

Exploring The Role of ICT Readiness and Information Sharing On Supply Chain Performance in Coronavirus Disruptions

Hendy Tannady¹, Resdiansyah², Johanes Fernandes Andry³, Rustono Farady Marta⁴

Department of Management Universitas Pembangunan Jaya Banten, Indonesia¹
Pembangunan Jaya Center for Urban Studies Universitas Pembangunan Jaya Banten, Indonesia²
Information System Universitas Bunda Mulia Jakarta, Indonesia³
Master's Degree of Communication Science Universitas Bunda Mulia Jakarta, Indonesia⁴



Abstract— Supply chain management is an important and integral part of supporting the company's business continuity. Coronavirus disruption presents new challenges for the industry especially logistics, pharmaceuticals and food & beverage to continue to contribute to the availability of medical and food in Indonesia. The purpose of this research is to improve the performance of supply chains in logistics, pharmaceuticals and food & beverage industries in Indonesia in the middle of the pandemic coronavirus. ICT readiness and information sharing are two variables that are thought to have a positive and significant contribution on supply chain performance. The survey was conducted on 80 practitioner respondents who working in the supply chain channel, the survey period was in March 2020, when the government of the Republic of Indonesia had released an appeal to work from home, learn from home and worship at home in response to a pandemic coronavirus. The results of this study concluded that there is a positive and significant effect of ICT readiness on supply chain performance with an estimated coefficient of 0.47. Information sharing has positive and significant effect in increasing supply chain performance with an estimated coefficient of 0.32. The influence of the two independent variables on the dependent variable simultaneously is 0.692.

Keywords: ICT readiness, information sharing, supply chain performance, coronavirus, Indonesia

1. INTRODUCTION

The business world today is facing an era known as business disruption [4][21]. At the beginning of 2020 the world was shocked by an epidemic known as coronavirus [2], the first time a coronavirus case was detected in Wuhan city, Hubei province, People's Republic of China in December 2019. On March 11, 2020, the World Health Organization (WHO) officially designated this outbreak as a world pandemic [40]. When this article was written, the number of coronavirus cases worldwide has reached more than five million cases in more than 190 countries, and caused more than 335 thousand people to die [43]. President Joko Widodo officially announced the existence of coronavirus case in Indonesia on March 2, 2020 [41] and then officially appealed to the Indonesian people to work from home, learn from home and worship at home [42]. The impact of coronavirus in Indonesia, especially after there is an appeal from the government is the slowing down of the economy in various sectors. Various types of industries are forced to do a lockdown, but the pharmaceutical and food & beverage industries are industries that are expected to continue to provide medical and food supplies to the community, and logistic industries is a vital component in supporting its availability. The capability of the supply chain is a determining factor and is the backbone of the company's business continuity in the era of disruption [23]. Coronavirus in Indonesia is one form of disruption experienced by businesses and the performance of the supply chain will determine not only business profitability but especially in the situation of disruption due to a pandemic is the availability of medical and food supply for all Indonesian people. The purpose of this study is to examine and analyze both the partial and simultaneous role of ICT

readiness and information sharing in influencing the Supply Chain Performance of companies engaged in logistics, pharmaceuticals and food & beverage in Indonesia. Various studies have shown that the two independent variables are able to influence Supply Chain Performance. Previous research that shows that ICT readiness is able to improving supply chain performance include research conducted by Biniazi and team in one of the global firm engaged in IT, this study concludes that ICT readiness can improve supply chain performance in an organization [20].

Other research by Wu and team that conducted a study of the effects of information technology on supply chain capabilities and how its implications for company performance, data collected from supply chain and logistic managers obtained a conclusion that ICT facilities and adequately education to employees related to the use and updates of ICT technology can improve the capabilities of the supply chain and have positive implications for company performance [11]. Some studies conclude the same result with Biniazi et al. (2011) and Wu et al. (2006) that by increasing ICT readiness it will contribute to the performance of the supply chain [7][24][25][28][32]. One of previous research that shows that information sharing can improve supply chain performance conducted by Al-Doori, he conducted a study of 232 key players in the automotive supply chain industries in Pakistan which included suppliers, manufacturers and distributors. The conclusion from his research is that one of the factors that significantly influence supply chain performance is information sharing [16]. Other study by Fawcett et al. (2007) who conducted a survey toward 588 members of professional association engaged in the Supply Chain sector, such as the Institute for Supply Management, APICS and the Council of Supply Chain Management Professionals. The results of the study is that with effective information sharing, supply chain performance will run well [35]. Some studies have the same opinion with Al-Doori (2019) and Fawcett et al. (2007) that by increasing information sharing, the performance of the supply chain will improve and bring positive benefits to business process and business profitability [9][13][17][38].

2. Literature Review

2.1 Supply Chain Performance (SCP)

Supply Chain Management (SCM) is a network of facilities that produce raw materials, turn them into semi-finished goods and final products, and send them to customers through a distribution system [22]. SCM is a business philosophy that seeks to integrate various activities, people and resources that run dependently from the point of origin to the final destination in a supply channel [8][15]. SCM is a systemic process, a strategically coordinated business function, involving several transactions in the supply chain with the aim of making long-term improvements to the company's performance and overall supply chain [3][15]. The way to measure the success of SCM is to identify Supply Chain Performance. Performance measurement in the supply chain is a challenge for organizations, because it involves various organizational functions that are often difficult to measure precisely [10]. Fawcett et al. (2007) provides SCP measurement indicators, namely Inventory costs, transportation costs, on-time delivery, overall customer satisfaction, order fulfillment lead times, and the cost of purchased items [35]. All activities in the supply chain that are not directly under the control of the individual company must be measured and controlled either by the company or its partners in the supply chain, the supply chain must be transparent to all stakeholders, continuous improvement and innovation are absolutely necessary to improve performance [12].

2.2 ICT Readiness

Communication and information technology has succeeded in changing the way of life of individuals and organizations [1]. ICT has been widely implemented in various types of organizations, private organizations, government or NGOs, ICT consists of various technological devices and resources used to communicate, create, disseminate, store and manage information [27]. The development of ICT in organizations follows the

development of the organization's business processes, in order to be able to remain the backbone of the organization, ICT needs to develop infrastructure, hardware, software, information systems and human resources [27]. In relation to supply chain performance, the use of ICT aims to provide availability and visibility of information, enable a single point of contact for data, allow decisions to be made based on information obtained throughout the entire supply chain and enable collaboration between business actors in supply chain [33]. Auramo, Kauremaa & Tanskanen (2005) measure ICT readiness by using four indicators namely buy-side transactions, sell-side transactions, inbound and outbound material flows and inventory management, and planning collaboration [18].

2.3 Information Sharing (IS)

IS is proven effective in increasing SCP [14]. Simply stated, IS is giving the right answer and very helpful for those who ask questions, there are two parties in IS namely the giver of answers and those who give questions [31]. IS is a desire to make a tactical and strategic data such as inventory levels, forecasting, sales promotion and marketing strategies available to more than one company that forms a supply chain node [6]. IS allows business people to see the various opportunities and risks of a supply chain channel from the initial stage to the very last stage, in managing IS information is important and crucial [30]. The purpose of IS is to make improvements to the efficiency and effectiveness of the entire network of the organization, which will ultimately have an impact not only on company performance but also operational performance [16]. Sundram et al. (2016) measures IS with six indicators namely give the information to partners in advance of changing needs, organization's partner share proprietary information, organization's partner keep your organization fully informed about issues that affect its business, organization's partner exchange information that helps the establishment of business planning, organization's partners share business knowledge of core business processes, and keep each other informed about events or changes that might affect the other partners [36]. IS can create a learning process in a better organization, IS will be more optimal if supported by adequate information technology in accordance with organizational needs [5]. IS includes logistics, customers, quality, time, market changes, design or uncertainty [34].

3. RESEARCH METHODOLOGY

The research method is quantitative using an online questionnaire as a data collection instrument. The design of the questionnaire uses an interval scale (likert scale). Data quality test uses validity and reliability tests, validity and reliability tests were tested on 30 respondents. Validity test uses Pearson correlation. All indicators are valid if the calculated r value is greater than the r table. Reliability test uses coefficient of cronbach alpha as value parameter, all indicators are declared reliable if it has an alpha value greater than 0.6 [37][39]. This study uses SEM (Structural Equation Modeling) as a tool in producing an analysis of the effect of each independent variable on the dependent variable both partially and simultaneously. SEM analysis is carried out after all indicators have passed the data quality test. The variables used in this research are ICT readiness (X1), information sharing (X2) and supply chain performance (Y). Variable X1 uses four measurement indicators, namely buy-side transactions, sell-side transactions, inbound and outbound material flows and inventory management, and planning collaboration (IR1-IR4) [18]. Variable X2 uses six measurement indicators, namely give the information to partners in advance of changing needs, organization's partner share proprietary information, organization's partner keep your organization fully informed about issues that affect its business, organization's partner exchange information that helps the establishment of business planning, organization's partner share business knowledge of core business processes, and keep each other informed about events or changes that may affect the other partners (IS1-IS6) [36]. The Y variable uses six measurement indicators, namely inventory costs, transportation costs, on-time delivery, overall customer satisfaction, order fulfillment lead times, and the cost of purchased items (SC1-SC6) [35]. The population in this study are all business practitioners involved in supply chain channels, especially in the logistics,

pharmaceutical and food & beverage industries in Indonesia. The sampling technique uses purposive sampling, where the characteristics of respondents are limited to the manager level and have been at least three years working at the same company when the survey was conducted or at least three years working on the supply chain channel. The minimum number of respondents is 80 people, using multiplication of the number of indicators and 5-10 [19]. The survey was conducted in March 2020 during the Work from Home (WFH) period due to the outbreak of a pandemic coronavirus in Indonesia. Research Hypothesis, ICT readiness affects supply chain performance (H1), Information sharing affects supply chain performance (H2). ICT readiness and information sharing simultaneously affect supply chain performance (H3).

4. DISCUSSION AND ANALYSIS

This stage begins with a data quality test which includes a validity test and a reliability test. After testing the data quality, the steps are continued by conducting SEM analysis which starts with confirmatory factor analysis (CFA). The initial survey involved 30 respondents to see whether the instrument had met the data quality test, using the degree of freedom (dof) 28, then the value of r-table was 0.361. The instrument is declared valid if r-value is greater than r-table ($r\text{-value} \geq r\text{-table}$, $\alpha: 0.05$). Table 1 shows the results of data quality tests from three variables which included 16 indicators.

Table 1. Data Quality Test (Validity and Reliability)

ICT Readiness (Reliability: 0.722)		Information Sharing (Reliability: 0.841)		Supply Chain Performance (Reliability: 0.862)	
Indicator	Validity Score	Indicator	Validity Score	Indicator	Validity Score
IR1	0.867	IS1	0.822	SC1	0.835
IR2	0.951	IS2	0.865	SC2	0.854
IR3	0.732	IS3	0.811	SC3	0.807
IR4	0.787	IS4	0.832	SC4	0.932
		IS5	0.850	SC5	0.786
		IS6	0.908	SC6	0.712

After all indicators meet the validity and reliability requirements, a CFA test is performed as part of the SEM analysis. CFA analysis aims to find the estimated coefficient of each independent variable on the dependent variable. It also calculates the value of t-value to determine the significance of the effect. Table 2 shows the value of estimated coefficients and t-value of ICT readiness and information sharing on supply chain performance partially.

Table 2. CFA Measurement Results

No	Variable	Estimation Coefficient	T Value
1	ICT Readiness	0.47	6.8
2	Information Sharing	0.32	7.3

All independent variables have a positive and significant effect on the dependent variable. The next step is a Goodness of Fit (GoF Test) test for the full model. Some indicators used in the goodness of fit tests are GFI, RFI, NFI, IFI, CFI, NNFI, RMSEA, and AGFI. GoF test aims to validate the combined performance of the measurement model (outer model) and structural model (inner model). Table 3 shows the results of the GoF test.

Table 3. Goodness of fit Index (Full Model)

Parameters	Results	Criteria
GFI, NFI	0.843, 0.834	Marginal fit, Marginal fit
IFI, NNFI	0.819, 0.887	Marginal fit, Marginal fit
RFI, CFI	0.825, 0.833	Marginal fit, Marginal fit
RMSEA	0.054	Good fit

Based on the Goodness of Fit test results, it can be concluded that the model is acceptable because it has indicated 'reasonable error of approximation'. Based on the results of the CFA analysis which produces a value of estimated coefficient and significance value, it can be concluded that H1-there is an effect of ICT readiness on supply chain performance with an estimated coefficient of 0.47 and t-value 6.8, X1 has a positive and significant effect on Y (H1 accepted). H2 - there is an effect of information sharing on supply chain performance with an estimated coefficient of 0.32 and t-value 7.3, X2 has a positive and significant effect on Y (H2 is accepted). H3 - there is an effect of ICT readiness and information sharing simultaneously on supply chain performance with R² value is 0.692 and f-value 9.25, X1 and X2 simultaneously have a positive and significant effect on Y (H3 accepted).

5. CONCLUSION

The ICT readiness and information sharing both partially and simultaneously have a positive and significant influence on the supply chain performance in the logistics, pharmaceutical and food & beverage industries in Indonesia amid coronavirus disruption. The more adequate ICT readiness will increase supply chain performance, and vice versa, companies that are not ready with the capability of ICT will experience a decrease in supply chain performance. The better companies and partners doing information sharing will increasingly elevate supply chain performance. From the results of the descriptive analysis it was found that the indicator 'inbound and outbound material flows and inventory management' of the variable of ICT readiness has a mean value below the average of indicators of ICT readiness indicators. The 'keep each other indicator informed about events or changes that may affect the other partners' of the variable of information sharing has a mean value below the average of indicators of information sharing. Both indicators have the highest standardized loading factor (SLC) value among the other indicators in each variable. Suggestions for management are to strengthen the readiness of ICT, especially in supporting the outflow and entry of goods and how ICT supports business processes related to inventory management. Disruption conditions cause uncertainty in the number of product demand so that the role of ICT will greatly affect the performance of the supply chain. Another suggestion is a policy that allows for transparency and a desire to share information from firm and partners, because disruption must also have an impact on the internal business processes of each company which naturally influences its business interactions with other companies.

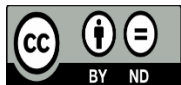
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