Will Digital Operations Management Improve industry 4.0?

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ABSTRACT

The rapid development of science and technology has brought about changes in the economic field. The era of digitalization is a new challenge that must be ready to be faced so that collaboration between companies and supply chain segments becomes an important element that must be a top priority. The company became the most important subject in the digitalization era, especially in the effort to sustain the company. The purpose of this research is to analyse the impact of the application of digital operations management that will improve company performance in the industry 4.0 era. The research approach for this study is a quantitative approach with descriptive methods. The population in this study is the operations manager of Jakarta with a sample of 70 respondents. Data collection used were interviews, observation, and documentation. Research data were processed using SEM-GSCA (*Generalized Structural Component Analysis)*. The results showed that digital operations management and innovation contributed positively and significantly effect to the sustainability business. Then digital operations management contributes positively to innovation. Finally, digital operation management has a positive and significant effect on business transparency through innovation activities.

Keywords: *Operations Management, Digital Operations; Innovation; Digitalization.*

1. INTRODUCTION

The development of the industry that is increasingly rapid at this time, making competition increasingly fierce between companies in the world. Every effort is made to be the best among competitors. Operations management is a management function that is essential for a company. This field is growing very rapidly, especially with the birth of innovations and new technologies applied in business practice. Therefore, many companies have looked at and made aspects of operations management as one of the strategic weapons to compete and outperform their competitors.

The digital era and industry 4.0 currently cannot be denied has influenced the development of the company [1]. With advances in technology and industrial applications, many concepts have emerged in the fields of manufacturing and services. Industry term 4.0 many companies are conducting research on the impact of the implementation of industry 4.0. Many researchers in various countries believe that industry is the beginning of a new revolution, which is considered the fourth industrial revolution. According to kulik research [2] state that over the

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past decade, business infrastructure has become digital with increased interconnection between products, processes and services. Then digitalization is revolutionizing the way business is done in industrial value chains through the use of Internet technology, increased exchanges, and predictive analytics [3].

Along with the rapid development of the industry, the company is required to provide good performance and the best quality so that it can produce products and services desired by consumers but does not have an impact on the environment of the company's activities. Research conducted [4] that through the quality performance management, managers will be able to improve the construction quality by monitoring the major indicators of construction project success and ultimately increase the competitiveness of the overall construction organization.

Competitive advantage shows the creation of a system that has a special advantage over competitors. Competitive advantage in Operations Management can be created through a differentiation strategy, low cost and fast response. In this study the authors see from a different side that is that the company's competitive advantage will be greatly influenced by innovation. In addition, that the competitive advantage of digital operations management companies. So the authors raise the question that needs to be proven "Will Digital Operations Management Improve industry 4.0?"

Operations management is an area of management concerned with designing and controlling the process of production and redesigning business operations in the production of good or services [5]. Slack [6] suggested that operations management (MO) is about how organizations produce goods and services. Whereas Nawangsari and Sutawidjaya [7] explains that operations management is a series of activities that create value in the form of goods and services by converting inputs into outputs.

Digitalization. Digitalization means changing interaction, communication, business functions and business models to (more) digital ones that often lead to the marketing mix of digital and physical as the omnichannel customer service, integrated or smart manufacturing with a mix of autonomous, semi-autonomous and manual operations [3]. Digital innovation will require Information Technology to ideate, or dream the digital dream, and execute in close partnership with colleagues, in an exploratory way, with understanding of the potential of new trends.

Digital Operations Management is an integrated management activity in designing, manufacturing process activities, product delivery and redesigning business operations by bringing together technology, automation, and workflows to mobilize teams to produce goods and services.

Innovation. Innovation is the creation of a new product-market-technology-organization-combination. Key activities in innovation management are: goal formulation, designing and organizing the process, monitoring progress and, if necessary, adjusting the goals, the process and/or its organization a [9] Innovation can at a essential level be the method of generating and combining thoughts to create a relationship between show achievements and past encounters to fathom a future issue. Innovation is an activity that the company solves problems by combining the knowledge [10].

The figure below shows the results of internal research that innovation is very important and innovation is a solution for the company. A company that wants to develop and advance certainly always strives to improve the competitiveness of the company. Companies that have high competitiveness will become competitive companies. To become a competitive

company, innovation is needed to improve the performance of all parties involved in the company. Some respondent argue that statements have to see whether the population think innovation is something that is meaningful and important. Others respondent describe that innovation is solving the problem.

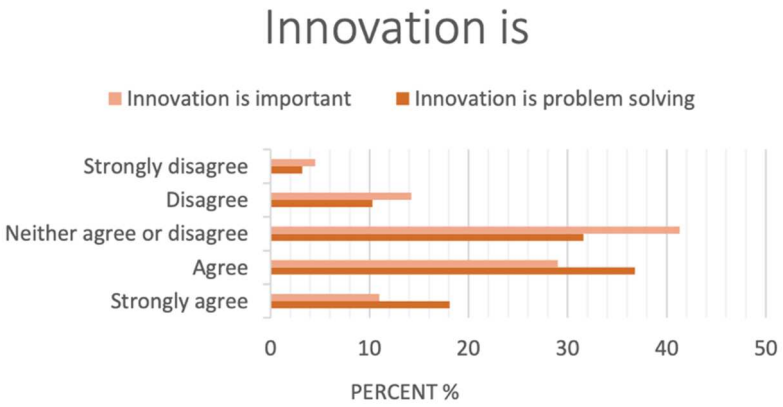

Figure 1. Research Innovation

Thus with innovation can create a standard of living and quality of life will be better. A small portion of the population says that innovation will certainly change in a civilization of technological change and development.

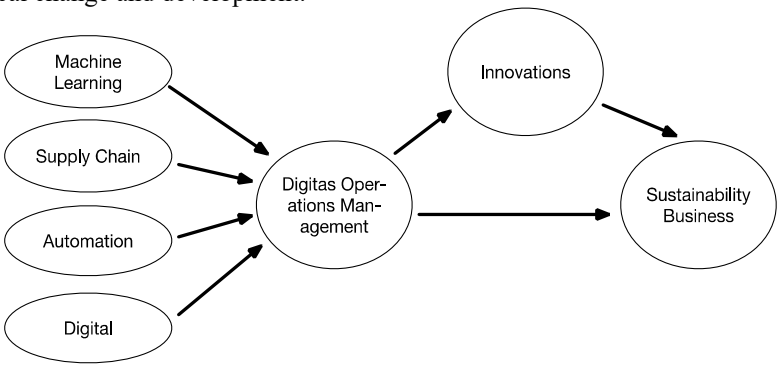

Figure 2. Conceptual Model

2. RESEARCH METHOD

This study adopts a descriptive study design. Descriptive study is to describe accurately the characteristics of a particular individual, or group situations and also in determining the frequency of occurrence or certain characteristics [11]. This study describes the characteristics of the selected manufacturing companies related to operations management.

The study population consisted respondents at managerial level in the manufacturing and service companies related to operations management based in Indonesia. A simple random sampling technique used in the selection unit is used as a sample population. The number of samples in this study was 70. The calculation of the research sample used [11] method where

the number of samples was 5 times the number of research indicators. Variables to be measured are translated into the indicator variables.

2.1 Test Validity and Reliability

2.1.1 Discriminant Validity

Discriminant validity, is a reflexive indicator measurement based on cross loading with its latent variables [12]. Another method is by comparing the square root of the average variance extracted (AVE) values of each construct, with correlations between other constructs in the model. In this connection, it is recommended that the measurement value be greater than 0.50. Furthermore, the results of the Discriminant validity test can be seen as visualized in Table 1 as follows;

Table 1. Discriminant validity Result Test

Variable	Average variance extracted (AVE)
Digital operation management (X)	0,500
Innovation (Z)	0.733
Sustainability business (Y)	0.581

Source: Primary data processed (2019)

Table 1 above shows the results of the discriminant validity test where all the values of Average variance extracted (AVE) are more than 0.50. Thus, it can be concluded that this measurement meets Convergent Validity requirements based on the value of Average Variance Extracted (AVE).

2.1.2 Composite Reliability

Composite reliability testing aims to test the validity of the instrument in a research model. Composite reliability test results can be seen as visualized Table 2 as follows:

Table 2. Composite Reliability Result Test

Variable	Composite Reliability	Description
Digital operation management (X)	0.615	Reliabel
Innovation (Z)	0.909	Reliabel
Sustanibility business (Y)	0.796	Reliabel

Source: Primary data processed (2019)

Based on table 2, it can be explained the results of composite reliability testing that shows satisfactory values, where all latent variables have been reliable because all the values of the variables have composite reliability values ≥ 0.60. In other words, the questionnaire used as an instrument in this study is reliable or consistent. Thus it can be concluded that, all indicators are indeed a measure of their respective constructs.

2.1.3 Goodness of Fit Model

The theoretical model in the conceptual framework of the study is said to be fit if it is supported by empirical data. There are two indications to see whether the model used is

good, namely structural goodness of fit model and overall model of goodness of fit. To find out that the hypothetical model of goodness of fit overall model is supported by empirical data presented in Table 3.

Table 3. Testing Results of the Overall Goodness Of Fit Model

Creteria	*Cut-of value*	Model Result	Description
SRMR	≤ 0,08	0.093	Good Model
GFI	≥ 0,90	0.992	Good Model

Source: Primary data processed (2019)

The results of the Goodness of Fit Overall Model test based on Table 3 shows that SRMR and GFI have met the cut-off value, so the GSCA model in this study is suitable and feasible to use, so that interpretation can be made for further discussion.
Goodness of Fit The structural model is measured using FIT and AFIT. In this modeling the FIT value is obtained that is equal to 0.552 which means the research model formed can explain all the existing variables of 0.552. The diversity of Digital operation management (X1), Innovation (Z) and Sustainability Business (Y) which can be explained by the model is 55.20% and the rest (44.80%) can be explained by other variables not included in the study. That is, if seen from the FIT value obtained, the model formed can be said to be good. Adjusted from FIT is almost the same as FIT. However, because there are not only one variable that affects Sustainability Business, there are two variables, so it would be better if the interpretation of the accuracy of the model uses AFIT. AFIT formed from the structural model is 0.537. So, the model formed can explain all the variables which are equal to 0.537. The diversity of Digital operation management (X1), Innovation (Z) and Sustainability Business (Y) which can be explained by the model is 53.70% and the rest (46.30%) can be explained by other variables. That is, if seen from the AFIT value obtained, the model formed can be said to be still quite good.

2.1.4 Variable Measurement Model

Conversion of path diagrams into measurement models for each Digital operation management (X1), Innovation (Z) and Sustainability Business (Y) variables

Table 4. Digital operation management (X1) Variable Measurement Model

Indicator	Estimate	SE	CR
X1.1	0.704	0.070	10.04*
X1.2	0.690	0.114	6.05*
X1.3	0.689	0.086	8.0*
X1.4	0.658	0.084	7.84*

CR* = significant at .05 level, Source: *Primary data processed* (2019)

The model shows the following:

1. The value of loading the indicator of the learning process of new technology (X1.1) is 0.704. This means that the diversity of Variable Digital operation management (X1) can be explained by indicators of the learning process of new technology (X1.1) of 70.40%. In other words, the contribution of the indicator of the learning process of new

technology (X1.1) in measuring the variable digital operation management (X1) of 70.40%.

2. The loading value of the role of the supply chain indicator (X1.2) is 0.690. This means that the diversity of Variable Digital operation management (X1) can be explained by the indicator of the Role of Supply chain (X1.2) of 69%. In other words, the contribution of the role of the supply chain indicator (X1.2) in measuring the variable digital operation management (X1) is 69%.
3. The loading value of the automation machine indicator (X1.3) is 0.689. This means that the diversity of Variable Digital operation management (X1) can be explained by the role of the automation indicator (X1.3) of 68.90%. In other words, the contribution of the role of the engine indicator (X1.3) in measuring the variable Digital operation management (X1) is 68.90%.
4. The loading value of the Big data indicator (X1.4) is 0.658. This means that the diversity of Variable Digital operation management (X1) can be explained by the Big data indicator (X1.4) of 65.80%. In other words, the contribution of the Big data indicator (X1.4) in measuring the Digital operation management (X1) Variable is 68.90%.

The Digital Operation Management (X1) Variable measurement model also informs us that the learning process of new technology (X1.1) has the greatest loading value of 0.704. This means that the learning process of new technology (X1.1) is the most dominant indicator in measuring Digital Operation management (X1) Variables.

Table 5. Innovation Variable Measurement Model (Z)

Indikator	Estimate	SE	CR
Z1.1	0.875	0.041	21.26*
Z1.2	0.851	0.038	22.51*
Z1.3	0.803	0.066	12.26*
Z1.4	0.891	0.033	27.17*
Z1.5	0.858	0.048	17.86*

CR* = significant at .05 level, source: *Primary data processed* (2019)

The model shows the following:

1. The value of loading the management innovation indicator (Z1.1) is 0.875. This means that the diversity of Innovation Variables (Z) can be explained by management innovation indicators (Z1.1) of 87.50%. In other words, the contribution of management innovation indicators (Z1.1) in measuring Variable Innovation (Z) of 87.50%.
2. The value of loading the product innovation indicator (Z1.2) is 0.851. This means that the diversity of Innovation Variables (Z) can be explained by the product innovation indicator (Z1.2) of 85.10%. In other words, the contribution of the

product innovation indicator (Z1.2) in measuring the variable Innovation (Z) of 85.10%.

3. The loading value of the system innovation indicator (Z1.3) is 0.803. This means that the diversity of Innovation Variables (Z) can be explained by the system Innovation indicator (Z1.3) of 80.30%. In other words, the contribution of the system Innovation indicator (Z1.3) in measuring the Variable Innovation (Z) variable is 80.30%.
4. The value of loading the process innovation indicator (Z1.4) is 0.891. This means that the diversity of Innovation Variables (Z) can be explained by the process innovation indicator (Z1.4) of 89.10%. In other words, the contribution of process innovation indicators (Z1.4) in measuring the Innovation Variable (Z) of 89.10%.
5. The loading value of the product / service distribution indicator (Z1.5) is 0.858. This means that the diversity of Innovation Variables (Z) can be explained by the product / service distribution indicator (Z1.5) of 85.80%. In other words, the contribution of product / service distribution (Z1.5) in measuring the Innovation Variable (Z) was 85.80%.

The Variation Innovation (Z) measurement model also informs us that the Company always has a process innovation in its activities (Z1.4) having the greatest loading value of 0.891. This means that the Company always has a process innovation in its activities (Z1.4) is the most dominant indicator in measuring the Innovation Variable (Z).

Table 6. Sustainability Business Variable Measurement Model (Y)

Indicator	Estimate	SE	CR
Y1.1	0.847	0.040	20.94*
Y1.2	0.883	0.025	35.71*
Y1.3	0.837	0.040	20.78*
Y1.4	0.746	0.066	11.35*
Y1.5	0.593	0.185	3.205*

CR* = significant at .05 level, source: *Primary data processed* (2019)

The model shows the following:

1. The loading value of environmentally friendly material indicators (Y1.1) is 0.847. This means that the diversity of the Sustainability business (Y) variable can be explained by the environmentally friendly material indicator (Y1.1) of 84.70%. In other words, the contribution of environmentally friendly material indicators (Y1.1) in measuring the Sustainability business (Y) variable was 84.70%.
2. The loading value of the indicator reduces waste (Y1.2) by 0.883. This means that the diversity of the Sustainability business (Y) variable can be explained by the indicator of reducing waste (Y1.2) by 88.30%. In other words, the contribution of the indicator reduces waste (Y1.2) in measuring the Sustainability business (Y) variable by 88.30%.
3. The loading value of the indicator reduces the consumption of food and water use (Y1.3) by 0.837. This means that the diversity of the Sustainability business (Y) variable can be explained by the indicator of reducing consumption of water and water use (Y1.3) by 83.70%. In other words, the contribution of the indicator reduces

consumption l use of wife and water (Y1.3) in measuring the Sustainability business (Y) variable by 83.70%.

4. The loading value of the indicator of the application of corporate social responsibility (Y1.4) is 0.746. This means that the diversity of the Sustainability business (Y) variable can be explained by the indicator of the implementation of corporate social responsibility (Y1.4) of 74.60%. In other words, the contribution of the indicator of the application of corporate social responsibility (Y1.4) in measuring the Sustainability business (Y) variable was 74.60%.
5. The loading value of the indicator reaches the targeted profit (Y1.5) of 0.593. This means that the diversity of the Sustainability business (Y) variable can be explained by the indicator of achieving targeted profit (Y1.5) of 59.30%. In other words, the contribution of the indicator to achieve the targeted profit (Y1.5) in measuring the Sustainability business (Y) variable of 59.30%.

The measurement model of the Sustainability business (Z) also informs that reducing waste during the production process of the company (Y1.2) has the greatest loading value of 0.883. This means that reducing waste during the production process at the company (Y1.2) is the most dominant indicator in measuring the business sustainability variable (Y)

2.1.5 Hypothesis Testing Results (Structural Model Test Results)

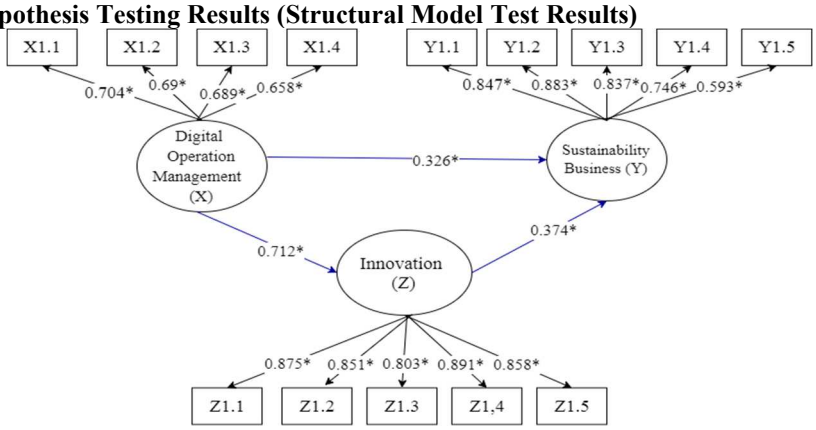

FIGURE 2. Structural Model

Hypothesis Testing Results in research can be explained in the table below

Table 7. Research Hypothesis Testing Results (Direct Effect)

Hypothesis	Direct Influence	Path coefficient	Standard Error	Critical Ratio	Description
H1	Digital operation management-> Innovation	0.712	0.061	11.66*	Significant
H2	Digital operation management- >Sustanibility business	0.326	0.160	2.04*	Significant
H3	Innovation->Sustanibility business	0.374	0.160	2.34*	Significant

CR* = significant at .05 level, source: *Primary data processed* (2019)

In addition to testing the direct effect, multivariate modelling is also known as an indirect effect. Indirect effect is the product of 2 (two) direct effects. An indirect effect is declared significant if the two direct influences that shape it are significant, if one or both of them are not significant then the effect is not necessarily insignificant. Here are the results of indirect effects,

Table 8. Results of Research Hypothesis Testing (Indirect Effects)

Hypothesis	Relationship	Coefficient	Description	Conclusion
H4	Digital operation management-> Innovation -> Sustainability business	0.266	Digital operation management-> Innovation (Sig.), Innovation->Sustainability business (Sig.)	Significant

Source: *Primary data processed* (2019)

In Table 8 the results of the analysis show that all relationships between variables on direct influence show significant results. Based on Table 8, the results of testing the indirect effect of the structural model are described and a significant result is obtained [18].

Explanation of each hypothesis

1. **Hypothesis 1: Digital operation management has a positive and significant effect on Innovation**
   Hypothesis testing using the GSCA approach produces a path coefficient of influence Digital operation management has a positive and significant effect on Innovation with a path coefficient of 0.712 and a CR value of 11.66. Because CR> 1.96 (critical value of Z table at alpha 5%), there is enough empirical evidence to accept H1: which states that Digital operation management has a positive and significant effect on Innovation. The coefficient marked positive indicates that the higher the Digital operation management, the higher the Innovation
2. **Hypothesis 2: Digital operation management has a positive and significant effect on business sustainability**
   Hypothesis testing using the GSCA approach produces a path coefficient of influence Digital operation management has a positive and significant effect on Sustainability business with a path coefficient of 0.326 and a CR value of 2.04. Because CR> 1.96 (critical value of Z table at alpha 5%), there is enough empirical evidence to accept H2: which states that Digital operation management has a positive and significant effect on Sustainability business. The coefficient marked positive indicates that the higher the Digital operation management, the higher the Sustainability business.
3. **Hypothesis 3: Innovation has a positive and significant effect on business sustainability**
   Hypothesis testing using the GSCA approach produces path coefficients of the influence of Innovation positive and significant effect on Sustainability business with a path coefficient of 0.374 and a CR value of 2.34. Because CR> 1.96 (critical value of Z table at alpha 5%), there is enough empirical evidence to accept H3 which states that Innovation has a positive and significant effect on Sustainability business. The coefficient marked positive indicates that the higher the Innovation the higher the Sustainability business.
4. **Hypothesis 4: Digital operation management has a positive and significant effect on business sustainability through Innovation**

Hypothesis testing using the GSCA approach produces path coefficients of Digital operation management influence on sustainability through Innovation which has a significant effect with a path coefficient of 0.266. Because the two direct influences that form are significant, there is sufficient empirical evidence to accept H4: which states that Digital operation management has a positive and significant effect on sustainability business through Innovation.

3 . RESULT AND DISCUSSION

1. **Digital operation management influences Innovation.** The transformation of digital operations management is not just about embracing new technology, it's about changes in organizational thinking, about innovation and creativity. There is a need for organizations to cope with changes in business scenarios, dynamic business demands and ways of innovating to quickly meet these changing needs, so that what the market or consumer desires will be fulfilled as expected.
2. **Digital operation management has an effect on business continuity**, in fact most of the opinions that digital transformation is referred to as business transformation. In fact, some prefer to use the term digital business transformation, which is more in harmony with aspects of business transformation. Digital business transformation is driven by key factors such as Innovative Technology, customer behavior and market demand, and also environmental factors [3]. For successful digital transformation in business organizations, the digital maturity of modern organizations is very important [13] .
3. **Innovation has a positive and significant effect on Sustanibility business.** Innovation has a positive and significant influence on business continuity [14] Business continuity is driven by key factors, one of which is innovative technology, customer behavior and market demand, and also environmental factors. Technological innovation causes technological disruption [15]. Business processes move away from legacy systems to adopt modern technologies such as Clouds. Big Data, IoT, etc. Many such technological innovations are then used and recognized throughout the company and bring value to business, increase speed, effort and lower costs and provide more effective results.
4. **Digital operation management has a positive and significant effect on Sustanibility business through Innovation.** Sustainability is at the heart of the company's business model, because business will grow when companies do it sustainably [16]. Various types of new business models have been offered by various websites that are growing rapidly on the internet. In the field of education, virtual sites of education (e-school) and virtual (e-training) education providers are increasingly rife, in the financial sector virtual financial institutions such as e-banking, e-stock exchange and e-stock have been established. insurance, in developing manufacturing companies that are ready to provide outsourcing business in the fields of e-procurement, e-logistics, e-distribution, and e-inventory and others.

4. CONCLUSIONS

This study aims to determine whether Digital Operations Management can improve in the industry 4.0 era [17] . Answers from the author's research results that digital operations management has a positive and significantly has an effect on innovation. On the other hand, digital operation management has a positive and significant effect on business continuity. And innovation has a positive and significant effect on business continuity. Finally, digital operation

management has a positive and significant effect on business transparency through innovation activities.

Recommendation. The authors recommend further research to identify problems from another dimension as; strategy, information, supply chain, creativity and operations performance.

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