The Effect of Digitalization and Human Capital on Life Insurance Demand in Indonesia

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Abstract: The insurance industry has a vital role in contributing to the rate of economic growth of a country which is directly related to the human resources and the implementation of industry revolution 4.0 through digital transformation. This study aims to provide the evidence on the contribution of digitalization based on communication and information technology, and human capital consisted of age dependency ratio, labour force, and life expectancy on life insurance demand in Indonesia. This study used the 16 years of annual data for the period from 2002-2017 and analyzed by using principal component regression for the research method. The result indicated that digitalization and human capital have a significant effect on the demand for life insurance products at 5%. The findings show that age dependency ratio has a negative relationship with life insurance demand as hypothesized. The labour force, life expectancy, individuals using the internet and broadband subscription have a positive impact on life insurance demand. Insurance industries are recommended to develop the human capital and their digital equipment to expand the business.

1 INTRODUCTION

Life Insurance in Indonesia has become a necessity in the life of modern society today. In Indonesia, demand for life insurance continues to grow in line with increased income and public awareness of the importance of risk anticipation. The number of life insurance companies is continuously increasing, and so is the variety of products offered in the market to meet the demand. Thus, the life insurance industry began to contribute to the Indonesian economy even though it was still categorized as relatively low.

Digitalization is the result of technological developments that are currently developing very rapidly. Its primary purpose is to provide convenience and efficiency both in all aspects, such as labour, costs, procedures and others. Digitalization is very synonymous with the use of electronics and computers. The presence of computer devices further simplifies and accelerates the growth of the digital world. Computerization is not only limited to computing devices. Now computerization can easily affect other devices, such as televisions and smartphones, have been computerized with the addition of operating systems like conventional computer devices. Salatin (2014) states that the development of electronic sales make the insurance company becomes more toward product orientation compared with customer orientation. Previous research conducted in Kenya where Waita and Nairobi (2014) found a positive impact of technological developments on the growth of microinsurance period. Indonesia is a developing country. The last few years, the development of technology is used in daily real life. This development makes the researchers stated that there is a significant influence on the existing insurance, Lin et al., (2012) states that technology affects the cost efficiency in the insurance industry that is only available in developed countries but not in developing countries.

Human capital is a combination of knowledge, skills, and individual ability to carry out their duties so that they can create value to achieve goals. The goals are related to the vision and target of the company. According to Campbell (1980), he said to optimal the purchase of insurance. It is based on human capital uncertainty. Ostaszewski (2003) further stated that life insurance is a business of securing human capital that overcomes the uncertainty and lack of individual human capital.

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The objective of this study is to investigate the impact of human capital and digitalization on the life insurance demand. In this study, human capital is measured by some variables, such as life expectancy, labour force, age dependency as well as the digitalization is also measured by the number of individuals using internet and broadband subscription.

2 METHODOLOGY

2.1 Data

The data used are secondary data that have dependent variables and independent variables. The dependent variable used is the number of life insurance requests calculated based on the many policies of life insurance (LI), that is, as the variable y. Various measures of life insurance demand have been used in empirical studies, such as premium spending, insurance density and insurance penetration (Beck and Webb, 2003). Dash (2018) investigated the life insurance demand by using the number of the policy holder to see the demographic and socio-economic characteristics of the life insurer. The independent variable used is human capital measured by three indicators, namely life expectancy (LE), labour force (LF), age dependency ratio (AD), and digitalization which are measured by two indicators namely the number of individuals using the internet (ID), and the number of broadband subscriptions (SB).

2.2 Methodology

The steps in data analysis are as follows:

1. Arrange the hypothesis in the form as follows.
   a. H1: Life expectancy has a positive effect on demand for life insurance
   b. H2: The number of workers has a positive influence on demand for life insurance
   c. H3: Age dependency ratio has a negative influence on life insurance demand
   d. H4: The number of individuals who use the internet has a positive influence on demand for life insurance
   e. H5: The amount of broadband subscriptions has a positive influence on the demand for life insurance
2. Explore data with descriptive statistics.
3. See the relationship of each variable X with the variable Y using a scatter plot and see the value of the correlation between independent variables.
4. Perform a regression analysis to determine the regression model with the least-squares method
5. Check the non-multicollinearity assumption by looking at the VIF value, looking at the coefficient of determination (R2)
6. Handling multicollinearity problems if the assumptions of non-multicollinearity are the regression of the main components that are looking for eigenvalues and eigenvectors,
7. Calculating the score of the main components, determine the number of principal components to be used
8. Regressing between component scores obtained with the dependent variable
9. Returns the regression equation to the standard variable form
10. Calculate the standard error for each regression coefficient and test using the t-test
11. Returns the regression equation to the original variable form
12. Interpret the primary component regression model.

2.3 Principal Component Regression

The standard form of multiple linear regression model with independent variables is in the following equation (Montgomery dan Peck, 1992).

$$Y_i = \beta_0 + \beta_1 X_{i1} + \cdots + \beta_{p-1} X_{i,p-1} + \varepsilon_i \quad (1)$$

With : Y_i is the independent variable for the i-th observation, for

$i = 1,2, \dots, n;\ \beta_0, \beta_1, \dots\ \beta_{p-1}$

These are the parameters;

$X_{i1}, X_{i2}, \dots, X_{i,p-1}$

Above is the dependent variables ; ε_i is the residual (error) for the observed i-th which is assumed to be normally distributed independently and identical with the average 0 (zero) and variance σ^2.

The method used to estimate the model parameters

Linear multiple regression is the least squares method or often also called the ordinary least square method (OLS). This OLS method aims to minimize the sum of squares error, OLS estimators for β are as follows (Montgomery dan Peck, 1992).

$$\hat{\beta} = (X^T X)^{-1} X^T Y \quad (2)$$

This study examines the effect of human capital and digitalization on demand for life insurance. The variable of human capital consists of life expectancy, many workers, age dependency ratio. While the digitalization variable consists of many

individuals who use the internet and broadband subscriptions. To test the hypothesis using multiple linear regression with the analysis model used in this study is:

$$LI_t = \alpha + \beta_1 LE + \beta_2 FL + \beta_3 AD + \beta_4 ID + \beta_5 BS \quad (3)$$

Multicollinearity is the linear relationship between independent variables X in multiple regression models. High multicollinearity causes the probability of accepting the wrong hypothesis to increase, and the value of R squared is high, but none of the few coefficients is estimated to be statistically significant. The correlation coefficient between the X variable and the large VIF (Variance Inflation Factors) value is a characteristic of multicollinearity problems.

The principal component regression forms the relationship between the dependent variable and the principal component selected from the independent variable (Ul-Saufie et al. 2011). The principal component regression can solve the multicollinearity problem (Montgomery dan Peck, 1992). The model for principal component regression is as follows.

$$Y = w_0 + w_1 K_1 + w_2 K_2 + \cdots + w_p K_p + v \quad (4)$$

With $K_1, K_2, \ldots, K_3$ is principal component explanatory variables, w_0 is intercept or intersection point of the Y, $w_1, w_2, \ldots, w_p$ is the principal component regression coefficient, v is an error factor.

3 RESULT AND DISCUSSION

The time tren of age dependency ration and life expectancy from 2002 till 2017 can be seen from the figure below

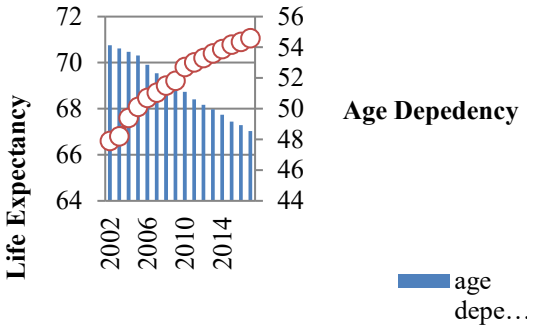

Figure 1. The Age Dependency Ratio and Life Expectancy 2002-2017 in Indonesia

From Figure 1. It can be seen that age dependency consistently decreases and life expectancy continues to increase every year. Life Expectancy (AHH) is an estimate of the average additional age of a person expected to continue to live. AHH can also be defined as the average number of years a person has lived after the person reached his x-th birthday. A commonly used measure is the life expectancy at birth that reflects the health condition at the time. Generally, regarding AHH, the average number of years means that someone has lived since the person was born. Dependency Ratio is the ratio between the population aged 0-14 years, plus the total population 65 years and over (both referred to as not the labour force) compared to the number of population aged 15-64 years (labour force).

Below is figure 2, which shows the labour force rate from 2002 to 2017.

Figure 2. Labor Force 2002-2017 in Indonesia

The labour force participation rates are the number of persons who are employed and unemployed but looking for a job divided by the total working-age population. Labor Force Participation Rate in Indonesia averaged 84,3 percent from 2002 until 2017, reaching an all-time high of 87.9 percent in 2012 and a record low of 78.8 percent in 2003.

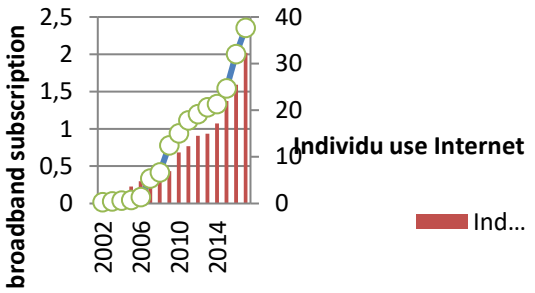

Figure 3. Individuals using Internet and Fixed Broadband Subscription 2002-2017 in Indonesia

Broadband refers to an internet bandwidth connection. The term bandwidth is generally used to refer to data transfer speeds, in terms of computer networks and internet connections. Data transfers are usually measured in bits per second (bps). In broadband internet connections, transfer speeds are very high compared to dial-up internet connections. There are various types of broadband internet connections, depending on speed, cost and availability (Figure 3).

Fixed broadband subscription refers to a fixed subscription for high-speed access to the public Internet (TCP / IP connection), at downstream speeds equal to, or higher than, 256 kbit / s. This subscription includes cable modems, DSL, fibre-to-the-home / building, other fixed bandwidth (cable) subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured regardless of payment method. This calculation includes residential subscriptions and subscriptions to organizations (Figure 4).

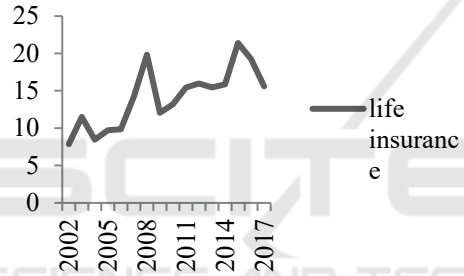

Figure 4. The Number of Life Insurance Policy Holder 2002-2017 in Indonesia

In this study, the number of life insurance demand is calculated based on the number of policies. The demand for life insurance is fluctuating every year. The average increase in the number of life insurance policies annually is 7.7%. In 2008, the number of policies increased to 39.64% and a decrease in the number of life insurance policies by 39.25%. Likewise, in 2015 there was an increase in the number of life insurance policies by 35%. Below is the table of descriptive statistics (Table 1).

Table 1. Descriptive Statistics

Variable	Mean	Dev St.	Min	Max	Med
Age depedency	51,36	1,88	48,53	54,13	51,26
Labor Force	84,28	2,92	78,84	87,92	85,33
Life Expectancy	69,26	1,45	66,60	71,06	69,51
Internet	11,60	9,00	2,13	32,29	9,42
Broadband	0,85	0,78	0,02	2,36	0,86
Life Ins. Demand	14,10	4,04	7,86	21,04	14,81

From the results of multiple linear regression analysis obtained an R squared value of 80,1%, indicating that the relationship between life insurance demand with the independent variable was 80,1% while other factors caused the remaining 18,9%. Henceforth it is necessary to do simultaneous tests and individual tests to see the effects simultaneously and individually between the independent variable and the dependent variable. From the analysis results obtained the calculated F value 8,07 with P-value 0,003, it can be said that the independent variables simultaneously affect the dependent variable. Table 3 shows the variance inflation factors (VIF), which indicated the multicollinearity problem.

Table 2. Variance Inflation Factors among Variables

No.	Variable	VIF
1	Age Dependency	101,45
2	Labor Force	1,39
3	Life Expectancy	41,5
4	Individuals use internet	26,1
5	Broadband Subscription	55,4

According to Table 2., time series regression model produced a tremendous value of VIF, which is more than 1. Multicollinearity also can be detected by calculating the correlation coefficient as Table 3 shown below.

Table 3. The Correlation Coefficient among Variables

Variables	Labor Force	Life Exp.	Indv. Internet	Broadband Subs.	Life Ins.
Age Dep.	-0,45	-0,9	-0,94*	-0,97*	-0,80*
Lab. Force		0,48	0,43	0,41	0,31
Life Exp.			0,88*	0,92*	0,77*
Indv. Intent				0,98*	0,71*
Broadband Subs.					0,70*

From Table 3, almost all correlation coefficients between the two variables are more significant than 0.5. This result also proves that there are multicollinearity problems.

The next step is to perform a principal component regression analysis. In this analysis, the initial step taken is to transform the independent variable *X* into a variable Z by using the correlation matrix because it is assumed that the units used in the independent variable are not the same in order to obtain new data with variable Z. After getting the eigenvalue and the score of the principal component

then determine which principal component meets the criteria of having eigenvalues greater than 1 ($\lambda > 1$). PC1 is the principal components selected. Below is the scree plot related to determining the eigenvalue (Figure 5).

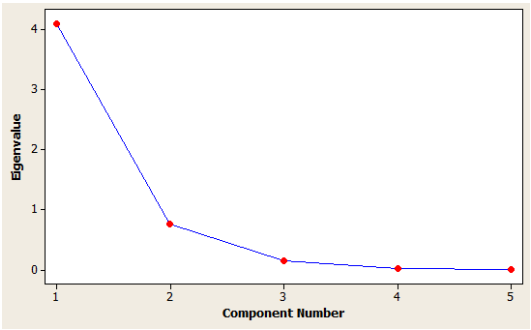

Figure 5. The Scree Plot of Eigen Value and the Component Number

The next step is to regress the dependent variable Y with the PC1, obtained a regression equation as follows.

$$Y = 14{,}10 + 1{,}50PC1 \dots (5)$$

The regression equation obtained from the standard variable is returned to the original variable form (with the X variable) so that the primary component regression model is obtained as follows.

$$Y = 46{,}11 - 19{,}95X_1 + 11{,}89X_2 + 34{,}28X_3 + 5{,}73X_4 + 0{,}07X_5 \dots (6)$$

The estimated regression coefficients of the variables in Model 6 are reported in Table 4 below.

Table 4. The Coefficient and Calculated t-test of Principal Components

Var. Z	Coeff.	Dev. Std $s(y_i)$	Calculated t
Z1	-0,73	0,043	-17,1721*
Z2	0,41	0,021	17,1721*
Z3	0,76	0,042	17,1721*
Z4	0,71	0,042	17,1721*
Z5	0,72	0,042	17,1721*

For the life insurance demand function, the test statistics indicate that most of the variables are statistically significant with the expected sign. It suggests that in model 6, an increase of one percent of age dependency is associated with a decrease of about 19 percent in life insurance consumption. An increase of 1 percent of forced labour is associated with an increase of about 11,9 percent in life insurance consumption. The coefficients of the number of a broadband subscription, labour force, life expectancy and individual using the internet have positive signs and in each case are highly statistically significant as expected. The coefficient of age dependency have a negative impact and statistically significant on life insurance demands as hypothesized.

4 CONCLUSIONS

The growing demand for life insurance is inseparable from the influence of the increasing development on digital technology and human capital. The age dependency ratio, labour force, life expectancy, broadband subscriptions and individual using internet services are the variables which statistically affect the life insurance demand. It could be a consideration for the policymakers of the insurance industry to start developing the online premium policy or the online claim system and their human capital index.

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