Article Type: Research Paper

The Role of Technology Information on Financial Literacy in Indonesia

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Abstract: Financial management literacy is a significant knowledge to assist individuals' financial condition. There are various factors influencing monetary management, including Information technology (IT). Thus, this study aims to investigate the role of IT affecting individual awareness of financial literacy in Indonesia with household characteristics as the controlling variable; the data are generated from the Indonesian Family Life Survey conducted in 2014. Probit and logit models signify that ITs and household characteristics positively and significantly affect financial literacy. In detail, handphones, televisions and newspapers, marital status, education level, and household income levels have a positive and significant influence on households' accessing financial knowledge. Furthermore, multinomial logit estimation used to compare three different levels of financial literacy (low, medium, and high), indicates that six out of nine variables significantly affect financial literacy at low level to high levels, whereas only four out of nine influence financial literacy from medium to a high level.
Keywords: Financial literacy; IFLS; Technology; Household characteristic; Probit; Logit
JEL Classification: G20; 010; G53

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THIS ARTICLE IS AVALILABLE IN:
http://journal.umy.ac.id/index.php/esp

DOI: 10.18196/jesp.v23i1.14148

CITATION:
Rizkan, M., Hartarto, R. B., Supiandi, S., & Hou, C-T. (2022). The Role of Technology Information on Financial Literacy in Indonesia. *Jurnal Ekonomi & Studi Pembangunan, 23*(1), 157-170.

ARTICLE HISTORY
Received:
02 Mar 2022
Revised:
25 Mar 2022
21 Apr 2022
Accepted:
26 Apr 2022

Introduction

In this digital era, individuals are expected to be more responsible for their financial situation, including their income, life expectancy, well-being, and financial freedom. Individuals must be able to manage their funds to enhance their living standards (Ameliawati & Setiyani, 2018). Furthermore, today's society is confronted with the unpredictability of financial products on the market, heightening the necessity for financial management. Therefore, individual financial troubles are directly related to poor money management. Individual and family financial illiteracy is one of the leading causes of personal financial problems. Hence, a combination of financial issues, such as low income, excessive debt, and lack of financial knowledge, can harm the individual and household (Fazli Sabri et al., 2020).

Based on the definition by the Organization for Economic Cooperation and Development (OECD), financial literacy is not only about knowledge or understanding of what financial concepts are, but an understanding of the skill, motivation, and implementation of the concepts in life in order of making better financial decisions and improve individual financial well-being (Swiecka et al., 2020). Demirguc-Kunt et al (2018) global index data-

base focuses on financial literacy based on three leading indicators: (1) ownership and use of an account at a formal financial institution, (2) saving behavior, and (3) borrowing activity. The addition of financial instruments and products positively impacts individuals to reach and access financial institutions. This diversity of instruments is created, considering individual demands and needs, such as financial services, payday loans, pawnshops, and mobile banking. Thus, this will affect individuals' behavior in making a financial plan. According to Lusardi and Mitchell (2013), the assets and liabilities of the household balance sheet changed, for instance, the current generation is more in debt as they near retirement than earlier generations.

Some prior studies have found evidence that financial literacy may have essential role implications on financial behavior. Individuals who are well-literate in financial literacy are more ready to plan their future life such as retirement (Mitchell et al., 2011), unexpected expenses, and other costs (Brounen et al., 2016; Yoshino et al., 2017). Individuals will also spend their money considerately and avoid over-indebtedness (Huston, 2012). In addition, concerning the financial stock market, individuals who have well literacy might achieve higher net wealth due to an understanding of getting a better-diversified portfolio (Darsono et al., 2022; Gaudecker, 2015; Tseng et al., 2019; Van Rooij et al., 2012).

Financial literacy is one of the crucial issues to be discussed, especially in lower-middle-income and middle-income countries such as Indonesia. World Bank (2014) reported that the share of Indonesian age ranges 15- to 24-year-olds with accounts in financial institutions is relatively low compared to other countries. Only 12.8 % of young adults and less than 20 % of adults have accounts in the bank. According to a nationwide survey in Indonesia, people with jobs are more likely to hold bank accounts for security concerns. On the other hand, people without jobs are less likely to use banking services (World Bank Data, 2022). According to a survey done by the Financial Services Authority (OJK) in 2016, the level of financial literacy in Indonesia is extremely poor (OJK, 2016). The financial literacy rate in Indonesia is just around 21.8 percent, which means that only 22 people out of every 100 are financially literate. Meanwhile, according to the most recent poll from 2016, there was a 6% increase (29.6 percent). This condition indicates that Indonesians lack sufficient financial awareness. Only 13 of the 34 provinces have a financial literacy level that is higher than the national average (29.70 percent). This demonstrates that public financial knowledge is not distributed equally across all jurisdictions.

In terms of technology, Indonesia is rapidly developing information technology, particularly internet usage. The internet penetration rate in Indonesia continues to rise. Only 10% of Indonesia's population accessed the internet in 2010. Meanwhile, by 2020, the number of internet users in Indonesia will have increased fivefold (53 percent) (World Bank Data, 2020). Financial technology makes it easier for the public to obtain financial products, makes transactions easier, and improve financial inclusion (Atikah & Ma'ruf, 2016; Fazli Sabri et al., 2020; Hamori & Kume, 2018; Hon et al., 2021). According to Wadhwa et al. (2019), people will be more aware of financial services if they have access to financial news channels, TV shows, publications, blogs, and other sources of information. Nalini et al. (2016) also revealed that financial literacy has a direct impact on

investors' capacity to make solid financial income allocation decisions and boosts their overall financial strength. Investor financial education programs accompanied by innovative instructional technology have an important role in increasing financial literacy. Integration of financial programs with information technology practices will produce more significant benefits in the form of increased financial competence in the current setting when people rely on the internet as a source of information and services.

Financial literacy has been proven in several studies to improve people's ability to make better decisions that will benefit them in the future (Yoshino et al., 2017). They claim that financial literacy is positively associated with personal financial management and that financially literate people are more likely to invest rather than spend their money. Furthermore, financial education is required for gambling and any financial decision, for instance, risk assessment, budgeting, and awareness of random events. People with financial knowledge, for example, have a better chance of prospering in the money market. This has to do with a person's knowledge of the factors that drive market conditions (Hurla et al., 2017). During the 1990s, previous research focused on people's understanding of financial concepts, analyzing financial data, and understanding how to manage finances (Bakken, 1966; Chen & Volpe, 1998; Danes & Hira, 1987). Furthermore, Hilgert and Hogarth, (2003) and Mitchell et al. (2011) stated that financial literacy is a measuring tool for understanding financial management as well as financial indicators such as access to banking, investment, etc. Other financial literacy models are conceptualized into three dimensions: financial attitude, knowledge, and behavior (Atkinson & Messy, 2011).

The term financial knowledge refers to the understanding of personal finance topics. A person's financial knowledge can be measured via a questionnaire. Financial knowledge is often used with financial literacy, but the terms do not overlap completely. Huston (2010) stated that financial knowledge is an integral dimension of, but not equivalent to financial literacy. Financial attitude plays an important implication in financial literacy. Someone with an excellent financial attitude will have adequate financial literacy as well. On the other hand, individuals who have a lack of financial attitude will have an impact on low financial literacy. With good financial literacy, people make choices about good financial products for their future. It has been explained by Pankow (2003) that financial attitude is a state of opinion, mind, and judgment of a person about finance.

Financial behavior is also essential to financial literacy awareness (OECD, 2013). According to Atkinson and Messy (2011), people with full consciousness of money management are better at preparing for the future. While persons with money management abilities might have a better financial situation than those who do not. Furthermore, financial literacy is defined as the development of knowledge or education among the general population about the benefits of financial services, the results of which can lead to financial inclusion. It would be beneficial to analyze what factors influence individual families' comprehension of finances facilitated by personalized search and financial information to obtain all the real and potential benefits of financial literacy. The studies cited show that financial ability, literacy, and investing decisions are all linked.

One way that can be used to measure the level of financial literacy, a case study of Indonesian, is to examine the share of the population or individuals who are active in the financial system. The higher the amount of financial inclusion, the more financial literacy there is. This is related to the bank's role in imparting financial management knowledge. The author will also focus on the situations and qualities of the household's head of household when analyzing individuals and households in general. This has to do with a person's personality traits when it comes to financial literacy. In the analogy of corporate finance, household finance tries to find information on how individuals use financial instruments to achieve their goals. The qualities of members can be used to characterize financial challenges that emerge in a home. Individuals must have a long-term plan, such as planning to have an important asset that has not yet been traded in the future. Then individuals must have an illiquid asset, for instance, houses and various other financial decisions. To attain this objective, we could find out the characteristic of individuals in more detail.

Furthermore, the authors used data from the 2014 Indonesian Family Life Survey (IFLS) to set it apart from other studies, since there is a scarcity of research on the topic of financial literacy that employs similar data or variables. This research contributes important empirical results regarding the role of technology information on financial literacy in the case of Indonesia.

Research Method

This study's primary data sources are collected from the Indonesian Family Life Survey (IFLS) obtained by Surveymeter Indonesia and RAND. IFLS is the most comprehensive survey ever conducted in Indonesia. This survey is a panel study of households, individuals, and communities that have been carried out by RAND Corporation for five waves since 1993 in 13 out of 27 provinces in Indonesia. The fifth batch survey (IFLS-5) was conducted at the end of 2014 with 15,900 households and 709 communities. Specifically, 50,000 individuals participated in the survey.

In the data collection method, all related data is obtained from Indonesia Family Life Survey (IFLS) by recording longitudinal data IFLS-5 in 2014. The data are collected from the Surveymeter, the IFLS questionnaire provides data summarized in the 2014 HH (Household) book. Respondents are provided with different types of books. The selected book is used as a benchmark for selecting the variables to be studied, both the dependent and independent variables. The selection of variables needed in this study is contained in IFLS-5 in the 2014 HH (Household) book. The data is gathered for each variable from a variety of sources. Book 2A provided the financial literacy and television factors. Meanwhile, the 3A book provides access to cell phones, the internet, and newspapers. The book K final is used to acquire information about household characters such as marital status, income, household head, employment, and religion.

The primary goal of this research is to investigate the impact of technical information on financial literacy in Indonesia. This research also looks at financial literacy at the home

level in Indonesia. The authors collected financial literacy variables as the dependent variable in this study using data from the IFLS5 questionnaire, Book 2 in the BH (loans) part of the survey. Typically, the head of the household is questioned about their understanding of financial services and their experiences with them.

The author also uses the probit model (also known as probit regression). Probability models are a way to perform regression for binary outcome variables. A binary outcome variable is a dependent variable with two possibilities, such as yes or no, positive test result or negative test result and single or non-single. Furthermore, the authors also involve multinomial logistic regression. This model is a simple extension of binary logistic regression that allows more than two categories of dependent variables or outcomes.

There were 10426 observations for all of the variables, with the lowest value 0 and the maximum value 1 for each variable. In contrast to the education and income factors, education received the highest score of 22 and income received the highest score of 17.91. (See appendix 1 for more information).

Pearson correlation analysis (appendix 2) shows the positive and negative relationship between variables. This correlation will be the part to evaluate the level of multicollinearity among regression. Gujarati and Porter (2003) explained the pair-wise correlation of two variables above 0.50 signals a possible multicollinear problem. Appendix 2 shows us that the strongest significant pair correlation is the pair between Internet access and Education at 0.5250, indicating the existence of multicollinearity between these two variables.

In answering how technology and household characteristics affect the financial literacy of the head of the household, the data obtained through the questionnaire contains the number 1 for those who have financial literacy and 0 for those who do not.

Thus, the probit model used obtains two possible outcomes. The following is the probit model equation for financial literacy model 1 (finlit_a):

$$Finlit\_a_i = \alpha + \beta_1 hp_i + \beta_2 internet_i + \beta_3 tv_i + \beta_4 newspaper_i + \beta_5 married_i + \beta_6 education_i + \beta_7 job_i + \beta_8 income_i + \beta_9 region_i + \varepsilon_1$$

On the other hand, the Multinomial Logistics model, which is an extension of binary logistic regression of three or more categories of variables dependent, will be used to see if there are differences in the effect of technology and household characteristics on three different levels of knowledge of the head of the household (low, medium, high) on financial literacy. The following is the multinomial logistics model for financial literacy model 2 (finlit_bi):

$$Finlit\_b_i = \alpha + \beta_1 hp_i + \beta_2 internet_i + \beta_3 tv_i + \beta_4 newspaper_i + \beta_5 married_i + \beta_6 education_i + \beta_7 job_i + \beta_8 income_i + \beta_9 region_i + \varepsilon_1$$

Where $Finlit\_a_i$ indicates the financial literacy for the probit model and $Finlit\_b_i$ indicates financial literacy for the logit model, Hp indicates the availability of handphone, Tv indicates the availability of television, Newspaper indicates the access to newspapers, Married indicates the marital status, Education indicates level of education, Job indicates for job status, Income indicates the level of income, Region indicates where the respondents live (urban or rural), α refers to a constant term, β refers to estimated coefficient, and ε stands for error term.

Result and Discussion

This study examined the gathered data through a series of stages. Correlation analysis is used to determine the degree of the link between the independent and dependent variables. The linear correlation coefficient (r or R) is a statistic that indicates how closely two variables are related. Although correlation analysis can be linear or non-linear, this study concentrates on linear correlation analysis since it is the most common method employed in social science research (Alkan et al., 2020; Klieštik et al., 2015; Potrich et al., 2015).

Probit regression

This section explains probit regression to measure how significantly and the probability of financial literacy for each respondent. Table 1 (column 1), shows that there are 6 out of 9 determinants that are positive and significant at the level of 5%. Determinants such as handphone, television, newspaper, married, education, and income are positively and significantly affect financial literacy (finlit_a). While on the other column in the same table (Table 1 column 2), it shows the marginal effect. Technology determinants such as owning a handphone and having a television positively affect financial literacy (finlit_a) at a significance level of 5%. Individuals who had handphones and television in their houses had a 1.2% and 4.9% higher financial literacy than individuals who did not have them, respectively.

Regarding household characteristics, Individuals who were able to read newspapers whether in Bahasa Indonesia (Indonesian language) or/and other languages have a positive effect on financial literacy (finlit_a) at a significance level of 5%, where they have a 4.4% higher of financial literacy than individuals who were not. Next, marital status has a positive effect on financial literacy (finlit_a) at a significance level of 5%. Married individuals have a 5.1% higher financial literacy than unmarried individuals. The increase in education level for one year will increase the probability of individuals' financial literacy by reaching 1%. The increase in income level will increase the probability of individuals' financial literacy by 1.2%. In addition, the output of the literation log is - 4122.52, and it can be used for the model. It is also indicating how quickly the model converged. The likelihood ratio chi-square is f 513.93 and a p-value of 0.000, which means that this model is statistically significant; that is, it fits significantly better than a model with no predictors.

Table 1 The Result of the Probit Model and Marginal Effect Probit

Variable (s)	Probit	Marginal effect Probit
Handphone	0.055**	0.0121**
	(0.040)	(0.008)
Internet	0.019	0.0042
	(0.043)	(0.009)
Tv	0.226**	0.0493**
	(0.446)	(0.010)
Newspaper	0.203***	0.0442**
	(0.038)	(0.008)
Married	0.234**	0.0509**
	(0.041)	(0.009)
Education	0.043**	0.0095**
	(0.004)	(0.001)
Job	0.076	0.0165
	(0.049)	(0.010)
LogIncome	0.056**	0.0122**
	(0.014)	(0.003)
Region	0.025	0.0056
	(0.033)	(0.007)
Constant	-0.7657**	0.8516**
	(0.193)	(0.003)
Observations	10426	
Log-likelihood	- 4122.5254	
LR Chi2	513.93	
Prob>Chi2	0.0000	
Pseudo R2	0.0587	
AIC / BIC	8625.051 / 8337.571	
Note: Robust standard errors are reported in parentheses; ** p < 0.05.		

In line with Nalini et al. (2016), people rely on the internet as a source of information and services and their integration of the financial program with information technology practices, will give more significant results in improved financial competency. Moreover, Wadhwa et al. (2019) mentioned that level of awareness toward financial products among people with exposure to digital media such as portals, financial news channels, a market-related TV shows are higher, and their level of knowledge is also higher than those with no access. On the other hand, a study conducted by Fatoki (2014) stated that, on average, micro-entrepreneurs had little information on finance and skills. The study results also show the lack of using technology in which many respondents do not even have both email addresses and web pages due to their limited internet access.

According to the result, the study explains that the less frequently entrepreneurs use technology, the lower their understanding of financial literacy. A study conducted by Arora (2016) shows how digital technology helps elementary school teachers teach financial literacy. This study found a positive relationship between digital technology and improving financial literacy among children or students. The teachers interviewed by Arora (2016) combined various instructional strategies using digital technologies to deliver their lessons on financial literacy. The culminating results showed that the students performed well on formative and summative assessments in their classes.

Furthermore, Arora (2016) and Arthur (2012) explained that providing students with access to technology has the potential to transform the way students learn and help prepare them for success by enhancing their knowledge and application of technology in ways that will inform their future careers. The relation of the use of technology in influencing financial literacy in an individual in the household could be concluded.

Multinomial logistic regression

This model explains that the different levels of financial literacy (finlit_b) belong to individuals as respondents in this study. The three different levels are low-level, medium-level, and high-level financial literacy. The response variable "finlit_b" will be treated as categorical under the assumption that financial literacy levels have no natural ordering. This model will allow Stata to choose the referent group, which is the most frequently occurring group to be the referent group. Table 2 shows the results of the multinomial logistics model.

Table 2 Result of Multinomial logistic model

Multinomial Logistic			
Variable (s)	**Low-Level**	**Medium-Level**	**High Level**
Handphone	-0.1551**	-0.1195	Base Outcome
	(0.077)	(0.061)	
Internet	-0.0758	-0.1244**	
	(0.085)	(0.057)	
Tv	-0.4343**	-0.0917	
	(0.088)	(0.076)	
Newspaper	-0.4377**	-0.1681**	
	(0.075)	(0.060)	
Married	0.4690**	-0.1201	
	(0.080)	(0.065)	
Education	-0.1060**	-0.0621**	
	(0.009)	(0.006)	
Job	-0.1335	0.0023	
	(0.094)	(0.076)	
LogIncome	-0.1201**	-0.0491**	
	(0.028)	(0.023)	
Region	-0.0185	-0.0841	
	(0.063)	(0.047)	
Constant	2.6814**	1.234**	
	(0.371)	(0.309)	
Observations	10426		
Log-likelihood	-9942.356		
LR Chi2	810.18		
Prob>Chi2	0.0000		
Pseudo R2	0.0391		
AIC	19924.71		
BIC	20069.75		
Note: Robust standard errors are reported in parentheses; ** $p < 0.05$.			

Low-level relative to high-level financial literacy

This section is the multinomial logit estimate comparing variables relative to high-level financial literacy, given the other variables in the model are held constant. Based on the result of the multinomial logistic model in Table 2, Regarding technology determinants, the multinomial logit having a handphone to not having a handphone would be expected to decrease by 0.155 for low-level to high-level financial literacy, given all other predictor variables in the model are held constant. In other words, individuals who had handphones were more likely than those who did not have handphones to have low-level to high-level financial literacy.

Furthermore, individuals without a television have a lower degree of financial literacy (0.434) than those with a television. Regarding household characteristics, newspaper and married would be expected to decrease by 0.437 and 0.469, respectively, for low-level to high-level financial literacy. Then, education level – estimate for a one-year increase in education level for low-level relative to high-level, given the other variables in the model are held constant. If individuals were to increase their education level for one year, the multinomial log-odds for low-level relative to high-level would be expected to decrease by 0.106 years on financial literacy. Last, low-level income relative to high-level financial literacy would be expected to decrease by 0.120 Rupiah or USD (log income).

Medium-level relative to high-level in financial literacy

This section has the same interpretation of low-level relative to high-level financial literacy. The difference is that only internet access, newspaper, education, and income would be expected to affect medium-level to high-level financial literacy. They all would be expected to decrease by 0.124, 0.168, 0.062, and 0.049, respectively, for medium-level to high-level financial literacy.

From the point of view of household characteristics, many factors influence financial literacy, as shown by some prior study evidence. The behavior of household members in reading news in the newspaper, as mentioned in a study conducted by Freeman (2013), shows traders' news consumption behavior. This study explores the news consumption behavior of young adults aged 18 years in Malaysia. The results present that most young people prefer online news instead of traditional news media (newspaper). Furthermore, data present that young people tend to like entertainment news and dislike business and finance news. Regarding marital status, married men are more well-literate. Higher well-literate finance will lead them to be less worried about their financial concerns and greater financial well-being. Singles are such a significant tendency to reduce individuals' financial literacy levels compared to those who are married (Brown & Graf, 2013; Calamato, 2010; Dew, 2008)

A study by (Taft et al., 2013) shows the relationship between financial literacy, well-being, and concerns. The results showed that age and education positively correlate with financial literacy and financial well-being. Lalosa (2020) explained that the ability of financial literacy is found in someone who has a higher level of education and can access

more information about financial literacy. During their undergraduate program with some relevant subjects to economics and finance, students have a positive effect on daily financial practices. Mandell (2008) also states that children's financial literacy is associated with their parents' education levels. To ensure students make the right financial decisions, financial education experts contend that families and schools should foster financial literacy before students enter the teen years (Supon, 2012).

In a previous study, Johnson and Sherraden (2007) stated that students in high-income families have significantly higher levels of knowledge than those in low-income families. Hence, Atkinson and Messy (2011) found that Low-income levels have a close relationship to the low levels of financial literacy. Calamato (2010) stated that students in low-income families tend to drop out of school, and it will affect their financial literacy awareness. Another piece of the literature shows that low-outcome families often occur in households with low financial literacy (Badarinza et al., 2016).

On the other hand, a study by Chen & Volpe (1998) found that a person with long-time working experience is more concerned about financial situations; they get more information, thus facilitating lots of information and providing a standard for people of decision-making. Working arrangements also could influence financial attitude and behavior, considering that individuals with steady income conditions have a better plan to organize their financial life (Calamato, 2010). A survey conducted by Worthington (2006) in Australia reports that financial literacy scores tend to have higher amongst individuals in managerial occupations, and professional, and occupation fields are also associated with an individual's financial literacy levels. A survey by Emirate Arab investors found that individuals working in finance industries or investment show higher financial knowledge levels than those in other occupation fields (Hassan Al-Tamimi & Anood Bin Kalli, 2009).

Furthermore, employees have been categorized into two parts, namely urban and rural, depending upon whether the employee's place of employment is an urban area or rural area. From the results, employees working in urban areas are more financially literate than those working in rural areas (Bhushan & Medury, 2013).

Conclusion

This study examined factors affecting financial literacy in Indonesia. The data collected is cross-sectional data obtained from the latest wave (wave5) of Surveymeter and RAND in 2014-2015. The authors used probit and the multinomial logistic regression model to answer the research objectives. The probit regression test results indicate that there are 6 out of 9 factors that have a significant influence on financial literacy. These factors include owning mobile phones, having a television, reading newspapers in foreign languages, marital status, education level, and the average monthly income per capita. Meanwhile, internet access, job, and residence location (urban-rural) have no relationship and do not affect financial literacy. On the other hand, multinomial logistic regression gives us an explanation of the different levels of financial literacy in Indonesia. First, low-

level groups relative to the high-level group on financial literacy results show us 6 out of 9 determinants affect financial literacy. Second, the medium-level group relative to the high-level group results shows that only 4 out of 9 determinants affect financial literacy.

The things that can be considered from this research are that the government will continue to improve supporting facilities, especially information and technology for the public toward financial literacy awareness. In this case, supporting factors such as handphones and television positively correlate with financial literacy, and so do several other supporting factors (control variables). Meanwhile, internet access users are still shallow. In this era, all internet access should be maximized. Then, work status should also be the place where people can learn and increase their financial literacy. Thus, the government should facilitate them properly. As well as the location where people live shows have no relationship with financial literacy. Based on the data, support for financial literacy is dominated by people who live in urban areas (Java). It is the task of the government where all people in other regions should feel an equal distribution of financial literacy.

This study has several limitations. It only uses IFLS-5 cross-sectional data from 2014, implying that more research with up-to-date data, such as panel data or the most recent IFLS data, is required. Second, because this study only looks at a few variables, it needs to be expanded to look at other factors that may influence financial literacy.

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