International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 13, Issue 11, 2020

Why Enterprise Resources Planning Technology is Needed for Logistics Integration and Retailer Satisfaction

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This study examines the impact of enterprise resource planning (ERP) technology on retailer satisfaction through internal logistics integration and manufacturing integration. This research was conducted with 135 manufacturers domiciled in East Java, Indonesia. Data collection was carried out using a questionnaire and analysis was performed using SmartPLS. The results showed that ERP technology influence logistics integration. However, ERP technology does not affect manufacturing integration. ERP affects retailer satisfaction. Logistics integration influences manufacturing integration. Logistics integration influences retailer satisfaction. Manufacturing integration affects retailer satisfaction. One of the interesting findings is proof that internal logistics integration mediates the influence of ERP implementation on the retailer. However, manufacturing integration did not mediate the influence of ERP technology on retailer satisfaction. Hence, the ERP technology adopted by a manufacturer affects retailer satisfaction through direct and indirect effects. The results of this study provide an insight for industry practitioners that implement ERP, an excellent benefit for the company.

Key words: *ERP technology, internal logistics integration, manufacturing integration, retailer satisfaction.*

Introduction

In today's globalisation era, the development of the internet is growing. Many manufacturers use this developed technology to serve their retailers or distributors well. Some manufacturing companies have integrated their distributors through the use of the information technology provided by the company. The company is trying to improve retailer satisfaction in the pursuit of more orders coming from the retailer, and the retailers re-purchase of

products from the company in the future (Ali & Dubey, 2013). The company expects that retailers contribute more income, which then enables the company to survive and grow in the long term. The integration built by the company with retailers requires the adoption of applied information technology, which is usually in the form of enterprise resource planning (Graham, 2018). Research by Mandal & Bagchi (2016) states that in building a competitive strategy, top management usually adopts the enterprise resources planning technology to support company performance.

Technology provides benefits in several aspects related to the company, such as establishing an internal and external integration of the company (Demeter et al., 2016), which enables the company to deliver the goods on time as requested by the customers. Integration with retailers will also provide more and timely orders for companies and subsequently, the company can inform suppliers of the amount of raw material needed. Besides, external integration with the supplier will enable the production scheduling process that is essential for the production, while internal integration enables the cross-functional coordination to enhance the productivity and efficiency (Ståhle et al., 2019). From the distributor, the existence of internal and external integration will allow the distributor to anticipate all future deliveries of goods on time. Thus, distributors and retailers can fulfil all customer orders quickly. According to Thomé & Sousa (2016), manufacturing integration in companies will set up coordination between functions through the availability of integrated data and reporting systems.

For shipping companies, the adoption of information technology enables companies to build external and internal integration to improve company performance (Zhao et al., 2013). The information technology used by companies in the form of ERP is fundamental for the implementation of supply chain integration, especially for internal logistics integration systems (Graham, 2018). The integration of information within a company can inform the availability of raw materials in the warehouse or if not available, the ERP system creates a demand for goods automatically (Tarigan et al., 2019). Manufacturing integration within the company eliminates multiple activities that do not need to be done by one department, which allows cross-functional communication, interaction, coordination and collaboration to take place efficiently (Seo et al., 2015).

Manufacturing integration is an integration of divisions in an organisation that works together to produce a product, for example, a group or division of machines that work together with the cable division. They work together to form a new electronic device that is the same. The relationship between the concept of ERP and manufacturing integration certainly makes the process easier for manufacturing integration. Like the communication that occurs between divisions or groups in an organisation will undoubtedly be facilitated by the presence of ERP technology. Also, the existence of technology integration in the form of ERP makes the

process that must be carried out to produce an item faster and more effectively when compared to the absence of technology. This finding is also supported by research by Maiga (2012), which states that technology integration does not only improve communication but also simplifies the process of disseminating information within an organisation or company.

The relationship between the ERP adopted by companies as technology integration with retailer satisfaction is the use of ERP as system integration. Internal integration can influence the company's performance by making internal improvements in the company so that it can provide information according to customer needs (Riley et al., 2016). ERP technology helps companies to interact with retailers and facilitate order fulfilment by retailers to the customer by providing services in terms of proper technology. Technology in retailers is beneficial in all processes carried out with the benefit of facilitating a more efficient process. By using ERP, retailers can submit an order more quickly and the constraint of long-distance becomes irrelevant. Ali & Dubey (2013) state that by using technology, retailers find it easy to order a product and customer demand will be fulfiled properly and will make things favourable for the company in the eyes of customers.

The relationship between internal logistic integration with manufacturing integration is interconnected within a supply chain (Zhao et al., 2013). Logistics activities are interacting with other functions and are interconnected within a supply chain network (Seo et al., 2015). Logistics activities determine how the customer was served in terms of satisfaction level. If the production process is internally well organised and efficient, shipping automatically runs on time and the company process becomes efficient, and in the end revenue will increase. Vice versa, if logistics is hampered, it will automatically affect the company's production process, which causes productivity to decrease and be inefficient.

Internal logistics integration significantly influences retailer satisfaction. According to Ali & Dubey (2013), retailer satisfaction can be achieved through an excellent service provided by companies to retailers as consumers. In other words, the main and most important requirement for retailer satisfaction is the service level provided by companies. The relationship between manufacturing integration with retailer satisfaction may not be directly related. However, manufacturing integration enables the production department to improve the quality of the product, which in the end, will improve retailer satisfaction and encourage the retailer to re-purchase. Internal integration in manufacturing companies will be able to build an integrated manufacturing system to increase supply chain risk management and manufacturing flexibility (Chaudhuri et al., 2018).

Enterprise Resources Planning Technology

Supply chain integration in manufacturing companies enables companies to build internal and external integration of the company by using computer technology (Yuen & Thai, 2017). The integration established by the company through the use of ERP technology functions (Matende & Ogao, 2013) to integrate all departments or cross-functional within the company (Sundram et al., 2018). Tarigan et al., (2020) stated that ERP technology is used by companies to share data of orders from customers with the marketing department and the planning production inventory control (PPIC). The PPIC department, based on the shared data, provide production planning for the manufacturing and inventory system. The manufacturing companies always upgrade their ERP technology to match the current business process in order always to be able to integrate data, especially between departments in manufacturers namely: marketing, production, purchasing and warehouse (Jagoda & Samaranayake, 2017). Utilisation of ERP technology in companies improves the working efficiency and effectiveness (Tarigan et al., 2018). ERP technology in this study is assessed using indicators namely: ERP can integrate department data; make it easy to monitor company conditions; ERP systems are upgraded in line with technological advances; and ERP systems assist in decision making.

Internal Logistics Integration

Internal logistics integration can be defined as the company's ability to build integrated logistics systems with internal and external companies that are well-coordinated that the flow of information and material move smoothly (Prajogo et al., 2016). Internal logistics integration is measured by the extent to which logistics activities interact with other functional areas during the logistic process activities. It is like a manufacturing company in terms of the entire supply chain, which consists of many separate companies united in one network setting. It is therefore necessary to measure company performance in an absolute and relative manner to explore the relationship between integrity and performance. The company that has designed internal logistics integration can ensure that the materials required will arrive on time, the quality will meet expectations and the right amount of material will be delivered. Research by Beheshti et al., (2014) states that internal logistics integration is measured if inventory data is integrated with all relevant departments, performs real-time inventory management, provides real-time access to logistics systems and provides real-time access to logistics cost.

Manufacturing Integration

According to Thomé & Sousa (2016), manufacturing integration is essential for better coordination between functions. With the integration of manufacturing, the production cost

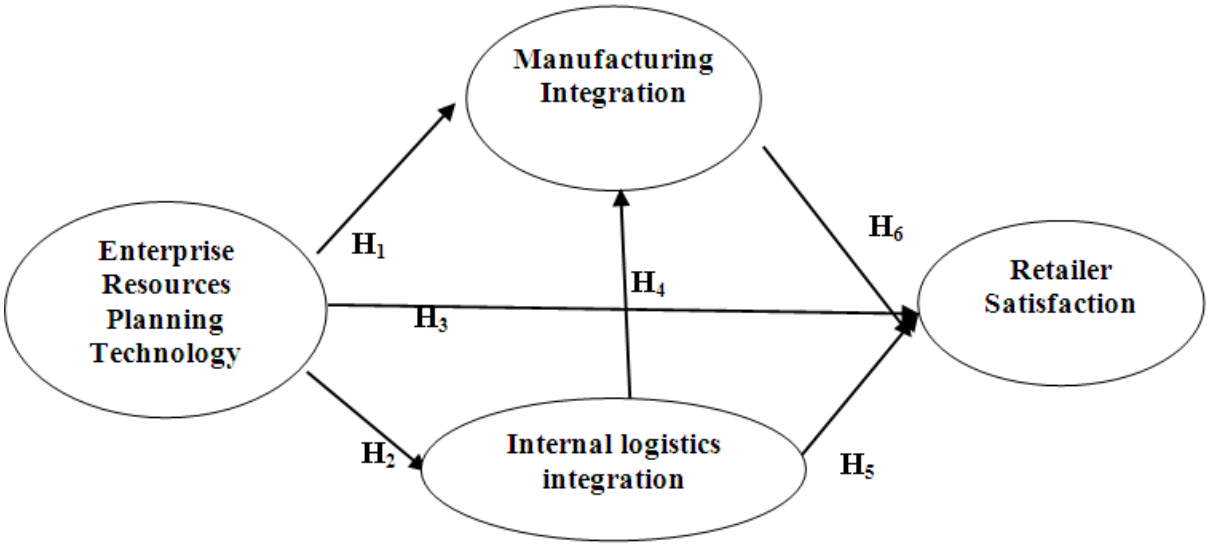
becomes more efficient and the process becomes better organised (Demeter et al., 2016). With manufacturing integration, productivity will increase, workers become more productive, the company gains more profits and increases market share. Manufacturing integration can be in the form of organisational practices, such as job rotation and co-location, or it could be in the form of technological practices. The company wants to use ERP as an operational system in business processes to improve capabilities in product design and rapid data integration. Innovations made at manufacturing companies are able to provide performance improvements and ultimately improve company competitiveness (Wijayanto et al., 2020). Stadnicka & Litwin (2019) also found that manufacturing integration eliminates the inefficient time, reduces production costs and improves the quality of the final product. Likewise, the work of particular groups will be continued by other groups continuously without any interruption of the process. The indicators used to measure manufacturing integration are: the existent of integrated production schedules; integrated order-inventory management; integrated production monitoring systems; and all functions in the company that can access production reports.

Retailer Satisfaction

Distributors and retailers are also the main customers of manufacturing companies to deliver the products or services requested to end-users. The company therefore should consider that it is very crucial to take into account retailer satisfaction. Retailer satisfaction usually is focused on the services provided by the company since the products offered by the companies have no significant differences, so service becomes the primary determinant of customer satisfaction (Ali & Dubey, 2013). Customer satisfaction is closely related to retailer satisfaction because customer satisfaction is an indicator of the retailer's satisfaction. Research conducted by Sahim et al., (2018) states that Indonesian farmers, as end-users, feel the shortage of fertiliser is not caused by a shortage of fertiliser company's production capacity but is constrained by distributors or retailers. The capability of the manufacturing companies to deliver their products to retailers is assessed using these indicators: delivery on time; delivery to the right agreed location; presence of product variance offered; deliver of the right quantity; deliver of the right product quality; and at an agreed price.

Based on the previous explanation, a conceptual research framework can be drawn up as shown in Figure 1.

Figure 1: Research Framework



Based on Figure 1 the research hypotheses are as follows:

H_1: ERP technology influence logistics integration.
H_2: ERP technology affects manufacturing integration.
H_3: ERP technology influences retailer satisfaction.
H_4: Internal logistics integration influences manufacturing integration.
H_5: Internal logistics integration influences retailer satisfaction.
H_6: Manufacturing integration affects retailer satisfaction.

Research Methods

This study uses a population of manufacturing companies located in East Java, the second largest province in Indonesia and the economic growth rate above the average growth of Indonesia. East Java is also one of the provinces with the most significant population in Indonesia. The primary respondent for data collection is those manufacturing companies that have: adopted ERP technology in their managing warehouse; use ERP in material procurement; use ERP in handling inventory; and use ERP in sending the finished product to the distributor or retailer. A total of 165 questionnaires were distributed to the respondents and 135 questionnaires were returned and valid for further analysis. The composition of respondents in terms of the department is shown in Table 1.

Table 1: The Respondents Composition by Department

No	Department	Number	%
1	Accounting and Finance	5	4%
2	General (Top Management)	13	10%
3	Human Resources Department	6	4%
4	Materials Management	6	4%
5	Marketing and Sales	35	26%
6	PPIC	4	3%
7	Production	22	16%
8	Purchasing	9	7%
9	Department SCM	9	7%
10	Warehouse	26	19%
Total		135	100%

As demonstrated in Table 1, respondents represented the various departments of the organisation. This finding indicated that the respondents represented almost all functions in an organisation. Hence, the responses represent all functions of the organisation.

Results

The measurement model is tested against the validity with the minimum recommended factor loading value of 0.50 or t-statistic >1.96. The measurement model is also tested for reliability. The test is performed against the minimum recommended composite reliability values above 0.7. The validity and reliability test results obtained are shown in Table 2.

Based on Table 2, the result demonstrated that all indicators have the smallest loading factor value on RS5 (exact product quality) of 0.692 above 0.50 and the smallest t-statistic value is at MI1 (schedule production has been integrated) with a value of 6.412 (higher than 1.96) so that all indicators meet minimum requirements.

Table 2: Test Validity and Reliability Research

Variable/Indicators	Original estimate sample	T-Statistic	Composite Reliability
Enterprise Resources Planning			0.868
ERP1 (ERP can integrate department data)	0.731	8.068	
ERP2 (Makes it easy to monitor company conditions)	0.829	15.798	
ERP3 (ERP systems is upgraded in line with technological advances)	0.770	11.666	

ERP4 (ERP systems assist in decision making)	0.823	18.349	
Manufacturing Integration			0.854
MI1 (The existent of integrated production schedules)	0.713	6.412	
MI2 (Integrated order-inventory management)	0.745	8.785	
MI3 (Integrated production monitoring systems)	0.839	13.522	
MI4 (All functions in the company can access production reports)	0.783	10.696	
Internal Logistics Integration			0.865
IL1 (Inventory data is integrated with all relevant departments)	0.717	8.978	
IL2 (Performs real-time inventory management)	0.798	12.779	
IL3 (Provide real-time access to logistics systems)	0.822	15.968	
IL4 (provide real-time access the logistics cost)	0.759	12.378	
Retailer Satisfaction			0.897
RS1 (Delivery on time)	0.822	15.603	
RS2 (Delivery to the right location)	0.848	20.819	
RS3 (Presence of product variance offered)	0.793	14.337	
RS4 (Deliver the right quantity)	0.730	9.478	
RS5 (Deliver the right product quality)	0.692	7.400	
RS6 (Agreed price)	0.726	7.180	

The reliability value, as shown in Table 2, indicated that the smallest value is 0.854 (manufacturing integration), which is higher than 0.7. All the variables have met the specified requirements in terms of reliability. The higher the value of composite reliability indicates the better level of accuracy, consistency and reliability of the variables in these indicators. An examination of the structural models is used to predict relationships between latent variables. The structural model is assessed using the coefficient of determination for the dependent variable, while the significance of the variables is assessed against the value of path coefficient and t-statistics. The coefficient of determination measures the ability of the independent variable to explain the variance of the dependent variable

The coefficient of determination is denoted by R-Square (R^2). The greater the value of R^2, the higher the percentage of variance, that can be explained. The value of R^2 is calculated using the SmartPLS program as shown in Table 3.

Table 3: Value of R^2

Variable	R^2
ERP	
Manufacturing Integration	0.450
Internal Logistics Integration	0.504
Retailer Satisfaction	0.531

The R^2 value for manufacturing integration is 0.450, which means that ERP technology and internal logistics integration can explain the variance of manufacturing integration up to 45%. The R^2value for internal logistics integration is 0.504, which means that the percentage of the variance of internal logistics integration can be explained by the ERP technology is 50.4%. The R^2value for retailer satisfaction is 0.531, which means that the percentage of the variance of retailer satisfaction can be explained by the ERP technology, internal logistics integration and manufacturing integration up to 53.1%. The evaluation can also be done by looking at the value of Q-Square (Q^2). Q^2assesses the relative influence of the structural model against observational measurements for endogenous latent variables. The Q^2value obtained is 0.8721. Since the Q^2value is greater than 0, it means the model has good predictive relevance.

The value of the coefficient path or inner model shows the level of significance in hypothesis testing. The t-statistics value indicates the significance of the coefficient score. Hypothesis testing is significant if the t-statistic value is more than 1.96 with a significance level (P-Value) of less than 5% or 0.05. The iteration results obtained using the Smart PLS software also produce the original sample estimate, mean of subsamples, and standard deviation. The original sample estimate is a beta score standardised that is used to see the predictive nature of the independent variable on the dependent variable.

Table 4 shows the results of the path coefficient. The ERP technology affects internal logistics integration with the path coefficient value of 0.710 and t-statistic of 11.239. This result shows that there is a significant positive effect between ERP technology and internal logistics integration in manufacturing companies in East Java.

Table 4: Hypothesis Test Result

Test	The original sample estimate the	Mean of subsamples	Standard deviation	T-Statistic
ERP > Internal Logistics Integration	0.710	0.727	0.063	11.239
ERP > Manufacturing Integration	0.032	0.015	0.160	0.199
ERP > Retailer Satisfaction	0.321	0.325	0.158	2.029
Internal Logistics Integration > Manufacturing Integration	0647	0686	0154	4214
Internal Logistics Integration > Retailer Satisfaction	0165	0183	0188	1977
Manufacturing Integration > Retailer Satisfaction	0363	0337	0158	2301

These findings also mean that an enhanced ERP will also significantly improve internal logistics integration. Companies implementing ERP can create integrated systems to facilitate the real-time monitoring of company conditions, which assists the management in decision making.

The adoption of ERP technology provides access to logistics systems and, in real-time, can monitor inventory availability. Meanwhile, the path coefficient of ERP on manufacturing integration shows a value of 0.032 with a t-statistic of 0.199. This finding shows that there is no significant influence of ERP on manufacturing integration. This result also means that an improvement in ERP does not significantly enhance manufacturing integration. The ERP designed by the company is not able to integrate the company's operational system. So, it is not easy to monitor the condition of the company, but the ERP system can help decision making through monitoring the production system and getting production reports that can be accessed by all functions in the company quickly.

The coefficient path for the effect of ERP on retailer satisfaction shows a value of 0.321 with a T-statistic of 2.029. This finding shows that there is a significant positive effect on ERP from retailer satisfaction in manufacturing companies in East Java. That is, an increase in ERP will also significantly increase retailer satisfaction in manufacturing companies. ERP built by the company can provide excellent facilities for external parties to enter the company's system so that external parties can monitor the company's operational conditions according to the rights granted and will help to make decisions for customers about timely product delivery, an agreed delivery location and product variance on demand. This result means that the management is required to give corporate customers, retailers and distributors,

the right level of satisfaction. The coefficient path for the effect of internal logistics integration on manufacturing integration shows a value of 0.647 with a t-statistic of 4.214. This value shows that there is a significant positive effect of internal logistics integration on manufacturing integration in manufacturing companies. This finding also means that an increase in internal logistics integration will significantly increase manufacturing integration in manufacturing companies. The company's ability to build a logistics integration system that provides a cross-functional company in real-time access to the logistics system and in real-time knowing the position of inventory management will have a positive impact on manufacturing systems because cross-functional in the company can monitor existing production systems and report production.

The coefficient path for the effect of internal logistics integration on retailer satisfaction shows a value of 0.165 with a t-statistic of 1.977. This finding demonstrates that there is a significant positive effect of internal logistics integration on retailer satisfaction in manufacturing companies in East Java. An enhancement in internal logistics integration will also significantly improve retailer satisfaction. The company's ability to integrate internal logistics provides access rights to cross-functional coordination and even access rights to the retailer to find out the position of the company's inventory in real-time. This information helps retailers to determine the accuracy of product delivery in terms of the right time and quantity of products available. Granting the right of access to external parties can help appropriate decision making. The coefficient path for the effect of manufacturing integration on retailer satisfaction is of 0.363 and t-statistic is 2.301. Manufacturing integration enhances retailer satisfaction. This finding proves that an improvement in manufacturing integration will also significantly enhance retailer satisfaction. Manufacturing integration built by the company through the adoption of ERP technology will enhance retailer satisfaction as the company can provide excellent service in delivering products on time and of the right quantity and promised quality.

Conclusion

The initial purpose of this study was to examine the effect of ERP, internal logistics integration and manufacturing integration on retailer satisfaction. The results showed that five of the six hypotheses were supported and one hypothesis was rejected. The results showed that ERP technology influences internal logistics integration. However, ERP technology does not affect manufacturing integration. ERP affects retailer satisfaction. Internal logistics integration influences manufacturing integration. The internal logistics integration influences retailer satisfaction. Manufacturing integration affects retailer satisfaction. One of the interesting findings is proof that internal logistics integration mediates the influence of ERP technology on retailer satisfaction.

However, manufacturing integration did not mediate the influence of ERP technology on retailer satisfaction. This finding indicated that ERP technology adopted by the manufacturer improved retailer satisfaction directly and indirectly. Hence, this result paves the way for management to establish a superior ERP technology in the pursuit of better retailer satisfaction. This result also contributes to the current research in the field of supply chain management theory.

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