The influence of resource flexibility and product complexity on operational performance moderated by employee competence in Indonesian defense industry

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ARTICLE INFO
Article history:
Received 19 February 2022
Received in rev. form 18 April 2022
Accepted 25 April 2022

Keywords:
Resource Flexibility, Product Complexity, Operational Performance, Employee Competence

JEL Classification:
D23, O15

ABSTRACT
Operational performance reflects the company’s operating performance in terms of waste reduction, product quality improvement, and product delivery. This study examines the effect of resource flexibility and product complexity on operational performance moderated by employee competence in the defense industry at PT. Pindad (Persero) Turen, Malang. 194 employees who work in the production function are sampled in this research. The data analysis model used is a structural equation model with a Partial Least Square approach using SmartPLS 3.0 software. The results show that resource flexibility has a positive and significant effect on operational performance, product complexity does not affect on operational performance, and employee competence has a positive and significant effect on operational performance. Moderation test shows that employee competence strengthens the effect of resource flexibility on operational performance and employee competence does not weaken or strengthen the effect of product complexity on operational performance.

Introduction
Today's manufacturing environment is highly uncertain and constantly changing, it is characterized by shorter product and technology life cycles, shorter delivery times, increased product variety, excellent quality, and intense global competition. Shi and Daniels (2003) state that uncertainty is an unavoidable consequence of the complexity caused by technological advances, where the main factors driving uncertainty for companies are product variations and demand uncertainty (De Toni and Tonchia, 1998). Increasing complex product offerings can undermine operational performance as measured in product quality, cost, and delivery, so understanding the impact on lead time and on-time delivery is important, where companies must increase their flexibility (Christopher, 2000).

PT. Pindad (Persero) is a State-Owned Enterprise that is engaged in the defense industry and is the only major weapon system manufacturer in Indonesia that produces ammunition of various calibers. Along with the increasing need for ammunition for the TNI, Polri, and export, the problem of accuracy of delivery time is unavoidable, where the realization of ammunition delivery has not yet reached the set target. In addition, the constraints of production machines that are old are also the cause of the high reject rate problem, this also results in increasing production costs. Therefore, in order to complete production orders on time, in the right quantity, and with the right quality, flexibility of resources in the production function and proper management are needed regarding product complexity and support for high employee competence when faced with urgent delivery times and to achieve cost efficiency.

Operational performance has been widely accepted as a critical success factor in many industries. Operational performance reflects the company's operating performance in terms of reducing waste, improving product quality, and product delivery (Bendickson and Chandler, 2019), this is in line with the opinion conveyed by Vickery et al. (1997) and Slack et al. (2013) that operational performance for manufacturing companies to identify cost, quality, and speed of delivery as manufacturing competitive priorities.

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Resource flexibility is one of the important factors in improving operational performance. Flexibility in the manufacturing environment shows a positive impact on manufacturing system performance (Baykasoglu and Ozbakir, 2008; Llorens et al., 2005; Swink et al., 2005). Flexible manufacturing has become one approach to improving operational performance (Jaikumar, 1986; Garetti, 1986). Resource flexibility improves the manufacturing responsiveness of a system because it increases the utilization of available resources to improve operational performance. Flexibility and responsiveness are needed in manufacturing systems to improve performance (Shin et al., 2009). Regarding the relationship between flexibility and performance, there is conflicting evidence about the nature of this relationship. Studies by Gupta and Sommers (1996), Swamidass and Newell (1987), and Vickery et al., (1997) provide evidence that flexibility has a direct effect on performance. On the other hand, several studies provide evidence that the relationship between resource flexibility and performance is moderated by other variables such as the research conducted by Vokurka and O’Leary-Kelly (2000), Fiegenbaum and Karnani (1991) and Parthasarthy and Sethi (1993). The differences between the results of these studies make it interesting to conduct further research on the effect of resource flexibility on operational performance.

Apart from resource flexibility, with the increasing demand for unique products from consumers, product complexity also affects operational performance. Operational performance is the key to a company's competitiveness (Fine and Hax, 1985), so it is important for companies to understand the impact of complex products on operational performance, such as quality, delivery, and cost. The negative impact of product complexity on most performance measures is an industry-wide phenomenon and is a warning to manufacturers looking to expand their product line. There are several research results regarding the relationship of product complexity to performance including studies on the impact of product complexity on performance providing clear support for a negative relationship (Wan, 2016; Wan and Dresner, 2015). This triggers the idea that greater product diversity leads to poorer performance (Palich et al., 2000; Wu et al., 2012). Contrary to the results of these studies, there are several positive relationships between product complexity and performance (Gupta and Srinivasan, 1998; Ruiz-Torres and Mahmoodi, 2007). From the differences in the results of the previous studies, this study takes product complexity as the second independent research variable to complete research related to research variables that affect operational performance.

Efficiency in completing assigned work on time, without compromising the production process, represents the strength of employees (Kumar and Singh, 2018). The concept of competence is usually applied to define the overall abilities, skills, behaviors, and knowledge of individuals that are oriented towards effective performance in a particular work environment. Individual performance as well as company performance and success depend on individual competencies (Savanecvice et al., 2008). In manufacturing systems, technology is supposed to reduce the tradeoff between flexibility and efficiency on the factory floor, but in fact many manufacturing systems experience very high failure rates, which are often attributed to inappropriate resource management practices (Snell, 1992). Skilled workers are the key to successful implementation of flexible manufacturing systems and increasing complexity. In this study, employee competence will be a moderating research variable and investigate its role in moderating the relationship between resource flexibility with operational performance and product complexity with operational performance.

Literature Review

Conceptual Background and Hypothesis Development

Resource-Based View (RBV)

One approach that can be applied by companies to deal with various challenges and opportunities is an approach based on the Resource-Based View (RBV). With RBV the company can build a sustainable competitive advantage through the use of its resources. In the concept of RBV, the focus of attention is the problem of resources, as stated by Barney (1991) that the success of an organization is determined by the resources it has. The company's ability to maximize the use of resources and have something different is very important, because it is the key to improving performance (Pearce and Robinson, 2007).

Resource Flexibility

Flexibility is the ability of the manufacturing function to react to changes in its environment without compromising performance significantly (Koste and Malhotra, 1999), being able to reconfigure resources so as to produce different products efficiently and of acceptable quality (Sethi and Sethi, 1990). The direct relationship between flexibility and performance indicates that increased flexibility will lead to increased firm performance (Gupta and Somers, 1996; Swamidass and Newell, 1987; Vickery et al., 1997; Kumar et al., 2017), while the relationship between flexibility and company performance moderated by other variables shows that the relationship between flexibility and performance is situational, where only increasing flexibility does not necessarily increase company performance but depends on other factors in the company environment (Fiegenbaum and Karnani, 1991; Parthasarthy and Sethi, 1993; Vokurka and O’Leary-Kelly, 2000).

Koste and Malhotra (1999) proposed a classification of individual resources which consisted of machine flexibility, material handling flexibility, and labor flexibility. Tsourveloudis and Philis (1998) stated that machine flexibility is the simplest type of flexibility that can occur in manufacturing systems. Machine flexibility refers to the machine's ability to perform various operations quickly (Sethi and Sethi, 1990). In general, machine flexibility will increase if the machine can perform more operations. Material handling flexibility refers to the ability of a material handling system to move various types of materials effectively (Sethi and Sethi, 1990).
A flexible material handling system increases machine availability and usage and reduces production time. Labor flexibility is the ability of the workforce to perform various manufacturing tasks economically and effectively (Zhang et al., 2003). By using a flexible labor, the company will be able to respond quickly to unexpected workloads that may arise.

**Product Complexity**

Product complexity that has been described in the literature has many instruments including the number of components, the number of variants of finished goods, the number of links between components, and the diversity of relationships between components (Jacobs, 2013; Jacobs and Swink, 2011; Lindemann et al., 2010). In this study, product complexity will be a related to product variety, where greater product diversity leads to poorer performance (Palich et al., 2000; Wu et al., 2012), therefore product complexity must be a concern for the company because it will damage operational performance. One of the factors moderating the relationship between complexity and operational performance is the skill level of the workforce, as explained by Djassemi (2005) that using skilled labor can reduce the effect of product complexity on operational performance.

In previous studies, the measurement of product complexity used several indicators, where product diversity was the most frequently used indicator. Inman and Blumenfeld (2013) argue that product variety is closely related to product complexity. In this study, the measurement of product complexity uses product variety indicators.

**Operational Management**

Operational management is important to improve overall performance by focusing on optimal use of available resources as inputs in an operating process to produce outputs. The operating system can be modeled as shown in Figure 1, where inputs are changed by one or more transformation processes into outputs that add value.

![Figure 1: Operating System (source: De Toni, 2016)](image)

Porter (1985) states that the operating system has an important role in the value chain, where a competitive advantage will be obtained if the output is met with cost efficiency. Operational management encourages organizations to utilize their resources well, the more optimally in utilizing the resources they have, the more operational performance will be (De Toni, 2016).

**Operational Performance**

Operational performance according to Daft (2008) is a field of management that specializes in the production of goods and services, and uses special tools and techniques to solve production problems. Operational performance is the key to competitiveness and overall company performance, so it is very important for companies to understand the impact of complex product offerings on lead times that require companies to increase their flexibility (Christopher, 2000). Tracey (2004) states that operational performance measurement is the ability of a function to set standards for achieving task performance. Operational performance can be measured by product quality, delivery, and cost efficiency indicators (Huo et al., 2019).

**Employee Competence**

Boyatzis (2008) defines competence as a characteristic that underlies a person, it can be in the form of attitudes, skills, aspects of one's self-image, social roles, or knowledge used. In general, competence is seen as a group of knowledge, skills, and attitudes that affect the roles and responsibilities of a person's work, which is correlated with performance that can be measured with specified standards and can be improved through training and development (Ozcelik and Ferman, 2006). Some researchers explain that competence is a combination of individual knowledge, behavior and skills that results in excellent performance (Cardy and Selvarajan, 2006; Draganidis and Mentzas, 2006; Soderquist et al., 2010).

In this study, employee competence will moderate the relationship between resource flexibility on operational performance and product complexity on operational performance. The adoption of flexible manufacturing systems indicates the need for more knowledgeable workers, and when firms do not employ high-skilled workers, performance will decline (Adler, 1986). One factor
that moderates the relationship between complexity and operational performance is the skill level of the workforce, using skilled labor can reduce product complexity on operational performance (Djassemi, 2005).

Conceptual Framework

This study examines the effect of resource flexibility and product complexity on operational performance and examines the moderating role of employee competence on the relationship between flexibility on operational performance and product complexity on operational performance. The conceptual framework of the research is described as follows:

![Conceptual Framework](image)

The hypotheses of this study are:

H1: Resource flexibility has a positive and significant effect on operational performance.

H2: Product complexity has a negative and significant effect on operational performance.

H3: Employee competence has a positive and significant effect on operational performance.

H4: Employee competence strengthens the effect of resource flexibility on operational performance.

H5: Employee competence weakens the effect of product complexity on operational performance.

Research and Methodology

Participants and Data Collection

The population in this study amounted to 377 people who are permanent employees who work in the production function of PT Pindad (Persero) Turen, Malang who have at least one year of work experience and have knowledge of products and understand the production process. The sampling technique in this study used a probability sampling technique with cluster sampling type. The number of samples in this study was 194 people who were determined using the Slovin formula. This research used a questionnaire. This research was conducted from October-November 2021

Analysis and Findings

Data analysis in this study used Structural Equation Modeling (SEM) with Partial Least Square (PLS) approach using SmartPLS 3.0 software. The stages in the PLS analysis are the outer model, the inner model, hypothesis testing, and moderation testing.

Characteristics of Respondents

194 questionnaires have been distributed to respondents and all of these questionnaires have been filled out and are suitable for analysis. The description of the characteristics of the respondents is divided into gender, age, last education, and years of service which is presented in the following table.
### Table 1: Characteristics of Respondents

<table>
<thead>
<tr>
<th>Characteristics of Respondents</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Man</td>
<td>190</td>
<td>97.94%</td>
</tr>
<tr>
<td></td>
<td>Woman</td>
<td>4</td>
<td>2.06%</td>
</tr>
<tr>
<td>Age</td>
<td>18 – 25 Years Old</td>
<td>1</td>
<td>0.52%</td>
</tr>
<tr>
<td></td>
<td>26 – 35 Years Old</td>
<td>81</td>
<td>41.75%</td>
</tr>
<tr>
<td></td>
<td>36 – 45 Years Old</td>
<td>33</td>
<td>17.01%</td>
</tr>
<tr>
<td></td>
<td>46 – 55 Years Old</td>
<td>79</td>
<td>40.72%</td>
</tr>
<tr>
<td>Recent Education</td>
<td>Secondary School</td>
<td>2</td>
<td>1.03%</td>
</tr>
<tr>
<td></td>
<td>High School</td>
<td>188</td>
<td>96.91%</td>
</tr>
<tr>
<td></td>
<td>Diploma Degree</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Bachelor Degree</td>
<td>4</td>
<td>2.06%</td>
</tr>
<tr>
<td></td>
<td>Post Graduate</td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>Working Period</td>
<td>1 – 5 Years</td>
<td>13</td>
<td>6.70%</td>
</tr>
<tr>
<td></td>
<td>6 – 10 Years</td>
<td>83</td>
<td>42.78%</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 Years</td>
<td>98</td>
<td>50.52%</td>
</tr>
</tbody>
</table>

### Outer Model

The outer model is carried out by testing the validity using discriminant validity which is known to be the Average Variance Extracted (AVE) value and reliability using composite reliability which is tested from Cronbach's Alpha value. The values of AVE, composite reliability, and Cronbach's Alpha are shown in the following table.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Average Variance Extracted (AVE)</th>
<th>Composite Reliability</th>
<th>Cronbach's Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Flexibility (X1)</td>
<td>0.513</td>
<td>0.940</td>
<td>0.932</td>
</tr>
<tr>
<td>Product Complexity (X2)</td>
<td>0.637</td>
<td>0.840</td>
<td>0.726</td>
</tr>
<tr>
<td>Operational Performance (Y)</td>
<td>0.516</td>
<td>0.927</td>
<td>0.912</td>
</tr>
<tr>
<td>Employee Competence (Z)</td>
<td>0.511</td>
<td>0.904</td>
<td>0.881</td>
</tr>
</tbody>
</table>

From Table 2 it can be seen that all research variables have an AVE value > 0.50 so that all research variables are declared valid, and all variables have a composite reliability value > 0.70 and Cronbach's Alpha value > 0.60 so it can be concluded that all research variables are declared reliable.

### Inner Model

The inner model is carried out to ensure that the model built is accurate. The structural model in this study is shown in the following figure.
Evaluation of the structural model is carried out through several approaches, namely the determinant coefficient ($R^2$), predictive relevance ($Q^2$), and Goodness of Fit (GoF).

The $R^2$ value in this study can be seen in Table 3, which shows that the $R^2$ value is below 0.67 but above 0.33 so that it can be said that the influence of resource flexibility ($X_1$) and product complexity ($X_2$) on operational performance ($Y$) is moderate.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R^2$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational Performance ($Y$)</td>
<td>0.512</td>
</tr>
</tbody>
</table>

The calculation of $Q^2$ in this study is as follows:

$$Q^2 = 1 - (1 - R^2) = 1 - (1 - 0.512) = 0.512$$

Based on the results of the above calculation, the value of $Q^2$ is 0.512 which means that the inner model in this study has a fairly good predictive relevance, where 51.2% of operational performance variables can be explained by resource flexibility and product complexity variables, while 48.8% explained by other variables which were not examined by this research model.

The calculation of GoF in this study is as follows:

$$GoF = \sqrt{\frac{AVE}{\bar{R}^2}} = \sqrt{0.516 \times 0.512} = 0.514$$

From the calculation above, the GoF value is 0.514 which means the model has a good ability to explain empirical data.

**Hypothesis Test**

Hypothesis test results are shown in the following table.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Path Coefficient</th>
<th>t-statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1 \rightarrow Y$</td>
<td>0.293</td>
<td>3.719</td>
<td>0.000</td>
</tr>
<tr>
<td>$X_2 \rightarrow Y$</td>
<td>0.038</td>
<td>0.808</td>
<td>0.419</td>
</tr>
<tr>
<td>$Z \rightarrow Y$</td>
<td>0.380</td>
<td>7.168</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 4. shows that the path coefficient of the influence of resource flexibility ($X_1$) on operational performance ($Y$) has a value of 0.293 with a t-statistics value > 1.96 and a p-value < 0.05 then it is declared significant, so it can be concluded that flexibility resources ($X_1$) have a positive and significant effect on operational performance ($Y$), thus Hypothesis 1 is accepted.

Based on Table 4. it can also be seen that the path coefficient of the effect of product complexity ($X_2$) on operational performance ($Y$) has a value of 0.038 with a t-statistics value < 1.96 and a p-value > 0.05 then it is declared insignificant, so it can be concluded that product complexity ($X_2$) has no effect on operational performance ($Y$), thus Hypothesis 2 is rejected.

In addition, from Table 4. it can also be seen that the path coefficient of the influence of employee competence ($Z$) on operational performance ($Y$) has a value of 0.380 with a t-statistics value > 1.96 and a p-value < 0.05 then it is declared significant, so that it can be concluded that employee competence ($Z$) has a positive and significant effect on operational performance ($Y$), thus Hypothesis 3 is accepted.

**Moderation Testing**

Moderation test results are shown in the following table.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Path Coefficient</th>
<th>t-statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1^*Z \rightarrow Y$</td>
<td>0.364</td>
<td>3.029</td>
<td>0.003</td>
</tr>
<tr>
<td>$X_2^*Z \rightarrow Y$</td>
<td>-0.091</td>
<td>1.134</td>
<td>0.257</td>
</tr>
</tbody>
</table>

Table 5. shows that the path coefficient of the moderating role of employee competence ($Z$) on the influence of resource flexibility ($X_1$) on operational performance ($Y$) has a value of 0.364 with a t-statistics value > 1.96 and a p-value < 0.05 then declared significant,
so that it can be concluded that the higher the competence of employees (Z) will strengthen the influence of resource flexibility (X1) on increasing operational performance (Y), thus Hypothesis 4 is accepted.

From Table 4, it can also be seen that the path coefficient of the moderating role of employee competence (Z) on the effect of product complexity (X2) on operational performance (Y) has a value of -0.091 with a t-statistics value < 1.96 and a p-value > 0.05, it is declared insignificant, so it can be concluded that employee competence (Z) does not weaken or strengthen the effect of product complexity (X2) on operational performance (Y), thus Hypothesis 5 is rejected.

Discussion

The Effect of Resource Flexibility (X1) on Operational Performance (Y)

Hypothesis 1 test results state that resource flexibility (X1) has a positive and significant effect on operational performance (Y). These results indicate that resource flexibility has an important role in realizing the targets set by the company. The item on the resource flexibility variable with the highest loading factor value of 0.736 is the operator's ability to work on machines with many operations contained in the worker flexibility indicator. This means that the highest resource flexibility is the ability of operators in the production function of PT. Pindad (Persero) Turen, Malang to work on a machine with many operations. The operator's ability can be useful in generating solutions to the problems encountered. With the operator's ability to work on machines with many operations, it means that companies can minimize the use of labor in a series of production processes so that they can reduce production costs.

The results of this study are in line with the empirical study conducted by Kaur et al. (2017), Kumar et al. (2017), Purwanto and Raihan (2016), Lee and Chen (2014), Raihani et al. (2013), Chandra et al. (2005), Gupta and Somers (1996), and Swamidass and Newell (1987) which stated that there was a positive and significant relationship between resource flexibility and operational performance.

The Effect of Product Complexity (X2) on Operational Performance (Y)

Hypothesis 2 test results state that product complexity (X2) has no effect on operational performance (Y). These results indicate that at PT. Pindad (Persero) Turen, Malang product complexity has no effect on operational performance because the demand for various product variants can still be met by production capacity. In addition, the availability of production machines consisting of various types of calibers is also one of the factors that product diversity does not affect operational performance. However, what needs to be considered is when the demand for product variants with the same delivery time increases beyond production capacity, it will affect operational performance.

The item on the product complexity variable with the highest loading factor value of 0.847 is the number of product variants contained in the product diversity indicator. This shows that a large number of product variants will be an obstacle if they are done on the same machine and have the same delivery time. From these conditions there will be potential delays in delivery if the product demand is greater than the available machine capacity. Therefore, the complexity of the product must be a concern for the company because if it is not managed properly, it will reduce operational performance. The results of this study differ from the empirical studies conducted by Wan (2016), Wan and Dresner (2015), Inman and Blumenfeld (2013), Wu et al. (2012), Bozarth et al. (2009), Zhang et al. (2007), and Palich et al. (2000) which states that the increase in product complexity has a negative effect on operational performance. However, the results of this study are in line with other empirical studies conducted by Caniato and Grossler (2013) and Christensen et al. (2007) which states that product complexity has no effect on operational performance.

The Effect of Employee Competence (Z) on Operational Performance (Y)

Hypothesis 3 test results state that employee competence (Z) has a positive and significant effect on operational performance (Y). These results indicate that the higher the competence of employees will improve operational performance. The item on the employee competency variable with the highest loading factor value of 0.740 is the skill level of the operator in carrying out the work contained in the skill indicator. With a high level of skill, operators can carry out work on the factory floor more efficiently and produce optimal quality work. Human resources that are not well developed often lead to low levels of operational performance in manufacturing systems, therefore operators with high skill levels are needed by companies to achieve high operational performance. The results of this study are in line with the empirical study conducted by Lasrado et al. (2017), Sarfaraz et al. (2015), Kolibacova (2014), Zaim et al. (2013), Savanevicence et al. (2008) which states that there is a positive and significant relationship between individual competence and operational performance.

The Moderating Role of Employee Competence (Z) on the Relationship of Resource Flexibility (X1) to Operational Performance (Y)

The moderating role of employee competence (Z) on the relationship of resource flexibility (X1) with operational performance (Y) has a quasi-moderation role, this means that the higher the employee's competence will strengthen the influence of resource flexibility on increasing operational performance.
The results of this study are in line with empirical studies conducted by Vokurka and O’Leary-Kelly (2000), Upton (1997), Parthasarthy and Sethi (1993), and Fiegenbaum and Karnani (1991) which stated that employee experience strengthens the effect of resource flexibility on operational performance improvement.

**The Moderating Role of Employee Competence (Z) on the Relationship of Product Complexity (X2) to Operational Performance (Y)**

The moderating role of employee competence (Z) on the relationship between product complexity (X2) and operational performance (Y) has a moderator role (moderation as a predictor), this is because the direct influence of employee competence on operational performance is significant and the moderating role of employee competence on the effect of complexity product on operational performance, so that employee competence does not weaken or strengthen the effect of product complexity on operational performance.

The results of this study differ from the empirical study conducted by Djassemi (2005) which states that the practice of using trained operators can improve operational performance when dealing with changes in demand and product diversity. However, the results of this study are in line with other empirical studies conducted by Er and MacCarthy (2006) which state that individual competence does not affect the relationship between product complexity and operational performance.

**Conclusion**

The results of this study can be concluded that the better resource flexibility will improve operational performance while product complexity has no effect on operational performance and the higher employee competence will improve operational performance, and the results of the study show that employee competence in the relationship between resource flexibility and operational performance has the role of quasi moderation, which means that employee competence strengthens the influence of resource flexibility on operational performance, while employee competence in the relationship between product complexity and operational performance has a moderating predictor role, which means that employee competence does not weaken or strengthen the effect of product complexity on operational performance.

Therefore, by ensuring the availability of a stock of ready-to-use tools in accordance with the usage index, it is hoped that tool changes can be carried out quickly so that the machine setting time can be shortened which has an impact on the time required for the machine to produce new products can be shorter and intensify communication between the sales function and the production function, prior to the issuance of the sale and purchase contract so as to avoid the emergence of contracts consisting of a large number of product variants and exceeding production capacity. Improve employee competence so that they have an adequate level of knowledge with their current job by coaching so that they can minimize errors at work and have high skills to be able to produce optimal quality. In addition, to improve the operator's ability to be able to operate machines with different processes and increase understanding of the production process, job assignments and training can be done.

Future research can be done by measuring flexibility at a higher level such as process flexibility, technological flexibility and innovation, as well as business flexibility, while measuring product complexity can add different indicators. Further research can also be conducted with respondents from State-Owned Enterprises or other companies engaged in general manufacturing.

**Acknowledgement**

**Author Contributions:** Conceptualization, HH., AY., S; Methodology, HH., AY., S; Data Collection, HH., AY., S; Formal Analysis, HH., AY., S; Writing—Original Draft Preparation, HH., AY., S; Writing—Review And Editing, HH., AY., S. All authors have read and agreed to the published the final version of the manuscript.

**Institutional Review Board Statement:** Ethical review and approval were waived for this study, due to that the research does not deal with vulnerable groups or sensitive issues.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

**Conflicts of Interest:** The authors declare no conflict of interest.

**References**


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