The Impact of Debt Literacy on Over-Indebtedness of Buy Now Pay Later (BNPL) Users in West Java

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Abstract. This paper examines the impact of debt literacy on the over-indebtedness of Buy Now Pay Later (BNPL) users in West Java. BNPL is widely used in Indonesia as a short-term loan option, with West Java having the highest number of users. BNPL services have a high non-performing loan (NPL) level, exceeding the threshold set by Otoritas Jasa Keuangan (OJK), Indonesia's financial services authority. It indicates a need to consider the NPL level of BNPL services. One major cause of high NPL is over-indebtedness and financial knowledge as a determining factor of over-indebtedness. Therefore, debt literacy is one of the financial knowledge components assessed to fit the context of BNPL services. The questionnaire was distributed to 400 BNPL users in West Java. Data analysis using multinomial logistic regression assessed the impact of debt literacy on over-indebtedness. Findings reveal that BNPL users have low debt literacy levels. Additionally, the study indicates that higher debt literacy reduces the probability of over-indebtedness. It suggests that the government and financial services authorities should promote programs to increase financial literacy with a specific focus on debt literacy to enhance financial welfare and reduce the high-level NPL.

Keywords: Debt Literacy, Multinomial Logistic Regression, Over-indebtedness, Pay Later.

1 Introduction

Technology advancements have driven transformations across various sectors, including financial services. Digitalization has become essential for increasing the efficiency and accessibility of financial services. For instance, in the banking sector, almost all types of services have transitioned to digital formats, from opening accounts online to managing everyday banking transactions. Digital payment systems are also increasingly used to facilitate transactions quickly and efficiently without needing cash. Lending services have also seen significant changes with the emergence of technology-based peer-to-peer lending and pay-later services that leverage technology to simplify the loan application process and offer faster loan solutions.

BNPL services can serve as financing solutions for individuals with unexpected needs or those looking to manage cash flow more effectively. Due to the easy application process and

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relatively quick approval, many Indonesians use these services for consumptive activities such as shopping on e-commerce platforms, paying bills for mobile credit, internet, and electricity, and purchasing electronic products. The Financial Services Authority (OJK) stated that according to the Monthly Financing Company Report, there were 72.88 million BNPL contracts in Indonesia as of May 2023 (Bisnis.com, 2023b). This figure represents a 33.25% increase from the previous year, indicating a positive trend in using BNPL services in Indonesia. According to PEFINDO Credit Bureau, the outstanding value of BNPL debt in Indonesia is IDR 25.16 trillion, with West Java being the province with the highest unpaid loan value at 26.67% (Bisnis.com, 2023a). However, the high adoption rate of BNPL services in Indonesia, particularly in West Java, is also accompanied by a high risk of default. Like the high default rate in P2P lending services, BNPL services also have a high default rate. PEFINDO Credit Bureau reported that non-performing loans for BNPL services reached 9.7% or IDR 2.15 trillion (CNBC Indonesia, 2023). The Financial Services Authority (OJK) has set a 5% alert threshold for non-performing loans, indicating that the default rate for BNPL services, as shown by the percentage of non-performing loans, exceeds the safe limit and warrants caution.

Non-performing loans could lead to default. Many factors contribute to non-performing loans, such as over-indebtedness, which occurs when an individual is burdened with excessive debt, making it hard to repay. Leandro & Botelho (2022) state that one of the determinants of over-indebtedness is the level of financial literacy, financial knowledge, or financial education. According to data from the Financial Services Authority (2022), the financial literacy rate of Indonesians regarding fintech services used in daily life is still low. However, it has significantly increased from 2019 to 2022, with only 10.90% compared to other financial services sectors. This low level of financial literacy may underlie the condition of over-indebtedness, which refers to the high default behavior in BNPL services. Chotewattanakul et al. (2019) assert that individuals with poor financial literacy are more likely to experience over-indebtedness. Also, Lusardi & Tufano (2015) found that poor debt literacy made individuals prone to over-indebtedness. Similarly, Kurowski (2021) found that financial literacy and debt literacy significantly influence an individual debt condition, as respondents with high financial literacy levels had low levels of over-indebtedness.

In this context of BNPL as a short-term loan option, assessing users' financial knowledge regarding debt literacy would fit in. Moreover, there has not been adequate research that explores debt literacy among BNPL users in Indonesia and its relation to over-indebtedness. Therefore, this research aimed to assess that low debt literacy might be the determinant factor of over-indebtedness among BNPL users.

2 Literature Review

The definition of over-indebtedness, or being burdened with excessive debt, has not been globally agreed upon. However, Leandro & Botelho (2022) define over-indebtedness as a situation where an individual has excessive debt, struggles to pay off their debt and living expenses, and perceives their debt as a heavy burden. A similar definition is provided by Kurowski (2021), describing it as a situation where an individual has too much debt and finds it hard to repay. Additionally,

over-indebtedness is defined as a condition where an individual struggles to manage bill payments, considers debt commitments a heavy burden, and is late in paying bills for more than three months (Money & Pensions Service, 2018).

Concluded from several definitions provided by previous research, over-indebtedness is a condition where an individual is so heavily burdened with debt that they find it hard to meet their obligations. When someone is over-indebted, they can default on their debt. Over-indebtedness has a significant impact on various aspects of an individual's life, including mental health, physical health, financial distress, reduced consumption, increased vulnerability and poverty, suicide attempts and cases, drug dependency, and dependence on parents (Leandro & Botelho, 2022). Therefore, analyzing the contributing factors that may drive over-indebtedness is crucial.

Debt literacy is a crucial aspect of financial literacy not studied in a specific context. Lusardi & Tufano (2015) were the first researchers to investigate an individual's literacy regarding debt or debt literacy. Debt literacy is the ability to make simple debt-related decisions and apply general knowledge about compound interest in everyday financial choices (Lusardi & Tufano, 2015). In contrast, Galariotis & Monne (2023) define debt literacy as an individual's ability to understand and apply basic mechanisms related to interest in debt. Differing from the two previous studies that emphasized numerical abilities in debt literacy, Cwynar et al. (2019) defines debt literacy as an individual's familiarity with sources of information or institutions that warn borrowers about the threats and risks inherent in a loan. Meanwhile, Kurowski (2021) defines debt literacy as an individual's ability to manage costs in debt management. In this study, the debt literacy dimensions used are the same as those of Lusardi & Tufano (2015) and Kurowski (2021), which consist of compound interest, debt burden, and time value of money.
In their research, Lusardi & Tufano (2015) stated that individuals with low levels of debt literacy tend to struggle with repaying their debts. Similarly, in the study by Kurowski (2021), debt literacy was found to significantly influence the likelihood of encountering problems related to debt repayment, specifically over-indebtedness. The higher the debt literacy, the lower the risk of an individual falling into over-indebtedness. Additionally, the study indicated that individuals with good debt literacy are less likely to experience defaults. Research on debt literacy was also conducted by Hidajat (2021), who found that individuals with low levels of debt literacy in the dimensions of interest compounding, debt burden, and time value of money tend to have higher levels of debt. Thus, based on the research purpose and previous literature, the research framework formed is shown in Figure 1. Based on the framework, the hypothesis suggested is H1: debt literacy significantly impacts the over-indebtedness of Buy Now Pay Later (BNPL) users in West Java.

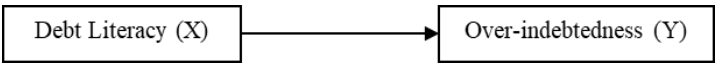

Fig. 1. Research Framework

There are three dimensions of debt literacy that can be used as indicators to reflect an individual's understanding of debt or borrowing activities, those are interest compounding, debt burden, and time value of money (Lusardi & Tufano, 2015). The understanding of interest compounding is closely related to debt literacy as it encompasses a fundamental understanding of the dynamics

of borrowing, the real value of debt, and the long-term implications of financial decisions related to loans. In the dimension of interest compounding, Lusardi & Tufano (2015) establish that an individual's debt literacy is determined by their ability to calculate how long it will take for a debt to double in value at a given interest rate.

The debt burden dimension within debt literacy, as described by Lusardi & Tufano (2015), refers to an individual's ability to understand how long it will take to repay a debt if only the minimum monthly payment is made, while the interest burden continues to accrue each year. Respondents' answers to this indicator reflect their understanding of how changes in interest rates can affect the total amount of debt over time. By comprehending that increasing interest rates can impact the total debt, individuals can plan effective repayment strategies to avoid being over-indebted. Meanwhile, money has a time value, meaning that any amount of money received today is generally worth more than the same amount received in the future (Titman et al., 2021:161), implying that the value of money in the future tends to decrease. Lusardi & Tufano (2015) formulated a question regarding the most advantageous payment option between two choices—one with interest and one without—as an indicator to determine whether an individual understands the concept of the time value of money and their ability to compare payment options.

3 Research Methodology

This study determines the impact of debt literacy on the over-indebtedness of BNPL users. The population of BNPL users in West Java is not known precisely. Hence, the sampling formula used in this research is the Cochran formula (Sileyew, 2019, p. 4). Using the formula, the minimum sample needed is 385 respondents, rounded to 400, to facilitate calculations in this research. The data collection method uses a questionnaire distributed online through social media and offline by meeting the respondents. The sample criteria used are West Java citizens who use BNPL services. All the questions were adapted from Lusardi & Tufano (2015) and Kurowski (2021) with an adjustment in the currency used. The independent variable used in this study is debt literacy. Debt literacy is measured using numeracy questions about financial concepts that are objectively assessed because there are correct or incorrect answers. A correct answer for each item in the debt literacy variable is given a score of 1, and an incorrect answer is given a score of 0. These scores will be summed for each variable. Debt literacy variables will each have a minimum total score of 0 and a maximum total score of 3.

In this study, the dependent variable is the over-indebtedness of Buy Now Pay Later (BNPL) service users in West Java. Over-indebtedness of the research subjects is measured using self-assessment based on the debt categories listed in Table 1. Therefore, over-indebtedness is a categorical variable with three categories. The three debt categories in this study are over-indebted, indicated by the statement “I have too much debt right now, and I have difficulty paying it off,” which is denoted by Y = 1, indebted, which is indicated by the statement “I am currently paying off my debt regularly” denoted by Y = 2, and debt-free which indicated by the statement “I have no debt at the moment” denoted by Y = 3.

Since the dependent variable is a categorical variable with more than two categories, the data analysis technique used is multinomial logistic regression (Hosmer et al., 2013, p. 269). The logistic model will show the logarithm comparing the odds of an event occurring to the odds of it not occurring (Hosmer et al., 2013), represented by the probability function as follows:

$$\pi_k(x_i) = P(y = 1|x_i) = \frac{e^{g_1(x_i)}}{1 + e^{g_1(x_i)} + e^{g_2(x_i)}} \quad (1$$

Where:
$\pi_k(x_i)$ = probability that the outcome is category 1 given the independent variable is x_i
$g_k(x_i)$ = linear predictor for category 1
E = base of the natural logarithm

However, the probability function is not linear, whereas the independent and dependent variables have a linear relationship. Therefore, the probability function must be transformed into the logit function (Roflin et al., 2023, p. 154) as follows:

$$ln\left[\frac{\pi_k(x_i)}{1 - \pi_k(x_i)}\right] = g_j(x_i) \quad (2)$$
$$g_j(x_i) = \beta_0 + \beta_1 x_1$$

Where:
ln = natural logarithm with outcome category probability
β_0 = constant value of the regression equation
β = coefficient value of the dependent variable
x_1 = debt literacy

4 Result / Finding

4.1 Descriptive Analysis

The respondents were predominantly in the indebted category, "I am currently paying off my debt regularly," with 197 respondents or 49.25%. This was followed by respondents in the over-indebted category, " I have too much debt right now, and I have difficulty paying it off," with 132 respondents, or 33%. Lastly, respondents in the debt-free category, " I have no debt at the moment," accounted for 71 respondents, or 17.75%.

The measurement scale used for the debt literacy variable is a dichotomous scale, where a correct answer is scored as 1, and an incorrect answer is scored as 0. The minimum scores a respondent can receive is 0, which means the respondent chose incorrect answers for all items. The maximum score a respondent can receive is 3, which means the respondent answered all items correctly. With a total of 400 respondents, the ideal total score is 1200, assuming all respondents achieve the maximum score. Table 1 shows the frequency, percentage, total score, and average score of the study respondents for the debt literacy variable.

Table 1. Respondents' Responses on Debt Literacy

Dimensions	Respondents' Responses				Category
	Wrong Answer		Right Answer		
	N	%	N	%	
Interest Compounding	257	64,25%	143	35,75%	Low
Debt Burden	316	79%	84	21%	Low
Time Value of Money	332	83%	68	17%	Very Low
Average Score				**24,58%**	**Low**

Based on Table 1, the respondent's debt literacy level is considered low at 24,58% of the average of correct answers. As for the dimensions, Table 1 shows that the time value of money has the lowest score at 17%, indicating a very low level of correct answers.

4.2 Multinomial Logistic Regression

Independence Test

An independence test was conducted to examine the relationship between the independent variables in this study, namely debt literacy, and the dependent variable. Table 2 shows the relationship between the independent and dependent variables through the chi-square test's significance value or p-value.

Table 2. Independence Test

	(Y)			Total	*p-value*	Decision
	(1) Over-indebted	(2) Indebted	(3) Debt-free			
Debt Literacy (X)	132	197	71	400	0,000	Reject

Based on the significance level of the debt literacy on the dependent variable, it can be concluded that it has a relationship with the dependent variable since the p-value < α (0,05).

Significance Test

Table 3. Significance Test

Effect	Model Fitting Criteria			Likelihood Ratio Tests		
	AIC	BIC	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept	214,492	222,475	210,492	174,019	2	0,000
Debt Literacy (X)	215,129	223,111	211,129	174,655	2	0,000

Table 3 shows that debt literacy significantly impacts the dependent variable since the significance level (0,000) < 0,05.

Goodness of Fit

The Goodness of Fit test clarifies the model's fit with the data. The model's fit can be indicated by looking at the significance value (p-value). Accepting the H0 decision is made when the significance value (p-value) is greater than α (0.05).

Table 4. Goodness of Fit

	Chi-Square	df	Sig.
Pearson	7,423	4	0,115
Deviance	8,053	4	0,090

Based on the significance value (p-value) in Table 4, the model's significance value (0.115) > α (0.05), so H0 is accepted. This means the model fits the data well.

R-Square Test

The coefficient of determination test measures the contribution of independent variables to the dependent variable. In Table 5, there are three Pseudo R-squared values. The value used in this study is the Nagelkerke R-Square because it has the highest value.

Table 5. R-Square Value

McFadden	0,214
Cox and Snell	0,354
Nagelkerke	0,406

Based on the Nagelkerke R-Square value in Table 5, which is 0.406 or 40,6%, it means that the independent variable's contribution, debt literacy, contributes to the categorical dependent variable of debt conditions by 40,6%. In comparison, the remaining 59.4% is determined by other variables not considered in the model.

Multinomial Logistic Regression Model

The parameters forming the logit function or multinomial logistic regression model are found in Table 6, with the β values for each category of the dependent variable, using the debt-free category (Y=3) as the reference category.

Table 1. Goodness of Fit

Reference Category: (3) Debt-free	Beta	
	Over-indebted	Indebted
Constanta	2,920	2,802
Debt Literacy (X)	-2,778	-1,390

Thus, the model formed based on the β values in Table 6 is as follows:

a. Logit Function

For the Over-indebted Category (Y = 1)

$$g_1(x) = 2{,}920 - 2{,}778x \quad (3)$$

For the Indebted Category (Y = 2)

$$g_1(x) = 2{,}802 - 1{,}390x \quad (4)$$

b. Probability Function

For the Over-indebted Category (Y = 1)

The probability of over-indebtedness (y = 1) based on debt literacy is:

$$\pi_1(x) = \mathrm{P}(\mathrm{y} = 1|\mathrm{x}) = \frac{e^{g_1(x)}}{1 + e^{g_1(x)} + e^{g_2(x)}} \quad (5)$$

For the Indebted Category (Y = 2)

The probability of indebtedness (y = 2) based on debt literacy is:

$$\pi_2(x) = \mathrm{P}(\mathrm{y} = 2|\mathrm{x}) = \frac{e^{g_2(x)}}{1 + e^{g_1(x)} + e^{g_2(x)}} \quad (6)$$

For the Debt-free Category (Y = 3)

The probability of being debt-free (y = 3) based on debt literacy is:

$$\pi_3(x) = \mathrm{P}(\mathrm{y} = 3|\mathrm{x}) = \frac{1}{1 + e^{g_1(x)} + e^{g_2(x)}} \quad (7)$$

Model Interpretation

Table 7 shows the Exp(B) values, or Odds Ratios (OR), with the debt-free category (Y = 3) as the reference category. This study focuses on discussing the over-indebted category, so the interpretation of the model is only for the over-indebted category.

Table 2. Odds Ratio

Variable	Over-indebted	
	Exp(B)	**Sig.**
Debt Literacy (X)	0,062	0,000

The OR value for the debt literacy variable is exp (β_x)= 0.062. This means that for each one-unit increase in the debt literacy variable, the likelihood of an individual being in the over-indebted category decreases by 93.8% (1 – 0.062 = 0.938). Therefore, a higher level of debt literacy significantly reduces the likelihood of being in the over-indebted category compared to debt-free.

Model Accuracy

The model's accuracy is measured by evaluating how accurately the model classifies events into categories of dependent variables.

Table 3. Model Accuracy

Observed	Predicted			
	Over-indebted	**Indebted**	**Debt-free**	**Percent Correct**
Over-indebted	113	19	0	85,6%
Indebted	103	87	7	44,2%
Debt-free	2	49	20	28,2%
Overall Percentage	**54,5%**	**38,8%**	**6,8%**	**55,0%**

Based on Table 8, the model's accuracy in classifying over-indebted events (Y = 1) is 88 cases or 85,6%, the indebted category (Y = 2) is 103 cases or 44,2%, and the debt-free category (Y = 3) is 2 cases or 28,2%. Overall, the model's accuracy in classifying categories is 55.0%.

5 Discussion

The average score for the debt literacy variable is at a low level, which is 24.58%. Three dimensions are used to measure the debt literacy variable: interest compounding, debt burden, and the concept of the time value of money. Respondents' understanding of interest compounding is relatively low, with a correct response rate of 35.75%. Similarly, the debt burden dimension has a low correct response rate of 21%. The time value of the money concept is the dimension with the lowest correct response rate, at only 17%. Responses to the third dimension indicate a low understanding, a lack of concern regarding the time value of money, and a preference for fixed payment systems. Overall, it can be said that BNPL users' understanding of debt concepts is very concerning.

The hypothesis test on the partial test shows that debt literacy significantly affects the condition of over-indebtedness. The odds ratio indicates that for every one-unit increase in the debt literacy variable, the likelihood of an individual being in the over-indebted category decreases by 93,8%. This means that the higher an individual's debt literacy level, the less likely they are to be over-indebted compared to individuals with low debt literacy levels. The high percentage reduction in risk can serve as a basis for increasing knowledge related to debt concepts among BNPL users to reduce over-indebtedness levels.

This study's results align with the research conducted by Kurowski (2021) and Hidajat (2021) but contradict the research by Idris et al. (2018), which stated that individuals with good debt literacy are also vulnerable to over-indebtedness. The differing results can be explained by the different methods used and the specific aims of Idris et al. (2018). Idris et al. (2018) conducted their study using qualitative methods, which can provide in-depth information about individuals' experiences with high debt literacy who are over-indebted due to taking on mortgages or long-term debt. However, that study does not reflect the general tendency that can be measured quantitatively. In contrast, this study shows that a high level of debt literacy is associated with a lower tendency to be over-indebted.

Based on this study's results, individuals' understanding of the three dimensions of debt literacy can reduce the risk of over-indebtedness. In the dimension of interest compounding, the needed understanding is that unpaid or late debt will continue to grow based on the principal amount of the debt plus the total accumulated interest burden. Therefore, individuals with this understanding will choose low-interest payment options and make regular payments to avoid the risk of over-indebtedness. Individuals with this understanding are also likely to correctly answer the debt burden dimension, as they understand the debt dynamics. Understanding the time value of money will encourage individuals to choose the most beneficial debt options.

6 Conclusion and Recommendation

From the discussion above, it can be concluded that debt literacy significantly impacts over-indebtedness among BNPL users in West Java. Thus, it should encourage citizens to improve their knowledge of debt mechanisms, including compound interest, debt burden, and especially the time value of money. Moreover, the Financial Services Authority (OJK) should initiate more financial literacy programs focusing on debt literacy. They can collaborate with BNPL platforms to hold these financial literacy programs. As for the BNPL platforms, they can apply simple debt literacy questions as a screening measure before users can utilize the app, ensuring they understand how debt mechanisms work. Further research is encouraged to consider more variables so the model can better explain over-indebtedness. Variables to consider are demographic determinants, financial experience, and loan motives.

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