

THE RELATIONSHIP BETWEEN FINANCIAL LITERACY LEVELS AND INVESTMENT BEHAVIOR: UNDERSTANDING THROUGH CAUSAL LOOP DIAGRAM

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ARTICLE INFO	ABSTRACT
<p>Keywords: Financial literacy, behaviour, investment intention, system dynamics, causal loop diagram</p>	<p>This research aims to provide an overview of the factors that influence a person's or individuals' investment behavior. The aspects modeled in this study are internal and external. The result is a picture of the relationship between financial literacy and investment intention. Financial literacy is represented by knowledge, skills, and competencies, while investment interest is represented by attitudes, subjective norms, and perceived behavioral control. The investment interest relation employs the theory of planned behavior (TPB), which proposes that a person's or individual's investment behavior is influenced by attitudes, subjective norms, and perceived behavioral control. This study's methodology is system dynamics, which is based on the concept of feedback from control theory and causal loops. In this study, a causal loop diagram approach was used, namely a feedback loop system in a diagram, and this is a feedback structure communication tool that represents the system's main feedback loop that produces the system's dynamic reference behavior.</p>
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1. INTRODUCTION

Every individual is in a quite dilemmatic choice situation when faced with a choice in deciding the allocation of funds that will be used now or in the future. Sometimes the funds you have cannot be maximized in productive activities or as passive income. Investment could be one solution to overcome this problem. Investment is a commitment of a certain amount of funds or other resources made at this time with the aim of obtaining a certain amount of profit in the future [1]. In other words, investment is a commitment to sacrifice current consumption with the aim of increasing consumption in the future. Investment is a commitment to invest funds now with the hope of gaining profits in the future. There are two types of investment. First, investment in real assets, such as: land; House; gold; as well as other real assets. Second, investment in financial assets, such as: deposits; share; bond; and other securities [1].

The capital market itself has an important role apart from being an intermediary institution, the capital market is also one of the pillars of a country's economy. Capital markets generally have two important functions. The first function is a source of company funds, while the next function is a means for corporations to collect funds from people who have capital or are usually referred to as investors. OJK noted that in the midst of increasing global economic turmoil and high global financial market volatility which has the potential to have an impact on domestic financial markets, the performance of the Indonesian Capital Market recorded positive growth with relatively controlled volatility compared to other countries [2]. To mitigate and reduce the impact of markets that fluctuate significantly and have the potential to put pressure on capital market stability, including the performance of capital market industry players, OJK has the authority to take steps to determine policies for handling volatility, stimulus and/or relaxation for financial services industry players in the capital market sector. This OJK regulation was issued to maintain good governance in establishing policies to improve the performance of Capital Market

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industry players, maintain Capital Market stability and Indonesia's economic growth[3]. The overall achievements of the Indonesian Capital Market are very important in efforts to realize Indonesia as a safe, comfortable and reliable place to invest, especially in supporting the provision of sustainable sources of financing, both for Government priority projects and to increase the competitiveness of Indonesian companies on the global stage[4].

Investing in the capital market is an investment option for individuals or investors apart from allocating existing funds, one of which is savings in banking. The aim of individuals or investors is to invest funds owned in the capital market with the aim of the allocated funds being productive and the risks can still be borne by the individual or potential investor. For individuals or investors, funds invested in the capital market are expected to provide returns where banks cannot provide profits with the same allocation of funds or investments, namely profits in the form of dividend payments whose nominal value can exceed the amount of interest paid by banks with the same investment value. Large profits will be accompanied by a large level of risk as well. One example is that when a company experiences losses, investors usually do not get the right to dividends [5]. The performance of the Indonesian Capital Market from press release SP 97/DHMS/OJK/XII/2022 still recorded positive growth. As of December 29 2022, the JCI was at 6,860.08 points or managed to grow by 4.23% year-to-date. Along with the growth of the JCI, market capitalization also grew by 15.18% year-to-date, namely IDR 9,509 trillion. JCI also broke its highest record in history at the level of 7,318.01 points, precisely on September 13 2022. Likewise with market capitalization which recorded its highest record in history on December 27 2022 amounting to IDR 9,600 trillion. Even though the JCI performance has experienced growth and is appreciated by many parties, the performance of Mutual Funds is still experiencing pressure due to several factors, including the policy of shifting unit links to other financial instruments outside mutual funds. As of 28 December 2022, the total NAV of Mutual Funds was recorded to have fallen 12.58% to IDR 505.69 trillion, with the number of Mutual Fund products also decreasing from 2,198 to 2,143 products[6].

On the other hand, the growth in the number of investors has also increased quite significantly. Currently, the number of Single Investor Identification (SID) has reached 9.38 million or an increase of 25.20 percent ytd. The highest investor growth was recorded by mutual fund investors and the majority is still dominated by millennials and generation Z under 30 years of age reaching around 59.43 percent [7]. In the regulatory sector, as of August 9 2022, OJK has issued eight Capital Market regulations, namely two POJK and six SEOJK which aim to support the government in encouraging national economic recovery, improving business processes, as well as related to increasing supervision efforts towards the Capital Market industry [7]. In implementing law enforcement in the Capital Market sector, up to 9 August 2022, OJK has issued 671 sanctions letters consisting of 33 written warning sanctions, two permits suspension sanctions, one permit revocation sanction, and 623 administrative sanctions in the form of fines with a total fine of IDR 30.75 billion.

Apart from that, OJK also issued 12 written orders as an effort to enforce the law against violations of laws and regulations in the Capital Markets sector[8]. Investors or potential investors in making decisions to invest are influenced by psychological factors [9]. Many research models have emerged regarding the relationship between psychology and human behavior, but the theory of planned behavior is the most satisfactory for application in studying human behavior and psychology [10]. The theory of planned behavior explains that attitudes towards behavior are an important point that can predict an action, however it is necessary to consider a person's attitude in testing subjective norms and measuring the person's perceived behavioral control. If there is a positive attitude, support from people around them and a perception of ease because there are no obstacles to behaving then a person's intention to behave will be higher[11]. Someone who has a positive attitude towards investing in shares, has support from people around him and has a perception of ease because there are no obstacles to investing in shares, then a person's intention to invest in shares will be higher.

Another aspect that needs to be considered is that financial knowledge is very important for each individual to be able to manage the capital they have. Economic added value is an advantage that can be obtained if each individual has good financial knowledge. It is now very important for individuals to have the ability and knowledge to manage personal finances effectively. Covering all levels of society from all walks of life and backgrounds. The participation of all stakeholders such as the government as a policy maker, financial services authorities, financial institutions and educational institutions such as

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universities or schools to provide education in the financial sector so that Indonesian people can be financially literate and not easily fooled by fraudulent investment products. Demographic factors such as gender, age, and education; socio-economic factors of income and employment; and the psychological factor of perception about the future has a significant effect on financial literacy. Among the factors found to be related to financial literacy, employment and future orientation are of particular interest because other factors are somewhat related to educational attainment in general. Individuals having a work background in finance and insurance greatly helps them to achieve financial literacy because of the knowledge gained through working with financial issues. Future orientation is also a specific factor of financial literacy because people tend to want to make better financial decisions when they are more concerned with the future. The results of the research conducted emphasize the need for formal financial education and social contact to increase the level of financial literacy in Japan[12].

Based on this description, this research aims to create a system dynamics model related to investment intentions for investment instruments in Indonesia, causing this research to model individual behavior, subjective norms and control of perceived behavior towards investment intentions using causal loop diagrams.

Literature Review

Causal Loop Diagrams

Causal loop diagrams identify the principal feedback loops of the systems. The causal loop diagrams are used to describe basic causal mechanisms hypothesised to generate the reference mode of behaviour of the system over time. A feedback loop contains two or more casualty related variables that close back on themselves. The relationship between one variable and next in the loop can be either positive or negative. A positive relationship means that if one variable increases, the other also increases[13].

Steps in Causal Loop Diagram[13]:

1. Define the problem and the objectives.
We must first of all study the system based on information collected through interview, focus group discussion, research report and case study. We must describe the system and define the problem with the reference mode of the behaviour of the system.
2. Identify the most important elements of the systems.
We should identify the key variables affecting the behaviour of the system, and it should be a good starting point to develop the causal loop diagram. Other variables can be added during later stages of causal loop development.
3. Identify the secondary important elements of the systems.
Secondary variables within the system boundary should be added after careful identification of the most important variables. This would provide an opportunity to consider the secondary variables of the system of importance in the causal loop diagram.
4. Identify the tertiary important elements of the systems.
Tertiary variables within the system boundary should be added after careful identification of the secondary variables. However, tertiary variables of little importance can be omitted in the later stages once it is established by simulated studies.
5. Define the cause-effect relationships.
Find the cause-effect relationships using arrows with polarity for the primary variables first, then for the secondary and tertiary variables.
6. Identify the closed loops.
Trace closed loops formed by cause-effect relationships for the variables describing the system.
7. Identify the balancing and reinforcing loops. Identify the number of negative cause-effect relationships in each of the closed loops. The closed loops with odd number of negative relationships are negative, i.e. balancing loops, and the others are positive, i.e. reinforcing loops.

Financial Literacy

Financial literacy is financial knowledge and the ability to apply it in the form of knowledge and abilities[14]. Financial literacy can be interpreted as knowledge to manage finances. Financial literacy consists of a number of abilities and knowledge about finances that a person has to be able to manage or use a certain amount of money to improve their standard of living and aim to achieve prosperity[14].

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Understanding the financial implications arising from financial decisions is fundamental to financial literacy.

Theory Of Planned Behavior

The theory of planned behavior or what we usually know as the Theory of Planned Behavior, this theory explains that behavior is the actions of a person or individuals that can be observed to describe how an individual or person takes action under certain conditions[15]. Financial literacy is a reflection of an individual's ability to understand financial information and use this information skillfully and confidently to use it according to a multi-dimensional view in conceptualizing and operationalizing existing constructs [16]. Therefore, financial literacy involves individual financial knowledge, behavior and attitudes[17]. [18] classifies financial literacy into three categories including technical financial knowledge, mutual fund knowledge, and market knowledge. Technical financial knowledge does not have a significant impact on the behavior of disposition securities, while mutual fund knowledge and current market knowledge are quite relevant to explain investor behavior.

Conceptual framework

Based on the description above, it can be built research framework as follows:

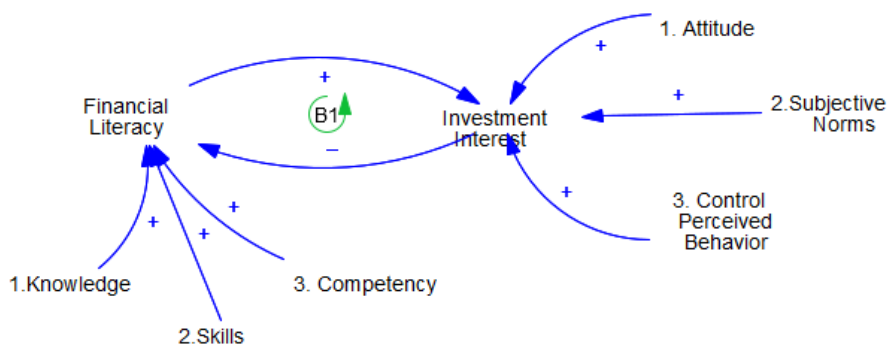


Figure 1. Conceptual framework with CLD'S

Research Hypothesis

Once the problem is identified, the next step is to develop a theory called dynamic hypothesis based on the reference mode behaviour over a time horizon. The dynamic hypothesis in terms of causal loop diagram and stock-flow diagram of the system can explain the dynamics of the problem. The hypothesis is provisional and is subject to revision and rejection which solely depends on the observed and simulated reference mode of behaviour over a time horizon[19].

The dynamic hypothesis is a conceptual model typically consisting of a causal loop diagram, stock-flow diagram or their combination. The dynamic hypothesis seeks to define the critical feedback loops that drive the system's behaviour. When the model based on feedback concept is simulated, the endogenous structure of the model should generate the reference mode behaviour of the system, and thus, the endogenous structure causes the changes in the dynamic behaviour of the system[19]. For example, the boom and bust of shrimp production systems can be represented by causal loop diagram and stock-flow diagram, and the simulation model based on the causal loop diagram and stock-flow diagram can generate dynamic behaviour of the shrimp production systems. The shrimp production systems in the form of causal loop diagram and stock-flow diagram are hypothesised to generate the observed boom and bust of shrimp production systems in the reference mode. In essence the degradation of the soils in the shrimp aquaculture ponds resulting from the large-scale intensification of the shrimp culture caused the boom and bust of shrimp production systems in Thailand. In fact when the shrimp industry is prone to exceed and consume its carrying capacity, the boom and bust type of development results in and this dynamics results from the endogenous consequences of the feedback structure[20].

2. METHOD

The system dynamics methodology is based on the feedback concept of control theory, and causal loops are a convenient way to represent the structure of a system's feedback loop. Causal loop diagrams are used to represent feedback loop systems diagrammatically, and this is a feedback structure

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communication tool that represents the main feedback loop of the system that produces the reference dynamic behavior of the system[13]. System dynamics or system dynamics is a methodology based on feedback systems that refers to control theory, and can easily handle non-linear systems, time delays and multi-loop structures of a complex and dynamic system[13]. Forrester's methodology provides a foundation for building computerized models to do what the human mind cannot do by rationally analyzing the structure, interactions, and modes of behavior of complex social systems, thereby providing a framework within which strategies can be tested[21]. Many software such as STELLA, VENSIM, and POWERSIM are currently available to perform almost any process or system dynamics modeling[13].

We can usually understand and design management strategies, but we need some structure or guiding principles to understand and manage the complexity and change of complex dynamic systems based on a systems approach that considers the entire system rather than in isolation. The systems approach is more of a rational and somewhat intuitive approach[13]. It depends on several formal methodologies consisting of problem definition methods, dynamic hypotheses, modeling, policy analysis, etc., and theoretical techniques that are useful for solving problem models and sub-models. Basically the system must be modeled and simulated to understand the system and design management strategies. Also this must be done before implementing management strategies[13]. Forrester's system dynamics methodology provides a methodology—guiding principles for developing computer models to simulate complex and dynamic systems to understand complex systems and design management strategies[13]. In essence, systems thinking is a formal methodology consisting of problem definition methods, dynamic hypotheses, modeling and policy analysis to understand and manage complex and dynamic systems[13].

As complexity increases, systems thinking emerges as a critical factor for success, in the world of complex dynamic systems, everyday experiences fail due to time constraints and the scope of the system being so broad[13]. When real-world experiments are impossible, simulations become the primary way we can effectively learn about the dynamics of complex systems. System dynamics is the most appropriate technique for simulating complex and dynamic systems based on systems thinking to develop policy scenarios and learn to manage systems effectively[13]. Systems thinking and modeling basically consists of problem statements, causal loop diagrams, stock–flow diagrams, scenario planning and modeling and implementation and organizational learning. The character of Systems thinking makes it effective on the most difficult types of problems to solve: those involving complex issues, those that depend heavily on the past or on the actions of other people, and those that result from ineffective coordination among those involved[13].

3. RESULT AND DISCUSSION

The value of testing the research hypothesis can be described as shown below:

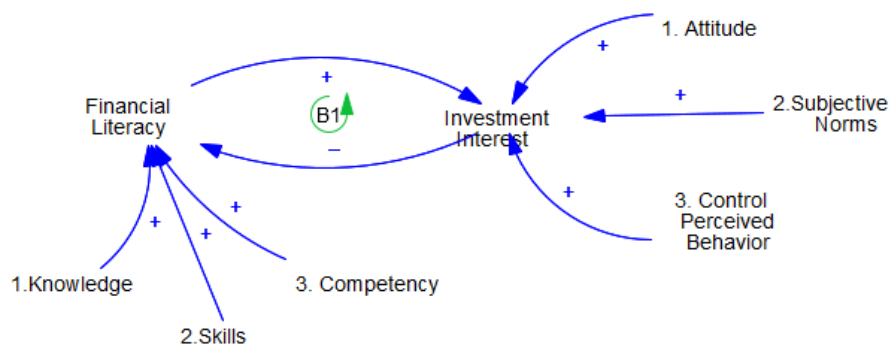


Figure 2. Financial Literacy and Investment Interest (B1)

In figure 4.1. Explains the general overview model or grand model of individual behavior carried out by individuals on an investment instrument. There are 2 aspects that will be modeled, namely financial literacy and investment interest. In figure 4.1. shows causal loop diagrams from a simple irrigation model. In the investment behavior model, the main variables are financial literacy and

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investment interest. Increased financial literacy will increase individual investment interest and vice versa, forming a negative feedback loop B1.

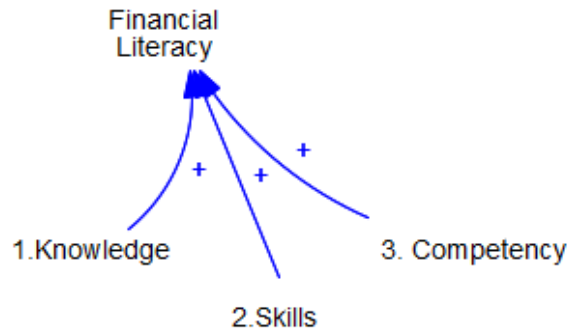


Figure 3 Model of Financial Literacy Aspects

In Figure 4.2. Aspect Model The level of financial literacy describes the extent to which a person has knowledge, skills and beliefs that will influence their attitudes and behavior in financial management. Financial literacy is a belief that a person can improve the quality of financial decision making with the knowledge and abilities they have. To achieve good behavior in financial management, a person must have good financial literacy. The direction of the positive relationship in the model above from the financial literacy aspect model is in accordance with several relevant previous studies, namely research conducted by and Fatimah [22] which shows that financial literacy has a significant positive influence on student financial behavior. In this research, the influence that arises is in the same direction, where if financial literacy is high then students' financial behavior will also be good and vice versa, Herawati [23] where the results of their research on Financial Literacy on Financial Self Efficacy have a positive coefficient value, this shows that The higher the financial literacy, the higher the financial self-efficacy, Ameliawati [24] where the research results are that financial literacy has a positive and significant influence on financial management behavior,

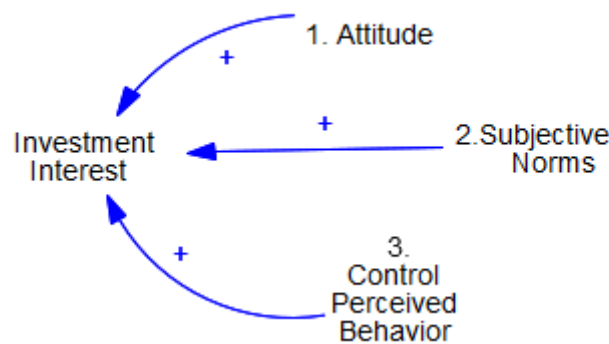


Figure 4 Investment Interest Aspect Model

In figure 4.3. The Investment Interest Aspect Model describes using the Theory of Planned Behavior explaining that when acting it always starts with interest, such as the desire to start investing excess funds owned in the capital market[11]. A person's or individual's main needs have been fulfilled which is the basis for the desire to invest. The desire to demonstrate existence in directing individuals to carry out various efforts even though it is not easy and requires quite a lot of effort. Ajzren[11] in the theory of planned behavior (TPB) suggests that behavior is caused by several factors. These factors are attitudes, subjective norms, behavioral control, and intentions. In this case, the behavior referred to is financial behavior. Behavior depends on the intentions or intentions that are held, these intentions depend on attitudes, subjective norms, and control over behavior. Based on the theory of planned

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behavior, it can be said that behavior related to individuals is influenced by several factors originating from internal and external factors.

4. CONCLUSION

This research produces a model of investment behavior using system dynamics to describe the investment behavior of a person or individual using two general variables, namely financial literacy and investment interest. Systems thinking is a method of studying the dynamic behavior of complex systems by considering a systems approach, namely considering the whole system rather than separately, and system dynamics is a tool or field of knowledge for understanding change and complexity over time of a dynamic system[13]. In isolation, complex systems can give a false impression of dynamic behavior that is far from the actual behavior of the actual system[13]. Thus, systems thinking must consider all interacting components that influence the dynamics of a complex system, and a system dynamics methodology based on the feedback concept of control theory developed by Forrester[25] is the most appropriate technique for dealing with such complex systems to improve thinking. systems and learning systems[13]. The basic structure of a feedback loop is a closed path in a sequence consisting of decisions that control actions (based on the current state of the system and desired goals) that produce flows, stocks or system levels and information about system stocks, the latter returning to the decision point to further action. The currently available information about the level or stock of the system and its goals is the basis for current decisions that drive action. The action of changing the state of the system. A single feedback loop structure is the simplest form of a feedback system. The feedback loop structure of a system simulates dynamic behavior, and all dynamics arise from the interaction of two types of feedback loops: positive feedback loops and negative feedback loops.

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