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THE MEDIATING ROLE OF RETIREMENT PLANNING IN THE RELATIONSHIP BETWEEN RISK TOLERANCE AND FINANCIAL RESILIENCE: A STUDY ON INDUSTRIAL WORKERS IN BATAM CITY

Etty Sri Wahyuni [1]*, Henry Aspan[2], Ari Prabowo[3]
[1]Universitas Batam, Batam, Indonesia
[2]Universitas Pembangunan Panca Budi, Medan, Indonesia
[3]Universitas Potensi Utama, Medan, Indonesia
E-mail: ettywahyunie@gmail.com[1]*, henryaspan@yahoo.com[2], ariprabowotanjung@gmail.com[3]

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Abstract

This study examines the mediating role of retirement planning in the relationship between risk tolerance and financial resilience among industrial workers in Batam City, Indonesia. Using a quantitative cross-sectional survey design, data were collected from 78 permanent industrial workers employed in manufacturing companies across Batam's industrial zones through purposive sampling. The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the proposed hypotheses regarding direct relationships and mediation effects. The measurement model demonstrated satisfactory reliability and validity, with Cronbach's Alpha values ranging from 0.892 to 0.968 and Average Variance Extracted (AVE) meeting acceptable thresholds. The structural model analysis revealed significant positive relationships across all hypothesized paths. Risk tolerance showed the strongest relationship with retirement planning ($\beta = 0.640$, $t = 9.317$, $p < 0.001$), while retirement planning demonstrated substantial positive effects on financial resilience ($\beta = 0.609$, $t = 5.202$, $p < 0.001$). Risk tolerance also exhibited a direct positive relationship with financial resilience ($\beta = 0.339$, $t = 2.555$, $p = 0.011$). Most importantly, the mediation analysis confirmed that retirement planning partially mediates the relationship between risk tolerance and financial resilience, with a significant indirect effect ($\beta = 0.390$, $t = 3.898$, $p < 0.001$) that exceeds the direct effect. The findings contribute to behavioral finance literature by demonstrating that retirement planning serves as a critical mechanism through which individual risk preferences translate into financial resilience outcomes among industrial workers in emerging market contexts. The results support lifecycle theory and planned behavior theory, showing that systematic retirement planning behaviors are more effective than spontaneous risk-taking activities in enhancing financial resilience. Practical implications suggest that financial literacy programs should focus on retirement planning education tailored to workers' risk tolerance levels, while policymakers can develop targeted interventions leveraging individual risk preferences to improve workers' long-term financial well-being. The study provides valuable insights for enhancing financial resilience among Indonesia's industrial workforce in the context of evolving social security systems and demographic transitions.

Keywords: Risk Tolerance, Retirement Planning, Financial Resilience, Industrial Workers

INTRODUCTION

Financial resilience has emerged as a critical concept in personal finance research, particularly in the context of economic uncertainty and demographic shifts toward an aging population. This study explores financial literacy, behavior and preparedness of Millennials and Generation Z in Indonesia, focusing on understanding how these three factors interact with job status, income usage, debt management and digital engagement, demonstrating the increasing importance of financial preparedness in Indonesia's evolving economic landscape. Indonesia's industrial sector has experienced significant growth, with Indonesia recently becoming the 10th-largest manufacturing nation in the world. Its large manufacturing sector accounts for almost a quarter of the nation's total GDP and employs over a fifth of Indonesia's working age population (around 25 million workers) (Economy of Indonesia, 2025). This growth has created substantial employment opportunities, yet financial challenges persist among industrial workers. According to data from the Indonesian Chamber of Commerce and Industry (Kadin Indonesia), released in 2023, a whopping total of 99 percent of all business ventures in Indonesia involve informal businesses. In absolute numbers,

this was 66 million units of micro, small and medium-sized enterprises (MSMEs). They contributed an estimated 61 percent to Indonesian gross domestic product (GDP), and delivered employment opportunities for around 117 million workers (Indonesian Investment, 2025). The retirement planning landscape in Indonesia has undergone significant changes with recent policy reforms. Starting January 1, 2025, workers in Indonesia enrolled in the pension program under BPJS Ketenagakerjaan will need to wait until they reach 59 to access their pension funds. This change follows Government Regulation (PP) No. 45 of 2015, which mandates gradual increases in the pension age in Indonesia (Salam, 2025). These changes have created new challenges for workers in terms of retirement preparedness and financial planning. Batam City, as one of Indonesia's major industrial hubs and a Special Economic Zone, presents a unique Batam City, as one of Indonesia's major industrial hubs and Special Economic Zone, presents a unique context for studying financial behavior. The city's strategic location and favorable investment climate have attracted numerous manufacturing companies, creating employment for hundreds of thousands of workers (BP Batam, 2024). However, research on financial behavior among industrial workers in this specific context remains limited.

Previous studies have highlighted the importance of individual psychological factors in financial planning. Grable defines risk tolerance as an individual's willingness to accept uncertainty in pursuit of potentially higher returns (Ch'ng et al., 2023), while Lusardi and Mitchell demonstrate that retirement planning significantly influences long-term financial outcomes (Lusardi, 2019). However, the mechanism through which these factors interact, particularly in the context of industrial workers in emerging markets, remains underexplored. Indonesian female workers found that financial literacy has a direct effect on retirement planning activity, yet noted that "financial literacy appears to be a significant mediator between demographical factors and future time perspective in affecting retirement planning"(Kumar et al., 2019). This suggests that the relationship between individual characteristics and financial outcomes is complex and may involve mediating mechanisms. The Indonesian social security system, managed through BPJS Ketenagakerjaan, aims to provide universal coverage for all workers. According to Omni HR (2024), this system "works on the principle of shared responsibility" where both employees and employers contribute to ensure sustainability. However, concerns remain about the adequacy of these benefits in ensuring comprehensive financial resilience.

Studies on retirement planning in Southeast Asian contexts have revealed significant gaps in preparedness. Research by Yusoff et al. (2024) found that among Malaysia's low-income private sector employees, "the B40 has the lowest savings in EPF, with only 1.01%, compared to the M40, which amounts to 16.56%" (Prasidya & Dewi, 2023). Similar patterns may exist among Indonesian industrial workers, highlighting the need for targeted research. The COVID-19 pandemic has further emphasized the importance of financial resilience. As noted by the World Bank (2024), Indonesia has focused on "strengthening economic competitiveness and resilience" as part of its recovery strategy. This context makes understanding the financial behavior of industrial workers even more critical for policy development. Despite the growing recognition of financial resilience's importance, limited research has examined the specific mechanisms through which individual risk preferences influence financial outcomes among industrial workers in Indonesia. This study addresses this gap by investigating the mediating role of retirement planning in the relationship between risk tolerance and financial resilience among industrial workers in Batam City.

PROBLEM ANALYSIS

The financial challenges faced by industrial workers in Batam City reflect broader systemic issues in retirement preparedness and financial resilience planning within Indonesia's evolving economic landscape. Through careful examination of existing literature and current conditions, three critical problems emerge that necessitate comprehensive investigation.

1. Industrial workers in Batam face a paradox where financial knowledge does not always translate into actionable retirement planning behaviors, as research demonstrates that "both generations have demonstrated a strong understanding of financial concepts, but this knowledge does not always translate into effective financial preparedness."
2. The specific mechanism through which risk tolerance influences financial resilience among industrial workers remains unclear, despite emphasizing that "effective retirement planning has been linked to improved financial outcomes and greater financial resilience."
3. The BPJS Ketenagakerjaan system has constraints in ensuring comprehensive financial resilience, as indicated by Malaysian research showing "the B40 has the lowest savings in EPF, with only 1.01%", reflecting similar challenges faced by Batam's industrial workers earning minimum wages of Rp 4,685,050 per month.

Building upon the comprehensive background analysis and identified gaps in existing literature, this research formulates specific research questions that address the complex relationships between psychological factors and

financial outcomes among industrial workers. The following problem formulations are designed to systematically investigate the mediating mechanisms through which individual risk preferences translate into long-term financial stability in the context of Batam's industrial workforce.

1. Does risk tolerance have a significant effect on financial resilience among industrial workers in Batam City?
2. Does risk tolerance have a significant effect on retirement planning among industrial workers in Batam City?
3. Does retirement planning have a significant effect on financial resilience among industrial workers in Batam City?
4. Does retirement planning mediate the relationship between risk tolerance and financial resilience among industrial workers in Batam City?

LITERATURE REVIEW

1. Theoretical Foundation

The theoretical framework for this study is grounded in behavioral finance theory and lifecycle theory, which provide complementary perspectives on financial decision-making behavior. Behavioral finance theory emphasizes the role of psychological factors in financial decisions, while lifecycle theory suggests that individuals make consumption and savings decisions based on their expected lifetime income and preferences for consumption smoothing over time. Lifecycle theory posits that "individuals with higher risk tolerance are more likely to engage in long-term planning activities that involve uncertainty about future outcomes" (Bodie et al., 2014). This theoretical foundation supports the investigation of how individual risk preferences influence retirement planning behaviors and subsequent financial resilience outcomes.

2. Financial Resilience

Financial resilience represents a multidimensional construct that encompasses an individual's capacity to withstand financial shocks and maintain financial stability over time. Financial resilience as "the ability to cope with financial shocks and maintain financial stability over time," emphasizing both reactive and proactive components of financial management (Klapper & Lusardi, 2020). The concept extends beyond simple wealth accumulation to include behavioral and psychological dimensions of financial management. Identify various determinants of financial resilience, including "income stability, savings behavior, debt management, and financial knowledge," highlighting the complex nature of this construct (Gathergood & Weber, 2017). In the context of industrial workers, financial resilience becomes particularly important due to the cyclical nature of manufacturing industries and potential economic volatility. Research by McKinsey Global Institute (2024) indicates that industrial workers face unique challenges, noting that "few informal businesses are formalizing and growing" in emerging economies, which affects long-term employment security. For Indonesian industrial workers specifically, financial resilience must be understood within the framework of the national social security system. The BPJS Ketenagakerjaan system provides a foundation, but as noted by Omni HR (2024), the system "works on the principle of shared responsibility," requiring individual preparation beyond mandatory contributions.

3. Risk Tolerance

Risk tolerance in financial contexts refers to an individual's willingness to accept uncertainty in financial decisions, particularly regarding potential losses in pursuit of higher returns. A foundational definition of risk tolerance as "an individual's willingness to accept uncertainty in pursuit of potentially higher returns." The concept is rooted in expected utility theory, which suggests that individuals make decisions based on their preferences for risk-return trade-offs. However, behavioral finance research has revealed that risk tolerance is not merely a function of rational calculation but is influenced by psychological factors, cultural background, and personal experiences. Research demonstrates that risk tolerance significantly influences various financial behaviors. Risk tolerance influences various financial decisions, including asset allocation, savings rates, and insurance purchases" (Kannadhasan, 2015). This broad influence makes risk tolerance a critical factor in understanding overall financial behavior patterns. In the context of industrial workers with limited investment experience, risk tolerance may manifest differently than in sophisticated investor populations. The limited availability of complex financial products may channel risk tolerance primarily through savings behavior and retirement planning decisions rather than direct investment activities.

4. Retirement Planning

Retirement planning encompasses the comprehensive process of setting retirement goals, estimating future financial needs, and implementing strategies to achieve those goals. Retirement planning as "the process of setting retirement goals, estimating future financial needs, and implementing strategies to achieve those goals"(Lusardi, 2019). The planning process involves both cognitive elements (knowledge and goal-setting) and behavioral elements (actual implementation of savings and investment strategies). This dual nature makes retirement planning a complex behavior that bridges financial literacy and financial action. The Indonesian retirement planning landscape has evolved significantly with the implementation of universal social security programs. The BPJS Ketenagakerjaan system provides mandatory coverage, but questions remain about adequacy. As noted in recent policy changes, "starting January 1, 2025, workers in Indonesia enrolled in the pension program under BPJS Ketenagakerjaan will need to wait until they reach 59 to access their pension funds" (Cekindo, 2025). Specifically examining Indonesian workers found that "financial literacy is confirmed to have a direct effect on retirement planning activity," while also noting that "financial literacy appears to be a significant mediator between demographical factors and future time perspective in affecting retirement planning"(Aspan et al., 2019; Kumar et al., 2019).

METHOD

1. Research Design

This study employs a quantitative cross-sectional survey design to examine the mediating role of retirement planning in the relationship between risk tolerance and financial resilience among industrial workers in Batam City. The approach is consistent with similar financial behavior studies (Hair et al., 2021)).

2. Population and Sample

The target population consists of permanent industrial workers in Batam's manufacturing zones with minimum 2 years tenure and BPJS Ketenagakerjaan enrollment. Using purposive sampling, 78 respondents were selected from manufacturing companies in Batamindo Industrial Park, Kabil Industrial Estate, and Bintan Industrial Estate. While smaller than ideal SEM requirements, this sample size is adequate for PLS-SEM analysis (Chin & Newsted, 1999) and aligns with practical constraints in industrial settings. Inclusion criteria: Permanent employees, 2+ years tenure, BPJS enrollment, income Rp 3-15 million, age 23-55 years.

3. Data Collection

Primary data was collected through structured questionnaires distributed in physical and digital formats over 4 weeks. The process included pre-survey pilot testing with 10 respondents, orientation sessions, and quality control measures. Ethical considerations included informed consent, voluntary participation, and confidentiality protection.

4. Data Analysis with Smart PLS

Analysis employs Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0, appropriate for the sample size of 78. Preliminary analysis includes data screening, normality testing, and reliability assessment. The structural model examines direct effects (H1-H3) and mediation (H4) through bootstrapping procedures. SPSS 29.0 supports descriptive analysis.

RESULTS AND DISCUSSION

1. Respondent Characteristics

Table 1. Demographic Characteristics of Respondents

Characteristics	Category	Frequency (n)	Percentage (%)
Gender	Male	48	61,5
	Female	30	38,5
Age	23-30 years	32	41,0
	31-40 years	28	35,9
	41-50 years	15	19,2
	51-55 years	3	3,9
Education Level	High School	42	53,8
	Diploma/Vocational	24	30,8
	Bachelor's Degree	12	15,4

Monthly Income	Rp 3,000,000 - 4,999,999	38	48,7
	Rp 5,000,000 - 6,999,999	25	32,1
	Rp 7,000,000 - 9,999,999	11	14,1
	Rp 10,000,000 - 15,000,000	4	5,1
Employment Tenure	2-5 years	35	44,9
	6-10 years	28	35,9
	11-15 years	12	15,4
	>15 years	3	3,8

The demographic profile of 78 industrial workers reveals a predominantly male workforce (61.5%) with 76.9% aged 23-40 years, indicating a young productive population with substantial time for retirement planning but potentially limited long-term financial awareness. Most respondents hold high school education (53.8%) and earn below Rp 7 million monthly (80.8%), with 48.7% in the Rp 3-4.99 million range, reflecting typical manufacturing worker characteristics that may constrain retirement planning capabilities beyond mandatory BPJS contributions. Additionally, 80.8% have employment tenure under 10 years, suggesting they are in early-to-mid career phases where immediate financial stability often takes precedence over long-term retirement planning, providing crucial context for understanding the risk tolerance-retirement planning-financial resilience relationships in Batam's industrial setting.

2. Outer Model

a. Outer Loading

The measurement model evaluation establishes the validity and reliability of constructs before examining structural relationships. Figure 4.1 displays the outer loadings for all indicators, showing how well each observed variable represents its underlying construct. The results demonstrate generally acceptable indicator performance across all three constructs: Risk Tolerance (X1-X8), Retirement Planning (Z1-Z8), and Financial Resilience (Y1-Y8), with most loadings exceeding the minimum threshold of 0.60, indicating satisfactory construct validity for further structural analysis.

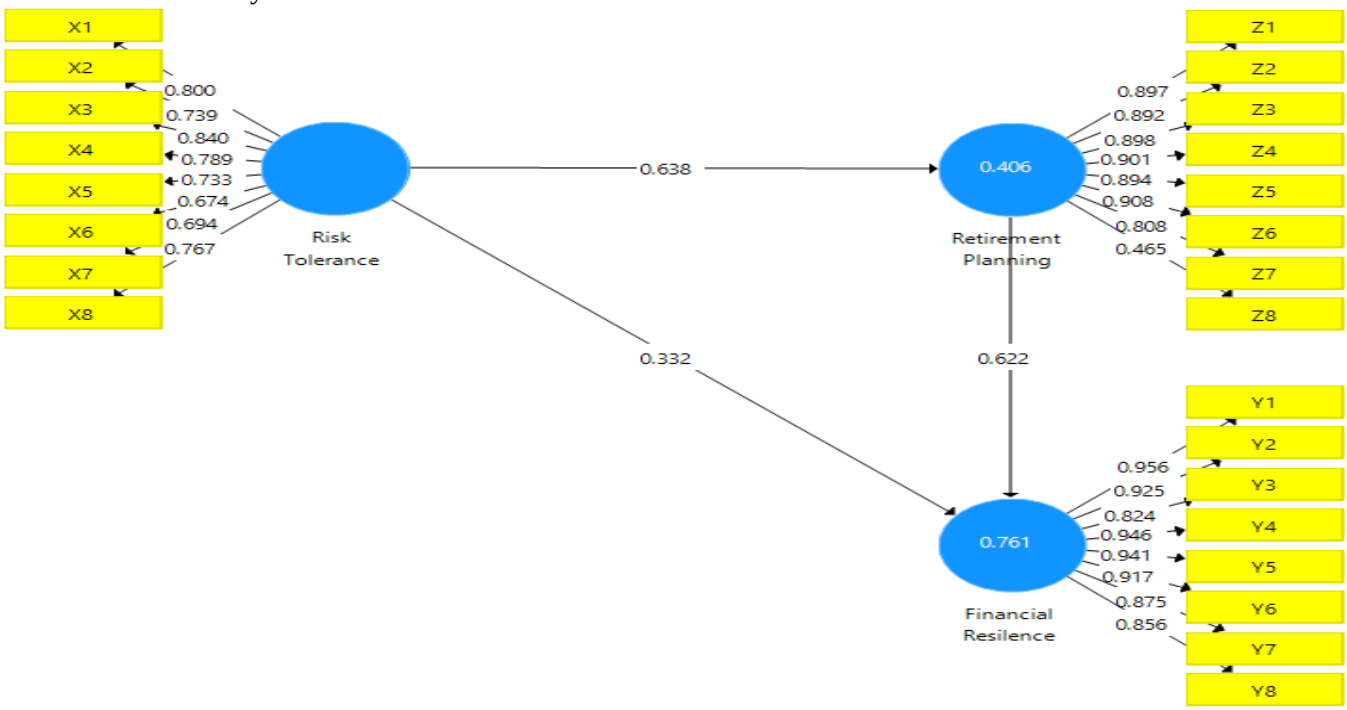

Figure 1. Outter Loading

Table 2. Evaluation of outer loading

Variable	Construct	Loading Factor 1	Loading Factor 2	Result
Risk Tolerance	X1	0.800	0.800	Include
	X2	0.739	0.739	Include
	X3	0.840	0.840	Include
	X4	0.789	0.789	Include
	X5	0.733	0.732	Include
	X6	0.674	0.674	Include
	X7	0.694	0.694	Include
	X8	0.767	0.767	Include
Retirement Planning	Z1	0.897	0.900	Include
	Z2	0.892	0.904	Include
	Z3	0.898	0.910	Include
	Z4	0.901	0.910	Include
	Z5	0.894	0.896	Include
	Z6	0.908	0.911	Include
	Z7	0.808	0.795	Include
	Z8	0.465		Exclude
Financial Resilience	Y1	0.956	0.956	Include
	Y2	0.925	0.925	Include
	Y3	0.824	0.824	Include
	Y4	0.946	0.946	Include
	Y5	0.941	0.941	Include
	Y6	0.917	0.917	Include
	Y7	0.875	0.875	Include
	Y8	0.856	0.857	Include

The outer loading analysis reveals that most indicators demonstrate satisfactory construct validity, with 23 out of 24 indicators meeting the minimum threshold of 0.60 and being retained in the model. Risk Tolerance indicators show loading factors ranging from 0.674 to 0.840, indicating moderate to strong relationships with the construct. Retirement Planning indicators demonstrate strong performance with loadings between 0.795 and 0.911, except for Z8 (0.465) which was excluded due to insufficient loading. Financial Resilience exhibits the strongest indicator performance with all loadings ranging from 0.824 to 0.956, demonstrating excellent construct validity. The overall results confirm that the measurement model is reliable and valid for further structural equation modeling analysis, with only one indicator (Z8) requiring removal to maintain model quality.

Table 3. Evaluation of measurement model

	CA	Composite Reliability	Average Variance Extracted (AVE)
Financial Resilence	0.968	0.973	0.821
Retirement Planning	0.956	0.964	0.793
Risk Tolerance	0.892	0.914	0.572

The measurement model evaluation demonstrates excellent reliability and validity across all constructs. All constructs exceed the recommended thresholds for internal consistency, with Cronbach's Alpha values ranging from 0.892 to 0.968, indicating high reliability. Composite Reliability values (0.914-0.973) surpass the 0.70 threshold, confirming construct reliability. Average Variance Extracted (AVE) results show that Financial Resilience (0.821) and Retirement Planning (0.793) exceed the 0.50 benchmark for convergent validity, while Risk Tolerance (0.572) marginally meets the requirement. Overall, the measurement model demonstrates satisfactory psychometric properties, with Financial Resilience showing the strongest measurement quality, followed by Retirement Planning and Risk Tolerance, providing a solid foundation for structural model analysis.

3. Inner Model

Following the measurement model validation, the structural model examines the hypothesized relationships between constructs. Figure 4.2 displays the structural model with path coefficients and t-statistics for all direct relationships in the proposed mediation framework.

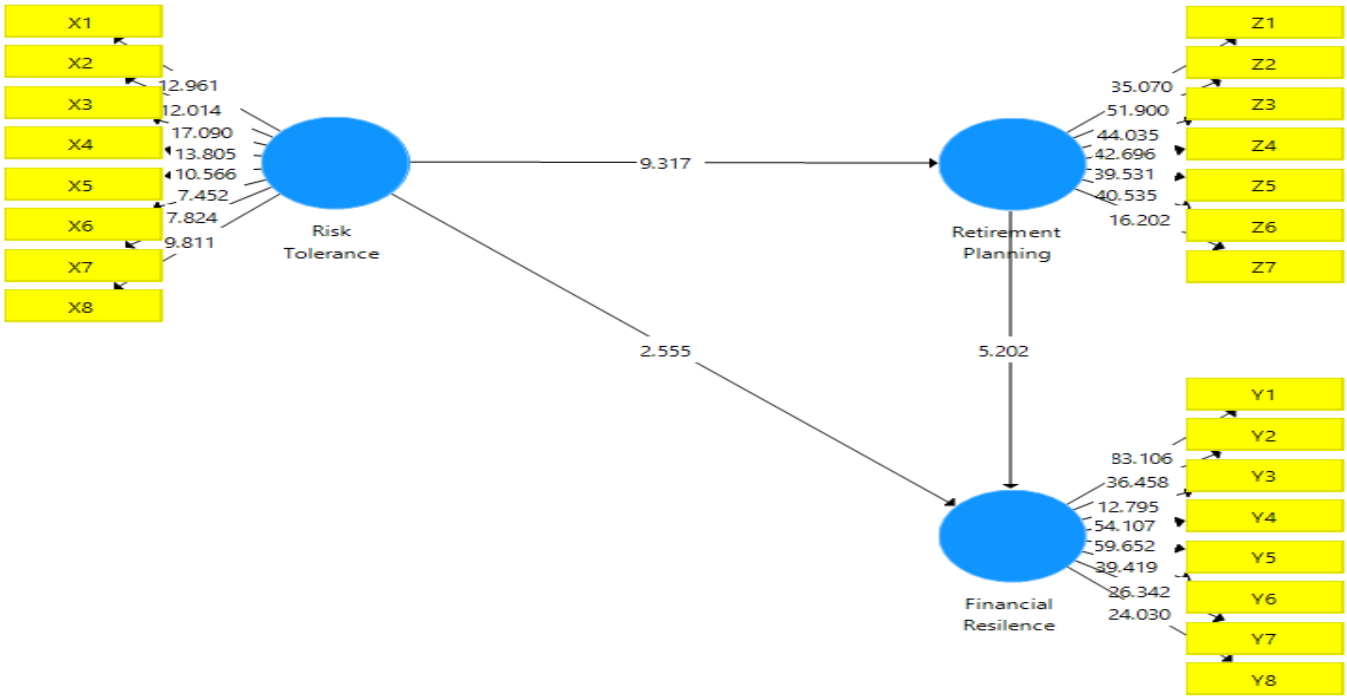

Figure 2. Inner Model

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Tabel 4. Direct Effect

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
Retirement Planning -> Financial Resilence	0.609	5.202	**0.000**
Risk Tolerance -> Financial Resilence	0.339	2.555	**0.011**
Risk Tolerance -> Retirement Planning	0.640	9.317	**0.000**

The direct effects analysis reveals significant relationships across all hypothesized paths, providing strong empirical support for the proposed theoretical framework:

1. The relationship between Risk Tolerance and Retirement Planning demonstrates the strongest effect ($\beta = 0.640$, $t = 9.317$, $p < 0.001$), indicating that industrial workers with higher risk tolerance are significantly more likely to engage in retirement planning activities.
2. Retirement Planning shows a substantial positive effect on Financial Resilience ($\beta = 0.609$, $t = 5.202$, $p < 0.001$), suggesting that workers who actively engage in retirement planning exhibit significantly greater financial resilience.
3. Risk Tolerance demonstrates a direct positive relationship with Financial Resilience ($\beta = 0.339$, $t = 2.555$, $p = 0.011$), confirming that risk tolerance independently contributes to financial resilience outcomes beyond its indirect effects through retirement planning.

All three direct effects are statistically significant, establishing the foundation for mediation analysis to examine the proposed mediating role of retirement planning in the risk tolerance-financial resilience relationship.

Tabel 5. Indirect Effect

	Original Sample (O)	T Statistics (|O/STDEV|)	P Values
Risk Tolerance -> Retirement Planning -> Financial Resilence	0.390	3.898	**0.000**

The indirect effects analysis provides crucial evidence for the mediating role of retirement planning in the relationship between risk tolerance and financial resilience. The indirect effect of Risk Tolerance on Financial Resilience through Retirement Planning is statistically significant ($\beta = 0.390$, $t = 3.898$, $p < 0.001$), confirming that retirement planning serves as a significant mediator in this relationship. This finding indicates that a substantial portion of risk tolerance's influence on financial resilience operates through retirement planning behaviors, with the indirect effect ($\beta = 0.390$) being stronger than the direct effect ($\beta = 0.339$). The significant indirect effect, combined with the significant direct effect previously established, suggests partial mediation, meaning that retirement planning partially explains how risk tolerance influences financial resilience among industrial workers in Batam City, thereby supporting hypothesis H4.

CONCLUSION

1. Risk Tolerance - Retirement Planning Relationship

The strongest relationship between risk tolerance and retirement planning among Batam's industrial workers can be explained through Lifecycle Theory and Theory of Planned Behavior. According to lifecycle theory, individuals with higher risk tolerance engage in more sophisticated long-term planning (Bodie et al., 2014). In Batam's industrial context, workers face cyclical employment patterns and uncertainties from export-oriented manufacturing. Workers with higher risk tolerance recognize these risks and proactively engage in retirement planning as a risk management strategy. The relatively young workforce (76.9% aged 23-40) who relocated to Batam for opportunities demonstrate inherent risk-taking propensity that extends to financial planning behaviors, supported by Behavioral Finance Theory which links risk tolerance to proactive financial decision-making.

2. Retirement Planning - Financial Resilience Relationship

This substantial relationship aligns with Financial Capability Theory and Precautionary Savings Theory. Lusardi and Mitchell (2011) argue that systematic financial planning develops both cognitive skills and behavioral competencies that enhance overall financial well-being. For Batam's industrial workers earning moderate incomes (80.8% below Rp 7 million monthly), retirement planning serves as comprehensive financial education that improves money management and emergency preparedness. Precautionary Savings Theory explains how planning creates buffers against income volatility from global economic conditions and potential factory relocations. The planning process inherently develops financial discipline and knowledge that enhances overall resilience beyond direct savings effects.

3. Direct Risk Tolerance - Financial Resilience Relationship

The independent contribution reflects Portfolio Theory and Entrepreneurial Theory principles. Risk tolerance enables workers to pursue income diversification strategies such as overtime work, skill development, or side businesses – common practices among Indonesian industrial workers. Behavioral Economics Theory, particularly Mental Accounting, suggests risk-tolerant individuals are more flexible in resource allocation and willing to invest in higher-yield opportunities. In Batam's competitive industrial environment, this translates to strategic decisions like education investments or participation in informal financial systems that directly enhance financial stability independent of formal retirement planning.

4. Mediation Effect Through Retirement Planning ($\beta = 0.390$)

The significant mediation effect, where indirect effect ($\beta = 0.390$) exceeds direct effect ($\beta = 0.339$), demonstrates Planned Behavior Theory in action. Risk-tolerant attitudes create stronger intentions for retirement planning, which leads to systematic behaviors that enhance financial resilience more effectively than spontaneous risk-taking. Resource-Based View suggests that retirement planning transforms individual risk tolerance into organized financial capabilities that are more sustainable than unstructured approaches. Institutional Theory explains how formal retirement systems (BPJS, employer programs) provide structured channels that make risk-tolerant

behaviors more effective than informal risk-taking activities, particularly relevant in Indonesia's evolving social security landscape where formal planning offers more reliable pathways to financial resilience.

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