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# Indonesian Manufacturing Industry Performance towards Global Trade: An Analytical Review of Professionalism In Islam

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**ABSTRACT**

Economic integration involves many countries was necessary to have superior products and competitiveness in the international market. Industrial performance was a benchmark for a country's export success. This study aims to estimate industrial performance by analyzing at the level of technical efficiency and Islamic views on work professionalism where this research analyzes the workforce used in the production process. The method used in this study is the stochastic frontier analysis (SFA) method. The results found that the level of technical efficiency of companies in the manufacturing industry in Indonesia between 2010 and 2015 with a total of 10,464 companies observed a trend of declining levels of company technical efficiency. In addition, labor as one of the inputs in production is not differentiated based on the level of education, skills and experience. The results imply that companies in the Manufacturing industry in Indonesia have internal problems related to the company's technical efficiency namely professionalism.

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## INTRODUCTION

Globalization, followed by the development of the economic sector, has become integrated with each other between countries around the world. The national economy is integrated into the global economy because of the stimulus for the internationalization of production (Anós-Casero & Astarl, 2010; Ezzahid et. al., 2015; Foster, et. al, 2013). Torres Mazzi & Foster-McGregor (2021) argued that international integration allows domestic Manufacturingrs to obtain intermediate products (raw materials) and capital equipment from the most competitive global suppliers. Import of quality raw materials (import content/IC) and capital equipment will increase efficiency and profitability. Erduman, et. al., (2020) assess that international trade with export and import activities brings two advantages, namely price advantages and advantages in terms of quality. On the other hand, Mikulić & Lovrinčević, (2018); Elliott et. al, (2019); Tiryaki (2019); McGaughey et. al., (2020) stated that relatively low prices for imported raw materials and good quality for export products will increase product competition in the international market. Besides that, economic integration allows each country to benefit from trading activities, both from the import and export sides. These advantages include: obtaining goods that are not produced domestically, relatively cheap prices, specialization, maximum market invasion, and improvement of domestic technology from the overflow of foreign technology.

The Ministry of Industry noted that the contribution of the Manufacturing sector to GDP was consistently the highest (https://kemenperin.go.id, 2021). In 2021 the contribution of the Manufacturing sector will reach 76.49% of the total national income. The success of the industrial sector is supported by Indonesia's export performance. Industrial sector exports reached US$ 143.76 billion or contributed 77.17% of the total national exports of US$ 186.31 billion. Even though it had experienced a decline due to the pandemic, the contribution of the Manufacturing sector has relatively increased from year to year. The following is a comparison of sectoral contributions for 2020 and 2021 according to the Central Bureau of Statistics (2021);

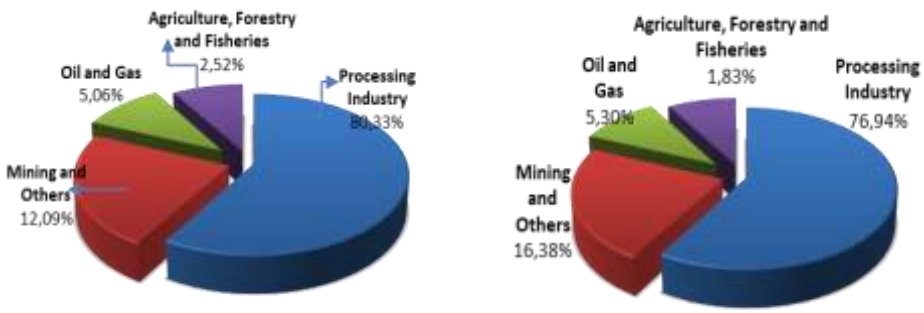


**Figure 1.** The Description of Indonesia's Export Value Year 2020-2021

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Trading activities experienced development and competition, especially from export activity and quality (Ndubuisi & Owusu, 2021). While this condition also opens prospects for each country to increase associations in international trade by specializing or diversifying its export products (Amado & Stehrer, 2014; Jangam, 2019; Li et. al., 2020; Peng & Zhang, 2020). The development of international trade in the last few decades shows that the export of products and the import of raw materials have become increasingly dominant. A globally competitive company can be seen from its performance. Industrial performance is measured based on productivity and efficiency (Coelli et. al., 2005). Efficiency can be seen in two ways, namely, technical efficiency and allocative efficiency. Technical efficiency looks at the company's ability to produce its products based on its inputs, while allocative efficiency is more based on the use of inputs based on the price paid. A country's economy will be better if the companies in it produce more efficiently (Amores & Raa, 2014; Le et. al., 2018; Ivina & Chereshneva, 2019; Walheer & He, 2020; Rawat & Sharma, 2021; Biswas et. al., 2021). Companies need to do efficiency to be able to grow and survive. If not, the company will stagnate and exit the market. Companies in the Manufacturing industry sector must increase efficiency if they are oriented to the global market. The company's ability to increase efficiency will have an impact on competitiveness (Harianto, 2020; Pradinda, 2020).

Previous research on the efficiency of the Manufacturing industry was done by Sena (2006); Bozec & Dia (2007); Rodríguez-Álvarez, et. al., (2007); Chen & Tang (1987); Gnangnon (2019); Biswas et. al., (2021); Rawat & Sharma (2021) and Kumbhakar et. al., (2022). While Nurrahma (2013) only included capital and labor variables in its production function. Further Agustin & Setiawan (2021) emphasised on company efficiency from consistently published financial reports during the period 2013 to 2017. In addition, specific research related to company efficiency carried out by Fernández-Menéndez et. al., (2009); Charoenrat et. al, (2013); Yang et. al., (2013); Hailu & Tanaka (2015) and Walheer & He (2020) with the foreign direct investment variable as a determinant of efficiency. As a result, direct foreign investment influences the company's technical efficiency. This study includes all inputs in the analysis of technical efficiency, namely capital, labor, raw materials, and energy. By including all production input factors, the estimated value of technical efficiency will be more accurate. In addition, this study analyzes the performance of companies in the form of labor use from an Islamic point of view, so that it is expected to be able to enrich industry-related discourse and reference material in Islamic studies on other industries in the future.

Empirical facts regarding the relationship between technical efficiency and exports are explained in several studies. Studies on company productivity on company exports have been carried out since 1998 by Clerides et. al., (1998). This study found that productivity has a positive effect on the company's export activities. Corroborating its findings, this study finds that many efficient companies enter the export market. This finding was in line with Bernard & Jensen (1999); Cassiman, et. al., (2010); Cassiman & Martínez-Ros (2007); Delgado et. al., (2002); Lileeva & Trefler, (2010); Svanidze &

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Götz (2019); Esquivias & Harianto (2020). While Fahmy-Abdullah et. al., (2021) found that by confirming that only companies that are efficient enough to bear entry costs and only strong companies can enter in a fairly tight market competition, namely the export market.

Based on the discussion, this study aims to estimate industrial performance by looking at the level of technical efficiency and Islamic views on work professionalism where this study analyzes labor as one of the inputs used in the production process.

## RESEARCH METHOD

This research is a quantitative inferential study by estimating the technical efficiency of companies using the translog production function with the Stochastic Production Frontier (SFA) approach. This study uses the SFA method because this method is able to minimize the deficiencies that exist in other methods, namely DEA. SFA can distinguish the effect of statistical noise from productive inefficiency and allows formal statistical testing of hypotheses which is a weakness of the DEA method (Yang et. al., 2013). In addition, the advantage of the SFA method is that as a parametric approach, this method is able to provide an overview of how input influences output.

The production function is an equation that shows the combination of the number of inputs to make certain goods or products. Coelli et. al., (2005) formulated the production function as an input function. Inputs in the production function are called factors of production. Factors of production generally consist of land, labor, capital or capital, and raw materials. In general, the production function is formulated as follows:

$$q = f(x) \quad (1)$$

Where $q$ represents the output, $x = (x_1, x_2, \ldots, x_N)$' is $N \times 1$ is a vector of the input variable. Further formulation of the production function which refers to the Cobb-Douglas production function is as follows:

$$\ln q_i = x_i' \beta - u_i \qquad i = 1,\ldots l, \quad (2)$$

Where $q$ is the level of output produced by company $i$; while $x_i$ is a $K \times 1$ vector containing the logarithm of the input. $\beta$ is a vector of unknown parameters; and $u_i$ is a non-negative random variable associated with technical inefficiency. In order to minimize statistical noise that arises from the exclusion of research-relevant variables or due to measurement errors and estimation errors associated with the choice of functional form, the model is then created as follows:

$$\ln q_i = \beta_0 + \beta_1 ln\, x_i + v_i - u_i \quad (3)$$

Where $q_i$ is the output generated from the production process, $x$ input used in the production process; $B$ is the estimated parameter, $v$ is the error that comes from random effect or noise and $u$ is the error caused by technical inefficiency, $I$ is the number of firms.

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Furthermore, Battese and Coelli, use a different efficiency model on the stochastic frontier production function for unbalanced panel data types that affect the company and are assumed to be distributed as truncated normal random variables (random variables) and allow variations in time periods. Following are the models introduced by Battese & Coelli (1992):

$$TE_i = \frac{Y_i}{\exp(x_i\beta)} = \frac{\exp(x_i\beta - u_i)}{exp(x_i\beta)} = \exp(-u_i) \qquad (4)$$

Where TE is the technical efficiency, $Y_i$ is the output ratio of the *i* company, $x_i\beta$ is the frontier output and *u* is the technical inefficiency. Meanwhile, the value obtained from this technical efficiency is in the range of 0 to 1. This result indicates the amount of output at company $_i$ that can be efficiently produced by the company using the same input (Coelli et, al., 2005).

The different needs of each company for the amount of production results in the use of factors of production such as capital, labor, raw materials and energy which are also different. The difference in the level of use of this input combination reflects the level of skill and technical knowledge of the company. The use of production inputs such as skilled labor will certainly be very different from the use of less skilled labor. Likewise, the level of knowledge differences and various workforce motivations will also affect the company's output.

There are several types of functions in production. These functions are needed to estimate the model in the technical efficiency of the company. In this study, the form of the production function used is the transcendental logarithmic production function (translog function). The form of the function written in natural log form is as follows:

$$lnY_{it} = \beta_0 + \beta_1(lnK_{it}) + \beta_2(lnL_{it}) + \beta_3(lnM_{it}) + \beta_4(lnE_{it}) + \frac{1}{2}\beta_5(lnK_{it})^2 + \frac{1}{2}\beta_6(lnL_{it})^2 + \frac{1}{2}\beta_7(lnM_{it})^2 + \frac{1}{2}\beta_8(lnE_{it})^2 + \beta_9(lnK_{it})(lnL_{it}) + \beta_{10}(lnK_{it})(lnM_{it}) + \beta_{11}(lnK_{it})(lnE_{it}) + \beta_{12}(lnL_{it})(lnM_{it}) + \beta_{13}(lnL_{it})(lnE_{it}) + \beta_{14}(lnM_{it})(lnE_{it}) + \beta_{15}t + \beta_{16}t^2 + \beta_{17}(lnK_{it})(t) + \beta_{18}(lnL_{it})(t) + \beta_{19}(lnM_{it})(t) + \beta_{20}(lnE_{it})(t) + v_{it} - u_{it} \qquad (5)$$

Where *Y* is the value of the firm's output; *K* is the company's capital value; *L* is the number of workers used by the company; *M* is the raw material used by the company; *E* is the energy that the company uses in the production process; $\beta$ is the estimation parameter; *i* is the 1st, 2nd, 3rd company, etc. n; *t* the time span used in the study (2010 – 2015); and *v* is the error term.

The data used in this study is secondary data which is micro or firm level data on the Manufacturing industry in Indonesia which uses data for six years, namely from 2010-2015. The data is data from the annual survey report conducted by the Central Bureau of Statistics in the form of raw data. The data was selected and adjusted to

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obtain the data needed in the study by following the changes in industry classification from 2010 to 2015, namely referring to the 2009 KBLI (Indonesian Business Field Standard Classification). The data in this study are included in the unbalanced dataset category. Where the number of observations from the object unit is not balanced in each year. In addition, because it is in the form of raw data, a lot of data is missing or empty, so it must be removed from the dataset.

## RESULT AND DISCUSSION

Descriptive statistical analysis is an analysis used to analyze data in the research model by describing the data collected before being processed further. Subekti & Akhsani (2020) explained that the purpose of descriptive statistical analysis is to provide an overview of data in variables seen from the average (mean), minimum, maximum and standard deviation values. In addition, the use of descriptive statistical analysis is also able to provide an overview of the research in the form of the relationship of the independent variables to the dependent variable. From the results of statistical calculations on the variables used in this study, both the independent and dependent variables in the analysis of technical efficiency, the following results are obtained:

**Table 1.** Variable Statistical Description (ln thousand IDR)

| No | Variabel | Obs | Mean | St. Dev | Min | Max |
|---|---|---|---|---|---|---|
| **1** | **Output (Y)** | 10464 | 17.03723 | 2.068468 | 8.940017 | 24.5828 |
| **2** | **Capital (K)** | 10464 | 15.40009 | 2.208729 | 2.700326 | 28.06909 |
| **3** | **Labor (L)** | 10464 | 4.504719 | 1.338808 | 2.302585 | 10.09398 |
| **4** | **Material (M)** | 10464 | 15.95758 | 2.350219 | 4.781133 | 23.94659 |
| **5** | **Energy (E)** | 10464 | 13.25299 | 2.301904 | 2.231117 | 21.2212 |

Source: the Central Bureau of Statistics, Indonesia (2010-2015)

It can be seen in table 1 that the total observations or N for each valid variable are 10464. From the 10464 observation data for estimating technical efficiency it can be seen that the data output (Y) has a minimum value of 8.9400, a maximum value of 24.5828, with a time range between 2010 – 2015 the mean value is 17.0372 and the standard deviation value is 2.0684 which means that the mean value is greater than the standard deviation value which means that the data deviation that occurs is low, so the distribution of values is even. Then the data of the independent variables namely capital, labor, materials and energy each also have a mean value that is higher than the standard deviation value, so that all independent variables in the estimation of technical efficiency have low data deviations so that it is concluded that they have an even distribution.

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**The Production Function Estimation Results**

The table 2 is the result of the estimation of the translog production function (model 4.1) which was estimated using the Maximum Likelihood (MLE) method with using Frontier 4.1 software. Estimation of the production function with model 4.1 uses 20 independent variables. Of the 20 independent variables estimated, there are 18 independent variables that are proven to be significant or have an effect on the company's output with a significance level (p) at 0.01 or 1%.

**Table 2.** Maximum Likelihood Estimation Results in the Production Function

| Variabel | Parameter | Coefficient | | Standart-error | t-ratio |
|---|---|---|---|---|---|
| **Constant** | β0 | 1.427462 | *** | 0.383736 | 3.719908 |
| **ln K** | β1 | 0.156454 | *** | 0.036613 | 4.273173 |
| **ln L** | β2 | 0.538353 | *** | 0.062641 | 8.594310 |
| **ln M** | β3 | 0.302439 | *** | 0.039376 | 7.680837 |
| **ln E** | β4 | 0.416819 | *** | 0.036110 | 11.543048 |
| **(ln K)^2** | β5 | 0.009311 | *** | 0.001171 | 7.951830 |
| **(ln L)^2** | β6 | 0.024171 | *** | 0.004527 | 5.339685 |
| **(ln M)^2** | β7 | 0.047668 | *** | 0.001527 | 31.225343 |
| **(ln E)^2** | β8 | 0.022670 | *** | 0.001804 | 12.570119 |
| **(ln K) (ln L)** | β9 | -0.008221 | *** | 0.003548 | -2.317067 |
| **(ln K) (ln M)** | β10 | -0.023873 | *** | 0.002598 | -9.188946 |
| **(ln K) (ln E)** | β11 | -0.002224 | | 0.002589 | -0.859010 |
| **(ln L) (ln M)** | β12 | -0.021927 | *** | 0.004133 | -5.304775 |
| **(ln L) (ln E)** | β13 | -0.000799 | | 0.004249 | -0.188038 |
| **(ln M) (ln E)** | β14 | -0.046861 | *** | 0.002736 | -17.125379 |
| **t** | β15 | 1.300746 | *** | 0.045943 | 28.312181 |
| **t^2** | β16 | 0.089511 | *** | 0.003813 | 23.476064 |
| **(ln K) (t)** | β17 | 0.060829 | *** | 0.002634 | 23.090790 |
| **(ln L) (t)** | β18 | -0.086811 | *** | 0.004545 | -19.099842 |
| **(ln M) (t)** | β19 | -0.090462 | *** | 0.002948 | -30.684134 |
| **(ln E) (t)** | β20 | -0.031855 | *** | 0.003002 | -10.609516 |
| **Sigma-squared** | | 2.194847 | *** | 0.033196 | 66.118584 |
| **Gamma** | | 0.816474 | *** | 0.005588 | 146.111600 |

The estimation results show that the variables capital (K), labor (L), raw materials (M), and energy (E) have a significant positive effect on output. Furthermore, the variables K2, L2, M2, and E2 each show a significant positive contribution to output. A significant positive contribution indicates a unidirectional relationship, namely an increase in the company's inputs which include capital, labor, raw materials, and energy will increase the company's output. The inclusion of interaction variables aims to

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determine the interaction relationship between inputs, whether there is a substitute or complementary relationship. The substitution relationship is marked in a positive direction, while the complementary relationship is marked in a negative direction. There are two pairs of interaction variables that are not significant, namely K and E, and L and E. In addition to the two pairs of interaction variables, other pairs of interaction variables have a significant relationship with a negative relationship, which means they have a complementary relationship. The pairs of interaction variables are K and L, K and M, L and M, and M and E.

The variables interacted with time (t) have different results, namely there are positive and negative results. Significant positive results are shown in the interaction between capital (K) and t. These results indicate that technological progress occurs over time. Meanwhile, the interaction variables between L and t, M and t, and E and t produce a significant negative effect. Significant negative effect indicates that there is a technological regression. A small sigma square value indicates that the inefficiency is normally distributed, while the gamma value indicates the ratio between inefficiency and random error. The gamma value is 0.81 or 81% of the residual comes from inefficiencies in production, the remaining 19% comes from random errors.

This study measures the value of a company's technical efficiency using SFA (Stochastic Frontier Analysis) with the help of Frontier 4.1 software. The output table for annual technical efficiency measurement results will be presented in table 5.3. During the period 2010 – 2015 or 6 years of observation, the efficiency level of companies in the Manufacturing industry in Indonesia has decreased by 1 percent per year. The average level of technical efficiency of the company has not yet reached an efficient scale. From a scale between 0 to 1, the average efficiency level over a period of 6 years is 0.37. The highest efficiency score with a value of 0.64 in 2010 and the lowest efficiency score with a value of 0.12 was in 2015. This value as a whole is still not close to 1 which means it is still far from being efficient.

**The Performance of the Indonesian Manufacturing Industry as Viewed from the Value of Technical Efficiency**

The Indonesian Manufacturing industry is the prima donna industry with the largest contribution to the Indonesian economy. The Manufacturing industry is also an industry that is consistently at an expansive level, even though it slumped when the pandemic hit Indonesia. The 2015 – 2035 National Industrial Development Master Plan stipulates the industrial sector as the driving sector of the national economy. This is because the industrial sector is able to make a significant contribution in increasing added value, employment, and foreign exchange. Besides that, the industrial sector is also able to contribute to the formation of national competitiveness. Competitiveness is needed as a basis for the ability of domestic companies to provide for domestic and international market demands accompanied by optimal productivity and efficiency.

According to the results of estimating the technical efficiency level of the Indonesian manufacturing industry during a period of 6 years (2010 to 2015), the trend

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of technical efficiency of the manufacturing industry in Indonesia decreased from year to year. This shows that companies in the manufacturing industry in Indonesia are not yet at their level of technical efficiency. The highest level of technical efficiency is in the pet food industry with ISIC code 10801 with an efficiency level close to efficient, namely 0.94 in the first year to the sixth year. Meanwhile, companies that have the lowest level of efficiency are companies that are included in the wood building materials industry with ISIC 16221 with an efficiency level of 0.05, which means that the company only achieves a maximum production potential of 5%. This finding is in line with the research by Pradinda (2020) which estimated the technical efficiency of the manufacturing industry in Indonesia and found that the trend of industry in Indonesia has decreased from year to year.

By looking at the reality of the condition of companies in the Indonesian manufacturing industry, it is necessary to optimize government regulations to encourage companies in the Indonesian manufacturing industry to improve and maintain their technical efficiency. Populist policies such as tax reductions for industry are very significant in encouraging companies to face the global market (Sil et al, 2018). In addition, it is also necessary to increase Research and Development (R & D) activities for companies. Further, the government has issued regulations related to the focus of Indonesia's economic growth which focuses on the manufacturing industry sector.

**Analysis of Professionalism in Islam**

From the results of the estimation of the efficiency level of the manufacturing industry in Indonesia, it can be seen that the average level of efficiency has decreased from year to year. This is in line with research Saragih (2018) related to the manufacturing industry in the Sumatran archipelago which is relatively slow compared to other islands. This overview generally explains the need for quality improvement from all fields if the domestic industry wants to compete in the global market. Of course, this estimate cannot describe in detail whether the position of the workforce used is unskilled labor. However, from this estimate it can be seen that the performance of the manufacturing industry in Indonesia, which utilizes resources which include capital, energy, raw materials and of course labor, is still not efficient enough. This can be seen from the low efficiency score, which means that it is not yet in an efficient condition. Further Petiana et. al, (2015); Salim et. al., (2019); Idris & Rahmah (2006); Ismail (2009) and Noor (2014) found that labor as one of the inputs in production is not differentiated based on the level of education, skills and experience. The workforce used for the technical efficiency analysis refers to the total paid and unpaid male and female workforce in that period. According to this result, to enhance the Research and Development activities refers to Islamic views is important related to the obligation to improve the quality of human resources (labor) in all aspects of life, both for the needs of life in this world and in the hereafter Arifqi, (2019); Harahap et. al., (2021).

Islamic teaching becomes an integrative driving motive or integral motivation to become professional, not merely because of the many or fewer material gains (Hydara,

2020; Phelan, 2023). This is what distinguishes professionals according to the capitalist view and the Islamic view, namely the way of assessing the ultimate goal of the professional itself. The Islamic view that encourages its adherents to increase their own capacity by carrying out the process of inputting information and skills is also evidenced by economic studies on the process of human investment through increasing knowledge, skills and technology (Yasir, et. al., 2021; Basir & Musa, 2022), by increasing those three things human capital can increase a country's output as stated in Islamic teaching (Djakfar, 2007).

According to Sari (2021) there are several components or indicators that a Muslim is called a professional at work. These indicators can be seen in terms of *Kafa'ah* (proficient) or expert in the field of work performed. *Kafa'ah* can be obtained through education, training and experience. *Second*, *himmatul 'amal*, namely enthusiasm and high work ethic. This enthusiasm and work ethic are obtained through high self-motivation towards the basic goal of life, namely worshiping Allah in all aspects of life. *Third*, *amanah* (sense of responsibility), every Muslim will always be responsible for his work so he will always give his best work because this is a form of responsibility not only to superiors or institutions but a form of responsibility for the mandate that has been given to God for him.

## CONCLUSION

The primary results of this study demonstrate that the level of technical efficiency of companies in the Manufacturing industry in Indonesia between 2010 and 2015 with a total of 10,464 observations shows a trend of decreasing levels of company technical efficiency. The results imply that companies in the Manufacturing industry in Indonesia have internal problems related to the company's technical efficiency namely professionalism. Professionalism needs to be applied to every Muslim by referring to three important things, namely the desire to always improve self-quality (*kafa'ah*), then having high enthusiasm and work ethic as a manifestation of the attitude of *himmatul 'amal*, and *amanah* an attitude of trustworthiness or responsibility answer as a form of monotheism.

Despite of the compelling results, this study acknowledges a research limitation. This study only put the classification level of education, skills and work experience for the workforce used as input of Manufacturing industry in Indonesia. Future research can analyze the influence between the quality of human resources as seen from the level of education, skills and work experience on company or industry performance so that it can contribute to the wealth of research in the realm of Islamic economics.

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