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The Effect of *Kaizen*, Innovation, and Design toward Operations Performance on MSMEs the Manufacturing Sector: The Role of Output Quality as an Intervening Variable

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Abstract:- This study aims to analyse the effect of *kaizen*, innovation, and design on output quality; analyse the effect of *kaizen*, innovation, design, and output quality on operations performance; and analysing the effects of *kaizen*, innovation, and design on operations performance through output quality. Determination of the sample using total sampling technique and obtained 183 MSMEs as the research sample. The unit of analysis is the business owner or the person in charge of production in MSMEs, the manufacturing sector, with sub-sector of the furniture industry scattered in the City of Parepare. The data analysis used Structural Equation Modeling (SEM) analysis techniques with the AMOS program's help. The results showed that *kaizen*, innovation, and design had a positive effect and significant on output quality; *kaizen*, design, and output quality have a positive effect and significant on operations performance; innovation has a positive effect but not significant on operations performance; and *kaizen*, innovation, and design have a positive effect and significant on operations performance through output quality. *Kaizen* is the most dominant variable that affects improving the output quality and operations performance, which are the findings of this study. Other findings also show that efforts to improve operations performance through innovation have not been going well. The success of implementing innovation for MSMEs actors requires sufficient entrepreneurial readiness and the ability to read opportunities and dare to take risks.

Keywords*: Kaizen, Innovation, Design, Output Quality, Operations Performance*.

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I. INTRODUCTION

Increasingly competitive community life with various needs for products in the form of goods and services influences the producers in maintaining the quality of products and services to guarantee the community's satisfaction and loyalty as a determinant of the company's sustainability. The availability of abundant natural resources requires processing business procedures and human resources to carry out these activities. The processing industry is one of the industry branches that carry out economic activities by changing raw materials, semi-finished goods, or finished goods mechanically or chemically by machine or by hand into more valuable and closer to the end-user. The development of the processing industry in each region can also be used to observe economic development both domestically and nationally in a country, either based on consumer demand, product quality, or the processing industry's performance as a whole.

The manufacturing sector industry that has developed until now is still dominated by labour-intensive industries, which usually have relatively short production chains. The creation of added value is also relatively small. However, due to a large number of business units, its contribution to the economy remains large. Several economic actors support the processing industry's development, namely private-owned companies, state-owned companies, village-owned enterprises, cooperatives, and micro, small, and medium enterprises (MSMEs).

The growth of the UMKM manufacturing sector in the City of Parepare has experienced ups and downs in the number of business units and labour absorption. In 2015 the number of MSMEs was 1,552 units with a total workforce of 4,947 people. A drastic decline occurred in 2016, where there were only 1,338 MSMEs with 4,303 workers, meaning that there were 214 business units that stopped operating and 644 workers who lost their livelihoods. However, until 2019 the number of business units and employment has increased but not significantly. The processing industry category in the City of Parepare was only formed by the non-oil and gas industry sub-group, which had a business sector contribution of 2.04% to growth Parepare's GRDP 2.25%. The industrial sector classification in Indonesia is divided into four groups: large industry, medium industry, small industry, and micro-industry (household scale). The basis for grouping these industries are based on the number of workers involved, regardless of the production machines used or the capital invested.

In 2019, the Department of Manpower and Trade Office of the City of Parepare noted 16 medium-sized industries with 76 workers, 969 small industries with 3,267 workers, and 361 micro enterprises (household scale) with 1,148 workers. Based on these data, the total number of MSMEs and workers in the City of Parepare is currently 1,346 MSMEs with 4,491 workers, as shown in the following graph.

The attention and concern of the Parepare Government did not have a tangible impact on the growth of MSMEs performance in terms of controlling the local market in the City of Parepare. The large number of MSMEs products originating from outside the region and abroad illustrates its weak competitiveness. Various obstacles to achieving MSMEs performance are also found from the results of recent research, including an increase in work culture and inadequate HR development, resulting in low HR competence to carry out management in achieving performance (Munir *et al*., 2019; Ramlawati & Putra, 2018; Sampe, 2019), lack of ability to innovate (Ismail *et al*., 2019; Pono *et al*., 2019), and efforts to improve product quality are still low due to weak planning stages to be transformed into the production process (Tejaningrum, 2019).

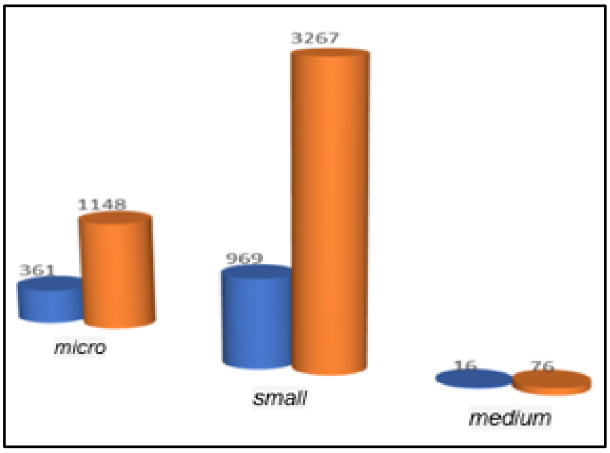

Fig.1. Number of MSMEs and Workforce Based on Business Scale in the City of Parepare 2019.

The author also found that many MSMEs tend to pursue profits without improving and maintaining product quality. Reducing the dosage of materials or using low-quality raw materials outside the specified standards, not maintaining cleanliness, packaging, and unattractive labelling. This kind of practice undermines the product's usefulness and durability, ultimately leading to disappointment in consumers. This research is expected to provide solutions for MSMEs actors in achieving operations performance according to the standards set by forming a quality awareness paradigm.

There are two different experts' views in achieving performance by implementing operations strategies (Gagnon, 1999). First, the "market-based" competition view and the "resource-based" competition view. The first view sees operations as a system that can be perfectly adapted and focused on successfully following market rules. In contrast, the latter suggests that it is more profitable to focus on developing, protecting, and enhancing unique operating resources by following competition rules.

This relates to the operations strategy theory pioneered by Skinner (1969), which refers to the highest quality and performance in all business operations. Treacy & Wiersema (2007) argue that organisations cannot succeed by trying to be everything. As a result, three different core disciplines that organisations can use to combine operating models are proposed. Three core disciplines were identified as operations performance excellence, product leadership, and customer intimacy. Operations performance excellence is described as a strategy for a company that seeks to provide a combination of quality, price, ease of purchase, and service that no other company in an industry can match.

Operations performance reflects the company's internal performance, which can be measured in terms of costs, reducing waste, improving product quality, developing new products, improving delivery performance, and increasing productivity (Brah & Lim, 2006; Suriyanti *et al*., 2020). Operations performance is a part of product performance that is commonly used in operations management. This type of performance results in the company's performance in achieving its primary objectives: quality, productivity, and service (Bayo-Moriones & De Cerio, 2002).

Taddese & Osada (2010) revealed that quality is an essential factor for the competitiveness of MSMEs. Pursuing total quality can spur companies to improve performance by maintaining the quality of their processes and products to compete to dominate the market. Several studies have shown the importance of quality awareness for companies by implementing TQM to improve operations performance (Rauf *et al*., 2018; Wurjaningrum & Reynanda, 2012; Salaheldin, 2009). However, some studies fail to prove that quality positively affects operations performance because MSMEs have not entirely focused on consumer desires (Nugroho, 2015).

Lean manufacturing theory describes quality improvement by continually trying to eliminate waste in production process activities. Lean implementation can be done by applying *kaizen* as an economic improvement activity. Running *kaizen* in the MSMEs production system can reduce costs, minimise production space, process time and improve communication networks which in general can increase the efficiency of resource use (Chen *et al*., 2010; Upadhye *et al*., 2010; Arya & Jain, 2014; Meliala *et al*., 2016). Several studies have also found the effects of applying *kaizen* to improve product quality and operations performance, finance, and the environment by eliminating waste, reducing costs, improving processes, and customer service (Mathur *et al*., 2012; Martínez-Jurado & Moyano-

Fuentes, 2014; Negrão *et al*., 2017). In contrast to the research by Bahri *et al*. (2012); Gambi *et al*. (2015); Pearce *et al*. (2018), who failed to find a positive effect to improve the output quality and operations performance from *kaizen*. This failure was not due to *kaizen*'s wrong philosophy but a mistake in commitment to exploiting all limited resources.

The current business competition illustrates increasing pressure on business units to introduce new products and innovate faster than their competitors (Srimindarti, 2004). Innovation is related to the theory of dynamic capability, which provides a comprehensive view of the company's ability to utilise internal and external competencies to keep up with a rapidly changing environment (Teece *et al*., 1997). Zhou *et al*. (2019); Ilyas *et al*. (2017); and Sahoo (2019), in their research, reveals that there is a positive and significant effect of the application of innovation on the performance of MSMEs. However, several other studies have not found the effect of improving the quality and operations performance of the application of innovation in the company due to limited resources, especially time and finance (Minguela-Rata, 2011; Lee & Ooi, 2015; Love & Roper, 2015; Terziovski, 2010; and Lukas & Menon, 2004).

In principle, every product has a different life cycle. Product Life-Cycle Theory explains that all products will go through stages after entering the market, starting from the stage of introduction, growth, maturity, and product decline (Shahmarichatghieh *et al*., 2015). In the end, companies are forced to develop and deliver high-quality, low-cost products. Research on several processing industries (Taj & Morosan, 2011; Bagshaw, 2017; Ahmad *et al*., 2018) found that design practices (supply chain, HR, and production system design) have a significant effect on performance (flow, flexibility, and quality). However, Nair (2006); Aydin *et al*. (2007); and (Boer & Boer, 2019) found that the contribution of design factors to the company's operations performance was insignificant due to insufficient R&D budget factors. Some findings contribute to a gap claiming that a too new design triggers a negative response from customers, ultimately disrupting operations performance (Mugge & Dahl, 2013).

The results of a review of the theory and literature on output quality and operations performance found gaps in research regarding the role of *kaizen*, innovation, and design in improving output quality and operations performance. In this study, the authors used the output quality as a separate variable. They positioned it as an intervening variable that served as a mediator between exogenous variables and endogenous variables. The writer does this with the opinion of Deming (1984) that quality and operations performance cannot be achieved simultaneously. The field phenomenon also shows that there are companies with unquestionable operations performance but may experience defects or malfunctions in their products. This study is expected to fill the gap by placing output quality as a mediating variable between *kaizen*, innovation, and design and operations performance.

II. LITERATURE REVIEW

Efforts to improve and maintain the quality of output are carried out by reducing or as much as possible eliminating activities that do not add value to output. Lean manufacturing theory provides an overview of the concept of quality improvement by continuously striving to eliminate waste, increase product added value, and provide value to customers (Vincent Gaspersz, 2005). Lean manufacturing supports *kaizen*'s application in the proper production area by maximising using existing resources to increase operations performance sustainably (Hardjosoedarmo, 2004; Krajewski *et al*., 2016). Applying lean through *kaizen* application aims to reduce lead time and increase output by eliminating waste in various forms (Gaspersz & Fontana, 2011). Several research results show that the successful application of *kaizen* has a positive effect on increasing the quality of output by eliminating waste and production defects (Singh & Singh, 2012; Sahno & Shevtshenko, 2014; Lombard *et al*., 2014; Realyvásquez-Vargas *et al*., 2018; Dhingra *et al*., 2019). Terziovski *et al*. (1997), supported by Yen *et al*. (2002), revealed different findings that show companies' failure to apply *kaizen* to improve quality output achievement. The inexpensive and straightforward concept of *kaizen* also positively influences the company's operations performance (Tseng *et al*., 2006; Mallick *et al*., 2013; Bolatan *et al*., 2016; Prashar, 2017; Singh & Singh, 2018; Yadav *et al*., 2019). However, research conducted by Fuentes-Fuentes *et al*. (2004) found the opposite, that there is a negative effect of the application of *kaizen* on operations performance. Several other studies have also produced the same view as the various constraints found in the company so that the application of *kaizen* does not have a good effect on the company's operations performance (Bayo-Moriones *et al*., 2010; Bahri *et al*., 2012; Schröders & Cruz-Machado, 2015; Sinha *et al*., 2016; Iqbal *et al*., 2018). Once again, this is not the fault of the *kaizen* philosophy. Still, the company's character and its resources also play a significant role in the success of *kaizen*'s practice.

Innovation is an effort from companies through technology and information to develop, produce and market new products to meet customer desires (Freeman, 2004). In general, innovation is carried out to meet production and marketing objectives such as improving product quality, reducing production costs, increasing market share, creating new markets, and increasing production flexibility (Quadros *et al*., 2001). Innovation has a role in improving its operation's performance, where innovation includes the creation, selection, and development/improvement of products, processes, and technology adoption that impact operations performance (Zahra & Das, 1993). Several studies have shown a significant influence between innovation and output quality (Prajogo & Sohal, 2003; McNally *et al*., 2011; Leavengood *et al*., 2014; Daragahi, 2017; Shi *et al*., 2018). Other studies have also revealed different findings regarding the negative effect of innovation on the quality of output caused by various factors, including financial and technological limitations (Hellofs & Jacobson, 1999; Parseker & Çetin, 2009; Terziovski, 2010), as well as minor/much development of product variations. And time constraints

(Lukas & Menon, 2004). Innovation helps companies adapt to a dynamic business environment and achieve a scale of production cost savings which is a measure of operations performance. The study results found that innovation has a positive and significant effect on operations performance (Rita, 2010; Gunday *et al*., 2011; Atalay *et al*., 2013; Kafetzopoulos & Psomas, 2015; Titisari, 2017; Ismanu & Kusmintarti, 2019). Conversely, innovation can also hurt operations performance, as revealed by Freel & Robson (2004), where innovation disrupts operations performance due to increased product selling prices. This condition can occur because most MSMEs in developing countries cannot use a culture of innovation in a strategic and structured manner (Terziovski, 2010). Other studies have also found different things such as process innovation (Simpson *et al*., 2006; Mohnen & Hall, 2013; Harrison *et al*., 2014; Jaumandreu & Mairesse, 2017) and product innovation (Lööf & Heshmati, 2006; Fernandes & Paunov, 2015; Al-Sa'di *et al*., 2017) which has an insignificant impact on operations performance. Some find a weak relationship between innovation and operations performance (Thornhill, 2006; Lin & Chen, 2007), which is entirely due to time pressure.

Concept-Knowledge (C-K) Theory explains why a designer thinks and designs new objects in the form of new products, services, or processes. This due to the tight entrepreneurial competition, which requires MSMEs players in the processing sector to act creatively to increase their ability to create quality product designs (Hatchuel *et al*., 2018). Design creativity is also an important marketing tool, enhancing company image and brand loyalty. The design impacts product costs, selling prices, and process design can increase the efficiency of production or consumption of a product/service and increase productivity as a measure of operations performance (Pryce, 2005). Research on the small-scale manufacturing sector (Swink & Calantone, 2004) states that design is a strong driver in improving output quality. This opinion is reinforced by the research results that found that the product and process design's technical design significantly improves product quality (Ahire & Dreyfus, 2000; Permana, 2013; Colledani *et al*., 2014; Bošković & Radosavljević, 2016). On the other hand, Nair (2006), in his research, did not find any significance between the design and the increase in output quality, especially in small-scale processing industries. (Gemser *et al*., 2011; Ekaputra, 2013; Ahmad *et al*., 2018). Abdullah & Abidin (2012) shows the influence of technical design in improving quality and supporting higher operations performance. Designing a production system can streamline the flow of the production process, which in turn improves quality and optimises operations performance (Kaynak, 2003; Taj & Morosan, 2011; Riadi *et al*., 2014; Roper *et al*., 2016; Abdul-Rashid *et al*., 2017; Bagshaw, 2017;).

Presenting a culture that focuses on participatory and quality-oriented management aimed at customers is a complex and challenging task to achieve, especially in MSMEs-scale business units. The problematic quality achievement goals can be linked to Goal Setting Theory. Goal setting states that measurable and challenging goal setting will improve performance to achieve these goals (Locke *et al*., 1981). The creation of quality products and increasing company productivity cannot be separated from the significant increase in production costs. However, it is believed that efforts to create quality products can provide satisfaction for customers and bring more benefits and benefits to the company. In an operating system, achieving quality involves developing a system to ensure that products designed and manufactured can exceed both the customer's and the manufacturer's expectations. Several studies have explained that the setting of output quality targets has a significant positive effect on operations performance (Colledani & Tolio, 2006; Salaheldin, 2009; Wurjaningrum & Reynanda, 2012; Yun & Kurniawan, 2014; Cvjetković *et al*., 2017; Rauf *et al*., 2018; Chakraborty, 2019). However, some studies have found the opposite. The output quality has an insignificant and even negative effect on operations performance (Singh *et al*., 2006; Haryani *et al*., 2018).

III. METHODOLOGICAL REVIEW

This research is designed as confirmatory research, which is used to test the indicators of a construct. The quantitative approach is used to test hypotheses to strengthen or reject theories or hypotheses from previous research results. The research was conducted on the MSMEs processing industry sector, focusing on the wood, rattan, and bamboo furniture industry's sub-sector as the main products of the City of Parepare. Determination of the sample using non-probability sampling method with total sampling technique to obtain 183 MSMEs in the processing industry sector in the sub-sector of the furniture industry in Parepare as the research sample.

Measurement of variables using instruments in the form of statements of indicators for each construct variable. To measure respondents' perceptions of the variables studied, each statement item on the questionnaire uses an adjective bipolar scale. This scale is a refinement of the semantic scale, hoping that the respondent's response can be in the form of interval scale data by only giving two extreme categories: Strongly Disagree and Strongly Agree (Ferdinand, 2014).

The data analysis technique used is SEM analysis with the help of AMOS software version 21.0. SEM analysis stages include constructing validity and reliability, SEM analysis assumption tests, model suitability testing, and structural model estimation. The results of the analysis will then be used to answer the research questions.

In this study, there is an intervening variable, namely the output quality variable. To determine the effect of indirect variables through intervening variables and to see the level of significance can be done with Sobel's procedure known as the Sobel test. Researchers will use a calculation tool with an online Sobel test calculator, accessed at https://www.danielsoper.com.

IV. RESULT AND ANALYSIS

4.1 Measurement Model Testing

The construct validity test is carried out by looking at each indicator's loading factor value in the construct. An indicator is declared valid if it has a Loading factor value > 0.6 (Ferdinand, 2014). Furthermore, the construct reliability test is carried out based on the results of calculations with Average Variance Extracted (AVE) and Construct Reliability (CR), where the indicators of the variables are said to be reliable if the AVE value is ≥ 0.5 and CR ≥ 0.7 (Ghozali, 2011). Fornnel & Larcker *in* Ghozali (2011) suggest that measurement with AVE can measure reliability. The results are more conservative than Construct Reliability (CR).

Table 1 shows the results of the CFA test for each variable. The test results show that all indicators in all research variables are declared valid because they get a loading factor value above 0.6. Furthermore, reliability testing can be seen in the AVE and CR values, where all variables obtain AVE values ≥ 0.5 and CR ≥ 0.7. Thus, all constructs for each variable can be used for further analysis. Table 1 shows the results of the CFA test for each variable. The test results show that all indicators in all research variables are declared valid because they get a loading factor value above 0.6. Furthermore, reliability testing can be seen in the AVE and CR values, where all variables obtain AVE values ≥ 0.5 and CR ≥ 0.7. Thus, all constructs for each variable can be used for further analysis.

Table 1. Measurement Model Testing Result

Construct and Item	CFA Test		
	Factor Loading	*AVE*	*CR*
Kaizen			
1. Seiri/compact (K1)	0,897	0,795	0,951
2. Seiton/neat (K2)	0,886		
3. Seiso/clean (K3)	0,876		
4. Seiketsu/take care (K4)	0,906		
5. Shitsuke/diligent (K5)	0,892		
Innovation			
1. Variation of product types (I1);	0,830	0,681	0,927
2. Variation of product forms (I2);	0,833		
3. Variation in product prices (I3);	0,839		
4. Product uniqueness (I4);	0,836		
5. Utilization of production equipment (I5); and	0,876		
6. Expansion of market segments (I6).	0,729		
Design			
1. Facility layout (D1);	0,871	0,817	0,957
2. Prevention of damage (D2);	0,922		
3. Ease of repair (D3);	0,924		
4. Availability of technology (D4); and	0,942		
5. Availability of human resources (D5).	0,856		
Output Quality			
1. Compliance with specifications (MK1);	0,884	0,828	0,960
2. Product safety (MK2);	0,920		
3. Reliability (MK3);	0,903		
4. Durability (MK4); and	0,880		
5. Serviceability (MK5).	0,960		
Operations Performance			
1. Biaya produksi (KO1);	0,883	0,781	0,947
2. Kecepatan pengiriman (KO2);	0,834		
3. Fleksibilitas (KO3);	0,916		
4. Tingkat kecacatan produk (KO4); dan	0,936		
5. Pengurangan limbah (KO5).	0,846		

Source: Primary data processed, 2020.

4.2 Structural Model

Structural model fit test in SEM analysis is carried out by looking at several goodnesses of fit model criteria such as the Chi-Square value, probability, RMSEA, GFI, AGFI, CFI, NFI and TLI. In this study, the Goodness of fit model's fulfilment will refer to the Goodness of fit model criteria; namely, the Chi-Square model value is expected to be negligible based on the probability value above 0.05.

The initial model's computational results show that the model does not yet have the same sample covariance matrix as the population covariance matrix. Hence, the model is not yet suitable to be used to test the research hypothesis. This requires modification of the model based on modification indices offered by the AMOS software through improvements to covariances, variances, and regression weights (Hair *et al*., 2010). The modified model results are shown in the following figure.

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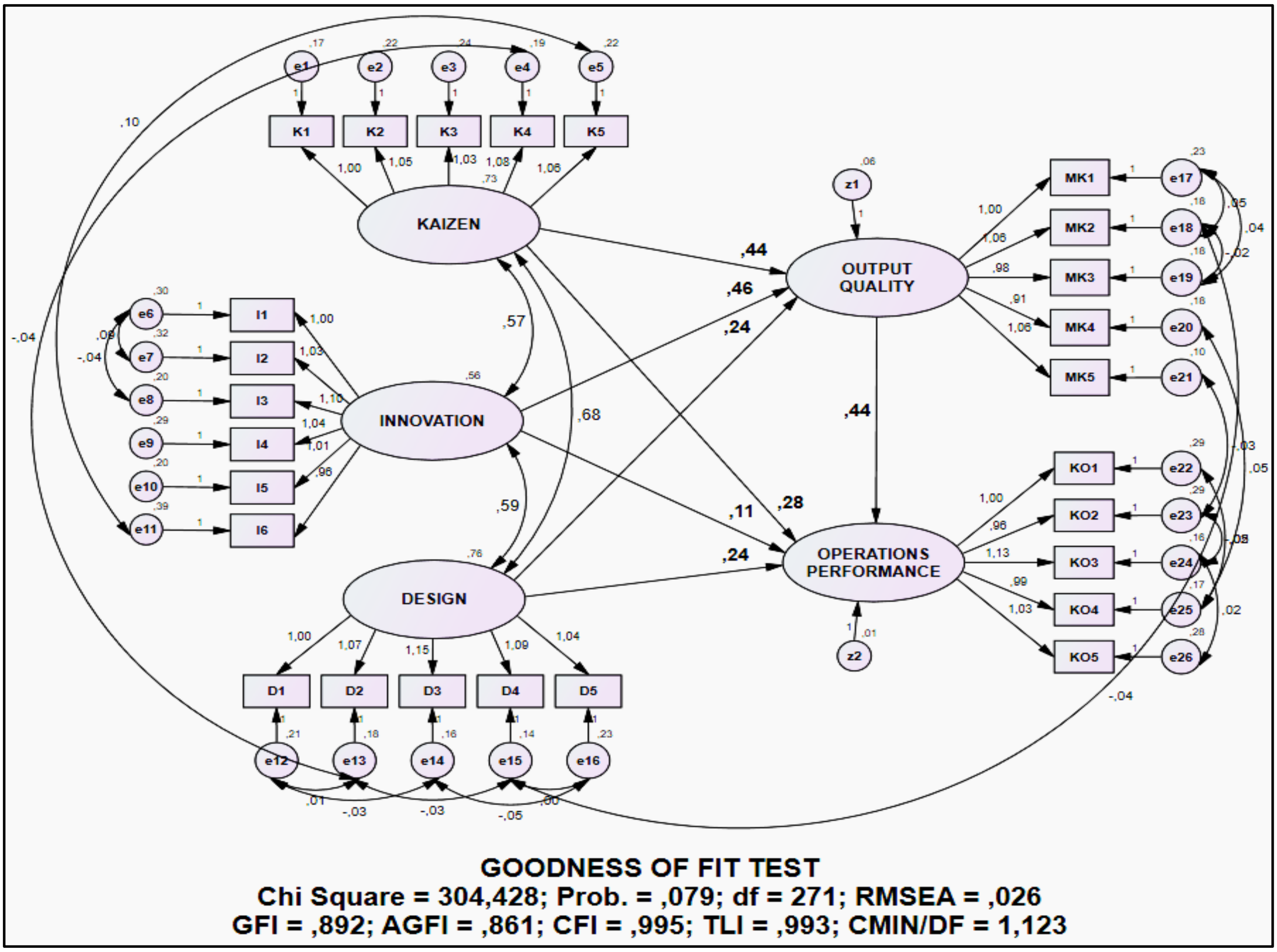

Figure 2. Structural Model Testing Results After Modification
Source: Primary data processed, 2020.

Based on the test results after the modification model, the Goodness of fit criteria have been met, especially at the value of a significant probability greater than 0.05. Significance probability is a test of the importance of the difference in the data's covariance matrix with the estimated covariance matrix. The significance probability value is more significant than 0.05, which indicates that the model is acceptable.

4.3. Hypothesis Testing

After the final model meets the Goodness of fit (GOF) criteria, hypothesis testing is carried out by comparing the value of p (probability) and c.r. (critical ratio). The result of regression weight with the required limits, namely the p-value less than 0.05 and the value of c.r. greater than 1.96, then the hypothesis can be accepted; however, the results show that the p-value is greater than 0.05 and c.r. smaller than 1.96, then the hypothesis is rejected (Ferdinand, 2014). However, based on the hypothesis built in this study, a one-sided test was carried out so that the value of c.r. used was 1.645 at a significance level of 0.05. Thus, the hypothesis is accepted if the p-value is less than 0.05 and the c.r value is greater than 1.645.

In testing the research model's hypothesis developed in the previous section of this research paper, *Kaizen*, Innovation, and Design are exogenous (independent) variables, Output Quality as an intervening variable, and Operations Performance endogenous (dependent) variable. In this study, the hypothesis proposed is to see the direct effect and indirect effect through intervening variables. Thus, the results of hypothesis testing are shown in the following table.

Table 2. Recapitulation of Hypothesis Test Results

No.	Variable			Direct Effect	Indirect Effect	Total Effect	*p-value*	Result
	Eksogenous	*Intervening*	Endogenus					
1	*Kaizen* (X1)	-	Output Quality (Y1)	0,407	-	0,407	0,000	Supported
2	Innovation (X2)	-	Output Quality (Y1)	0,370	-	0,370	0,000	Supported
3	Design (X3)	-	Output Quality (Y1)	0,223	-	0,223	0,022	Supported
4	*Kaizen* (X1)	-	Operations Performance (Y2)	0,258	-	0,258	0,002	Supported
5	Innovation (X2)	-	Operations Performance (Y2)	0,093	-	0,093	0,236	Not Supported
6	Design (X3)	-	Operations Performance (Y2)	0,226	-	0,226	0,002	Supported
7	Output Quality (Y1)	-	Operations Performance (Y2)	0,443	-	0,443	0,000	Supported
8	*Kaizen* (X1)	Output Quality (Y1)	Operations Performance (Y2)	0,258	0,180	0,438	0,002	Supported
9	Innovation (X2)	Output Quality (Y1)	Operations Performance (Y2)	0,093	0,164	0,257	0,005	Supported
10	Design (X3)	Output Quality (Y1)	Operations Performance (Y2)	0,226	0,099	0,325	0,026	Supported

Source: Primary data processed, 2020.

V. DISCUSSION AND CONCLUSION

The study results prove a positive and significant relationship between *kaizen*, innovation, and design with output quality. This shows that the better the implementation of *kaizen*, innovation, and design in MSMEs' production activities, the higher its quality. The results of this study support the empirical findings of Paramita (2012); Lombard *et al*. (2014); Realyvásquez-Vargas *et al*. (2018); Dhingra *et al*. (2019). The research by Terziovski *et al*. (1997), supported by Yen *et al*. (2002), revealed different findings that show companies' failure in applying *kaizen* to improve the achievement of quality output. Castillo & Aleman (2009); McNally *et al*., 2011; Hartini (2012); Shi *et al*. (2018) and (Daragahi, 2017) and found that innovation has a significant positive effect on the quality of output. As for Hellofs & Jacobson (1999); Parseker & Çetin (2009); and Terziovski (2010) revealed different findings with the negative influence of innovation on output quality caused by various factors, including financial and technological limitations. Ahire & Dreyfus (2000); Swink & Calantone (2004); Permana (2013); Colledani *et al*. (2014); Bošković & Radosavljević (2016) found that design is a strong driver in improving the quality of output. On the other hand, Nair (2006) did not find any significance between design and increased output quality, especially in small-scale processing industries. The study found that nearly 80% of production costs were determined at the design stage.

Furthermore, this study also proves a positive and significant causal relationship between *kaizen*, design, and output quality with operations performance. This shows that the better the implementation of *kaizen*, design, and awareness of product quality results in higher operations performance. The results of this study support the empirical findings of Bolatan *et al*. (2016), Prashar (2017); Yadav *et al*. (2019); and Shojaei *et al*. (2019). However, this research contradicts several other studies which found various constraints in the company, so that the application of *kaizen* does not have a good effect on the company's operations performance (Bayo-Moriones *et al*., 2010; Bahri *et al*., 2012; Schröders & Cruz-Machado, 2015; Sinha *et al*., 2016; Iqbal *et al*., 2018). Once again, this is not the fault of the *kaizen* philosophy. However, the company's character and its resources also play a big role in the success of *kaizen*'s practice. Then, this study also supports the empirical findings of Abdullah & Abidin (2012), which show the influence of technical design in helping higher operations performance. Other studies have found that designing a production system can streamline the production process flow, which improves operations performance (Riadi *et al*., 2014; Roper *et al*., 2016; Bagshaw, 2017; Abdul-Rashid *et al*., 2017). Another case with research by Aydin *et al*. (2007) and Boer & Boer (2019) found that the contribution of design factors to the company's operations performance was insignificant due to insufficient R&D budget factors MSMEs-scale businesses. Some findings claim that a too new design triggers a negative response from customers, which ultimately impairs operations performance (Hekkert *et al*., 2003; Goode *et al*., 2013; Mugge & Dahl, 2013). Furthermore, we provide empirical support for the findings of Colledani & Tolio (2006), Cvjetković *et al*. (2017) and Chakraborty (2019) that in the operating system, achieving quality involves developing a strategy to ensure that products designed and produced can exceed customer and producer expectations. However, some studies have found the opposite. The output quality has an insignificant and even negative effect on operations performance (Singh *et al*., 2006; Haryani *et al*., 2018).

Several things were found in this study, including the *kaizen* variable having the most dominant influence in providing an increase in output quality and operations performance. This is because the implementation of *kaizen* practices does not require extensive resources and is relatively easy to do. However, *kaizen* practice's success is determined by the high commitment of all individuals in the company. A positive but insignificant causality relationship between innovation and operations performance empirically rejects the 5th hypothesis. It can be seen that price variation, market segment expansion, and utilisation of production tools are not the main drivers in improving operations performance. The application of innovations made by MSMEs players only has a small impact on improving operations performance because the innovations have not been maximised by the MSMEs players in the manufacturing sector in the City of Parepare. This finding follows the Entrepreneurship Theory by Schumpeter (1934) in Sukirno (2006), where the application of innovation by business actors is primarily determined by the entrepreneurial spirit in a community that can take advantage of opportunities and takes risks in developing their business. To improve operations performance through innovation, MSMEs players must be skilled at reading market opportunities in creating standardisation on the diversity of product types, diversity of product forms, and varying product prices. Also, skills are needed to create product uniqueness that illustrates the product's superiority as its trademark, the use of production tools with appropriate technology, and the ability of business actors to expand market segments for the products they produce.

Output quality as an intervening variable gives a large enough contribution. It plays a role in the relationship between innovation and operations performance in the MSMEs' manufacturing sector. When innovation is mediated by output quality, there is a significant positive effect on operations performance. It means that complete mediation occurs by involving the output quality variable between innovation and operations performance which is also following the opinion of Robbins (2007), that innovation is a new idea applied to initiate or improve a product, process, or service. Therefore, business actors must have quality awareness and standardise products to achieve superior operations performance.

The discussion results can conclude that output quality plays a vital role in mediating *kaizen*, innovation, and design on operations performance. Based on this study's findings, the higher the innovation applied does not significantly improve operations performance. However, if MSMEs actors have an awareness of product quality in advance, the operations performance will increase significantly. Likewise, *kaizen* and design are the main alternatives to improve operations performance. Implementing *kaizen* and process design that is getting better will result in high-quality products, significantly impacting improving operations performance.

As a writer, we hope that future researchers can develop this research because of the various limitations in this study. These limitations include, among others, the unit of analysis is limited to MSMEs players who only focus on the manufacturing sector with the furniture industry sub-sector in the City of Parepare. This research sample's limitation certainly impacts the results that are less representative to generalise the results of research to the existing MSMEs population. This study only examines and tests three variables, namely *kaizen*, innovation, and design toward the quality of output and operations performance in the manufacturing sector MSMEs. The next researcher can study from a different side, using other variables or indicators, so that new findings can be obtained to enrich the scientific treasures of management, especially in the study of operational management.

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