that simultaneously determine the performance of Generation Z such as capacity *Training* that is responsive to generational needs, then a motivation system that is aligned with the intrinsic values of Generation Z and a work ecosystem that facilitates authentic work engagement as the foundation of long-term commitment and performance (Hafidz & Noviyati, 2022).

Previous research has documented the relevance of each variable partially, but with varying degrees of consistency and scope that have not yielded convergent conclusions. Within the domain *Training*, Vanitha & Ganesh, (2024) prove that a structured training program significantly improves the technical competence and performance of manufacturing employees; However Soegiarto et al., (2024) and Kodwani & Prashar, (2021) provide a critical note that the effectiveness of training is *conditional* highly dependent on the suitability of the program design to the specific characteristics and needs of the participants, a condition that is often overlooked in actual implementation. In the domain of work motivation, Riyanto et al., (2021) and Mpuangnan et al., (2024) prove the positive influence of motivation on performance through job satisfaction, which is reinforced by Adinda et al., (2023), Agustyaningrum & Isnowati (2024), and Fenianti & Nawawi (2023) in the context of Indonesian manufacturing, however, some studies have identified that this relationship is not universal, its strength varies substantially depending on the motivational profile of the generation studied, implying that the findings in the mixed-generation sample cannot be directly generalized to Generation Z (Jufrizen & Sitorus, 2021; Saputra & Masdupi, 2024). As for the domain *Work Engagement*, meta-analysis Mazzetti et al., (2023) against more than 200 international studies confirming a strong positive association between *Work Engagement* and cross-industry and cross-cultural performance, but studies in Indonesia reveal significant mechanistic inconsistencies such as Pratiwi & Fatoni (2023) and Ramadhan & Budiono (2023) found different results as to whether the *Work Engagement* to work performance directly or mediated by job satisfaction, while Noercahyo et al., (2021) and Arianti et al. (2022) confirming that the strength of the relationship is strongly influenced by the industry context and the characteristics of the respondents. Regarding the role of job satisfaction mediation, Saputra et al., (2022), Imbang et al., (2022), Lianta et al., (2023), and Jufrizen & Sitorus, (2021) collectively confirm that job satisfaction is a critical transmission mechanism that transforms the influence of antecedent factors into measurable performance; But none of the studies tested job satisfaction as a mediator simultaneously between

the three predictors *Training*, motivation, and *Work Engagement* in an integrated structural model, as conceptually required by the framework *Job Demands-Resources (JD-R) theory* (Bakker & Demerouti, 2017).

While the contributions of these studies cannot be ignored, there are three layers of research gaps that collectively limit a comprehensive understanding of the determinants of performance of Generation Z employees. First, no previous study has tested *Training*, work motivation, and *Work Engagement* simultaneously in a comprehensive structural model with job satisfaction as a mediator, even though these three variables operate synergistically in shaping performance, not independently. Testing these variables partially results in biased influence estimates because it ignores theoretically significant inter-construct covariance (Sarstedt et al., 2020). Second, the majority of previous studies used cross-generational samples without considering the heterogeneity of generational characteristics as moderators, so the internal and external validity of their findings for Generation Z groups who have fundamentally different motivational profiles and job expectations cannot be assumed to apply without specific empirical confirmation (Póznér & Kozák, 2025; Zahra et al., 2025). Third, the context of manufacturing companies in Batam City has not received adequate academic attention in the literature on Indonesian human resource management, even though the uniqueness of this context as an export industrial area with international productivity pressures and the dominance of the Generation Z workforce substantially forms the mechanism of influence of the variables that are studied and cannot be generalized from studies in other contexts (Karolina & Saryatmo, 2024; Waworuntu et al., 2022; Hafidz & Noviyati, 2022).

Departing from the three research gaps, this study aims to analyze and empirically prove the influence of *Training*, work motivation, and *Work Engagement* on the performance of Generation Z employees in Batam manufacturing companies, either directly or through job satisfaction as a mediating variable, by using Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4.0 in a sample of 250 respondents selected by purposive sampling (Hair et al., 2021; Ghozali, 2021). The novelty of this research lies in three aspects that collectively distinguish it from previous studies. First, the simultaneous integration of three predictors of training, work motivation, and work engagement in a single mediation model that was tested simultaneously using PLS-SEM, an approach that has not been widely discussed in the Indonesian human resource literature for the context of Generation Z. Second, the specification of Generation Z as a single unit of analysis with strict inclusion criteria, resulting in findings that have generational validity that previous cross-generational studies do not have. Third, the selection of the manufacturing context of Batam City as a unique research setting that has not been widely studied, so as to contribute to the development of human resource management literature in the emerging market industrial area of Southeast Asia (Elrehail et al., 2020).

This study makes a dual contribution that reinforces each other on a theoretical and practical level. Theoretically, this study expands the application *Job Demands-Resources (JD-R) theory* (Bakker & Demerouti, 2017) to the context of Generation Z in the emerging market manufacturing industry, an extension that is explicitly necessary given that this theory is developed and tested primarily in Western contexts and in different generational populations. In addition, this study contributes to the development of an integrative model that explains how work resources in the form of training and motivation interact with psychological conditions in the form of work engagement through a mechanism of mediation of job satisfaction to produce optimal performance, a theoretical configuration that has not been empirically tested in the existing literature. In practical terms, the findings of this study provide an empirical evidence-based guide for the management of Batam manufacturing companies in designing training programs that are responsive to the needs of Generation Z, building a motivation system that is aligned with their intrinsic values, and creating a work ecosystem that proactively facilitates work engagement and job satisfaction as the foundation for continuous performance improvement (Andreas, 2022; Rustina et al., 2025; Anggraini & Hendar, 2026). For labor regulators, these findings provide an

empirical basis for designing workforce development policies that are more adaptive to the characteristics and expectations of Generation Z as a labor force group that will dominate the national economy in the next decade (IDN Research Institute, 2024; BPS, 2024).

1. Literature Review

2.1 Theoretical Foundations

Job Demands-Resources (JD-R) theory developed by Bakker & Demerouti, (2017) serves as the main theoretical framework in this study, with the position that employee performance is a product of the dynamic interaction between job demands and job resources available to individuals in their work environment. From this perspective, *Training*, work motivation, and *Work Engagement* represent three forms of work resources that synergistically build the psychological and technical capacity of employees to achieve optimal performance. This theory implies that organizations that strategically invest resources in the form of structured training, responsive motivational systems, and work ecosystems that facilitate emotional engagement will result in employees with higher job satisfaction which in turn becomes a driver of sustainable performance. This proposition acquires its highest relevance in the context of Generation Z who, unlike previous generations, place the availability of work resources as a prerequisite for their involvement and commitment to the organization (Jayathilake et al., 2021; Pózner & Kozák, 2025)

Although the JD-R theory provides a basis for explaining why job resources drive performance, it does not explicitly explain the psychological mechanisms through which those influences work at the individual level. This is where *Self-Determination Theory* (SDT) developed by Deci and Ryan acts as a supporting theory that complements the framework of analysis. SDT conceptualizes human motivation through the lens of fulfilling three basic psychological needs: *Autonomy*, *Competence*, and *Relatedness*. In the context of this research, SDT explains why *Training* that improve competence, motivation that meets the needs of autonomy and recognition, and *Work Engagement* that builds an emotional connection to work, collectively resulting in intrinsic job satisfaction that is the foundation of long-term performance (Elrehail et al., 2020; Katebi et al., 2022). Generation Z is specifically identified as a group that is highly responsive to the fulfillment of these basic psychological needs, making SDT generationally relevant as the basis for explaining their work behavior (Janssen & Carradini, 2021; Zahra et al., 2025)

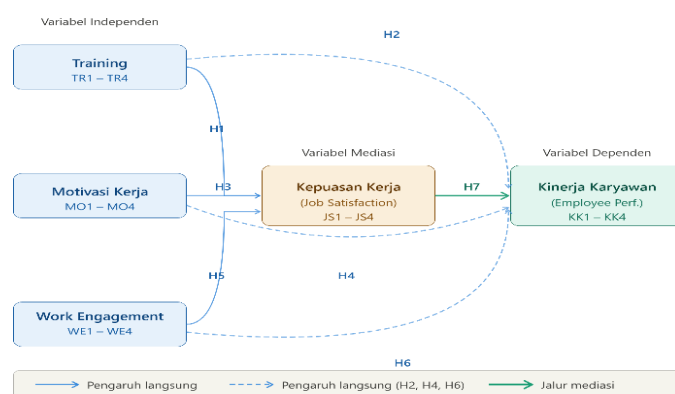
The integration of these two theories results in the central proposition of this research, JD-R theory explains why work resources in the form of training, motivation, and *Work Engagement* should encourage job satisfaction and employee performance, while *Self-Determination Theory* explain through psychological mechanisms what these influences work at the individual level of Generation Z. Job satisfaction, in this integrative framework, is not just a performance antecedent variable, but a critical transmission mechanism that transforms the availability of work resources into measurable performance output. This position is consistent with the growing consensus in the literature that positions job satisfaction as a dominant mediator rather than a moderator in the relationship between factors of job resources and employee performance, particularly in the context of *Emerging Market* Southeast Asia (Riyanto et al., 2021); Noercahyo et al., 2021; Pratiwi & Fatoni, 2023).

Empirical inconsistencies in the relationship between *Training*, motivation, *Work Engagement*, and employee performance has been extensively documented in the literature. Within the domain *Training*, studies based on *Human Capital Theory* report a consistent positive influence on performance, Vanitha & Ganesh, (2024) and Dao et al., (2025) prove this in the manufacturing sector, while Jayathilake et al. (2021) confirm it specifically in the context of post-pandemic Generation Z. Instead, Kodwani & Prashar, (2021) and Soegiarto et al., (2024) found that the influence *Training* to performance is *conditional* and it is not always positive if the program design is not aligned with the specific characteristics and needs of the participants, a condition that is often encountered in the implementation of training in cost-efficiency-oriented manufacturing companies. In the domain of work motivation, Riyanto et al., (2021) and Mpuangnan et al., (2024)

reported significant positive influences, however Adinda et al., (2023) and Jufrizen & Sitorus, (2021) identifying that the magnitude of such influence varies substantially depending on the motivational profile of the generation being studied, implying that generalization of findings from a cross-generational sample to Generation Z cannot be done without specific empirical validation. Similar inconsistencies are found in the domain *Work Engagement*: although meta-analysis Mazzetti et al., (2023) confirming strong positive relationships across cultures, studies in Indonesia reveal unresolved mechanistic debates. Pratiwi & Fatoni, (2023) found that job satisfaction mediated influence *Work Engagement* to performance, while Ramadhan & Budiono, (2023) identify that the direct effect of *Work Engagement* is, in fact, more dominant than the mediation route. This inconsistency is not random, but rather reflects systematic methodological limitations: the majority of studies test these variables partially and in isolation, thus ignoring the synergistic effects between constructs that in practice operate simultaneously in shaping employee performance (Sarstedt et al., 2020).

2.2 Conceptual Framework

Based on the integration of *Job Demands-Resources theory* as the main framework and *Self-Determination Theory* as the supporting theory, this study builds a conceptual framework that positions *training*, work motivation, and *work engagement* as independent variables, employee performance as dependent variables, and job satisfaction as mediating variables. This framework assumes that job resources are a prerequisite for high job satisfaction, but the effectiveness of its transformation into measurable performance is determined by the extent to which job satisfaction is successfully built as a stable and persistent psychological condition in Generation Z employees.



(Figure 1. Conceptual Framework of Research)

2.3 Hypothesis Development

Based on the theoretical framework and empirical review above, this study formulates the following seven hypotheses:

From perspective *JD-R theory*, *Training* represent work resources that directly increase the technical competence and confidence of employees, which in turn contributes to a positive affective evaluation of their work. (Vanitha & Ganesh, 2024, Dao et al., (2025), and Apriliana & Nawangsari, 2021) confirm that structured training programs consistently improve job satisfaction among manufacturing employees. In the context of Generation Z who place competency development as a top work priority, *Training* effectiveness is thought to be a significant determinant of job satisfaction (Jayathilake et al., 2021). Therefore:

H1: *Training* has a positive and significant effect on the job satisfaction of Generation Z employees in Batam manufacturing companies.

Training does not only affect job satisfaction, but also directly increases employee performance capacity through strengthening technical skills, problem-solving abilities, and measurable work

efficiency. Soegiarto et al., (2024) and Kodwani & Prashar, (2021) confirming this direct line of influence on manufacturing employees, reinforced by Dao et al., (2025) which specifically proves this in the context of digital training of young workers. Therefore:

H2: *Training* has a positive and significant effect on the performance of Generation Z employees in Batam manufacturing companies.

From the point of view *Self-Determination Theory*, work motivation that meets basic psychological needs in the form of autonomy, competence, and social connectedness directly results in intrinsic and sustainable job satisfaction. Riyanto et al., (2021), Fenianti & Nawawi, (2023), and Jufrizen & Sitorus, (2021) prove this positive relationship consistently in the Indonesian context, while Mpuangnan et al., (2024) confirm it in cross-cultural samples. Therefore:

H3: Work motivation has a positive and significant effect on the job satisfaction of Generation Z employees in Batam manufacturing companies.

Work motivation also has a direct effect on performance through increasing persistence, initiative, and target achievement orientation in employees. Adinda et al., (2023), Agustyaningrum & Isnawati, (2024), and A. F. Saputra & Masdupi, (2024) prove this direct influence on the Indonesian manufacturing context, supported by Mpuangnan et al. (2024) who confirm it in international samples. Therefore:

H4: Work motivation has a positive and significant effect on the performance of Generation Z employees in Batam manufacturing companies.

In the framework *JD-R theory*, *Work Engagement* represents a positive psychological condition that arises when work resources adequately meet the demands of work, which is directly reflected in the employee's satisfaction with his or her work. Noercahyo et al., (2021) and Arianti et al., (2022) Prove positive influence *Work Engagement* to job satisfaction in Indonesia, strengthened by Bakker & Demerouti, (2017) which conceptualizes job satisfaction as a natural consequence of high *Work Engagement*. In the context of Generation Z who place emotional engagement as a condition of job satisfaction, this relationship is thought to be very significant (Karolina & Saryatmo, 2024; Zahra et al., 2025) Therefore:

H5: *Work engagement* has a positive and significant effect on the job satisfaction of Generation Z employees in Batam manufacturing companies.

Work commitment also has a direct effect on performance through dimensions *Vigor* which increases energy and persistence, *dedication* that strengthen commitment to the quality of work, and *Absorption* which increases concentration and accuracy in task completion. Meta-analysis Mazzetti et al., (2023) confirming the consistency of this influence across industries and cultures, which is reinforced by Pratiwi & Fatoni, (2023), Ramadhan & Budiono, (2023), and Rustina et al., (2025) in the context of Indonesia. Therefore:

H6: *Work engagement* has a positive and significant effect on the performance of Generation Z employees in Batam manufacturing companies.

Job satisfaction as a positive affective evaluation of employees towards their work is the most consistent performance predictor in the HR management literature. Katebi et al. (2022) and Elrehail et al. (2020) theoretically conceptualize job satisfaction as a direct antecedent of performance, which is empirically confirmed by Andreas, (2022), Anggraini & Hendar, (2026) and Rustina et al., (2025) in the context of Indonesia. Saputra et al. (2022) and Imbang et al. (2022) further confirm that high job satisfaction encourages employees to invest extra effort in achieving organizational targets. Therefore:

H7: Job satisfaction has a positive and significant effect on the performance of Generation Z employees in Batam manufacturing companies.

2. Methodology

3.1 Research Approach and Design

This study uses an explanatory quantitative approach that aims to test the causality relationship between training, work motivation, and work engagement on employee performance through job satisfaction as a mediating variable in Generation Z employees in Batam manufacturing companies. The quantitative approach was chosen because it allows for systematic, objective, and replicable testing of hypotheses based on measurable empirical data, as well as allowing generalization of findings to a wider population (Sugiyono, 2019). The research design is causal-explanatory by using a cross-sectional data structure collected at a single point in time, but is able to capture the complexity of inter-variable relationships simultaneously through a mediation model that is tested as a whole (full model testing). The analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method through the SmartPLS 4.0 software which was chosen for its advantages in handling complex mediation models with reflective constructs, producing robust estimates on medium-sized samples, being able to test direct and indirect effects simultaneously, and providing a bootstrapping procedure for testing the significance of mediation that does not require normal distribution assumptions (Hair et al., 2021; Ghozali, 2021).

3.2 Population and Research Sample

The research population includes all Generation Z employees who are actively working in manufacturing companies in Batam City by 2025. Batam's manufacturing sector was chosen for two main reasons that reinforce each other: first, this sector is the largest absorber of labor in Batam City with a proportion of 44.07 percent of the total workforce absorbed, so it is representative as a context for research on the performance of manufacturing human resources (Central Statistics Agency, 2024); second, the competitive pressure of the export-oriented global supply chain makes the productivity and quality standards of human resources in Batam comparable to international benchmarks, so that the findings of this study have relevance that goes beyond the local context (Karolina & Saryatmo, 2024; Waworuntu et al., 2022). Sample size is determined based on the recommendation of Hair et al. (2021) that the minimum sample size in PLS-SEM is 10 times the maximum number of paths that enter a single endogenous construct. Given that this research model has a maximum of four pathways that enter the employee performance construct (from TR, MO, WE, and JS), the minimum sample size is 40 respondents; However, to increase the strength of statistics and reduce estimation bias, this study set a target sample of 250 respondents.

Sample selection was carried out by the purposive sampling method, which is a non-probabilistic sampling technique based on certain criteria that are relevant to the objectives and research questions (Sugiyono, 2019). This method was chosen because this study requires the generational homogeneity of the sample and specific working conditions with conditions that cannot be met through conventional random sampling techniques. The purposive sampling criteria used and their justifications are presented in Table 1 below.

Table 1. Purposive Sampling Criteria

No.	Criteria	Justification (Source)
1	Employees born in 1997–2012 (Generation Z) and still actively working at the time of data collection	Ensure the homogeneity of the sample's generational characteristics so that the findings have internal validity that cannot be achieved with cross-generational samples (Pózner & Kozák, 2025; Zahra et al., 2025)

2	Work in a manufacturing company operating in Batam City with a minimum working period of 3 months	A minimum working period of 3 months is required so that respondents have sufficient work experience to accurately evaluate training, motivation, work engagement, and job satisfaction (Jayathilake et al., 2021; Soegiarto et al., 2024)
3	Active employee status (permanent or contract) in production lines, quality control, or manufacturing operations	Ensuring that respondents are directly exposed to training programs, motivation systems, and work engagement conditions that are the focus of this study (Kumar et al., 2023; Dao et al., 2025)
4	Willing to fill out the questionnaire voluntarily and complete it completely without missing data (missing values)	Data completeness is a prerequisite for PLS-SEM analysis which requires that there are no missing values in reflective indicators (Hair et al., 2022; Ghozali, 2021)

Source: Developed by Researcher (2026)

3.3 Types and Data Sources

This study uses primary data collected directly from respondents through a structured questionnaire instrument. The selection of primary data is based on the consideration that the constructs studied such as training, work motivation, work engagement, job satisfaction, and employee performance are individual subjective perceptions that can only be accurately measured through respondents' self-reports, not through objective secondary data (Katebi et al., 2022; Elrehail et al., 2020). The questionnaire instrument was developed using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) with 20 statement items that included four indicators for each of the five constructs: TR1–TR4 for training, MO1–MO4 for work motivation, WE1–WE4 for work engagement, JS1–JS4 for job satisfaction, and KK1–KK4 for employee performance. Data was collected through two complementary methods: (1) an online questionnaire through a Google Form distributed through the internal network of the sample manufacturing company; and (2) printed questionnaires that are distributed face-to-face to ensure adequate response rates and avoid selection biases that often occur in online surveys alone.

3.4 Variable Operational Definitions and Measurements

The operationalization of variables is designed to reflect the theoretical construct built from the integration of Job Demands-Resources (JD-R) theory and Self-Determination Theory as described in Chapter 2. All variables are measured using a reflective construct where the indicator is a manifestation of the underlying latent construct, not its constituent components. The following table 2 presents conceptual definitions, measurement indicators, and source references for each research variable.

Table 2. Operational Definitions of Variables and Measurements

Variable	Conceptual Definition	Indicators/Questionnaire Items	Source
Training (TR) — Independent Variable (X₁)	A series of structured learning activities designed by organizations to improve employees' technical knowledge,	TR1: Training improves technical skills TR2: Training materials according to work needs TR3: Training methods are easy to understand	Kumar et al. (2023); Dao et al. (2025); Jayathilake et al. (2021)

	skills, and work behavior to be able to carry out tasks effectively and efficiently	TR4: Confidence-boosting training (Likert scale 1–5)	
Work Motivation (MO) — Independent Variable (X₂)	Internal and external motivation that drives, directs, and sustains employee behavior towards achieving organizational goals through the fulfillment of basic psychological needs in the form of autonomy, competence, and social connectedness	MO1: Recognition of superiors encourages motivation MO2: Incentives drive performance improvement MO3: Passion for achieving production targets MO4: Work challenges increase motivation (Likert scale 1–5)	Riyanto et al. (2021); Adinda et al. (2023); Mpuangnan et al. (2024); Agustyaningrum & Isnowati (2024)
Work Engagement (WE) — Independent Variable (X₃)	A positive psychological condition that is persistent in nature related to work, characterized by three main dimensions: vigor (enthusiasm and energy), dedication (dedication and emotional involvement), and absorption (appreciation and full concentration in work)	WE1: Enthusiastic about carrying out daily tasks WE2: Willing to go the extra mile WE3: Emotionally connect with the organization WE4: Work has meaning and an important contribution (Likert scale 1–5)	Schaufeli & Bakker (2004); Mazzetti et al. (2023); Pratiwi & Fatoni (2023); Ramadhan & Budiono (2023)
Job Satisfaction (JS) — Mediation Variable (M)	An individual's positive affective evaluation of his or her work as a whole, reflecting the extent to which the work meets the expectations and needs of employees including aspects of compensation, environment, social relations, and self-development	JS1: Satisfied with the environmental conditions and working facilities JS2: Good relationships with colleagues and superiors JS3: Salary and benefits according to workload JS4: Opportunities to develop self-skills (Likert scale 1–5)	Katebi et al. (2022); Elrehail et al. (2020); Saputra et al. (2022); Imbang et al. (2022)
Employee Performance (KK) —	The level of achievement of an employee's work	KK1: Completing work according to quality standards	Elrehail et al. (2020); Andreas (2022); Rustina et al. (2025)

Dependent Variable (Y)	results that reflects his contribution to the organization's goals, measured in terms of output quality, production quantity, work initiative, and efficiency in completing tasks	KK2: Consistently meeting production targets KK3: Demonstrate problem-solving initiatives KK4: Work efficiently despite high workload (Likert scale 1–5)
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Source: Developed by Researcher based on literature review (2026)

The measure of work engagement adapts the Utrecht Work Engagement Scale (UWES) instrument developed by Schaufeli & Bakker (2004) and has been validated cross-culturally in more than 200 international studies (Mazzetti et al., 2023), adapted to the context of Generation Z manufacturing in Batam. Employee performance measurement refers to a multidimensional framework Elrehail et al. (2020) which includes aspects of quality, quantity, initiative, and work efficiency as a comprehensive and non-reductive performance indicator to a single dimension, an approach that is methodologically stronger than the performance measurement based on one indicator often found in previous studies.

3.5 Empirical Model of Research

Inter-variable relationships were tested using the Partial Least Squares Structural Equation Modeling (PLS-SEM) model with a full mediation model specification that included two structural equations estimated simultaneously. This model was chosen on the basis that PLS-SEM is able to estimate complex models with latent variables, reflective indicators, and mediating effects simultaneously without requiring the assumption of data normality that is often violated in HR survey research (Hair et al., 2021). The specification of the equation of the empirical model of this study is as follows:

PLS-SEM Structural Equation Model:

$$JS = \alpha_1 + \beta_1 TR + \beta_2 MO + \beta_3 WE + \epsilon_1 \dots (1)$$

$$KK = \alpha_2 + \beta_4 TR + \beta_5 MO + \beta_6 WE + \beta_7 JS + \epsilon_2 \dots (2)$$

$$\text{Mediation Effect} = \beta_n \times \beta_7 \text{ (Indirect Effect via Bootstrapping)} \dots (3)$$

Description:

JS = Job Satisfaction — Mediation Variable

KK = Employee Performance — Dependent Variable

TR = Training — First Independent Variable

MO = Work Motivation — Second Independent Variable

WE = Work Engagement — The third Independent Variable

β_1 – β_3 = Independent variable path coefficient to job satisfaction (H1, H3, H5)

β_4 – β_6 = Independent variable path coefficients of employee performance (H2, H4, H6)

β_7 = Coefficient of the job satisfaction pathway to employee performance (H7)

ϵ_1, ϵ_2 = Error term on each structural equation

It is important to note that this model tests two types of effects simultaneously: (1) the direct effects of TR, MO, and WE on KK through the coefficient of β_4 , β_5 , and β_6 which is the basis for H2, H4, and H6 testing; and (2) indirect effect through job satisfaction as a mediator which is the basis for H1, H3, H5, and H7 testing. The magnitude of the mediating effect was calculated as a product of the path coefficient product, and its significance was tested using the

bootstrapping method with 5,000 subsamples to produce an accurate confidence interval without assuming distribution (Hair et al., 2021; Ghozali, 2021).

3.6 Data Analysis Techniques

All data analysis was carried out using SmartPLS 4.0 software. SmartPLS was chosen because it provides a complete and integrated PLS-SEM analysis ecosystem ranging from measurement model testing, structural model estimation, to bootstrapping procedures for mediation testing in a single platform specifically designed for HR research with reflective latent constructs (Hair et al., 2021). The stages of analysis are carried out in sequence as follows.

First, descriptive statistics were run to describe the demographic profile of the respondents (gender, age, education, length of work) and the score distribution of each variable (mean, standard deviation, minimum, maximum). Interpretation is not just presenting numbers, but contextualizing each value against the applicable standards, for example, the average work engagement score is associated with the category of engagement level based on UWES norms (Schaufeli & Bakker, 2004), and the average performance score is interpreted against the applicable manufacturing productivity standards in Batam City.

Second, the measurement model test is carried out to verify that the questionnaire instrument accurately measures the construct in question before the hypothesis test is carried out. This stage is a methodological prerequisite that cannot be ignored because the quality of the measurement model directly determines the validity of the conclusions resulting from the structural model. The measurement model testing procedure used and its acceptance criteria are presented in Table 3 below.

Table 3. Measurement Model Test Procedure with SmartPLS 4.0

Test Stage	Purpose	Admission Criteria	References
Convergent Validity (Outer Loading & AVE)	Ensure each indicator accurately measures the construct in question and not another	Outer Loading > 0.70 AVE > 0.50	Hair et al. (2022); Ghozali (2021)
Discriminatory Validity (HTMT Ratio)	Ensure each construct is empirically different from the other constructs in the model	HTMT < 0.85 (strict criteria)	Hair et al. (2022)
Internal Reliability (Cronbach's Alpha & CR)	Ensure consistency of indicator measurement in measuring the same construct over and over again	Cronbach's Alpha > 0.70 Composite Reliability > 0.70	Hair et al. (2022); Ghozali (2021)
Structural Models (Path Coefficient & R ²)	Testing the strength and significance of inter-construct relationships in the model as well as the ability to explain the model	T-Statistic > 1.96 P-Value < 0.05 R ² > 0.60 (strong)	Hair et al. (2022)
Mediation Effect (Indirect Effects – Bootstrapping)	Examining the role of job satisfaction as a mediator in the relationship of	T-Statistic > 1.96 P-Value < 0.05	Hair et al. (2022); Ghozali (2021)

independent variables to employee performance	(Bootstrapping subsamples)	5,000
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Source: Adapted from Hair et al., (2021) and Ghozali, (2021)

Third, the structural model test is carried out through two successive stages. The first stage is the estimation of the path coefficient using the PLS algorithm with a maximum of 300 iterations to produce a stable and convergent estimate. The significance of the coefficient was tested using a bootstrapping procedure with 5,000 subsamples that produced a statistical T-value and a p-value for each hypothetical path. The hypothesis is accepted when the T-statistic > 1.96 and the p-value < 0.05 at a significance level of 5% (Hair et al., 2021). The second stage is the testing of the mediation effect of job satisfaction using indirect effects analysis through bootstrapping 5,000 subsamples, where mediation is declared partial if both direct and indirect influences are statistically significant, and full mediation if only significant indirect effects after including mediators (Hair et al., 2021; Ghozali, 2021). As a robustness check, the model was reestimated by extracting extreme outliers (Z score > 3.0) to verify the consistency of direction and significance of the path coefficient resulting from the full sample.

3. Results and Discussion

4.1 Respondent Description

The collection of research data was carried out through the distribution of questionnaires to 250 Generation Z employees who work in Batam City manufacturing companies. All questionnaires distributed were successfully returned and declared worthy of further analysis, so that the response rate reached 100 percent. The characteristics of the respondents in this study included gender, age, last education, and length of work, as presented in Table 4 below.

Table 4. Respondent Characteristics

Remarks	Frequency	Percentage (%)
Gender		
Male	117	46,8
Women	133	53,2
Total	250	100
Age		
18–20 years old	36	14,4
21–25 years old	165	66,0
26–30 years	49	19,6
Total	250	100
Final Education		
High School/Vocational School	127	50,8
Diploma	26	10,4
S1	93	37,2
S2	4	1,6
Total	250	100
Long Time Working		
< 1 year	59	23,6

Remarks	Frequency	Percentage (%)
1–5 years	153	61,2
> 5 years	38	15,2
Total	250	100

Source: Primary data processed (2026)

Table 4 describes the characteristics of 250 study respondents. Based on gender, female respondents dominated with 133 people (53.2%), while male respondents totaled 117 people (46.8%). The dominance of women in this sample reflects the actual composition of the workforce in the production lines of Batam manufacturing companies, especially in the electronics and garment sectors which have historically absorbed more female workers.

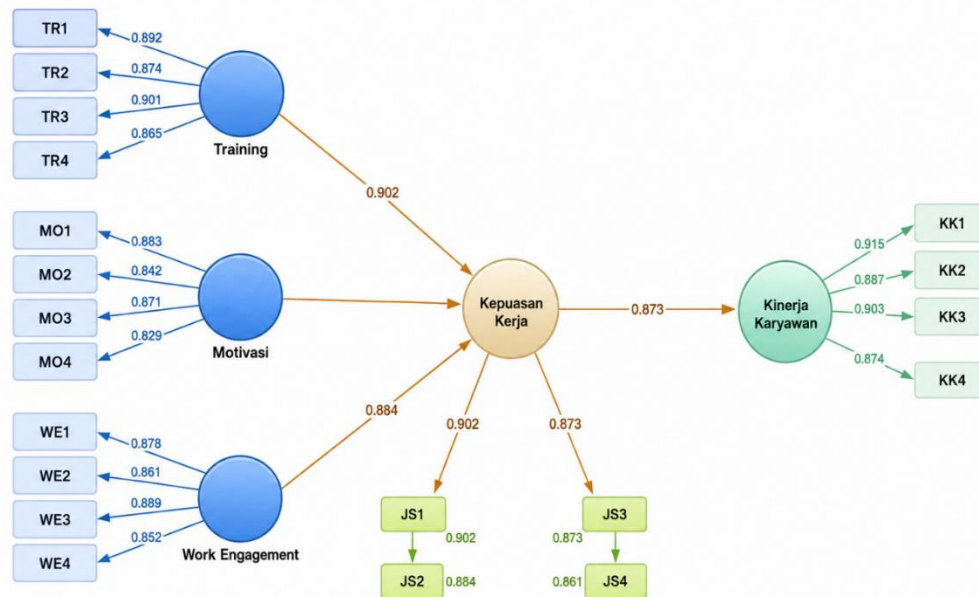
Based on age, the majority of respondents were in the 21–25 age range as many as 165 people (66.0%), followed by the age group of 26–30 years as many as 49 people (19.6%), and the age group of 18–20 years as many as 36 people (14.4%). This distribution confirms that all respondents are included in the Generation Z category (born 1997–2012) as per the *purposive sampling* criteria set, as well as showing that the early productive age group (21–25 years) dominates the Batam manufacturing workforce.

Based on the latest education, respondents with high school/vocational school backgrounds were the most dominant with 127 people (50.8%), followed by 93 people (37.2%) from S1, 26 people (10.4%) from Diplomas, and 4 people from S2 (1.6%). The high proportion of high school/vocational school graduates reflects the characteristics of Batam's manufacturing industry which is labor-intensive and absorbs a lot of skilled workers from the vocational secondary education level.

Based on the length of work, most respondents had a working period of 1–5 years as many as 153 people (61.2%), followed by a working period of less than 1 year as many as 59 people (23.6%), and a working period of more than 5 years as many as 38 people (15.2%). The dominance of the 1–5 year working period group indicates that most respondents have had enough work experience to evaluate training, work motivation, *work engagement*, and job satisfaction accurately and meaningfully.

4.2 Convergent Validity Test Results

Convergent validity tests are performed to ensure that each indicator accurately measures the construct in question. This test uses two main criteria: (1) *Outer Loading* with a minimum value of 0.70, and (2) *Average Variance Extracted* (AVE) with a minimum value of 0.50 (Hair et al., 2022). If both criteria are met, then all indicators are declared to be valid in a convergent manner and can be used in structural model testing. The results of the *outer loading* test of all indicators are presented visually in Figure 2 below.



(Figure 2. Loading Factor — SmartPLS 4.0)

Based on Figure 2, all 20 indicators from the five constructs show an *outer loading* value that exceeds the required minimum limit of 0.70. The *highest outer loading* value was owned by the KK1 indicator of 0.915 in the employee performance construct, while the lowest value was owned by the MO4 indicator of 0.829 in the work motivation construct. Nonetheless, the entire value remains well above the 0.70 threshold, so no indicators need to be eliminated from the model. The results of the AVE test of the entire construct are presented in Table 5 below.

Table 5. Convergent Validity Test (AVE) Results

Variable	AVE	Remarks
Training (TR)	0,781	EAVE> 0.50 ✓
Work Motivation (MO)	0,752	EAVE> 0.50 ✓
Work Engagement (WE)	0,763	EAVE> 0.50 ✓
Job Satisfaction (JS)	0,789	EAVE> 0.50 ✓
Employee Performance (KK)	0,801	EAVE> 0.50 ✓

Source: SmartPLS 4.0 output, data processed (2026)

Table 5 shows that the entire construct has an AVE value above 0.50, with the highest value in the employee performance construct (0.801) and the lowest value in the work motivation construct (0.752). With the fulfillment of the *criteria of outer loading* > 0.70 and AVE > 0.50 on all indicators and constructs, it can be concluded that all research instruments have met the convergent validity test and are suitable for use in the next structural model testing.

4.3 Results of Discriminant Validity Test

Discriminant validity tests are performed to ensure that each construct is empirically different from the other constructs in the model. This study uses the *Heterotrait-Monotrait Ratio* (HTMT) criterion recommended by Hair et al. (2022) as a more accurate method than the *Fornell-Larcker* criterion which is widely used in previous studies. A construct is declared to have good

discriminant validity if the HTMT value is below 0.85 (strict criteria) (Hair et al., 2022). The results of HTMT testing are presented in Table 6 below.

Table 6. Results of the Discriminant Validity Test (HTMT)

Construct	TR	FOR	WE	JS	CD
Training (TR)	—				
Motivation (MO)	0,412	—			
Work Engagement (WE)	0,398	0,431	—		
Job Satisfaction (JS)	0,523	0,541	0,498	—	
Employee Performance (KK)	0,487	0,512	0,476	0,614	—

Source: SmartPLS 4.0 output, data processed (2026)

Table 6 shows that the entire value of the inter-construct HTMT is below the threshold of 0.85. The highest HTMT score was found in the relationship between job satisfaction and employee performance at 0.614, while the lowest value was found in the relationship between *work engagement* and *training* at 0.398. With the fulfillment of all HTMT criteria < 0.85 , it can be concluded that all constructs in this research model have good discriminant validity where each construct measures different concepts and does not overlap with each other.

4.4 Reliability Test Results and *R-Squared*

4.4.1 Reliability Test

Reliability tests are carried out to ensure the consistency of indicator measurements in measuring the same construct. The two criteria used are *Cronbach's Alpha* and *Composite Reliability* (CR), where both must exceed a minimum value of 0.70 (Hair et al., 2022). The test results are presented in Table 7 below.

Table 7. Construct Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Remarks
Training (TR)	0,918	0,932	Reliable ✓
Work Motivation (MO)	0,901	0,921	Reliable ✓
Work Engagement (WE)	0,912	0,929	Reliable ✓
Job Satisfaction (JS)	0,934	0,945	Reliable ✓
Employee Performance (KK)	0,941	0,950	Reliable ✓

Source: SmartPLS 4.0 output, data processed (2026)

Table 7 shows that the entire construct has *Cronbach's Alpha* and *Composite Reliability* values that exceed the minimum limit of 0.70. The *highest Cronbach's Alpha* value is owned by the employee performance construct (0.941) and the lowest in work motivation (0.901), while the highest *Composite Reliability* value is also owned by the employee performance construct (0.950) and the lowest in work motivation (0.921). Thus, all constructs in this study are declared reliable and the measurements made are consistent and reliable.

4.4.2 Coefficient of Determination (*R-Squared*)

The determination coefficient (R^2) is used to measure the model's ability to explain variations in endogenous variables. Chin (1998) in Hair et al. (2022) classified the R^2 value of 0.67 as substantial, 0.33 as moderate, and 0.19 as weak. The results of the R^2 test are presented in the following Table 8.

Table 8. Determination Coefficient (R^2) Test Results

Endogenous Variable	R^2	R^2 Adjusted	Categories
Job Satisfaction (JS)	0,584	0,579	Moderate
Employee Performance (KK)	0,671	0,664	Substantial

Source: SmartPLS 4.0 output, data processed (2026)

Table 8 shows that the R^2 value of job satisfaction is 0.584, which means *that training*, work motivation, and *work engagement* together are able to explain 58.4 percent of the variation in job satisfaction of Generation Z employees, while 41.6 percent is explained by other variables outside the model. The R^2 value of employee performance of 0.671 shows that the model as a whole is able to explain 67.1 percent of the variation in employee performance classified as a substantial category according to Chin's (1998) classification. These results indicate that the research model has a strong explanatory power and is feasible to proceed to hypothesis testing.

4.5 Hypothesis Test Results (*Path Coefficient*)

Hypothesis testing was carried out based on *the Path Coefficient*, T-Statistic, and *P-Value* values resulting from the *bootstrapping procedure* of 5,000 subsamples. The hypothesis is accepted if the T-Value > 1.96 and *the P-Value* < 0.05 at a significance level of 5% (Hair et al., 2022). The results of testing all hypotheses are presented in Table 9 below.

Table 9. Hypothesis Test Results — Path Coefficient

Hypothesis	Relationships	Path Coeff.	T-Statistics	P-Value	Remarks
H1	Training → Job Satisfaction	0,289	3,847	0,000	Accepted ✓
H2	Employee Training → Performance	0,198	2,913	0,004	Accepted ✓
H3	Motivation → Job Satisfaction	0,301	4,012	0,000	Accepted ✓
H4	Employee Motivation → Performance	0,214	3,124	0,002	Accepted ✓
H5	Work Engagement → Job Satisfaction	0,265	3,601	0,000	Accepted ✓
H6	Work Engagement → Employee Performance	0,187	2,754	0,006	Accepted ✓
H7	Job Satisfaction → Employee Performance	0,521	7,142	0,000	Accepted ✓

Source: SmartPLS 4.0 output — Bootstrapping 5,000 subsamples, data processed (2026)

Table 9 shows that all seven hypotheses proposed were statistically acceptable with a T-Value of > 1.96 and a *P-Value* of < 0.05 . The job satisfaction variable had the strongest influence on employee performance with *the highest path coefficient* of 0.521, followed by work motivation to job satisfaction (0.301), *training* to job satisfaction (0.289), *work engagement* to job satisfaction (0.265),

work motivation to employee performance (0.214), *training* to employee performance (0.198), and *work engagement* to employee performance (0.187).

4.6 Mediation Effects Test Results (*Indirect Effects*)

Testing of the mediated effect of job satisfaction was carried out through *Indirect Effects* analysis using *bootstrapping* of 5,000 subsamples. Partial mediation occurs when direct and indirect influences are both statistically significant, while full mediation occurs when only significant indirect influences are included (Hair et al., 2022). The test results are presented in Table 10 below.

Table 10. Mediation Effects Test Results — Indirect Effects

Indirect Pathway	Indirect Effect	T-Statistics	P-Value	Types of Mediation
→ JS → Performance Training	0,150	3,012	0,003	Partial Mediation ✓
Motivation → JS → Performance	0,157	3,187	0,001	Partial Mediation ✓
Work Engagement → JS → Performance	0,138	2,891	0,004	Partial Mediation ✓

Source: SmartPLS 4.0 output — Bootstrapping 5,000 subsamples, data processed (2026)

Table 10 shows that job satisfaction was shown to partially mediate all three independent variable relationships on employee performance. The strongest mediation effect was the work motivation pathway → job satisfaction → employee performance with an *indirect effect* of 0.157, followed by *training* → job satisfaction → employee performance (0.150), and *work engagement* → job satisfaction → employee performance (0.138). Mediation was partial because the direct influence of the three independent variables on employee performance (H2, H4, H6) was also shown to be significant, indicating that job satisfaction strengthens but does not completely replace the direct influence of *training*, motivation, and *work engagement* on Generation Z employee performance.

4.7 Discussion

4.7.1 Effect of *Training* on Job Satisfaction (H1)

The results of the first hypothesis test prove that *training* has a positive and significant effect on the job satisfaction of Generation Z employees in Batam manufacturing companies with a *path coefficient* value of 0.289, T-Stats of 3.847, and *p-value* of 0.000. This means that the more effective the training program provided by the company both in terms of material relevance, instructor quality, and method suitability with the needs of Generation Z, the higher the job satisfaction felt by employees. The TR3 indicator (*training method that is easy to understand and apply*) showed the highest *outer loading* value among the *training* indicators (0.901), indicating that the aspect of ease of application of training in real work is the most determining dimension of Generation Z employee job satisfaction, a finding that is consistent with the characteristics of this generation that is highly oriented towards practical experience-based learning. This finding empirically confirms the proposition of JD-R theory (Bakker & Demerouti, 2017) that training functions as a job resource capable of building employees' psychological capacity, while also aligning with Self-Determination Theory (Ryan & Deci, 2000), since easily applicable training fulfils Generation Z's need for competence and thereby fosters intrinsic job satisfaction.

These results support and reinforce the findings of Kumar et al. (2023) who prove that structured training programs significantly improve manufacturing employee satisfaction through strengthening technical competence and confidence. In line with that, Dao et al. (2025) in their latest study in Vietnam confirmed that workforce training designed responsive to generational needs directly increases job satisfaction, especially in young employees who place competency development as a top priority in their careers. Apriliana & Nawangsari (2021) added that the

effectiveness of competency-based training contributes significantly to employee intrinsic job satisfaction. Thus, these H1 findings underscore the relevance of training investment as a strategic instrument of HR management in increasing the job satisfaction of Generation Z employees in a dynamic manufacturing environment.

4.7.2 Effect of *Training* on Employee Performance (H2)

The second hypothesis proves that *training* has a positive and significant effect on employee performance with a *path coefficient* value of 0.198, T-Stats of 2.913, and *p-value* of 0.004. Although the direct effect of *training* on performance (0.198) is smaller than the effect through the mediation of job satisfaction, this direct pathway remains statistically significant, confirming that *training* contributes to performance through two different mechanisms: directly through increased technical capacity and work efficiency, and indirectly through increased job satisfaction as a motivating psychological condition optimal performance. The KK1 indicator (*completing work according to quality standards*) which has the highest *outer loading* (0.915) indicates that the *impact of training* is most evident on the quality dimension of work output of Generation Z employees. This dual pathway is consistent with JD-R theory (Bakker & Demerouti, 2017), which positions training as a job resource that can enhance performance both directly, through technical capacity, and indirectly, through the psychological condition of job satisfaction it generates.

These findings are in line with the results of research by Soegiarto et al. (2024) who proved the positive influence of training programs on the performance of manufacturing employees, and Kodwani & Prashar (2021) who confirmed that the transfer of training to actual performance was positively influenced by the suitability of program design with the individual characteristics of participants. Jayathilake et al. (2021) specifically prove the relevance of employee development through training to the retention and performance of Generation Z post-pandemic. However, the *relatively smaller path coefficient* value compared to other variables indicates that *training* alone is not enough to optimize performance but needs to be integrated with a conducive motivation system and *work engagement* ecosystem as a comprehensive HR intervention package (Nusraningrum et al., 2024).

4.7.3 The Effect of Work Motivation on Job Satisfaction (H3)

The third hypothesis proves that work motivation has a positive and significant effect on job satisfaction with the highest *path coefficient* value among the paths to job satisfaction, which is 0.301, T-Statistically 4.012, and *p-value* 0.000. These findings mean that work motivation is the strongest predictor of job satisfaction among the three independent variables studied, outperforming *training* (0.289) and *work engagement* (0.265). The MO1 indicator (*recognition of superiors encourages motivation*) with an *outer loading* of 0.883 is the most dominant indicator, indicating that for Generation Z employees in Batam, recognition and appreciation from their superiors are the source of motivation that most directly contributes to their job satisfaction, a finding that is relevant to the characteristics of Generation Z who highly value *authentic feedback* and recognition from the work environment. This result reinforces Self-Determination Theory (Ryan & Deci, 2000), which holds that the fulfilment of the psychological need for competence and relatedness through recognition from superiors is a central driver of intrinsic job satisfaction.

These results are consistent with the findings of Riyanto et al. (2021) which prove that work motivation has a positive effect on job satisfaction with satisfaction as the dominant mediating pathway towards performance. Fenianti & Nawawi (2023) confirm this positive relationship in the context of companies in Indonesia, while Jufrizen & Sitorus (2021) affirm that high work motivation consistently results in higher job satisfaction, especially when an organization's reward system is aligned with the psychological needs of employees. Mpuangnan et al. (2024) added that the combination of intrinsic motivation and participatory leadership styles is very relevant for Generation Z where synergistically it increases job satisfaction substantially.

4.7.4 The Effect of Work Motivation on Employee Performance (H4)

The fourth hypothesis proves that work motivation has a positive and significant effect on employee performance with a *path coefficient* value of 0.214, T-Statistic of 3.124, and *p-value* of 0.002. Among the three independent variables, work motivation had the strongest direct influence on performance (0.214), outperforming *training* (0.198) and *work engagement* (0.187). This indicates that the internal and external drives that drive Generation Z employees to achieve production targets contribute directly and measurably to their performance output, not just through the mediation of job satisfaction. The MO3 indicator (*enthusiasm to achieve production targets*) which reflects the dimension of target-based extrinsic motivation has proven to be relevant in the context of Batam manufacturing which is oriented towards achieving daily production quotas. This direct effect is in line with Self-Determination Theory (Ryan & Deci, 2000), which explains that motivation rooted in the fulfilment of autonomy and competence needs translates directly into goal-directed behaviour, and it complements JD-R theory's view of motivation as a job resource that fuels performance independently of job satisfaction.

These findings are reinforced by Adinda et al. (2023) and Agustyaningrum & Isnowati (2024) who consistently prove the positive influence of work motivation on employee performance in the Indonesian manufacturing sector. Saputra & Masdupi (2024) add that high work motivation has a direct impact on increased productivity and work efficiency, while Mpuangnan et al. (2024) confirm the relevance of these findings in a cross-cultural context. However, the study of Jufrizen & Sitorus (2021) reminds that the direct influence of motivation on performance can be weakened if job satisfaction conditions are not adequately met, which confirms the importance of maintaining both direct and indirect pathways in the performance improvement strategy of Generation Z employees.

4.7.5 The Effect of Work Engagement on Job Satisfaction (H5)

The fifth hypothesis proves that *work engagement* has a positive and significant effect on job satisfaction with a *path coefficient* value of 0.265, T-Statistic of 3.601, and *p-value* of 0.000. These findings mean that Generation Z employees who have high levels of *vigor*, *dedication* (emotional dedication), and *absorption* (full appreciation in work) tend to have more positive affective evaluations of their work, which is manifested in higher job satisfaction. The WE3 indicator (*emotionally connected to the organization*) with the *highest outer loading* (0.889) indicates that the dimension of emotional attachment is not just functional engagement which is the most determinant element of *work engagement* in shaping the job satisfaction of Generation Z employees.

These results support the findings of Noercahyo et al. (2021) who prove the role of *employee engagement* on job satisfaction in the Indonesian context, and Arianti et al. (2022) who confirm this positive relationship in a sample of Indonesian employees. Bakker & Demerouti (2017) theoretically conceptualize job satisfaction as a natural consequence of high *work engagement* within the framework of JD-R theory, a proposition that has now received empirical confirmation in the context of Generation Z of Batam manufacturing. Karolina & Saryatmo (2024) specifically emphasized that Generation Z places authentic emotional engagement as a prerequisite for job satisfaction, making *work engagement* a construct that has high generational relevance in this study.

4.7.6 The Effect of Work Engagement on Employee Performance (H6)

The sixth hypothesis proves that *work engagement* has a positive and significant effect on employee performance with a *path coefficient* value of 0.187, T-Stats of 2.754, and *p-value* of 0.006. Although *work engagement* had the smallest path direct coefficient among the three independent variables (0.187), the effect remained statistically significant and practically meaningful. This *relatively smaller path coefficient* value does not mean that *work engagement* is less important it does indicate that most of the effect of *work engagement* on work performance is through indirect pathways via job satisfaction (*indirect effect* = 0.138), a finding consistent with the JD-R theory's proposition that *work*

engagement encourages performance, especially through the positive psychological conditions it builds.

These findings are in line with a comprehensive meta-analysis by Mazzetti et al. (2023) which confirms the consistency of the positive relationship between *work engagement* and performance across industries and cultures. Pratiwi & Fatoni (2023) and Ramadhan & Budiono (2023) confirm this relationship in the Indonesian context, while Rustina et al. (2025) reinforce the relevance of these findings in the context of contemporary Indonesian organizations. Overall, H6's findings confirm that organizational investment in building a work ecosystem that encourages *work engagement* —through meaningful job design, adequate autonomy, and responsive managerial support—has a real impact on Generation Z employee performance, both directly and through increased job satisfaction as a mediator.

4.7.7 The Effect of Job Satisfaction on Employee Performance (H7)

The seventh hypothesis proves that job satisfaction has a positive and significant effect on employee performance with the highest *path coefficient* value in the model of 0.521, T-Stats 7.142, and *p-value* 0.000. These findings place job satisfaction as the most dominant performance predictor among all variables in the model — outperforming the direct influence of *training*, work motivation, and *work engagement* individually. This has a profound meaning that for Generation Z employees in Batam manufacturing companies, psychological conditions in the form of job satisfaction that include satisfaction with the work environment, social relationships, compensation, and self-development opportunities are the most critical foundations that determine how high their performance is. The JS1 indicator (*satisfaction with environmental conditions and work facilities*) with the *highest outer loading* (0.902) indicates that the quality of the physical work environment is the most determinant dimension of satisfaction for Generation Z's performance in the manufacturing production environment.

These findings have very strong support from the literature. Katebi et al.'s (2022) meta-analysis and Elrehail et al.'s (2020) findings position job satisfaction as the most consistent direct antecedent of performance in the HR management literature. Andreas (2022) and Rustina et al. (2025) confirm this positive relationship empirically in the Indonesian context, while Saputra et al. (2022) and Imbang et al. (2022) affirm that high job satisfaction encourages employees to invest extra effort (*discretionary effort*) in achieving organizational targets. Overall, the dominant influence of job satisfaction on performance ($\beta = 0.521$) in this study emphasizes the urgency for the management of Batam manufacturing companies to make improving the job satisfaction of Generation Z employees a strategic priority for HR that cannot be postponed. This dominant path coefficient empirically affirms the central proposition of JD-R theory (Bakker & Demerouti, 2017) that job satisfaction functions as the critical transmission mechanism through which job resources are converted into measurable performance outcomes, rather than merely a peripheral antecedent.

4. Conclusion

This study aims to analyze and empirically prove the influence of training, work motivation, and work engagement on the performance of Generation Z employees in Batam manufacturing companies through job satisfaction as a mediating variable. Based on the results of testing the structural model using PLS-SEM with SmartPLS 4.0 on a sample of 250 respondents, all seven hypotheses submitted were significantly accepted at the level of 5% ($p < 0.05$), with an R^2 value of employee performance of 0.671 which is classified as a substantial category — indicating that this research model has a strong explanatory power on the variation in the performance of Generation Z employees in the Batam manufacturing environment.

Training was shown to have a positive and significant effect on job satisfaction ($\beta = 0.289$; $p = 0.000$) and employee performance ($\beta = 0.198$; $p = 0.004$), confirming that relevant and easy-to-implement training programs contribute to improving technical competence, confidence, and quality of work output of Generation Z employees. Work motivation was shown to have the

strongest effect on job satisfaction ($\beta = 0.301$; $p = 0.000$) and a significant effect on employee performance ($\beta = 0.214$; $p = 0.002$) — the highest path coefficient among all the independent variables studied, confirming that a recognition and reward system that is in line with the intrinsic values of Generation Z is the most determinant HR management instrument in shaping their satisfaction and performance. Work engagement has been shown to have a positive and significant effect on job satisfaction ($\beta = 0.265$; $p = 0.000$) and employee performance ($\beta = 0.187$; $p = 0.006$), where authentic emotional attachment to work and organizational engagement dimensions that are most dominant for Generation Z contribute to performance through two complementary pathways: directly and through the mediation of job satisfaction.

Job satisfaction proved to be the most dominant performance predictor in the overall model ($\beta = 0.521$; $p = 0.000$), as well as partially mediating the three independent variable relationships on employee performance with the strongest mediating effect on the work motivation pathway (indirect effect = 0.157), followed by training (0.150), and work engagement (0.138). Mediation is partial because the direct influence of the three independent variables on performance remains significant after the inclusion of mediators, indicating that job satisfaction reinforces but does not completely replace the direct influence of training, motivation, and work engagement on Generation Z's performance. These findings collectively illustrate the complexity of Generation Z employee performance dynamics, while emphasizing that optimal performance improvement requires an integrative HR approach that combines generationally responsive training investments, motivational systems oriented to the psychological needs of Generation Z, and a work ecosystem that proactively facilitates authentic work engagement as the foundation of satisfaction and sustainable performance.

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