

Smart Technologies and Financial Performance: The mediating effect of corporate sustainability

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Abstract

The World of Business and Industry began to transform from manual to digitizing, both large and small companies. Demands for the industrial revolution 4.0 Ask the business world to follow its development. Businesses or companies that cannot keep up with these developments will be crushed by the wheels of time. This study aims to investigate the effect of smart technology and three components of corporate sustainability (social sustainability, economic sustainability, environmental sustainability) on financial performance. This study also wants to investigate the mediating effect of corporate sustainability on financial performance. The sample in this study was SMEs engaged in food in East Java. The data analysis technique used in this study uses SEM-PLS. The results of this study indicate that smart technology shows a positive effect on financial performance and three components of corporate sustainability. The next finding is the third component of company sustainability which only supports positive economic sustainability on financial performance. The final finding in this study is that only economic sustainability can mediate smart technology on financial performance

Key words: smart technologies, corporate sustainability, financial performance

INTRODUCTION

The world of business and industry has begun to transform from manual to digitalization, both large and small companies. The demands of the 4.0 industrial revolution require the business world to follow its development. Businesses or companies that are unable to keep up with these developments will be crushed by the wheels of the times. This transformation from manual to digital is not an easy matter, but it is a big challenge (Li *et al.*, 2018) that will be experienced by the business world. The Industrial Revolution 4.0 requires all business operations to use *smart technologies*. *Smart technologies* help companies to improve human resource efficiency, because everything is done by machines. With this efficiency, companies that do not

have managerial skills and the ability to operate technology properly will in fact become a separate obstacle for the company. *Smart technology* is considered capable of reducing energy consumption and industrial emission processes, electricity grids and transportation systems Higón (2017). With the existence of *smart technology*, it is able to reduce energy use, so that it can reduce financial expenses, it can be concluded that it can improve the company's financial performance.

Perus a pany that is not able to keep up with technology and he will be difficult to survive in the competition. This applies to large companies or companies with a small scale, for example, micro, small and medium enterprises (MSMEs) . Rapid technological advances have led to new ideas in the business world, one of which is the emergence of applications that collaborate with MSMEs in marketing their products. MSMEs that can keep up with technological developments will be able to survive in the competition, so that they can improve their financial performance .

Research on the effect of technology on *financial performance* has been widely studied by previous researchers. *Green information technologies practices* have a positive effect on *financial performance* (Przychodzen and Fernando 2018), *green process innovation* is positively related to *corporate financial performance* (Xie, Huo, and Zou 2019) . Meanwhile, research on the effect of *smart technology* on *corporate sustainability* has been researched by (Saunila et al. 2019) , where the results of *smart technology* have a positive effect on one of the dimensions of *corporate sustainability*, namely the economic sustainability of the company. Economic sustainability is synonymous with the survival of a company, one of which is characterized by improvements in the financial sector. So it can be concluded that *smart technology* can help improve the *financial performance* of a company.

Furthermore, the effect of *smart technology* on *financial performance* mediated by *corporate sustainability* has not been widely studied by previous researchers. (Saunila et al. 2019) examined the direct effect of *smart technology* on *corporate sustainability*, but the results of their research still do not support what was hypothesized. Of the three dimensions of *corporate sustainability*, namely social, economic and environmental, only one dimension supports the hypothesis, namely economy. Therefore, the researcher wants to research it further.

BASIS OF THEORY AND HYPOTHESIS DEVELOPMENT

HYPOTHESIS DEVELOPMENT

Smart technologies with corporate sustainability

Smart technologies help companies to improve human resource efficiency, because everything is done by machines. The existence of *smart technologies* such as digital production machines as well as information and communication technology is considered capable of reducing the greenhouse effect, so as to preserve the environment. Sophisticated technology can also help companies process waste after production into goods that can be used, for example fertilizers or other recycled items so that they do not pollute the surrounding environment. Several previous researchers found that *smart technologies* have a positive effect on the environment (Be karoo *et al.* , 2016 ; Saunila *et al.* , 2019) .

The proper use of *smart technologies* will greatly help life, in addition to preserving the environment, *smart technologies* also have a positive impact on social life. Based on the theory and arguments above, the hypothesis proposed is as follows:

H1: Smart technologies have a positive effect on environmental sustainability

H2: Smart technologies have a positive effect on social sustainability

H3: Smart technologies have a positive effect on Economic sustainability

Richardson and Welker (2001) pointed out that social disclosure "could influence the cost of equity capital directly through investor preference effects if investors are willing to accept a lower expected return on investments that also fulfills social objectives" (p. 598). Early research concluded that social sustainability practices like employee knowledge enhancement, employee involvement programs, improving employee attitudes and satisfaction have improved quality performance. This in turn leads to financial performance in organizations and sustainable advantage (Flynn, Schroeder, & Sakakibara, 1995). Daily and Huang (2001) later found human resource and organizational behavior practices improve social sustainability performance in organizations which can result in improved financial performance. Explanations for improved performance from social sustainability include corporate stakeholder theory (Cornell & Shapiro, 1987). From this theoretical perspective, firm resources go beyond the bondholders and stockholders to include employees within the organization. Cornell and Shapiro (1987) noticed that firms with socially sustainable practices have more low-cost implicit claims, leading to higher financial performance. A lack of socially sustainable practices can also discourage investors, as they perceive higher risk in investing such firms (Alexander & Buchholz, 1978; Spicer, 1978). McGuire *et al.* (1988) noted that perceptions of low social sustainability decrease a firm's ability to obtain capital at constant rates and to have a more stable relationship with the financial community and the government. A later study by MD Johnson (2006) suggested that social sustainability practices like worker participation and training have a positive effect on social sustainability performance leading to financial performance. We also know social sustainability practices such as better worker safety programs and social sustainability employee programs are likely to improve the firm's financial performance by reducing the cost of

production and quality management (SP Brown 1996; KA Brown, Willis, & Prussia, 2000). Hence, we hypothesize,

H 4 : Environmental sustainability has a positive effect on financial performance

H5 : Social sustainability has a positive effect on financial performance

H 6 : Economic sustainability has a positive effect on financial performance

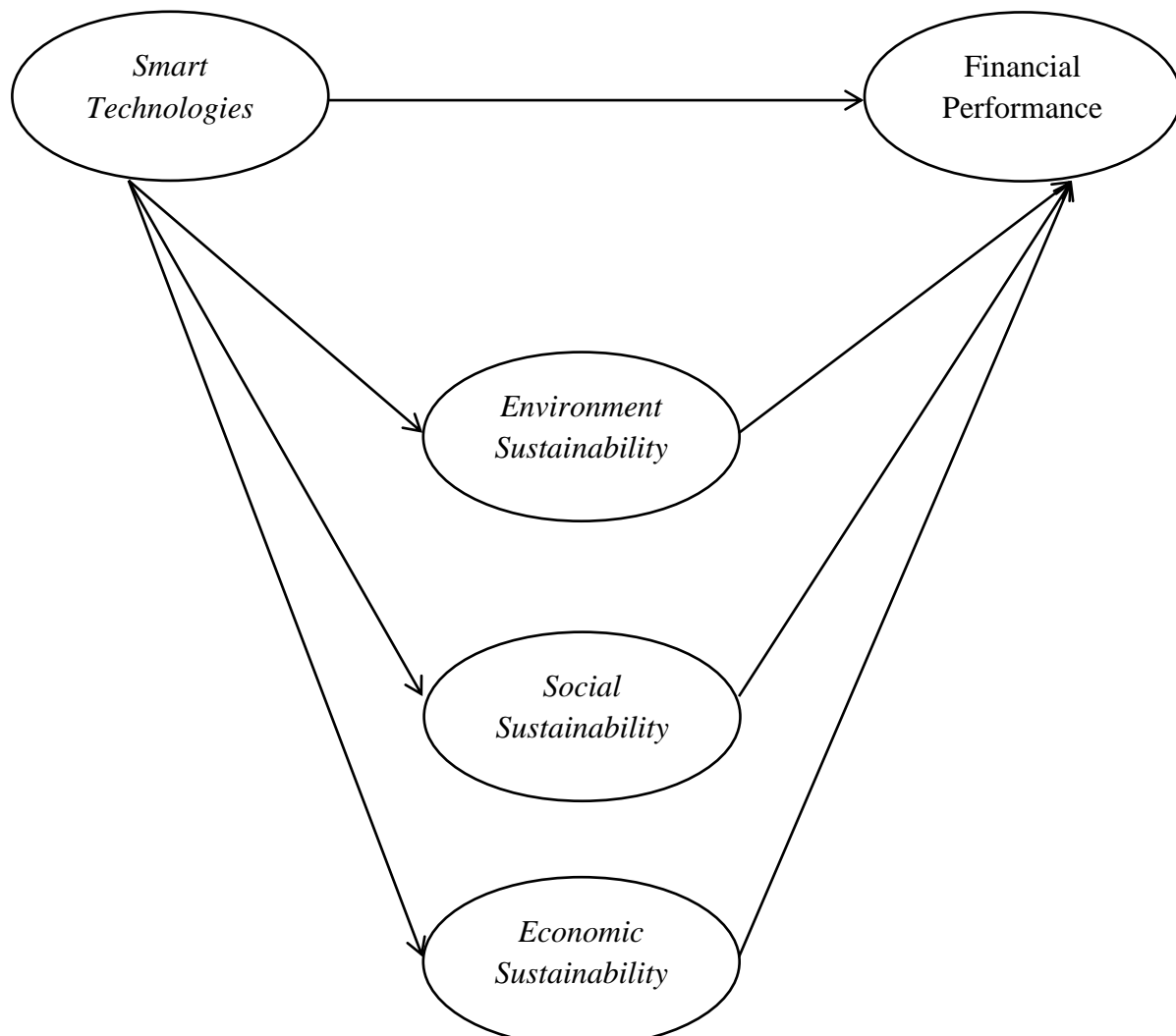
H7 : Environmental sustainability mediates the effect of smart technologies on financial performance

H8: Social sustainability mediates the effect of smart technologies on Financial Performance

H9: Economic sustainability mediates the effect of smart technologies on financial performance

Figure 1

Research Model



RESEARCH METHODS

1. Sample and Variable Measurement

This research is a quantitative research. The data in this study were obtained by distributing questionnaires *online* and directly to respondents. Respondents of this research are owners of MSMEs who are members of the East Java ICSB.

Variable Measurement

Smart Technologies variables were measured using a 5 statement in developed by Saunila *et al*, (2019) with minor modifications by the researcher. The five statement items are measured using a 5-point Likert scale, ranging from 1 strongly disagree to 5 strongly agree.

Environmental sustainability , economic sustainability, and social sustainability variables are measured using 3, 3 and 2 statement items that have been used by Saunila *et al*, (2019). The three variables above are dimensions of *corporate sustainability*. The statement items used in this study were developed from the statement items used by Saunila *et al*, (2019), which initially measured each dimension of *corporate sustainability* using only one statement so that there were 3 statement items. In this study, the statement items were developed into 7 statement items .

Financial performance variables were measured using 4 question items developed by Henry (2006) and Kaplan with slight modifications by the researcher.

2. Data analysis technique

Hypothesis testing in this study uses *Structural Equation Modeling* (SEM) with an alternative method of *Partial Least Square* (PLS) using the WarpPLS 3.0 *software* . The reason why using SEM-PLS is because the sample used in this study is relatively small and the research model is also relatively complex. Using a complex research model will be easier to use SEM-PLS, because SEM-PLS can be used efficiently with a small sample size and a complex model (Sholihin and Ratmono, 2013).

Result

1. Evaluation of the Measurement Model

Evaluation of the measurement model in this study is to look at convergent validity, discriminant validity and internal consistency reliability. Convergent validity is related to the principle that the gauges of a construct should be highly correlated (Hartono and Abdillah, 2014). The convergent validity test was assessed based on the *loading* factor of

each construct greater than 0.70 (Sholihin and Ratmono, 2013). The following is the result of convergent validity.

Table 1.1. Convergent Validity

Construct	Item	Loading	P-Value
Smart Technologies	ST1	0.707	<0.001
	ST2	0.834	<0.001
	ST2	0.782	<0.001
	ST4	0.808	<0.001
	ST5	0.726	<0.001
Financial performance	KK1	0.724	<0.001
	KK2	0.840	<0.001
	KK3	0.851	<0.001
	KK4	0.803	<0.001
Environmental Sustainability	EVS1	0.834	<0.001
	EVS2	0.879	<0.001
	EVS3	0.823	<0.001
Social Sustainability	SS1	0.843	<0.001
	SS2	0.902	<0.001
	SS3	0.887	<0.001
Economics Sustainability	ECS1	0.746	<0.001
	ECS2	0.907	<0.001
	ECS3	0.829	<0.001

The table above presents the results of the convergent validity test for each construct. The results of the convergent validity test above show that all constructs in this study have met the criteria, namely having a *loading* factor value above 0.7 and a *p-value* less than 0.05.

The next test is the discriminant validity test. The test of discriminant validity is assessed by comparing the square root of the *average variance extracted* (AVE) with the correlation between constructs, or it can also be by comparing the *loading* of the measured constructs with the *loading* of other constructs (Sholihin and Ratmono, 2013).

Table 1.2: Correlations between latent variables

	ST	KK	EVs	SS	ECS
ST	0.773	0.263	0.288	0.379	0.376
KK	0.263	0.806	0.287	0.262	0.346
EVs	0.288	0.287	0.846	0.678	0.715
SS	0.379	0.262	0.678	0.877	0.748
ESC	0.376	0.346	0.715	0.748	0.830

Table 1.2 above presents the results of the discriminant validity testing of the constructs in this study. The results in the table above indicate that the discriminant validity in this study has been fulfilled seen from the square root value of the AVE in the diagonal column which is greater than the correlation between constructs in the same column.

Further testing Reliability testing is measured using *composite reliability* and *Cronbach alpha*. The rule of thumb of *composite reliability* and *Cronbach 's alpha* is greater than 0.70 (Sholihin and Ratmono, 2013). The results of the internal consistency reliability testing in this study are presented in table 1.3 below.

Table 1.3: Internal consistency reliability test results

Coefficient	ST	KK	EVs	SS	ECS
<i>C omposite R eliability</i>	0.881	0.881	0.883	0.909	0.868
<i>Cronbach's alpha</i>	0.830	0.819	0.801	0.850	0.771
AVE	0.797	0.701	0.715	0.770	0.689

Hypothesis test

Hypothesis testing in the study was carried out by evaluating the structural model at SEM-PLS through the estimated path coefficient (β) and significance (*p-value*) shown. This evaluation is used for predictor variables or constructs that are hypothesized to affect endogenous variables / research criteria which are then used for statistical decision making on the hypothesis proposed in this study.

This study conducted two hypothesis testing, namely the direct hypothesis and the mediation hypothesis. The decision regarding the support of the research hypothesis is based on the results of the evaluation of the structural model at the next SEM-PLS, namely by looking at the path coefficient value (β) and the indicated significance (*p-value*). Supports research hypothesis stated when the research results to reject H0 (Ha supported) with a *p-value* <0.01 (for a significance level of 1%), *p* < 0.0 5 (for a significance level of 5%) and *p* <0.1 (for 10% significance).

Following the steps taken by Lau and Roopnarain (2014) and Sholihin et al. (2011), testing the mediation hypothesis in the structural model of research is carried out through the approach of Baron and Kenny (1986) which is commonly called the *step-wise* approach . To test the research mediation model, Baron and Kenny (1986) and Sholihin and Ratmono (2013) say that there are two steps that need to be taken in this test, namely:

- 1) Estimating the direct relationship between the dependent variable and the independent variable of the study.
- 2) Estimating the indirect relationship by including the research mediation variables.

This study uses this step to test the research hypothesis through a *step-wise* approach (Sholihin et al., 2011). First, researchers estimate the direct relationship between the variables of *smart technologies* (ST) with financial performance (KK) as the dependent variable (see Figure 2). Second, running a PLS analysis by including the variables *Environment sustainability*, *social sustainability*, and *economic sustainability* as mediating variables in the relationship in the first step. The second step is an estimate for the *full model* of the study (see Figure 3) which is used to test all research hypotheses (H1-H 10).

Figure 2

Estimated direct relationship (ST → KK)

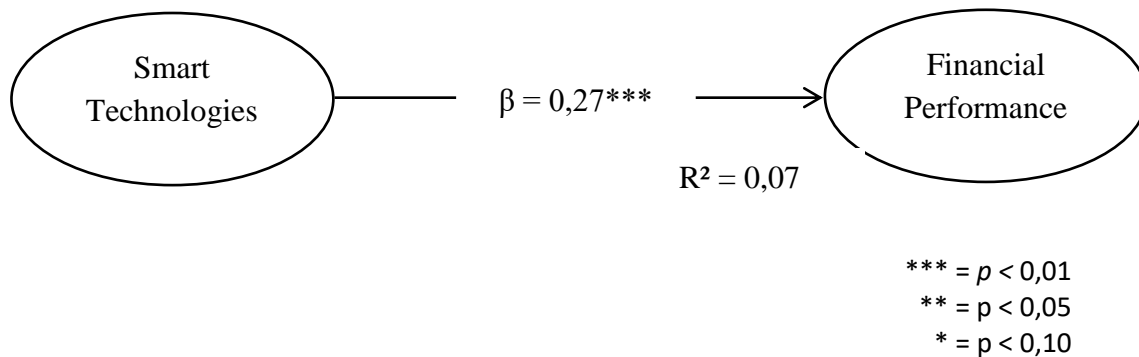


Figure 2 above is the first step in testing the hypothesis of this study which shows the estimation results for the direct relationship of *smart technologies* with financial performance showing a path coefficient of $\beta = 0.27$, $p < 0.01$. These results confirm the proposed hypothesis, that *smart technologies* have a positive effect on financial performance.

The second step in the process of testing this research hypothesis is to estimate the indirect relationship between *smart technologies* and financial performance by including the mediating variables of *environment sustainability*, *social sustainability*, and *economic sustainability*. Estimation in this second step is used to see empirical results as the basis for decision support for all the hypotheses proposed in this study. Figure 1.2 above shows all the estimated path coefficients of the research model as well as the significance value of each hypothesis. Based on Figure 1.2 above, it can be seen that the path coefficient of the *smart technologies* variable with *environment sustainability* is positive with a significance at $\alpha < 0.01$ (ST → EVS: $\beta = 0.33$, $p < 0.01$), while the path coefficient of the variable *smart*

technologies with *social sustainability* and *economic sustainability* are also equally positive with the respective significance of $\alpha < 0.01$ (ST \rightarrow SS: $\beta = 0.39, p < 0.01$; and ST \rightarrow ES: $\beta = 0.38, p < 0.01$). The path coefficient for the relationship between the *environment sustainability* variable and financial performance shows a positive value with a significance of $p > 0.10$, the *social sustainability* variable with financial performance has a negative path coefficient with a significance of $p > 0.10$. Finally, the relationship between *economic sustainability* and financial performance has a positive path coefficient with a significance of $p < 0.01$.

Further analysis is then carried out to test the mediation hypothesis (H8 –H10) which is carried out by comparing the value of the direct relationship path coefficient between *smart technologies* and financial performance in Figure 2 and the path coefficient of the relationship between *smart technologies* and financial performance after entering the mediating variable, namely *environment sustainability*, *social sustainability* and *economic sustainability* in Figure 3. The results of the comparison between the estimated direct relationship and the indirect relationship show that the path coefficient for ST on financial performance has decreased from 0.27 to 0.15 and remains significant after adding the mediating variables *environment sustainability*, *social sustainability* and *economic sustainability* (see figure 3) .

Table 1.5 below provides a summary of all the results of hypothesis testing in this study. Panel A contains the estimation results of the direct relationship between *smart technologies* and financial performance. Meanwhile, panel B contains an indirect relationship between *smart technologies* and financial performance mediated by *environmental sustainability*, *social sustainability* and *economic sustainability*.

Table 1.5

Research Hypothesis Testing Results

Panel A. Direct Relations				
Variable	Path to- Financial performance			
<i>Smart Technologies</i>	0.27 ***			
Panel B. Indirect Connection (Full model)				
Variable	Path to-			Financial performance
	<i>environment sustainability</i>	<i>social sustainability</i>	<i>economic sustainability</i>	
<i>Smart Technologies</i>	0.33 ***	0.39 ***	0.38 ***	0.15 ***
<i>environment sustainability</i>				0.07
<i>social</i>				-0.10

Additional Testing of Mediation Hypotheses

Further analysis of the research mediation hypothesis (H 8, H9 and H 10) is then carried out through *additional testing* . This additional test is carried out by calculating the *Variance Accounted For* (VAF) value in the Hair et al approach. (2014) which refers more to the method developed by Precaher and Hayes (2008). The VAF method for mediation testing is considered more suitable for SEM-PLS analysis because it does not require any assumptions about the distribution of variables so that it can be applied to a small *sample size* (Sholihin and Ratmono, 2013).

The mediation testing procedure with the VAF method consists of three stages, each of which must be fulfilled as follows: 1) The direct relationship must show a significant value before the mediating variable is entered. 2) When mediating variables are included, all indirect relationships must show a significant value. The estimation results hubun gan indirectly in Figure 1.2 shows that only one of the indirect relationships (ST → ES → KK) shows the results ya ng significant ($p < 0.01$). These results conclude that the mediating variable (*economic sustainability*) is able to absorb or reduce the direct relationship in the first step so that for the second condition the VAF test has also been fulfilled. As for the two indirect relationship Other (ST → EVS → KK and ST → SS → KK) did not show a significant result for the relationship EVS → KK and SS → KK, these results indicate that the mediating variables (*environment sustainability* and *social sustainability*) are not able to absorb or reduce direct contact in the first step so that it does not qualify for further VAF testing. 3) The final step is calculating the *Variance Accounted For* (VAF) by dividing (/) the total indirect relationship with the total relationship obtained from the sum (+) between the direct and indirect relationships. If the VAF value is > 0.80 , this indicates a full mediation role and if the VAF value is between 0.20 to 0.80 then the mediation role is only partial. Meanwhile, when the VAF value shows a number less than 0.20, it can be concluded that there is almost no mediation effect in the model (Hair et al., 2014). Table 1.6 presents the complete results for calculating the *Variance Accounted For* (VAF).

Table 1.6

Results of Calculation of the VAF Hypothesis Mediation

Indirect Relationship (Figure 1.2)

ST → ES → KK	0.38 * 0.20	0.076
Total Indirect relationship		0.076

Direct relationship		
ST → KK		0.27
Total Direct Links		
Total relationship	$0.076 + 0.27 = 0.346$	
VAF	$\frac{\text{Indirect relationship} = 0.076}{\text{Total relationship } 0.346}$	0.220

The results of the VAF calculation for additional testing of the research mediation hypothesis showed a number of 0.220 (see Table 1.6). The VAF value of 0.220 indicates that the mediating variable of *Economic sustainability is* able to absorb the direct relationship of the model without mediation (ST → ES → KK) of 22 %.

Table 1.7
Recapitulation of Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficient	Information
H1	ST → KK	0.15 ***	Supported
H2	ST → EVS	0.33 ***	Supported
H3	ST → SS	0.39 ***	Supported
H4	ST → ES	0.38 ***	Supported
H5	EVS → KK	0.07	Unsupported
H6	SS → KK	-0.10	Unsupported
H7	ES → KK	0.20 ***	Supported
H8	ST → EVS → KK	0.33 *** (0.07)	Unsupported
H9	ST → SS → KK	0.39 *** (-0.10)	Unsupported
H10	ST → ES → KK	0.38 *** (0.20 ***)	Supported (<i>Partial mediating</i>)
*** <i>p-value</i> <0.01			
** <i>p-value</i> <0.05			

Smart Technologies and Performance Keuangan

The first hypothesis in this study is that *Smart Technologies* (ST) is positively related to Financial Performance (KK). Based on the hypothesis testing that has been done, it can be seen that the path coefficient of the relationship between *Smart Technologies* (ST) and financial performance (KK) is 0.15 with a significance of $\alpha < 0.001$ (see Figure 1.2 and panel B table). The positive value on the path coefficient indicates that the better the use of technology in the company, the better its financial performance. Based on these results, hypothesis 1 is accepted.

Smart Technologies with *environment sustainability, social sustainability and economic sustainability*

The results of hypothesis testing for the relationship between *smart technologies* (ST) and *environment sustainability* (EVS), *social sustainability* (SS) and *economic sustainability* (ES) have respective path coefficients $\beta = 0.33$; $\beta = 0.39$; and $\beta = 0.33$ with a significant *p-value* at $\alpha < 0.01$. The test results provide empirical evidence for the support of the proposed hypotheses 2, 3, and 4. This finding is in line with research conducted by Saunila *et al.* (2019).

Environment sustainability, social sustainability and economic sustainability with financial performance.

Based on the results of testing of the above can be known that the value of the coefficient of the path and the *p-value* the influence of environment sustainability of the performance of finance is at 0,07 *p-value* > 0.05. The results are showing that the environment sustainability no effect on the performance of finance of SMEs that do not support the hypothesis that proposed. It shows that the sustainability of the environment that is done by the company did not influence on the performance of finance. The same thing also happened to the effect of social sustainability on financial performance. The results of hypothesis testing show the path coefficient and *p-value* of the influence of social sustainability on financial performance amounted to -0,10 and *p-value* < 0.05, which means that do not support the hypothesis that proposed. The results of testing hypothesis 5 This shows that more and more high social sustainability of the performance of finance is getting low. It that happens because of the cost of the sustainability of the social is sufficiently high so as to degrade the performance of finance of SMEs.

The results of testing hypothesis 6, namely the effect of economic sustainability have a positive and significant effect on financial performance. This can be seen from the path coefficient values of 0,20 and *p-value* < 0.001. Results are to be interpreted that the more high- economics is the sustainability of the performance of finance are also getting higher.

Environment sustainability, social sustainability and economic sustainability mediate the effects of smart technologies to Financial Performance.

The next test result is the mediation hypothesis testing. Based on the results of testing the hypothesis of mediation at the top, can be known that only there is one hypothesis of mediation that can be processed at testing the hypothesis of mediation that is *economic sustainability* mediate the effects of smart technologies to Financial Performance. The results of testing the mediation hypothesis show that *economic sustainability* is able to partially mediate the effect of smart technologies on financial performance.

While for the variable of environment and social sustainability not able to mediate the effect of smart technologies to Financial Performance. It that happens because the two variables that had not escaped at the stage of initial testing of the hypothesis of mediation so as not to be included on the step next.

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