The Effect of IT Implementation on Supply Chain Performance: The Mediating Role of Information Sharing and Information Quality

Hotlan Siagian*, Zeplin Jiwa Husada Tarigan, Erwin Susilo
Magister Management Department, Petra Christian University, Surabaya, Indonesia.

* Corresponding author. Email: hotlan.siagian@petra.ac.id, zeplin@petra.ac.id, erwin@petra.ac.id.
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Abstract: This study aims at examining the mediating effects of information sharing and information quality over the relationship between Information Technology (IT) implementation and supply chain performance. The sample size of 110 respondents, representing 55 manufacturing companies, have been interviewed using a questionnaire designed with five-point Likert scale. Data were then analyzed using SmartPLS software. The result of the research shows that IT implementation has positive direct impacts on the supply chain performance, information sharing, and information quality. Meanwhile, information sharing and information quality also affect supply chain performance directly. Furthermore, information sharing and information quality mediate the influence of IT implementation on supply chain performance. This finding contributes to the on-going research on the supply chain management. The result also paves the way for the manager to establish the IT implementation, information sharing, and information quality in the pursuit of increased supply chain performance in the manufacturing company.

Key words: IT implementation, supply chain performance, information sharing, information quality.

1. Introduction

The competition in the business world has been steadily rising over the past few years. This phenomenon has forced organizations to innovate either the product or the process if the organization would remain to exist in the business. The businesses in Indonesia, mainly Surabaya which is one of Indonesia's biggest and most populated cities with around 7.7 million populations, is also not exempt from this phenomenon. A report by the Indonesian central bureau of Statistics (2016) indicated that there is around 5% annual growth in the number of business companies all around Indonesia. Besides, the increase of the expenses such as salary and logistic expenses has also forced the decision makers to find out alternatives ways how to enhance the productivity and working efficiency. In recent years, the organization has been going global to find the source of raw material from other countries for the reason of lower price, better quality and shorter lead time. In the meantime, they also try to have access to the new market, and if necessary to establish a contract manufacturing in other countries. This atmosphere, consequently, emerges new constraints of the supply chain management in term of higher complexity, uncertainty, and risk. In another word, an organization should pay broader attention to the supply chain performance in order to increase the responsiveness in fulfilling the customer demand as the primary objective [1]. According to [2], the performance of the supply chain in Indonesia is relatively low compared to other countries. A survey

conducted by World Bank in 2010, regarding Logistics Performance Index (LPI), indicated that Indonesian logistic ranked 75 out of 155 countries, which is far lower than any other Asian countries. These findings signify that Indonesian supply chain needs earnest attention in the pursuit of global competitiveness [2]. The low performance mainly caused dominantly by an ineffective and inefficient logistic system in the context of cost and lead-time.

The availability of the information technology (IT) in the past recent years has enabled the Indonesian manufacturing companies to bring the IT into the business process and innovate their system to support their business strategies. Based on the survey conducted by the International Telecommunication Union (ITU) in 2014, the adoption of IT by mid-level companies, including manufacturing companies, in Indonesia have gradually increased, even though relatively low compared to other countries in Asia. However, this growth indicated the willingness of the manufacturing enterprise to adopt IT into their business process in enhancing the supply chain performance.

Aa suggested by [3], implementation of IT in business processes could directly improve the performance of a supply chain, especially from the logistic side, which is done by speeding up operational processes and improving the overall efficiency of the supply chain. Another researcher [4] suggest that IT implementation will help companies to improve the quality of the information and to share it with their supply chain partners. When companies have high-quality information, they will achieve higher supply chain performance, in term of responsiveness and delivery [5]. More than that, they will also be more motivated and willing to seek and share more information with their partners [6], which will ultimately result in improved supply chain performance [7].

Research by [5], [8] suggested that the information sharing and the information quality can improve the supply chain performance. The supply chain needs integration of those organizations involved along the chain. The integration can succeed when each member of the chain have the same information and excellent quality of the information. The appropriate information technology allows the organization to share the information and to improve the quality of the information. We, therefore, can say that IT implementation improve the information sharing and information quality.

Other research by [9] suggested that information is sharing positively improve the supply chain performance. With the information sharing in place, all parties will receive the same information coming from the same source, and at the end, help to eliminate the bullwhip effect. Another research by [10] claims that information quality affects the supply chain performance as well. The quality of the information is essential as it indicated the accuracy and the up to the date of the data. The most up to dated data are very important to make sure that all parties response to the correct and up to date information.

The above description demonstrated that many researchers had examined the direct impact of IT implementation, information sharing, and information quality on the supply chain performance respectively. However, to the best of our knowledge, there has been no study examines the relationship between the four constructs simultaneously. In order to fill this gap, this work investigates the influence of IT implementation on the supply chain performance through the mediating role of information sharing and information quality. Therefore, this research examines the questions if the IT implementation affects supply chain performance, information quality, and information sharing; if the information sharing and information quality influence the supply chain performance; and if the information quality and information sharing mediate the influence of IT implementation on the supply chain performance.

2. Literature Review and Hypotheses Development

2.1. IT Implementation

IT implementation is essential for today industry environment. The manufacturing company acquire the

resources from many places around the world and at the same time distribute the product in the global market. Without IT implemented, an organization faces difficulties in term of responsiveness, agility, and the cost. What IT implemented in the business process may be relevant to the several functions in the business process. Reference [1] classifies IT implementation into the primary functions, as follows: (1) data collection and communication; (2) data storage; (3) data processing and reporting. Reference [11] proposed four points of IT implementation, as follows: (1) Electronic Procurement (e-Procurement), (2) Electronic Data Interchange (EDI**);** (3) Enterprise Resource Planning (ERP, and (4) Electronic Fulfillment (e-Fulfillment).

2.2. Information Sharing

Information sharing is defined as all forms of data exchange between individuals within a department, inter-department within a company, or between companies in a supply chain network [11]. They also proposed that the shared information could be divided into six categories, namely (1) procurement; (2) operational; (3) logistics; (4) marketing; (5) customer's needs; and (6) company goals. According to [12], information sharing means the sharing of useful or crucial information to the system, people, or organization unit by considering what, whom, how, and when to share. The information sharing will help companies to avoid redundancy, reduce costs, and even improve respond speed and quality.

2.3. Information Quality

Uncertainties in a business environment, both regarding consumer or supplier's demand have triggered companies to share high-quality information, which is possible through a supported using the IT system [5]. Reference [13], proposes several aspects of information quality, i.e., (1) accuracy; (2) timely; (3) completeness; and (4) reliability. It is unfortunate that the shared information often experiences delay and distortion as it flows, either horizontally or vertically. So, to avoid confusion and other adverse effects, every company must ensure the quality of their information [13].

2.4. Supply Chain Performance

Reference [10] claim that measuring supply chain performance will provide the information needed as feedback to understand the current conditions and also help in decision-making, so it is expected to give positive contributions to business management and improve the company performance in the future. According to [10], every business activity could be measured by five performance attributes, i.e., (1) reliability, (2) responsiveness, (3) agility, (4) costs, and (5) asset management efficiency: the ability to use available assets efficiently.

2.5. Hypotheses Development

Reference [4], state that IT implementation, such as the usage of EDI and ERP, is vital for the company to share information of various activities enabling an efficient flow of material, information, and financial within the supply chain. The application of database management systems through IT implementation, also, will support the size, completeness, quality, and integration of data, which ultimately enable the company to monitor the performance of other members quickly, practically and instantly [4]. Many other researchers have also concluded that IT implementation enables significant progress in information sharing and the quality of information [5], [8]. This discussion leads to the first and second hypotheses as follows:

H1. IT implementation affects information sharing

H2. IT implementation affects information quality

IT implementation can help companies within a supply chain network to benefit from speeding up operational processes and improving the overall efficiency of the supply chain [3]. More than that, the

information flow enabled by IT has the potential to increase sales volume by reaching consumers quickly and directly when new products are introduced through previously inaccessible markets due to limited distribution and infrastructure capabilities [4]. The implementation of flexible IT systems can also enhance the ability and absorptiveness of a company or supply chain by increasing their amount and scope of knowledge [14]. Moreover, the implementation of this technology helps companies in standardizing, updating and connecting data or information sources, both within and between, so that it will result in the increased efficiency of asset management capabilities [7]. Therefore, this research proposes the third hypotheses as follows:

H3. IT implementation affects supply chain performance

According to [9], supply chain partners who exchange information on a regular basis will be able to work as an entity. They can understand better the needs of the end consumer, and be quicker and more efficient in responding to market changes. Efficient information sharing also adds visibility and reduces uncertainty in a supply chain. It allows companies to access data throughout their supply chain, enabling them to collaborate on various activities such as sales, production, and logistics [7]. In addition, [15] show that the negative impact of the bullwhip effect on supply chain can be reduced or even eliminated through constant and adequate information sharing. Therefore, this research proposes a fifth hypothesis:

H4. Information sharing affects supply chain performance

Better information quality can help companies involved in the supply chain network to make decisions faster, thus increasing their business responsiveness [16]. In addition, [8] claim that with the existence of quality information, companies will gain a competitive advantage through improved customer service. Reference [17] have also demonstrated that accurate and timely sharing of demand information will result in improved supply chain performance, particularly regarding procurement and delivery of goods. Therefore, this research proposes sixth hypotheses:

H5. Information quality affects supply chain performance.

As it has been discussed above, IT implementation influences the information sharing ([4] and information quality [5], [8], and at the same time, the information sharing and information quality affect the supply chain performance [7], [17]. Based on this relationship, we postulate that information sharing and information quality mediate the influence of IT implementation on the supply chain performance. Hence, we propose the last two hypotheses as follow:

H6: Information sharing mediate the influence of IT implementation on the supply chain performance.

H7: Information quality mediates the influence of IT implementation and supply chain performance.

3. Research Methodology

3.1. Population and Sampling

The population of this study is the medium and large size manufacturing companies which have performed supply chain management practices in the region of East Java, Indonesia. Based on this criteria, there has been found 55 manufacturing companies in this region. Two respondents represented each company. The respondents are selected from the top management level, at least a manager for the reason that they are considered the most informed person about the decision making. There are 110 respondents in total representing all the companies. The score of each company is represented by the average value of the two respondent. This study uses a quantitative causal research type which is relevant to examine the hypothesis.

3.2. Data Collection

The data of this research were collected by distributing questionnaires, designed with a five-point Likert scale ranging from 1: strongly disagree to 5: strongly agree, via postage and e-mail to the respondents. In

order to make sure that the questionnaire received and understood, the author has made a phone call or e-mail to the respondent when necessary.

3.3. Operational Definition

There are four constructs studied in this paper, i.e., IT implementation (ITI), information sharing (ISH), information quality (IQT), and supply chain performance (SCP). The operational definition of each construct is as follow. IT implementation assess the extent to which the company has implemented the information technology into the business process, i.e., 1) usage of electronic data interchange (IT1), 2) usage of the automatic identification system (IT2), 3) usage of enterprise resources planning (IT3), 4) application of e-procurement (IT4), and 5) usage of IT for warehousing management (IT5). This construct assessment adopts the study by [11]. The information sharing adopts six indicators used by [11] which assess the extent to which the company has performed the data exchange internally and externally in term 1) procurement (IS1), 2) operational (IS2); 3) logistics (IS3); 4) marketing (IS4); 5) customer's needs (IS5); and 6) company goals (IS6). The information quality adopts four indicators used by [13] which assess the extent to which the quality of information in term of 1) accuracy (IQ1), 2)timeliness (IQ2), 3) completeness (IQ3), and 4) reliability (IQ4). The last construct is the supply chain performance. This construct adopts five indicators from the work of [10] which assess the extent to which the company has achieved the performance in term of 1) reliability (SCP1), 2) responsiveness (SCP2), 3) agility (SCP3), 4) cost (SCP4), and 5) asset efficiency (SCP5).

3.4. Data Analysis

The data were processed by using the SmartPLS software. The analysis is performed in two stage. The first stage is to examine the measurement model to ascertain if the measurement model is valid and reliable. The second stage is to evaluate the inner model to test the hypotheses by looking at the path coefficient and the t-value of each relationship of the construct.

4. Analysis result

4.1. Evaluation of Measurement Model

The validity and reliability of the construct need to be tested before the hypotheses testing. The validity of the construct assessed by using factor loading, and cross loading of each indicator. While the reliability of the block indicators of each variable assessed using the composite reliability. The collected data is processed using the software of SmartPLS [18] with the results as shown in Table 1.

Based on Table 1, it can be seen that the value of the outer loading of every indicator proposed in this research were more than 0.5. Table 1 also shows that the resulting AVE value is higher than 0.5 and the composite reliability higher than 0.7. Thus it is proved that the indicators developed in this research model could measure the latent variables [19]. The data on Table 1 also shows that the instruments used in this research had already passed the minimum accepted value of composite reliability, 0.7 [19].

The indicators also need assessment against the discriminant validity in term of cross loading and correlation between construct. The indicator has an acceptable discriminant validity in case the cross loading of each indicator with its construct is higher than with another construct. As shown in Table 2, all the cross loading of each indicator is higher than its loading with another construct.

Table 2 demonstrated that the loading of each indicator with its construct is higher than with another construct. It means that each indicator fulfilled discriminant validity criteria. The second criteria are when the square root of the AVE is higher than the correlation between constructs. It means that indicator is valid in term of discriminant validity.

Table 1. Indicators Validity and Reliability

Latent Variable	Indicator	Outer Loadings	C/R	AVE	Remark
IT Implementation (ITI)	IT1	0.720	0.862	0.557	Valid/ reliable
	IT2	0.707			
	IT3	0.833			
	IT4	0.760			
	IT5	0.703			
Information Sharing (ISH)	IS1	0.829	0.923	0.671	Valid/ reliable
	IS2	0.911			
	IS3	0.875			
	IS4	0.886			
	IS5	0.585			
	IS6	0.787			
Information Quality (IQT)	IQ1	0.810	0.930	0.769	Valid/ reliable
	IQ2	0.890			
	IQ3	0.890			
	IQ4	0.915			
Supply Chain Performance (SCP)	SCP1	0.890	0.941	0.760	Valid/ reliable
	SCP2	0.852			
	SCP3	0.843			
	SCP4	0.919			
	SCP5	0.853			

Table 2. Indicator Cross Loading

Indicator	Cross loading			
	ITI	ISH	IQT	SCP
IT1	**0.720**	0.703	0.684	0.711
IT2	**0.707**	0.669	0.660	0.616
IT3	**0.833**	0.748	0.722	0.825
IT4	**0.760**	0.695	0.533	0.675
IT5	**0.703**	0.603	0.464	0.615
IS1	0.785	**0.829**	0.693	0.769
IS2	0.847	**0.911**	0.886	0.866
IS3	0.856	**0.875**	0.804	0.865
IS4	0.806	**0.886**	0.837	0.836
IS5	0.475	**0.585**	0.546	0.467
IS6	0.851	**0.877**	0.768	0.794
IQ1	0.663	0.740	**0.810**	0.745
IQ2	0.811	0.823	**0.890**	0.874
IQ3	0.790	0.833	**0.890**	0.770
IQ4	0.845	0.868	**0.915**	0.855
SCP1	0.853	0.867	0.889	**0.890**
SCP2	0.802	0.804	0.790	**0.852**
SCP3	0.814	0.834	0.740	**0.843**
SCP4	0.864	0.868	0.883	**0.919**
SCP5	0.809	0.789	0.724	**0.853**

Table 3 indicated that square root of the AVE, shown by the value in the diagonal, is higher than any other correlation between construct. Since the measurement model fulfilled the acceptable criteria, the further step of the analysis is to examine the relationship between constructs.

Table 3. Correlation and the Square Root of AVE

Construct	TI	ISH	IQT	SCP
IT Implementation (IT)	**0.746**			
Information Sharing (IS)	0.705	**0.819**		
Information Quality (IQ)	0,728	0,783	**0,877**	
Supply Chain Perform (SCP)	0,740	0,814	0,846	**0,872**

4.2. Evaluation of Structural Model

The next step of the analysis is to examine the hypotheses through the assessment of the path coefficient and the t-value of each construct relationship as shown in Table 4. The result demonstrated that all hypotheses are supported as those t-values are more significant than 1.96 for the significant level of 95%.

Table 4. Direct Influence Coefficient

Hypotheses	Path Coefficient	t-value	the p-value
ITI → ISH (H1)	0.603	8.336	0.000
ITI → IQT (H2)	0.890	31.771	0.000
ITI → SCP (H3)	0.428	4.406	0.000
ISH→ SCP (H4)	0.293	2.029	0.042
IQT→SCP (H5)	0.273	2.572	0.010

As shown in Table 4, the result of analysis supports all direct impact of each relationship. The result supports those hypotheses H1 up to H5. IT implementation affects information quality with the p-value 0.000 less than 0.05. The IT implementation influences information sharing with a p-value of 0.000 less than 0.05. IT implementation affects supply chain performance with the p-value of 0.000 less than 0.05. Information quality affects information sharing with the p-value of 0.000 less than 0.05. Information quality influences supply chain performance with the p-value of 0.010 less than 0.05. The last hypotheses are that information sharing affects supply chain performance with the p-value of 0.042 less than 0.05.

One of the primary purposes of this work is to examine the mediating role of the information sharing and information quality. This indirect relationship assessed from the path coefficient as shown in Table 4.

Table 5. Indirect Relationship Coefficient

Indirect relationship	Indirect coefficient	t-value
ITI ISH SCP (H6)	0,180	2,439
ITI IQT SCP (H7)	0,316	3,852

Table 5 demonstrated that all hypotheses of indirect relationships between IT implementation and supply chain performance supported. The IT implementation affects indirectly supply chain performance through information sharing with t-value of 2.439 higher than 1.96 for the significant level of 95%. Similarly. The last result also supports that IT implementation affects indirectly supply chain performance through information quality with the t-value of 3.852 greater than 1.96.

5. Discussion

The purpose of this study is to examine the impact of IT implementation on the supply chain performance through the mediating role of information sharing and information quality on the manufacturing industry in the region of East Java, Indonesia. The results support seven proposed hypotheses. As expected, the information sharing and the quality of the information contribute the mediating effect to the influence of IT implementation on supply chain performance. Hence, IT implementation improve, directly and indirectly, the supply chain performance. The implementation of IT into the business process enables the organization to communicate such a way that the decision making takes place appropriately in response to the customer demand.

The investment in the IT may include electronic data interchange, enterprise resource planning, automatic identification system, e-procurement, and warehousing management system. IT implementation directly enhances the supply chain performance in term of reliability, responsiveness, agility, cost, and efficiency. The information sharing, as expected, also improve the supply chain performance. When the information shared internally and externally among the parties engaged in the supply chain, such as the information regarding procurement, operation, logistic, and marketing, enable those parties to improve the

supply chain performance. The parties may involve in the supply chain network are supplier, distributor, logistic, and retailer. When those parties received the same information from the enterprise, they will be able to respond to any order just in time. In other words, the supply chain performance depends on the performance of the parties involved such as supplier, distributor, and retailer engaged in the network.

Beside the information sharing, the quality of the information also affects the supply chain performance. The information shared among the parties should be quality information. The information should be accurate, on time, complete, and reliable. These two constructs, information sharing, and information quality work together in enhancing the supply chain performance. However, the information sharing and information quality need a supported from the implementation of IT. This study verifies that IT implementation improve the information sharing and information quality. The use of enterprise resource planning, electronic data interchange, e-procurement, and warehousing management system, allow the gathering and sharing of information faster and more accurate. Since the IT implementation affects the information sharing and information quality, and the information sharing and information quality also affect the supply chain performance, then IT implementation indeed improve the supply chain performance indirectly through these two constructs. This study supported these two hypotheses. This finding implies that the presence of the information sharing and the information quality positively mediate the relationship between IT implementation and supply chain performance. This finding implies that IT implementation is crucial for the enterprise in enhancing the supply chain performance.

This study provides a managerial implication of how to enhance the supply chain performance through the IT implementation, information sharing and information quality. In another word, this study paves the way for the manufacturing enterprise to bring the IT into their business process. Then, the enterprise should also share the information internally and externally in order those partners in the supply chain network contributes to the supply chain performance. In addition to the information sharing, the manufacturing enterprise also needs to make the data available have excellent quality. The information quality is essential to make sure that the information is accurate, on time, complete, and reliable. Beside the managerial implication, this study also contributes to this study also contribute to the on-going research on the supply chain management particularly in respect of IT implementation in the pursuit of superior supply chain performance.

6. Conclusion

The present research aimed to examine the influence of the IT implementation on the supply chain performance through the mediating role of the information sharing and information quality. This study has proposed seven hypotheses based on the research model. The result demonstrated that this study supported all seven hypotheses. IT implementation improve the supply chain performance directly. The IT implementation also positively affects the information sharing and information quality. The information sharing and information quality also influence the supply chain performance directly.

One of the notable findings from the study is the fact that information sharing and the information quality contributes a mediating effect in the IT implementation and supply chain performance relationship. The presence of IT in the business process enables the enterprise to share the information quickly and on time. IT implementation also allows the enterprise to provide the quality information which at the end, will enhance the supply chain performance. The findings provide insights to the practitioner regarding the importance of IT implementation, information sharing and information quality in the pursuit of superior supply chain performance. The manufacturing company willing to improve their supply chain performance may adopt the result of this study.

References

[1] Hugos, M. H. (2011). *Essentials of Supply Chain Management*. John Wiley & Sons.

[2] Simatupang, T. M. (2013). Logistics and supply chain in Indonesia: Emerging practices.

[3] Li, G., *et al*. (2009). The impact of IT implementation on supply chain integration and performance. *Int. J. Prod. Econ.*, *120(1)*, 125–138.

[4] Wu, L., *et al*. (2013). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *Int. J. Prod. Econ.*, *148*, 122–132.

[5] Marinagi, C., *et al*. (2015). Information quality and supply chain performance: The mediating role of information sharing. *Procedia - Soc. Behav. Sci.*, *175*, 473–479.

[6] Hong, P., *et al*. (2008). Supply chain partnerships and supply chain integration: The mediating role of information quality and sharing. *Int. J. Logist. Syst. Manag.*, *4(4)*, 437–456.

[7] Kumar, R. S., & Pugazhendhi, S. (2012). Information sharing in supply chains: An overview. *Procedia Eng.*, 38, 2147–2154.

[8] Gorla, N., *et al*. (2010). Organizational impact of system quality, information quality, and service quality. *J. Strategy. Inf. Syst.*, *19(3)*, 207–228.

[9] Prajogo, D., & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology, and sharing, and logistics integration. *Int. J. Prod. Econ.*, *135(1)*, 514–522.

[10] Kocaoğlu, B., *et al*. (2013). A SCOR based approach for measuring a benchmarkable supply chain performance. *J. Intell. Manuf.*, *24(1)*, 113–132.

[11] Zhou, H., & Benton, W. C. (2007). Supply chain practice and information sharing. *J. Oper. Manag.*, *25*, 1348–1365.

[12] Lotfi, Z., *et al*. (2013). Information sharing in supply chain management. *Procedia Technol.*, *11*, 298–304.

[13] Li, S., & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. *Decis. Support Syst.*, *42*, 1641–1656.

[14] Zhu, K., *et al*. (2014.) Migration to open standard inter-organizational systems: network effects, switching costs, and path dependency. *MIS Q.*, *30*, 515–539.

[15] Zhang, J., & Chen, J. (2013). Coordination of information sharing in a supply chain. *Int. J. Prod. Econ.*, *143(1)*, 178–187.

[16] Omar, R., *et al*. (2010). Information sharing, information quality, and usage of information technology (IT) tools in Malaysian organizations. *African J. Bus. Manag.*, *4(12)*, 2486.

[17] Zhou, H., *et al*. (2014). Supply chain practice and information quality: A supply chain strategy study. *Int. J. Prod. Econ.*, *147*, 624–633.

[18] Ringle, C. M., *et al*. (2015). SmartPLS 3. *SmartPLS GmbH*. Boenningstedt.

[19] Hair, J. F., *et al*. (2010). Multivariate data analysis. *Vectors*.

Hotlan Siagian is working as an assistant professor at Petra Christian University, Surabaya, Indonesia. He completed his doctoral of business management in 2014 from Padjadjaran University in Bandung, Indonesia. He got a strong research background and had published several papers on supply chain management and business process re-engineering. He is an Indonesian citizen and a fellow of Indonesian supply chain and logistic association.

Zeplin Jiwa Husada Tarigan was born in 1974. He obtained his bachelor degree in electric and telecommunication engineering, and the master's degree in industrial management from Sepuluh Nopember Institute of Technology. He obtained his doctorate from the University of Brawijaya, Malang, Indonesia. He has experience as a manager in PPIC and BPO PP SAP R/3 in some manufacturing industries. At the moment, he is a full-time faculty member at Petra Christian University, teaching in the Program Magister Management or Master's program. His research interests are ERP and operation management

Erwin Susilo is a post graduate of master management in Petra Christian University. He is an Indonesian citizen and a business practitioner on supply chain management.