Review of Contemporary Philosophy
ISSN: 1841-5261, e-ISSN: 2471-089X
Vol 23 (1), 2024
pp. 210 - 228

The Impact of Advanced Financial Knowledge on Investment Decisions Mediated by Risk Bearing, Risk Composure, and Risk Preference: Evidence from State-Owned Enterprises and Their Subsidiaries in Indonesia

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Abstract

This paper investigates the influence of advanced financial knowledge on investment decisions and projects undertaken by State-Owned Enterprises (SOEs) in Indonesia, employing second-order models for variables like risk tolerance (integrating risk preference and risk composure) and risk perception (integrating risk-bearing and risk knowledge) based on prospect theory and behavioral decision theory. Observations from 101 SOEs and their subsidiaries were analyzed using PLS-SEM. The findings reveal that advanced financial knowledge significantly influences investment decisions directly. Furthermore, risk tolerance and perception can mediate the relationship between financial knowledge and investment decisions, with the risk tolerance profile emerging as a more significant mediator. Practical implications suggest that decision-makers exhibiting stronger risk preferences tend to have higher risk tolerance, influencing their investment behaviors. This study introduces a conceptual framework integrating a second-order model where risk tolerance comprises both risk preference and composure, and risk perception includes risk-bearing and risk knowledge, thereby elucidating the relationship between advanced financial knowledge and investment decisions.

Keywords: *advanced financial knowledge; investment decision; risk bearing; risk composure; risk knowledge; risk preference*

JEL Codes: G32, G41, O16

Received: 3 March 2024 **Revised:** 18 May 2024 **Accepted:** 15 June 2024

1. Introduction

Sustainable development is vital in bulding life by utilizing the surrounding environment (Thacker et al., 2019). However, the concept of sustainable infrastructure development has yet to be explored in depth in Indonesia, even though it has been supported by sustainable construction (Willar et al., 2021). Sustainable infrastructure paves the way for the construction industry to achieve sustainable development goals by considering social, economic, environmental, and cultural issues (Hariram et al., 2023). In the context of Indonesia's economic development, investment in construction projects has the potential to be a driver of growth (Kurniawan & Managi, 2018). Companies must formulate strategic decisions, especially state-owned enterprises (SOEs) and their subsidiaries, where each investment decision, funded through equity or loans at varying interest rates, directly impacts the future value of an asset such as a toll road or property (Mai & Casady, 2023). So, SOE management must deeply understand the financial strategy to make informed investment decisions. This decision must consider market dynamics and various managerial

behaviors, both rational and not rational, and irrational behavior is an essential element in behavioral finance (Ahmad et al., 2017). Nofsinger et al. (2018) states that behavioral finance is essential in decision-making. Behavioral finance consists of various aspects supporting the development of investment decisions based on psychological factors.

Making financial decisions means the task from an individual where the results of these decisions have a strong influence on the future and overall long-term conditions because decision-makers have to deal with uncertainty, a large number of choices, risks, and complex contract structures, as well as a high level of difficulty (Kalra et al., 2014). One of the main challenges SOE management faces is making investment decisions for projects that play a crucial role as a catalyst for Indonesia's economic growth (Kim, 2021). These decisions involve the allocation of significant resources and determine the direction and sustainability of the country's economic development. Long-term investments in large projects involve a high degree of risk, with inherent uncertainty regarding success in completing all phases required by the project and in post-construction operations, including the achievement of anticipated profitability (Albert et al., 2017). More specifically, the impact of uncertainty can occur in one of five things related to project uncertainty: market returns, project budget, project performance, market needs, and project schedule (Thomé et al., 2016). Some SOE companies make decisions based on capabilities related to advanced financial knowledge (Benassi & Landoni, 2019).

Advanced financial knowledge has a vital role in determining the best financial decisions for the company because it consists of abilities in critical thinking, experience, character, and cooperation (Graffin et al., 2020). Financial knowledge regarding risk management is the basis for managing all security, systems, and professionalism in construction projects (Smith et al., 2014). It is the knowledge that is the basis for measuring a company's business performance, which is integrated using a computational model in decision-making (Lusardi & Mitchell, 2014, p. 201). The financial knowledge possessed by individuals causes them to try to avoid risks to gain profits and instead dare to take risks about reducing losses and profits with the theory of prospect (Kahneman & Tversky, 1979), so that future financial planning can run well (Lusardi & Mitchell, 2014). Analysis of instruments used in finance, namely NPV, IRR, discounted cash flow, and duration analysis of decision-making, especially company investment (Zatrochova & Katrencik, 2023). This study is supported by previous research results showing that Advanced financial knowledge plays a vital role in determining decisions that can positively impact the company (Ali et al., 2015; Anderson et al., 2018; Boisclair et al., 2017; Kalmi & Ruuskanen, 2019; Larisa et al., 2020; Lusardi & Mitchell, 2011; Razen et al., 2020; Ricci & Caratelli, 2017; Sekita, 2011). Conversely, advanced financial knowledge does not have a direct impact on investment decision-making due to the gap in the actual understanding of financial data analysis, which results in difficulties in processing information to be used as a basis for decisions (Abdul Rashid et al., 2020; Almenberg & Säve-Söderbergh, 2011; Crossan et al., 2011; Farrar et al., 2019; Niu et al., 2020; Noone et al., 2010). Then, there is a research gap between advanced financial knowledge and project investment decisions.

Delivering the research gap above, the authors state that risk tolerance and risk perception are used as mediators of the influence of advanced financial knowledge to improve investment decision-making on infrastructure projects. This study carried out a new development of the risk tolerance variable into two dimensions, namely risk composition and risk preference, which can provide a comprehensive understanding of making investment decisions supported by Behavioral Decision Theory (Slovic et al., 1977). The implementation of risk preferences is oriented towards individual choices to engage in high-risk behavior or vice versa (Pace & Daidone, 2024). A person's preferences can be influenced by the knowledge or experience learned (Aren & Nayman Hamamci, 2023). The level of high-risk tolerance is determined by the calmness of risk, where individuals with a higher level of calmness can face high levels of risk with investment (Sang et al., 2020). In addition, a high level of risk preference indicates that company executives can mitigate and manage risk when making risky investment decisions (Bodnar et al., 2019). This shows that financial knowledge is a characteristic of individuals more tolerant of investment risk (Grable, 2008; L. T. M. Nguyen et al., 2016; Salman et al., 2020).

Moreover, this study focused on risk perception, which was used as a mediator of financial knowledge to develop investment decision-making from a company. Perception of risk can be designed based on problems in determining decisions in a construction project (Zhao et al., 2016). This study also carried out a new development on the risk perception variable by including two dimensions. According to Nobre et al. (2018), risk perception was used as a mediator of financial knowledge that influenced investment decisions, risk cushion, and risk knowledge so that it could provide a comprehensive picture of the investment decision-making model. Financial knowledge could be a catalyst that positively influences risk perception so that decision-makers understand their abilities, such as having a higher level of trust and open-mindedness (Sang et al., 2020). High-risk knowledge indicates that company managers can make risky investment decisions by considering analysis, understanding the impact, and estimating future results (Nobre et al., 2018). A high level of risk-bearing indicates that managers are expected to be able to bear all risks arising from investment decision-making if there is positive support from the company owner (Benischke et al., 2019). These two dimensions can influence high-risk perceptions that can significantly affect risk decision-making in the context of project financing/investment (Dhole et al., 2023; Salman et al., 2020). Previous studies have shown that high-risk perceptions influence individuals to invest in high-risk investment portfolios (Ahmed et al., 2022; Thai et al., 2017).

This study aimed to investigate the influence of advanced financial knowledge on investment decisions by infrastructure companies, especially SOE, Indonesia. The mediators of this study were risk tolerance and risk perception, which were integrated into a second-order model based on behavioral decision theory. In addition, the results of the study would consider risk tolerance variables, such as risk preferences and risk exposure, and risk perception variables, such as risk-bearing and risk knowledge, to provide further insight into how advanced financial knowledge had the potential to provide positive and significant benefits and influences on investment decisions. Then, decision-makers already understand the level of volatility they would face in obtaining more optimal returns through project investment.

2. Literature Review

2.1 Prospect Theory

Previous studies on decision-making have been conducted long ago, showing that project investment still has problems that cause various risks for the company. Behavioral Finance is a basis for determining decisions, especially in risk conditions (Kahneman & Tversky, 1979). Prospect theory focuses on company strategies that prefer to minimize risk to provide benefits for the company. However, this could cause losses due to investment values that are not by the company's plans regarding the benefits. Profits and losses result from how a company can manage the company's finances with various considerations from the company's financial system. Even though the company loses, the company manager must be able to accept all risks from the decisions that have been made by the company (Sadgrove, 2016). This study implemented prospect theory as a basis for designing concepts related to the influence of research construction, advanced financial knowledge, and investment decisions. Finally, individuals' financial knowledge skills can determine the primary basis for making long-term investment decisions.

2.2 Behavioral Decision Theory

Behavioral decision theory shows perceptions based on risk perception and tolerance (Slovic et al., 1977; Slovic & Peters, 2006). Risk analysis focuses on mental factors related to risk management and classical financial perspectives. In addition, risk policies provide information related to social norms. For example, individuals focus on social behavior based on applicable norms. Risk sentiment also focuses on how individuals make decisions based on their perspectives that are based on experiences caused by the problems individuals face (Aggarwal, 2022). Niittymies (2020) stated that heuristic is a concept that provides information related to decision-making based on experiences and mindsets. Risk assessment can show how company managers make decisions with results that do not necessarily meet company expectations. The risk of a situation can show the results of the decision; loss or profit is determined by how each assesses the company's decisions (Kahneman & Tversky, 2013).

The risk profile aims to provide various ways for each individual to make decisions that have risks. It is what causes differences in showing differences in the approach to decision-making that has risks (Carr &

Steele, 2010). Risk tolerance is developed into investment risk, comfort, and experience (Grable et al., 2020). Each individual in the company has different assessments regarding the decisions of the company's managers, whose involvement also determines the company's success, even though the results of the decision are not to the company's expectations. This study uses a framework based on risk preferences and risk composition, which are the variables of this study, namely risk tolerance. In addition, the results of previous studies provide information related to the assessment of the multidimensional nature of risk tolerance integrated with the scaling method (Cooper et al., 2014).

Infrastructure project investment is a picture of company managers who perceive risk negatively affects the results of decisions for the company (Thamhain, 2013). Decision-making is based on various factors that are the company's expectations for success. Risk is a process of company development that begins with decision-making regarding company goals. The relationship between risk and return provides information related to decisions with a subjective concept where individual perceptions focus on assessing risk responsibility (Markiewicz et al., 2020). Thus, based on the literature review above, this research concept develops a dimension of risk perception variables consisting of risk knowledge and risk bearing to conceptualize the possibility of risk loss on the amount invested by managers in the company. Based on the view of behavioral decision theory described by prospect theory, this study uses a conceptual framework for the relationship between risk tolerance and risk perception that mediates the risk profile so that the investment decision-making process can develop by implementing the collaboration of the two variables.

2.3 Advanced Financial Knowledge and Investment Decision

Advanced financial knowledge is a significant factor in making decisions for investment planning. This theory is supported by Lusardi and Mitchell (2014), which states that high financial knowledge influences better future financial plans so that it is a valuable tool for making financial decisions, while the level of financial knowledge is still relatively low in many countries, mainly when applied in decision investing in long-term projects such as infrastructure projects, oil, and gas, etc. Basic financial knowledge is developed into advanced financial knowledge in making investment decisions that consider the complexity of funding sources and long-term returns (Sivaramakrishnan et al., 2017). The measure of advanced financial knowledge is related to investment returns and funding sources in the form of bonds, bank debt, or equity investments.

Individuals with financial literacy can quickly identify appropriate indicators and their function and significance in influencing the performance of investment options. Much of the uncertainty associated with investing will be eliminated as these people realize that their decisions to face or avoid certain risks are based on knowledge. They tend to be open-minded and have a positive outlook on financial investments. Individuals with sound financial knowledge also state that investment activities are an effective way to overcome inflation, which maintains the value of wealth assets to remain sustainable (Gatti, 2023). Investment diversification will be understood as a helpful concept for reducing risk without ignoring the many potential profits. Due to factors influencing investment results, individuals with sound financial knowledge can develop better investment plans that suit their preferences and goals (Razen et al., 2020). It showed that financial knowledge, which could be categorized as high level, makes individuals choose to invest their financials.

In a study conducted in China, Xia et al. (2014) found a significant influence of advanced financial knowledge on investment decisions when investing in the stock market. Advanced financial knowledge, such as estimating NPV, IRR, and DCF, focuses on shares and bonds in a company so that investors can decide whether the share price or the bonds purchased are still below market price or vice versa (Anderson et al., 2018; van Rooij et al., 2011). The previous research showed that advanced financial knowledge significantly influenced investment decisions (Sivaramakrishnan et al. 2017; Anderson et al. 2018; Razen et al. 2020; Van Rooij et al. 2011). Based on the theoretical description and empirical findings above, Hypothesis 1 can be formulated as follows:

H1: *Advanced financial knowledge has a significant positive effect on investment decisions.*

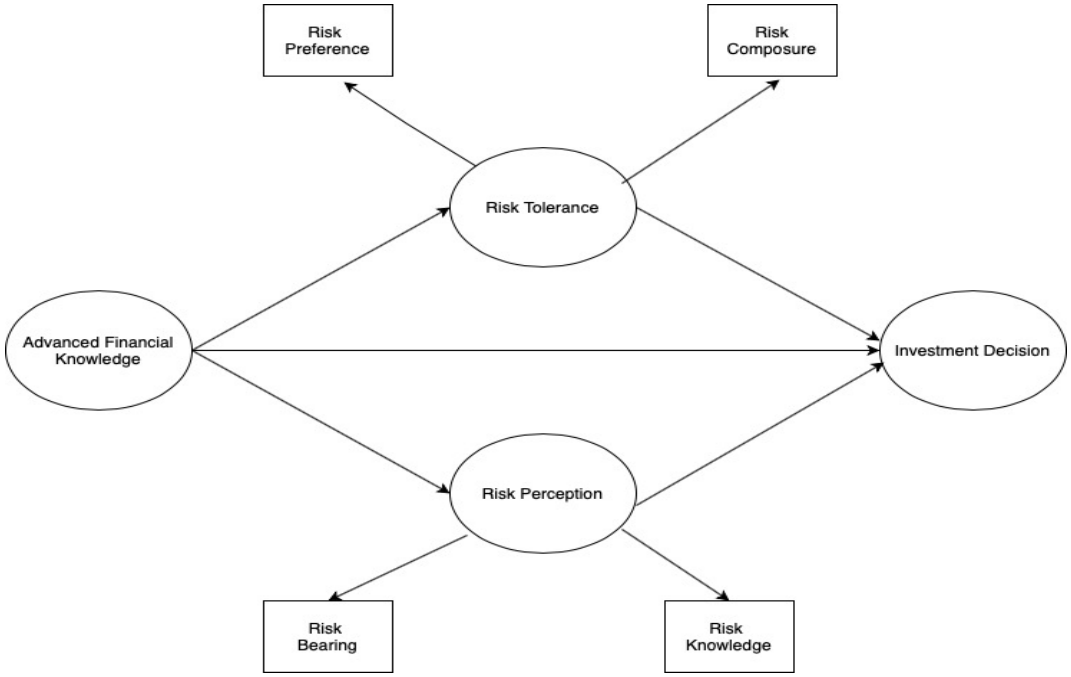

Figure 1. Conceptual Model

2.4 The Mediation role of Risk Tolerance

Advanced financial literacy of capital market investors in Australia found that risk tolerance could provide higher financial knowledge for investors (Nguyen et al. 2016). The results of this research support the behavioral perspective in explaining individual financial risk tolerance. Incompetent individuals are more sensitive to behavioral biases. Specifically, the study findings consider essential factors such as financial literacy to understand investors' risk tolerance better. Furthermore, if individuals have high critical thinking skills in risk, they will have better knowledge about the importance of the process in evaluating possibilities (De Bortoli et al., 2019). Thus, cognitive ability can also determine an investor's risk profile. People with more significant cognitive abilities tend to understand financial markets more consistently and are thus able to process information more efficiently, broadening their participation in the stock market (Thanki & Baser, 2021). For this reason, previous research shows that individuals with more excellent cognitive abilities tend to have a high-risk investment profile.

Financial skills provide an assessment of a background that can provide guidelines in providing knowledge about expertise in financial management that focuses on assets that can be categorized as non-risky or high-risk (Heo et al., 2021). As Nguyen et al. (2019) stated, financial knowledge significantly influences risk tolerance because the higher the financial knowledge of an individual, the higher the risk tolerance of the company's investment results (Grable, 2008; Nguyen et al., 2016). Decision-making plays a vital role in determining risk tolerance, resulting in future losses for the company. Decision-making has several types, which are determined by how each individual takes risks based on the decisions they make for the company. The company dares to make decisions for its goals even though the results result in losses or success in the future, but the company has tried its best to invest its assets. Risk Tolerance is a limitation that is a benchmark for each individual in making decisions, while avoidance focuses on minimizing risks that will give bad results for the company (Kaplan & Mikes, 2016). Risk tolerance allows individuals to play an active role in financial behavior even though the results may be a loss (Grable, 2016). Previous studies have shown that risk tolerance guides the determination of more consistent decisions. Risk tolerance is essential in determining bolder decisions, especially in investment. High-risk tolerance influences individuals to dare to make decisions and vice versa (Frey et al., 2021).

At each age, investment will not decrease, and their assets will not experience high risk (Charness & Gneezy, 2010). In addition, risk preferences and composition are categorized as concepts consistent with a

company's risk profile design (Göstl, 2020). Each individual has a different perception and perspective when determining investment decisions. Some of them choose risky decisions or do not care about the risks that will occur with the decision (Leder & Betsch, 2016). Risk composition focuses on the manager's background and experience in making decisions for previous companies. It directly assumes that a manager has aggressive experience in decision-making in the past and does not hurt the decisions taken so that indirectly, he has aggressive behavior in decision-making in the future. In addition, risk preferences focus on how individuals exhibit behavior that is categorized as risky (Nobre et al., 2018). Risk preferences are based on individual hunches and their feelings about their choices (Rashad Abdel-Khalik, 2014). So, risk composition and risk preferences can develop a manager's risk profile, which can influence risk tolerance. Risk tolerance and investment decisions have a significant relationship (Grable et al., 2020) because risk tolerance can affect investment in different cases (Graffin et al., 2020; Salman et al., 2020; Shtudiner, 2018). High-risk tolerance will cause individuals to be more daring in investing in assets with high risks. Therefore, Hypothesis 2 can be formulated as follows:

H2: Risk tolerance significantly, as a mediator, affects the relationship between advanced financial knowledge and investment decisions

2.5 The Mediating Role of Risk Perception

Advanced financial knowledge significantly influences risk perception in the context of financial investment (Sang et al., 2020). An individual's self-confidence can be driven by their financial knowledge based on previous experience in making financial decisions, such as analyzing specific financial information reports. Related to this, individuals who consider themselves more knowledgeable in the financial field can reduce doubts about their ability to make the right financial decisions. High knowledge of financial products can influence investors towards the risks of the product (Hillenbrand et al., 2020). More than 1200 individuals in Switzerland prefer risky assets when investors have high financial capabilities to mitigate the risk opportunities that will occur (Drobetz et al., 2009)—Lim et al. (2019) stated that financial knowledge affects risk perception among office workers in Malaysia. Empirical results show that individuals who know more about higher financial knowledge process financial information more easily. Sound financial knowledge indicates that individuals tend to positively perceive the risk of investment returns (Sahi, 2017).

Individuals tend to focus on the prospects inherent in financial investments when they perceive that the investment project is profitable, resulting in risk-seeking behavior (Shrader et al., 2021). For example, they engage in project investment activities whose results prove that risk perception measures an individual's opinion of the financial investment risk. It can be a practical approach to determining the correct type of investment. Alternatives with lower risks may be recommended when individuals consider specific investment options risky and vice versa. In other words, investment portfolios can be made according to investors' risk perceptions based on each individual's knowledge.

Investment risk perceptions significantly influence financial investment decisions in the capital market (Nguyen et al., 2019). Individuals negatively perceive the results of their decisions when investing their assets. They do not want to suffer losses in the future. Individuals try to obtain various information that provides an understanding of the risks that may occur from the decision (Slovic et al., 2013). It is influenced by social groups or references that can be used as a guide in making decisions. Other people's risk assessments can affect individual risk perceptions because individuals quickly change consumer attitudes in business (Vlaev et al., 2009). Risk perception can help individuals to invest (Lim et al., 2018). In addition, risk perception has internal and external factors that can influence decisions because there are various considerations given by risk perception. Thus, in previous studies, risk perception helped increase the consistency of decision-making when facing the risk of loss when making financial decisions under conditions of uncertainty.

High-risk perception significantly influences financial investment (Aeknarajindawat, 2020). Managers with high-risk perceptions will dare to invest in financial products with high returns even though investment projects are volatile because of the role of risk knowledge with risk-bearing on risk perception (Rao, 2016). Risk perception focuses on the mindset of individuals who influence the processing of the information they

get from various sources related to the risk of decisions (Rao, 2016). The purpose of risk-taking is to provide an overview of the results of the decision, which can be in the form of objective and psychological aspects. Actuarial knowledge calculations can be used to assess the risk of decisions taken by individuals so that they can be aware of the risk (Hart & Cooke, 2013). For example, two individuals presented with the same "facts" may interpret the inherent risk differently. For some people, factory smoke causes fear because it indicates pollution, while for others, it is a calming sign because it symbolizes work and economic activity. Perception assessment is based on internal and external factors focusing on the individual's knowledge and decision-making ability (Abubakar et al., 2019). The development of perception is based on processing information from the surrounding environment and indirectly forms an assessment of the acceptability of a condition that will be accepted (Renn & Benighaus, 2013). Perception can be formed according to the context of the problem in which the decision is made and the various factors that underlie the problem.

Managers' skills, experience, and knowledge can be determined by how the decision affects the result. Risk perception can indicate uncertainty in a decision, but a quality manager will be able to demonstrate various strategies that can minimize risk with maximum results (Slovic et al., 2013). Risk perception provides various solutions to problems that arise from decision-making. Risk bearing focuses on the decision's impact, which poses a risk to the result, which can threaten the manager's position or cause losses that are a significant problem for the company (Chang, 2015). It is supported by Sang et al. (2020), who state that risk perception has a significant relationship with investment decisions. High-risk perception influences individuals to invest in their assets, which can pose high risks. So that the formulation of Hypothesis 3 can be designed as follows:

H3: Risk perception significantly, as a mediator, influences the relationship between advanced financial knowledge and investment decisions

3. Research Method

3.1 Data Instrument

The data instrument used in this study was a questionnaire that focused on a five-point Likert scale. This study used four concepts that form the framework of this study, namely advanced financial knowledge that aimed to measure five critical indicators: risk tolerance, which was a combination of risk preference and risk composure; risk perception, which was a combination of risk bearing and risk knowledge, and investment decisions that aimed to measure six critical indicators. This study was conducted using previous instruments that were by the topic of this study (Anderson et al., 2018; Bonfim et al., 2018; Carr & Steele, 2010; Chang, 2015; Grable et al., 2020; Haritha & Uchil, 2020; Mojtahedi & Oo, 2017; L. Nguyen et al., 2019; Nobre et al., 2018, 2018; Ogunlusi & Obademi, 2021; Sang et al., 2020; Sivaramakrishnan et al., 2017; van Rooij et al., 2011; Wojewnik-Filipkowska et al., 2021).

3.2 Sample Design

This study aimed to determine the effect of risk tolerance and risk-bearing on investment decisions of State-Owned Enterprises (SOE) in Indonesia that focus on infrastructure projects. This study was conducted with a sample from the Ministry of SOE consisting of 130 subsidiaries of SOE in Indonesia (Annual Report of SOE, 2022). The sample of this study was 130 random companies that are part of the subsidiary SOE. Project managers were the respondents of this study because they have authority in all aspects of the company, especially problems that occur from decisions taken for the company. The research instrument was a survey in the form of envelopes as initial information related to this study. The results showed that 101 samples responded to 77.69%, explained in Table 1 as a demographic sample.

3.3. Scale Validation

PLS was used in this study to determine the structural equation based on the purpose of the estimate. Table 2 explains that the leading of standard items showed 0.715 to 0.913. The Cronbach's alpha construct shows 0.794 to 0.913. The average variance extracted (AVE) showed 0.603 to 0.778. Table 3 explains that the AVE

on each construct shows a significant influence over its correlation to all other constructs. This concludes that the reliability, convergence, and validity are well accepted.

4. Hypothesis Testing

PLS aims to analyze the hypothesis of this study, which focuses on the structural model. The first step of this study was to determine the path coefficient and statistical significance, which focused on the influence of the results. The coefficient of determination related to the endogenous variable focuses on assessing predictive power. Relative importance was tested using first-level indicators related to second-level constructs with essential indicators (Hair et al., 2017). The results of the structural model can be seen in Figure 2, and the results of the standard path coefficient model can be seen in Table 4. The path coefficient of advanced financial knowledge on investment decisions showed a significant effect (ß = 0.226; p-value <0.01), so H1 was supported. The last step of this study was the indirect relationship between advanced financial knowledge on investment decisions using risk tolerance and risk perception as mediators, which were also positive and significant (ß = 0.296, p <0.01; ß = 0.065, p <0.05). H2 and H3 were in the supported category. From these results, the intervening variable had a significant effect as a partial mediation used to link advanced financial knowledge and investment decisions.

Table 1. Demographics

Characteristic	Frequency	Percent
Gender		
Male	87	86,14%
Female	14	13,86%
Education		
Undergraduate	37	36,63%
Post-graduate	54	53,46%
Doctoral	10	9,91%
Position		
Chief Executive Officer	11	10,89%
Directors	48	47,52%
Division Head	30	29,70%
Manager	12	11,89%
Working Experience		
< 2 years	6	5,94%
2 – 5 years	34	33,66%
5 – 10	46	45,54%
> 10 years	15	14,86%
Project Investment		
< USD 7 Million	18	17,82%
> USD 7 Million	83	82,18%
Operational Income Annually		
< USD 3.5 Million	14	13,86%

USD 3.5 Million – USD 7 Million	23	22,77%
> USD 7 Million	64	63,37%
	101	100%

Table 2. Item Measurement Model

Item Name	Item Loading	Cronbach's alphas	AVE
Advanced Financial Knowledge adapted by Van Rooij et al., 2011; Sivaramakrishnan et al., 2017; Wojewnik-Filipkowska et al., 2019; Mojtahedi & Oo, 2017		0,744	0,603
AFK1	0,613*		
AFK2	0,737		
AFK3	0,762		
AFK4	0,783		
AFK5	0,823		
Risk Bearing adapted by Grable, 2017; Sang et al., 2020; Chang, 2015		0,825	0,656
RB1	0,872		
RB2	0,930		
RB3	0,920		
RB4	0,920		
RB5	0,645*		
Risk Knowledge adapted by Bonfim et al., 2018		0,858	0,778
RK1	0,634*		
RK2	0,822		
RK3	0,908		
RK4	0,913		
RK5	0,612*		

Risk Preference adapted by Grable et al., 2020; Nobre et al., 2018; RP1 RP2 RP3 RP4 RP5	 0,715 0,795 0,820 0,726 0,874	0,850	0,621
Risk Composure adapted by Carr, 2010; Gou et al., 2021; Vieider et al., 2019 RC1 RC2 RC3 RC4 RC5	 0,822 0,879 0,909 0,900 0,795	0,913	0,743
Investment Decision adapted by Ogunlusi & Obademi, 2021; Haritha & Uchil, 2020; Anderson et al., 2018; Nguyen et al., 2019 ID1 ID2 ID3 ID4 ID5 ID6	 0,781 0,898 0,645* 0,861 0,675* 0,543*	0,813	0,720

(Source: Authors own work) (* dropped item loading < 0,7)

Table 3. Discriminant Validity

Variable	**AFK**	**ID**	**RP**	**RT**
AFK				

ID	0,715			
RP	0,470	0,653		
RT	0,419	0,882	0,499	

(Source: Authors own work)

Figure 2. The Model Results (Source: Authors own work)

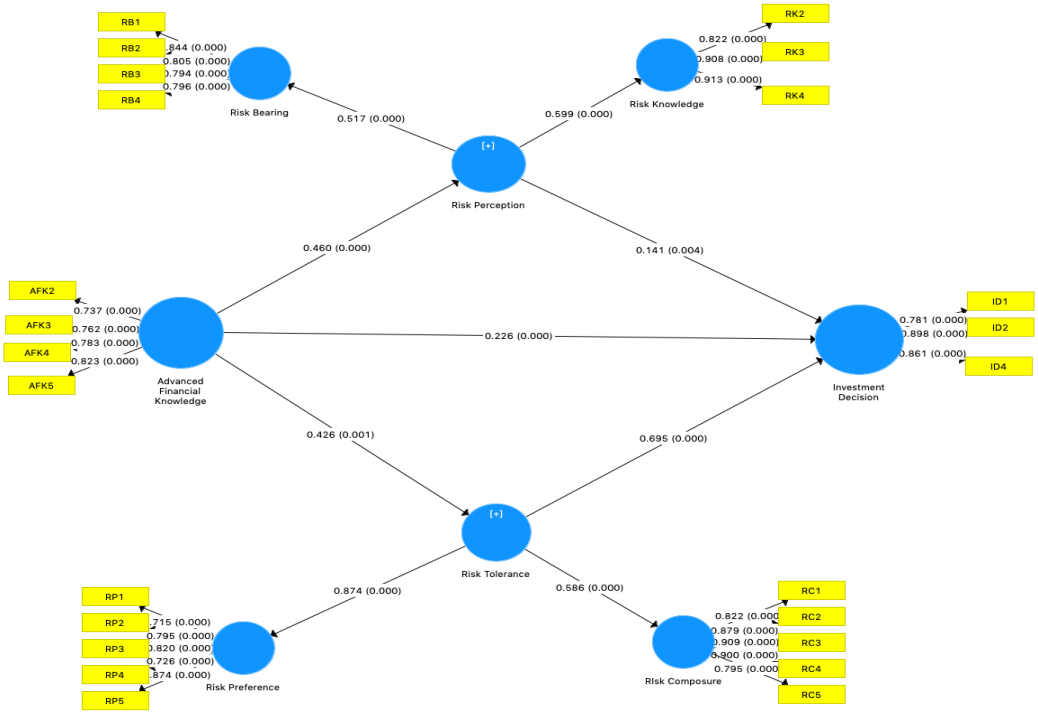

Table 4. The hypotheses result

Hypothesis	Relationship	Path Koefisien	Test Result
H1	*Advanced Financial Knowledge –> Investment Decision*	0,226	Significant at 99%
H2	*Advanced Financial Knowledge –> Risk Tolerance –> Investment Decision*	0,296	Significant at 99%
H3	*Advanced Financial Knowledge –> Risk Perception –> Investment Decision*	0,065	Significant at 95%

(Source: Authors own work)

5. Findings and implications

Advanced financial knowledge improves project investment decisions in state-owned enterprise subsidiaries. Advanced financial analysis skills from management can evaluate project investment decisions more accurately. High financial knowledge can influence individuals to manage finances by evaluating, assessing, and considering investment decisions (Tang & Baker, 2016). It also provides an overview for individuals to demonstrate financial attitudes based on beliefs and knowledge of finance.

Furthermore, the better a person's knowledge of advanced finance, the better the management's ability to solve problems in investment decision-making. Understanding the structure of a project's financial model is also essential in the decision-making process of a project, including the need to carry out a simulation process of the possibilities related to project performance. Project investment decisions taken by company management always consider the project feasibility analysis tool as Net Present Value (NPV), where project management will try to maximize high project profitability (Peymankar et al., 2021). A net current project investment value is calculated based on the formation of cash flow, which is calculated based on methods such as free cash flow. Based on project finance projects that include cash inflows and outflows, including considering the amount of investment value and financing costs, all of which are calculated using the present value using discounts (Benninga, 2014).

The study showed that with high-level financial analysis skills, management could evaluate project investment decisions more accurately, where one crucial consideration is using NPV predictions. Risk tolerance is this study's primary focus, which significantly influences advanced financial knowledge with investment decisions. This study showed that advanced financial knowledge skills focus on various financial feasibility evaluation methods, especially NPV and advanced sensitivity analysis methods such as the Monte Carlo method (Fabianová et al., 2023), which will be the basis for investment decision-making (Anderson et al., 2018). Paying attention to the influence of risk is accommodated through the risk tolerance of decision-makers. Behavioral decision theory focuses on management as decision-makers selectively process information, with attention paid to the most influential dimensions between risk composition and risk preference. Decision makers focus more on risk preferences for actual and directly experienced issues that can impact business performance. This experience encourages management to evaluate preferences by referring to the results of previous investment experiences.

In investing in state-owned companies, management experience is likely to involve risk criteria arising from each investment decision, where management tends to have a high-risk preference for increasing the return value of its investment projects. Experience in choosing the type of project investment allows management to prioritize risk preferences over risk composition. Thus, decision-making will be easier if one of the criteria is set as the most crucial. For example, state-owned companies tend to invest in projects with criteria for public/community interest, such as toll road infrastructure, even though several other aspects, such as funding sources, come from bank loans or increases in the cost of project raw materials. Management has a high-risk tolerance because of the encouragement of high-risk preferences. SOE management can analyze its projects so that there is a desire to take more significant risks to optimize investment results (Li et al., 2023). They take several steps to achieve success, namely divesting no longer profitable projects to ensure that the target return on the investment portfolio is achieved. It provides an opportunity for management to immediately take advantage of taking projects in the future. Furthermore, when investment results decline, management will dare to release its assets and then divert its investment to other projects to gain more profit from previous investments. The higher the tolerance for financial risk and diversification of business activities, the more it can guarantee the continuity of daily business operations, even though several units in business or productive assets experience a decrease in value.

Risk perception is also a primary focus that shows a significant influence in mediating advanced financial knowledge on investment decisions. It is in line with behavioral decision theory, where management already has high financial knowledge regarding NPV and IRR projection instruments, so the perception of risk related to the investment that arises will be higher. Based on risk-bearing and risk-knowledge as dimensions of risk perception (Nobre, 2018). This study showed that the risk-bearing dimension tends to have a more minor influence on the risk perception variable when compared to risk knowledge. Respondents tend to pay more attention to risk control capabilities and the process of implementing risk management than choosing investments that provide high returns even though they are ready to bear losses or failures on investments invested in specific business sectors if the project fails or suffers career and financial consequences from project failure.

Most SOE management is ready to bear all the consequences of risks related to project investment, although the project investment decision-making process tends to take a long time. Management generally estimates

risk freely by making calculated decisions so that it is more likely to avoid high risks. Management's risk perception behavior is more towards high-risk bearing when compared to risk knowledge in increasing the speed of the project investment decision-making process. For example, investment in constructing a toll road project requires a huge area of land. Land acquisition factors are often an obstacle where not all land can be obtained quickly and efficiently, so that management already knows the project's risk level to be implemented is relatively challenging. However, central government support in the land acquisition process can be resolved where the risk-bearing aspect provides certainty regarding the risk burden that management must bear.

In this context, the company owner can bear potential losses arising from project operational costs and market risks in project investment activities, so that the management board of directors dares to make optimal investment decisions. This study's results align with the findings of Ahmed et al. 2022; Nguyen et al. 2019; Bonfim et al., 2018 showed that high management perceptions can reduce investment assessments of projects to be selected. Risk perception affects investor decision-making from management based on cognitive attributes and the burden of responsibility in financial behavior that affects investment. Management is vulnerable to the consequences of future project investment failures and cognitive errors in projecting and controlling investment risks that result in suboptimal project investment choices. Thus, SOE management with a high-risk perception tends to pursue projects with a high-risk scale because they have a high investment return, thus encouraging investment decision-making for projects in this sector.

Theoretically, prospect theory and behavioral decision theory can develop with the study results. The results of this study indicate that advanced financial knowledge significantly influences investment decisions using risk tolerance and perception in the infrastructure project investment process in SOE. Risk tolerance is more influential than risk perception when management considers investment decision-making. In addition, developing a conceptual theory with a second-order model where risk tolerance with two dimensions, namely risk preference and risk composition, and risk perception with two dimensions, namely risk cushion and risk knowledge, can bridge the relationship between advanced and advanced financial knowledge and investment decisions.

Practically, management of SOE has a stronger risk preference so that overall, it has a higher tolerance, which ultimately forms risk behaviour in the decision-making process regarding project investment. A high-risk acceptance preference indicates a high tolerance for risk behavior so those with high-risk preferences can tolerate more significant risks compared to those with low-risk preferences. Advanced financial knowledge is highly influenced by management experience with problems arising from previous investment projects. Management that has gone through difficult experiences and obstacles in implementing previous investment projects tends to have high-risk calm and remains confident in the investment decisions that have been taken. Thus, in-depth analytical knowledge of management causes management to prefer investment projects with high-risk preferences even though they must be willing to tolerate greater potential profits or losses. Thus, management tends to take and accept more risks because of high risk perception factors, plus the belief that returns and risk preferences depend on support from shareholders or ownership. Thus, the management's high-risk tolerance profile is supported by high-risk preferences and calmness so that project investment decision-making can change quickly, especially regarding capital expenditure and project feasibility, so that management takes risks at varying levels. So, high financial risk tolerance must be able to design a project investment plan well to prevent unwanted risks.

6. Conclusions and Limitations

There was a novelty in this study that influences the development of advanced knowledge mediated by risk tolerance and risk perception in infrastructure project investment decisions run by SOE. The results of this study indicated that risk tolerance is more capable of mediating project investment decisions than risk perception. The results of this study could answer the gap in this research because there is a conceptual model in managerial risk-taking that focuses on the risks and the risk profile of the decision-making. In addition, the conceptual model shows a significant influence on risk bearing, risk knowledge, risk

preference, and risk control. The results in the form of a significant influence on factors and managerial risk-taking behaviour evidence this. Therefore, companies prefer this conceptual model because it can provide an overview of the profile of managers who meet the company's investment project requirements. The limitation of this study was the analysis using a cross-sectional design that affected the longitudinal study, which is used as the basis for further research. The respondents in this study only focused on SOE management in the infrastructure cluster. Further research can develop respondents by focusing on private companies with diverse clusters. In addition, managerial risk-taking behavior focuses on risk perception and risk tolerance based on the mindset toward investment decisions. Further research can develop risk bearing, risk knowledge, risk preference, and risk control to be more related to each other and provide a significant influence on mediator variables in investigating advanced financial knowledge that focuses on investment decisions.

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