

# Influence of Supply Chain Integration and Just in Time Method to Smoothly Process Production at Assembly Company in Batam Riau Islands

Rusda Irawati, Shinta Wahyu Hati, Bambang Hendrawan

**Abstract:** *This research aims (1) to know the influence of supply chain integration to the smoothness of production process of manufacturing company in Batam, (2) to know the influence of just in time method toward the smoothness of production process in Batam, (3) to know the influence of supply chain integration and just in time to smooth manufacturing process of manufacturing company in Batam. Samples were taken as many as 100 manufacturing companies engaged in various assembly fields such as electronics, textiles, pipes, printers, softlense, construction and others. The sampling technique used is purposive random sampling and using questionnaire as data collection method. Technique Analysis of data used is multiple linear regression. The results showed that there is a positive influence between the variables of Supply Chain Integration (X1) partially to the smoothness of production process at the manufacturing company in Batam, there is a positive influence between the variables of the method just in time (X2) partially to the smoothness of production process in the manufacturing company in Batam, and there is a positive and simultaneous influence between the supply chain integration variables (X1) and the just in time (X2) method for the smoothness of the production process (Y).*

**Keywords:** *just in time, manufacturing company, smooth production process, supply chain.*

## I. INTRODUCTION

Business competition in the era of globalization is increasing, companies compete to meet high market demand. Especially in manufacturing companies that are required to produce a quality product with the cost, the right time and at the time required. The success of a company can be judged from the smoothness of a company to perform the production process, therefore the company thinks the right way and method for raw material procurement process and cooperation from all integrated supply chain to achieve that goal.

For the procurement of raw materials, one of the ways often used by manufacturing companies is to use the system just in time that was first triggered by a Toyota Company that is famous for the system of Toyota Production System (TPS) or Lean Manufacture. According to Taiichi Ohno, Vice President of Toyota in Sajida Nuril (Zunariah, 2015)<sup>24</sup>, Just

in Time is producing and delivering necessary items when needed and necessary quantities, to improve work efficiency and eliminate young jobs in the workplace.

The company sees just in time as a way to manage the delivery of material needs at the right time so that the smoothness of the production process can be maintained. All activities are well integrated and work together with each other, so that procedures, communication and cooperation in all aspects run smoothly. The activity that governs it is supply chain integration. Batam is a City Industrial area which most of the manufacturing industry will certainly more and more activity of material supply almost in the whole industry, this process is very dependent on supply chain activity and application of supply chain integration very good. Cooperation built through an integration of raw material procurement information, material planning, material arrival on the supply chain is essential for the smoothness of the production process.

This research aims (1) to know the influence of supply chain integration to the smoothness of production process of manufacturing company in Batam, (2) to know the influence of just in time method toward the smoothness of production process in Batam, (3) to know the influence of supply chain integration and just in time to smooth manufacturing process of manufacturing company in Batam.

## II. LITERATUR REVIEW

### A. Empirical Study

Research by Nuno Sutrisno (Sutrisno, 2014) 16 The Effect of Supply Chain Integration Implementation, just in Time Purchasing, Just in Time Manufacturing to Logistic Performance. This research uses variable Supply Chain Integration, just in Time Purchasing, Just in Time Manufacturing Logistic Performance with SEM analysis tool. The result is Supply Chain Integration and Just in Time Manufacturing directly affect the logistics performance, while the implementation of Just in Time Purchasing indirectly affect the Logistic Performance. Research Anis Rachma Utary and M.Ikbal (Utary & Ikbal, 2014) 18 Effect of Supply Chain Integration Implementation, Just In Time Purchasing, Just In Time Manufacturing to Logistic Performance. Supply Chain Integration, just in Time Purchasing, Just in Time Manufacturing Logistic Performance. Supply Chain Integration and Just in Time

**Revised Manuscript Received on June 8, 2019.**

**Rusda Irawati**, Management Business Department, Batam State Polytechnic, Batam Island, Indonesia.

**Shinta Wahyu Hati**, Management Business Department, Batam State Polytechnic, Batam Island, Indonesia.

**Bambang Hendrawan**, Management Business Department, Batam State Polytechnic, Batam Island, Indonesia.



## Influence of Supply Chain Integration and Just in Time Method to Smoothly Process Production at Assembly Company in Batam Riau Islands

Manufacturing directly influence the logistics performance, while the implementation of Just in Time Purchasing indirectly affect the Logistic Performance. Research by Kenneth (Jr., Inman, Birou, & Whitten, 2014) 8, examine the impact of a T-JIT strategy within a supply chain context, and analyze a model incorporating T-JIT as the focal construct with supply chain management strategy (SCMS) as an antecedent and supply chain competency (SCC) and organizational performance as consequences. Study results indicate significant, positive relationships between a supply chain management strategy and T-JIT, T-JIT and supply chain competency, and supply chain competency and organizational performance. Pius Alphonse Katua (Katua, 2014)7, The Impact of Supply Integration on the Supply Chain Performance in the Manufacturing Firm in Kenya. Study result that, the organizations have realized significant supply chain coordination through supply chain integration. Sajida Nuril (Zunariah, 2015)24, Applied Just in Time (JIT) implementation analysis as an alternative to raw material inventory control to assess cost efficiency at PT Kediri Tani Sejahtera. Just in time, raw material inventory, cost efficiency. Companies should apply JIT calculations in the management and remaining of raw materials in ordering must be able to know the conditions and suppliers of raw materials. Paper by Zurita Mohd Saleha and Rosmimah Mohd Roslin (Saleh & Roslin, 2015)12, Supply Chain Integration Strategy: A Conceptual Model of Supply Chain Relational Capital Enabler in the Malaysian Food Processing Industry is to propose a framework in investigating the influence of SCRC on the execution of SCI by adopting relational capital theory. Through a review of related literature and formal interview, relational elements such as trust, commitment and socialization have become significant elements to facilitate the execution of SCI practices among firms in food processing industry. Article by (Yuchun Xu, 2016)23, Improving Just-in-Time manufacturing operations by using Internet of Things based solutions presents a research on using IoT based solution to enhance JIT manufacturing. A framework to support the proposed IoT solution is developed and its implementation steps are suggested. The proposed framework can response to the dynamic changes with customer orders, production progress, and availability of required resources. This allows manufacturers to adjust planned schedules during production to maximize the production outputs with limited resources. An implementation plan for deploying the dynamic scheduling framework is developed based on the consideration of factors such as easiness of implementation, benefit brought by the proposed modules, and the relations between the modules, proposed modules, and the relations between the modules. The Impact of Supply Chain Integration on Performance: Evidence from the UK Food Sector, paper by (Kumar, 2017)9, develops a conceptual framework from the literature and defines four constructs of integration (customer, supplier, internal, and information integration) to see how this would lead to improved supply chain performance (such as production flexibility, inventory turns, order fulfillment rate, total logistics costs, and

operational performance). The findings from this study though originates from the food sector, they also tend to be applicable in other sectors. Although this study advocates the greater integration with suppliers and customers, heavy integration can sometimes act as a barrier to forming dynamic and flexible supply chains. (Yinan Qi 2016) 21, The impact of operations and supply chain strategies on integration and performance. This study aims to develop a comprehensive model that facilitates an understanding of relationships among operations strategies (OSs), supply chain strategies (SCSs), supply chain integration (SCI), and firm performance. The results show that a lean supply chain is appropriate for firms placing higher priorities on cost, quality and delivery strategies, while an agile supply chain is appropriate for firms competing on the flexibility strategy. Furthermore, both lean and agile SCSs require higher levels of SCI in terms of internal and external integration, but lean SCSs have a significantly higher impact on external integration than agile SCSs. (Yongyi Shou, 2017)22, article about Supply chain integration and operational performance: The contingency effects of production systems contribute to the SCI literature by examining the contingency effects of internal production systems on the relationship between supplier integration, customer integration and operational performance. Based on organizational information processing theory, we provide evidence to show that the impact of supplier and customer integration on operational performance varies across production systems, such as one-of-a-kind production, batch production and mass production systems. The empirical results also reveal how supplier and customer integration can be matched with different configurations of production systems in order to achieve the desired quality, flexibility, delivery or cost performance. (Seyed Mehdi Zahraei 2017) 13, researcher's consideration production smoothing and its effect on inter-stage demand flow in a supply network that is capable of expediting shipments between its stages. They model a general network of production and inventory stages, model a general network of production and inventory stages, which allows production smoothing to be optimized in realistic network configurations. They incorporate parameters that can significantly affect smoothing, expediting and safety stock decisions but are not considered in most multi-echelon models, including reorder frequencies and inter-stage demand correlation. show the importance of downstream smoothing in reducing upstream variability. From the system-wide viewpoint, the optimal smoothing at a production stage depends on the trade-off between its holding and expediting costs at the processed inventory versus its production expediting cost plus all upstream costs. The trade-off depends significantly on the inter-stage cost differences and network configuration. The optimal amount of smoothing should be adjusted according to the changes in the network cost structure such as over the life of a product. Despite the insights, it may not be obvious how to set the extent of smoothing according to the changing costs for typical supply networks where

network cost structure and configuration can be complex. (Kenneth W. Green Jr, 2014) 8, they examine the impact of a T-JIT strategy within a supply chain context, and analyze a model incorporating T-JIT as the focal construct with supply chain management strategy (SCMS) as an antecedent and supply chain competency (SCC) and organizational performance as consequences. The results of this study support T-JIT as a viable supply chain strategy that influences overall supply chain competency, contributing to organizational performance. In addition, the definition of total system JIT and a scale for its measure is developed. (Singh, Sohani, & Marmat, 2013)14, this paper proposes a research model for prioritizing lead time reduction with Within-firm supply chain integration (WFSCI) and Between Firms Supply Chain Integration (BFSCI). And this research also tries to reduce the lead time through implementation of Lean/JIT practices with supply chain integration. This study emphasizes the contribution of LJIT practices and SCI for reducing the lead time. As time based competition intensify is, organizations use various methods such as LJIT practices and SCI to reduce lead time.

### B. Definition of Variables

According to Indrajit and Djokopranoto in Nuno Sutrisno (Sutrisno, 2014)<sup>16</sup>, Supply Chain Integration (SCI) is a system to integrate all areas of organizational functions ranging from suppliers, manufacturing, retailers to end-users. The purpose of this integration is to facilitate the flow of communication and material flow throughout the supply chain, especially between supply chain members to facilitate the production process. According to Donk and Van Der Vaart (Vaart & Donk, 2004)<sup>19</sup>, Supply chain integration can be divided into 4 different sections of which are material flow, planning and controlling, organization and information flow. Conceptually Supply Chain integration means that the legally independent participating firms coordinate seamlessly as if they one company in order to achieve the common goal (Lu, 2011)<sup>10</sup>. Furthermore, Lu explained a framework of supply chain integration. It looks at the product flow that goes through a typical supply chain, which has the manufacturer as the focal company in the middle, involving two tiers of suppliers upstream and two tiers of customers downstream. On top of everything else, the information flow through the supply chain is the essential infrastructure for the integration. Referring to Chen in (Kumar et al., 2017)<sup>9</sup>, SCI as a concept is concerned with the synergy that exists between the internal functions of a firm and its external activities across its supply chain that leads to organizational performance. Literature identifies internal integration, supplier integration, customer integration and information integration as key measures of SCI. In their paper also said that, a firm's ability to integrate its processes internally and externally with its supply chain partners aids its ability to respond to the changing demands of the customer. Based on previous research, (Yongyi Shou, 2017)<sup>22</sup> state that Supply chain integration (SCI) indicates strategic collaboration, information-sharing, joint decision-making and system-coupling between the

manufacturer and its supply chain partners, especially in the production phase.

According to Tita Detiana (Detiana, 2011)<sup>5</sup>, Just in time (JIT) is a philosophy of sustainable problem solving and it must be faced that can cause something to be wasted. Activities in Just in time are a reduction of futility and a reduction in variability. According to Lu (Lu, 2011)<sup>10</sup>, Just in time is an approach to control the material to be implemented if a company needs material for a production process. Just in time is done when the material is needed and will be delivered on the spot. Meanwhile, according to Cachon and Terwiesch (2009) (Cachon & Terwiesch)<sup>4</sup>, Just-in-time (JIT) is about matching supply with demand. The goal is to create a supply process that forms a smooth flow with its demand, thereby giving customers exactly what they need, when they need it. (Kenneth W. Green Jr, 2014)<sup>8</sup>, Total JIT (T-JIT) is defined as an integrated supply chain strategy incorporating previously defined elements of JIT-production, JIT-purchasing, JIT-selling, with the addition of an important new element, JIT-information. Some previous studies stated that, JIT may be viewed as an integrative strategy facilitating timeliness and quality not only in production, but also in supply and distribution. However, be aware that, JIT has some challenges, e.g. lack of required information sharing or communication between stakeholders, insufficient sound action or planning system etc. (Yuchun Xu, 2016)<sup>23</sup>.

According to Assauri (Assauri, 2008)<sup>2</sup>, the production process can be defined as ways, methods and techniques to create or add to the usefulness of a good or service by using available resources (labor, machinery, materials and funds). The production process can be said to be smooth if supported by elements of the preparation of production and operation plans, inventory planning and control as well as material procurement, machinery and equipment maintenance, quality control, and labor management. According to Eilon in Assauri (Assauri, 2008)<sup>2</sup>, Production, planning and control has the role of organizing and coordinating materials or raw materials to achieve production objectives, and is responsible for ensuring every material and assembly has arrived at the right time and place. By doing Production, proper planning and control will affect the smoothness of production process in order to run effectively and efficiently.

### C. Hypothesis

Implementation of supply chain integration will be a framework to improve the organization's overall effectiveness and just in time functionality. The purpose of the framework of supply chain integration is to improve the effectiveness of just in time and the entire organization Gunasekaran in Sutrisno (Othman, Sundram, Sayuti, & Bahrin, 2016; Sutrisno, 2014)<sup>16</sup>. Implementation of supply chain integration will be the foundation in the implementation of just in time and jointly maximize the smooth production process to get the right raw materials and quickly so as to meet market demand. According to research conducted by Indrajit



# Influence of Supply Chain Integration and Just in Time Method to Smoothly Process Production at Assembly Company in Batam Riau Islands

and Djokropranoto in Sutrisno (Banerjee, Kim, & Burton, 2007; Sutrisno, 2014)<sup>16</sup> stating that supply chain integration aims to integrate all organizational functions ranging from suppliers, companies and consumers. So that the flow of materials and raw materials and production plans will arrive at all the functions of the organization and will help the production process. From the results of this study shows that the implementation of supply chain integration becomes the foundation and has an influence for the smoothness of the production process. In an integrative relationship, manufacturers and their supply chain members engage themselves in sharing information about sales forecasts, production plans, order tracking and tracing, delivery status and stock level. Meanwhile, all the supply chain activities are based on risk- or revenue-sharing and long-term agreements. When contingencies happen, they are willing to make decisions jointly and solve problems together in order to maximize benefits for the whole supply chain. In order to achieve the unified control of inter- and intrafirm processes, system-coupling with suppliers and customers, for example, vendor managed inventory (VMI), just-in-time (JIT), Kanban and continuous replenishment, is required in the SCI relationship (Yongyi Shou, 2017)<sup>22</sup>. Based on that opinion, it can be proposed the first hypothesis as follows:

*H1: Supply chain integration has a positive and significant effect on the smoothness of production process.*

According to Russell & Taylor (Taylor, 2011)<sup>17</sup>, the just in time method is used to minimize inventory and facilitate the flow of material so that the necessary material will come just in time. So that materials will be ready for production process without any waiting period. Based on the above opinion, it can be seen that the just in time method affects the smoothness of the production process. JIT systems integrate five functions of the production process sourcing, storage, transportation, operations, and quality control into one controlled manufacturing process. The essence of JIT is that the exact number of components will arrive at a workstation exactly at the time required and, in JIT, the supply of materials will exactly match the demand of materials both in terms of quantity and time. JIT is not simply about inventory reduction; it is a complete shift from traditional 'push' approaches based around production of large batches (made to stock). Instead, a 'pull' system based upon 'make to order' for customers becomes the focus of Production (Steve Brown, 2005)<sup>15</sup>. so it can be proposed the second hypothesis:

*H2: Just in time method has a positive and significant effect on the smoothness of production process.*

According to Gunasekaran in Sutrisno (Sutrisno, 2014)<sup>16</sup>, the purpose of the framework of supply chain integration is to improve the effectiveness of just in time functions and overall organizational functions. In the research can be seen that supply chain integration and just in time can increase the effectiveness of the company including in the smoothness of production process. Based on the research and supported by the first hypothesis and the second hypothesis can be concluded that Supply chain integration and just in time method have positive effect and impact on the smoothness of production process, so it can be proposed the third

hypothesis:

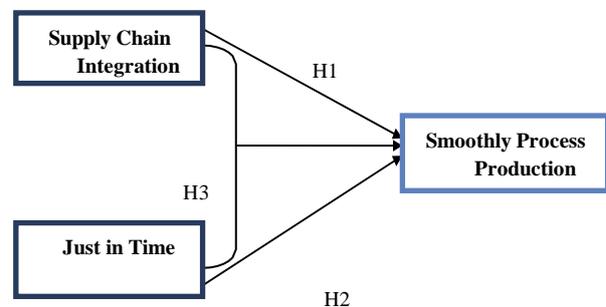
*H3: Supply chain integration and just in time method simultaneously have a positive effect on the smoothness of the production process*

## III. METHODOLOGY

The approach used in this research is survey method, with object in this research is Supply chain integration and just in time method to smooth production process of Manufacturing Company in Batam. This research consists of 3 (three) variables that are supply chain integration variables, just in time variable and variable of production process smoothness. This study focuses on only three variables including SCI, JIT and smooth production process in manufacturing companies. This is because the research is competed in a research grant with a time limit and a predetermined amount of funds. Due to the number of variables studied there are only three, then the data analysis technique that is considered most appropriate is Multiple Linear Regression. Difficulties in obtaining the data are also related to the condition of the manufacturing company being the research sample. Informants directly involved in production processes and activities related to SCI and JIT have limited time to meet. so the research sample can only be limited to 100 respondents.

### A. Constructing Measurement

Supply chain integration variables were measured using the definitions of Indrajit and Djokopranoto cited by Anatan (Anatan)<sup>1</sup>, which consisted of material flow, planning and control, Organization and Information flow. The Just in Time variable is measured using the definition of Taiichi Ohno cited by Nuril (Zunariah, 2015)<sup>24</sup>. Consists of quality, inventory, flexible production lines, changes in organizational structure that lead to products and the use of information technology effectively. While the variables The smoothness of the production process is measured based on the concept of Assauri (Assauri, 2008)<sup>2</sup>. Indicators include the preparation of production and operation plans, inventory planning and control as well as material procurement, Maintenance of machinery and equipment, quality control, labour management (human resources).



**Fig.1. Model for Paper**

Population in this research is employees of manufacturing company part of production, purchasing, scheduling, planner and logistic. Total amounted to 100 people from various manufacturing companies



that do the assembly business process, sampling method in this study using purposive sampling technique. Observations and questionnaires were used as instruments of data collection. The previous questionnaire tested its validity and reliability. Validity test using Pearson's Product Moment method, that is by correlating the score of item on the questionnaire with total score value. While test Reliability using Cronbach Alpha method.

**B. Statistical Analysis**

The data analysis techniques used in data processing are descriptive statistics and inferential statistics. Descriptive analysis is a statistic used to analyse data by describing or describing the data that has been collected as it is. To test hypothesis 1 and hypothesis 2 use t test. While to test the hypothesis 3 used the F test. Inferential statistics using multiple linear regression analysis, with the model as follows:

- $Y_i = b_0 + b_1X_1 + b_2X_2 + e$
- $Y_i$  Smooth Process of Production
- $X_1$  Supply Chain Integration
- $X_2$  Methods Just in Time
- $b_0$  Constants
- $b_1 - b_2$  Regression coefficient of independent variables
- $e$  Estimation error

**IV. RESULT AND FINDING**

Respondents in this study are employees who work in manufacturing companies engaged in the field of assembly. The company consists of manufacturers that produce electronic, pipe, printer, contact lens, textile and construction. The location of the company spread in several industrial areas located in Batam.

Table 4.1. Profile of Respondents

Profile of Respondent	Classification	Number
<b>Gender</b>	Male	40
	Female	60
<b>Age</b>	18-25	51
	26-36	34
	37-47	11
	> 47	4
<b>Years of Service</b>	< 5 years	64
	5-10 years	19
	>10 years	17
<b>Employee Category</b>	Permanent employees	54
	Contract employees	46
<b>Division</b>	Purchasing	24
	Logistic	27
	Planner	13
	Scheduling	14
	Production	22
<b>Supplier type</b>	Local	49
	Overseas	51

<b>Material Waiting Time</b>	Less than 1 week	16
	More than 1 week	44
	1 month	40
<b>Number of Suppliers in Each Production Process</b>	1-3 suppliers	26
	4-6 suppliers	30
	8-10 suppliers	24
	More than 10 suppliers	20
<b>Level of education</b>	High school	42
	Diploma	47
	Bachelor	11

**A. Description of Variables**

Questionnaire distributed to respondents consisted of closed questions with Likert techniques and using five scales, each variable consists of eight questions. The average assessment of respondents to each indicator in each supply chain integration variables, JIT and smooth production process is in the range 3.31-3.99. It can be said that the assessment is at a neutral level to strongly agree. Result show that, good and sustained cooperation in supply chain integration in assembly manufacturing Companies will create data and information transparency for all areas of the supply chain organization. Continuity of production process supported by the availability of materials in accordance with the time required. It can be said that Supply Chain Integration Manufacturing company in Batam is quite good. Respondents are able to plan and implement supply chain integration on schedule of production process. The result of data processing shows that just in time method applied in assembly manufacturing company in Batam is very influential to the availability of material for continuity of production process. Implementation of just in time method can increase productivity facilitate the process of material supply and minimize inventory to avoid stockpile of goods that can impact on operational efficiency. For each indicator on the variable smoothness of the production process, the average respondent answered in the range strongly agree with all statements contained in the questionnaire.

**B. Multiple Linear Regression Analysis Test Results**

Testing of variable regression coefficients Supply chain integration ( $X_1$ ) shows that the variables of Supply Chain Integration have a positive and significant influence on the smoothness of production process. Table 4.2 shows the result that, arithmetic for supply chain Integration variables of 2.326 and t table of 0.1703. This means that  $t_{count} > t_{table}$  or  $2.326 > 0.1703$  and the sig value of 0.022 is smaller than sig 0.05. Based on the results of t test analysis of just-time method variables in the same table, that there is a significance value (Sig.)  $0.000 < 0.05$  and the value of t test for  $0.56 > t_{table}$  of 0.1703, it can be concluded that the



## Influence of Supply Chain Integration and Just in Time Method to Smoothly Process Production at Assembly Company in Batam Riau Islands

variables just in time effect positive and significant to the smoothness of the production process.

**Table 4.2.** Multiple Linear Regression Analysis Test Results

Model		Unstandardize d Coefficients		Standardize d	t	Sig.
		B	Std. Error	Bet		
1	(Constant)	8.742	2.349		3.72	.00
	Supply Chain Integratio	.199	.086	.199	2.326	.022
	Just in Time Method	.481	.086	.478	5.600	.000

Further test results show F calculated by 40.226 with F table 3.07 and significant value 0.000. Because  $F_{\text{arithmic}} > F_{\text{table}}$  or  $40.226 > 3.07$  and the value of  $\text{sig } 0.000 < 0.05$ . So it can be stated that there is a significant influence between Supply chain integration Just in time method together to Smooth production process.

### C. Result of Hypothesis Test

Hypothesis 1 states Supply chain integration has a positive and significant effect on the smoothness of the production process. Result of hypothesis test yield positive value equal to 0.199 and t test with t value  $2.2326 > t_{\text{table}}$  0.1703. This means that the supply chain integration variables have a positive and significant effect on the smoothness of the production process. The results of this study are also supported by previous research used by Pius Katua (Katua, 2014)<sup>7</sup>, that there is a positive and significant influence between supply integration in supply chain performance in manufacturing companies in Kenya. The results of this study are also supported by previous research used by (Yongyi Shou, 2017)<sup>22</sup>, Supply chain integration and operational performance: The contingency effects of production systems and The Impact of Supply Chain Integration on Performance: Evidence from the UK Food Sector by (Vikas Kumar, 2017)<sup>20</sup>.

Hypothesis 2 states Just-time method has a positive and significant effect on the smoothness of the production process. The test results produce a positive value of 0.481 and t test with a value of t arithmetic of  $0.56 > t_{\text{table}}$  of 0.1703 which means a positive and significant effect on the dependent variable Smoothness of the production process. It is also supported by Sutrisno (Sutrisno, 2014)<sup>16</sup>, that the implementation of just in time purchasing to just in time manufacture has a direct influence on the company. The results of this study are also supported by previous research used by (Yuchun Xu, 2016): Improving Just-in-Time manufacturing operations by using Internet of things based solutions and also support by (Kenneth W. Green Jr, 2014)<sup>8</sup>, Total JIT (T-JIT) and its impact on supply chain competency and organizational performance.

Hypothesis 3 states Supply chain integration and just in time method simultaneously have a positive and significant effect on the smoothness of the production process. The result

of hypothesis test is proved by R test of 0.617 indicating that there is a strong relationship between Supply chain integration and Just in Time method simultaneously to smooth production process. And the influence of variables Supply chain integration and just in time method to Variables Smooth production process of 33.8%. While the rest of 66.2% influenced or explained by other variables. Also strengthened by the F test with  $F_{\text{arithmic}} > F_{\text{table}}$  that is equal to  $40.226 > 3.07$ , which means there is a significant influence between Supply Chain Integration Just in time method together to Smooth production process. The results of this study are supported by previous research used by Sutrisno (Sutrisno, 2014)<sup>16</sup>, on the implementation of supply chain integration to just in time purchasing significantly at the supplier companies.

## V. CONCLUSION

Based on the results of the analysis that has been done, the conclusions that can be taken in this study are as follows: (1) There is a positive and significant influence between the variables of Supply Chain Integration (X1) partially to the smoothness of production process in assembly-based manufacturing company. In addition, the implementation of supply chain integration in the assembly manufacturing company in Batam has a positive effect on the smoothness of the production process, because with integrated information and communication system such as sharing plan production, database and e-business that already exists make the performance between organizational functions, and manufacturing runs smoothly. (2) There is a positive and significant influence between the variables of just in time (X2) method partially to the smoothness of the production process in the assembly-based manufacturing company. The method of just in time has been going on for a long time in the assembly manufacturing company in Batam and has been proven by a special database system created to create just in time method for easy operation and procurement of materials so as to help smooth the production process. (3) There is a positive and simultaneous influence between the Supply Chain Integration (X1) and Just in Time (X2) on the smoothness of the production process (Y), this implies the application of Supply Chain Integration and the Just in Time method together in order to improve the smooth process of production process that will improve product competitiveness. Implementation of supply chain integration and just in time method in assembly manufacturing company in Batam, mutually related to each other and assist in the smoothness of production process. With an integrated system and just in time method that has been created, then between supply chain organizations such as purchasing, planner and planning production can access data and information about the material needed in a timely and on the spot. Relationships with suppliers are more efficient at communicating and accurate data for material procurement.

Based on the results obtained, to the company can be suggested things as



follows: Companies need to improve facilities that will support supply chain integration well, such as facilities in exchange of data and information. Systems and networks are good for the creation of good communication relationships between organizational functions within the company; Establish good relationships with all related parties including the manufacturers, suppliers and customer. So that the flow of material that will support the smoothness of production can be controlled and companies need to maintain cooperation between supply chain organizations with manufacturing and customer so that supply chain integration function and just in time method can run optimally and can affect the smoothness of production process. It is suggested for further research to add other variables related to supply chain integration, just in time and organizational performance including production process.

### ACKNOWLEDGMENT

This study includes a research group of Regional Competitiveness Study Center funded by Grants Competition Batam State Polytechnic research funding in 2016.

### REFERENCES

- [1] Anatan, L. (2008) Managing Integrated Supply Chain for Manufacturing Competitiveness, academia.edu. Available: <https://www.academia.edu/>
- [2] Assauri, S. (2008). Manajemen Produksi dan Operasi (Revisi 2008 ed.). Jakarta Indonesia: Fakultas Ekonomi Universitas Indonesia.
- [3] Banerjee, A., Kim, S.-L., & Burton, J. (2007). Supply chain coordination through effective multi-stage inventory linkages in a JIT environment. *Int. J. Production Economics*, 108, 271–280. doi:10.1016/j.ijpe.2006.12.015
- [4] Cachon, G., & Terwiesch, C. *Matching Supply with Demand: An Introduction to Operations Management* (3rd ed.): Mc Graw Hill.
- [5] Detiana, T. (2011). Manajemen Operasional Strategi dan Analisa (Service dan Manufaktur). Jakarta Indonesia: Mitra Wacana Media.
- [6] Jr., K. W. G., Inman, R. A., Birou, L. M., & Whitten, D. (2014). Total JIT (T-JIT) and its impact on supply chain competency and organizational performance. *Int. J. Production Economics*, 147, 125–135. doi:<http://dx.doi.org/10.1016/j.ijpe.2013.08.02>
- [7] Katua, P. A. (2014). The Impact of Supply Integration On The Supply Chain Performance In The Manufacturing Firms In Kenya (Master), University Of Nairobi
- [8] Kenneth W. Green Jr, R. A. I., Laura M. Birou, Dwayne Whitten. (2014). Total JIT (T-JIT) and its impact on supply chain competency and organizational performance. *Int. J. Production Economics*, 147 (2014). doi:<http://dx.doi.org/10.1016/j.ijpe.2013.08.026>
- [9] Kumar, V., Chibuzo, E. N., Garza-Reyes, J. A., Kumari, A., Rocha-Lona, L., & Lopez-Torres, G. C. (2017). The Impact of Supply Chain Integration on Performance: Evidence from the UK Food Sector Procedia Manufacturing, 11(27th International Conference on Flexible Automation and Intelligent Manufacturing), 814 – 821. doi:10.1016/j.promfg.2017.07.183
- [10] Lu, D. (2011). *Fundamental of Supply Chain Management*: bookboon.com the e-book Company.
- [11] Othman, A. A., Sundram, V. P. K., Sayuti, N. M., & Bahrin, A. S. (2016). The Relationship between Supply Chain Integration, Just-In-Time and Logistics Performance: A Supplier's Perspective on the Automotive Industry in Malaysia *International Journal of Supply Chain Management*, 5.
- [12] Saleh, Z. M., & Roslin, R. M. (2015). Supply Chain Integration Strategy: A Conceptual Model of Supply Chain Relational Capital Enabler in the Malaysian Food Processing Industry. *Procedia - Social and Behavioral Sciences*, 172(Global Conference on Business & Social Science), 585-590. doi:10.1016/j.sbspro.2015.01.406
- [13] Seyed Mehdi Zahraei, C.-C. T. (2017). Optimizing a Supply Network with Production Smoothing, Freight Expediting and Safety Stocks: An Analysis of Tactical Trade-Offs. *European Journal of Operational Research*. doi:10.1016/j.ejor.2017.02.045
- [14] Singh, R. J., Sohani, N., & Marmat, H. (2013). Effect of Lean/JIT Practices and Supply Chain Integration on Lead Time Performance. *Journal of Supply Chain Management Systems*, 2(2 April 2013).
- [15] Steve Brown, R. L., John Bessant and Peter Jones. (2005). *Strategic Operations Management*
- [16] Sutrisno, N. (2014). Pengaruh Implementasi Supply Chain Integration Just in Time Purchasing dan Just in Time Manufacturing terhadap Logistic Performance. *Bisnis dan Akuntansi*, 16.
- [17] Taylor, R. a. (2011). *Operation Management*. Alaska: John Wiley and Son Pte Ltd.
- [18] Utary, A. R., & Ikbal, M. (2014). Kinerja Supplier, Just in Time Dan Kinerja Produksi Industri Elektronik Di Indonesia.
- [19] Vaart, T. V. D., & Donk, D. P. v. (2004). Buyer focus: Evaluation of a new concept for supply chain integration. *International Journal of Production Economics*, 92(1). doi:<https://doi.org/10.1016/j.ijpe.2003.10.002>
- [20] Vikas Kumar, E. N. C., Jose Arturo Garza-Reyes, Archana Kumari, Luis Rocha-Lona, and Gabriela Citlalli Lopez-Torres (2017). The Impact of Supply Chain Integration on Performance: Evidence from the UK Food Sector Procedia Manufacturing, 11(Flexible Automation and Intelligent Manufacturing), 814 – 821. doi:10.1016/j.promfg.2017.07.183
- [21] Yinan Qi, B. H., Zhiqiang Wang, Hoi Yan Jeff Yeung. (2016). The Impact of operations and supply chain strategies on integration and performance. *Intern. Journal of Production Economics*. doi:<https://doi.org/10.1016/j.ijpe.2016.12.028>
- [22] Yongyi Shou, Y. L., Youngwon Park, Mingu Kang. (2017). Supply chain integration and operational performance: The contingency effects of production systems. *Journal of Purchasing and Supply Management*. doi:<https://doi.org/10.1016/j.pursup.2017.11.004>
- [23] Yuchun Xu, M. C. (2016). Improving Just-in-Time manufacturing operations by using Internet of Thingsbased solutions. [under responsibility of the scientific committee of the 5th CIRP Global Web Conference Research and Innovation for Future Production]. *Procedia CIRP*, 56(Intelligent Manufacturing in the Knowledge Economy Era), 326 – 331. doi:10.1016/j.procir.2016.10.030
- [24] Zunariah, S. N. A. (2015). Analisis Penerapan Just in Time (Jit) Sebagai Alternatif Pengendalian Persediaan Bahan Baku Untuk Menilai Efisiensi Biaya Pada PT Kediri Tani Sejahtera.

### AUTHORS PROFILE



**Rusda Irawati**, Master in Management Postgraduate Program Padjadjaran University Bandung (2000), PhD students in Azman Hashim International Business School UTM, Johor Malaysia (Now), Several studies have been conducted: Factors The Influence of Individual Factors on Intention to Do Internal and External Whistle-Blowing at Accountants in Batam ; Affecting the Performance of Micro, Small and Medium Enterprises (MSMEs) in Batam City; The Effect of Individual, Situational, and Organizational Factors on the Intention of Whistle-Blowing at Accountants in Batam (Case Study of Batam State Polytechnic); Cost-benefit Analysis on ISO 9001 Certification and Higher Education Accreditation; The Effect of Supply Chain Integration and the Just In Time Method on the Smooth Production Process at Assembly Companies in Batam Kepulauan Riau; Utilization of Information Technology and Its Effects on Food-Based SME Performance; Study of Customer Satisfaction Survey of Telaga Punggur Domestic Crossing Port; Study of Sekupang Domestic Ferry Port Customer Satisfaction Survey; Analysis of Customer Satisfaction with the Marketing Mix of Services in a Study at SD Kartini 1 Batam; Analysis of Safety & Health Performance of Employees Working Women Production Operators Part In Batam. Member of the Batam Indonesia Marketing Association, Indonesian Lecturer Association



**Shinta Wahyu Hati**, Master in Business Administration, Faculty of Administrative Sciences, Brawijaya University Malang, East Java (2010), research has been conducted: Analysis of the Application of the Principles of Good Corporate Governance to Employee Performance at Batam State Polytechnic; Analysis of Profitability in Assessing the Financial Performance of UMKM of Our Studio Services Participants in the Batam Polytechnic Student Entrepreneur Program (PMW); The Effect of Supply Chain Integration and the Just In Time Method on the Smooth Production Process at Assembly Companies in Batam Kepulauan Riau; Analysis of Occupational Safety and Health (K3) in Learning at the Laboratory of Mechanical Engineering Study Program at Batam State Polytechnic; The Antara Government Partnership (Perhutani), the Institute of Forest Village (Pesanggem) and Stakeholder (Private) Institutions in Agroforestry Forest Management in Batu; Economic empowerment of female flower farmers



## Influence of Supply Chain Integration and Just in Time Method to Smoothly Process Production at Assembly Company in Batam Riau Islands

in Batu Malang City funded by DIKTI; Ease Study of SME Credit Distribution in the Greater Malang Region (Batu City, Malang City and Malang Regency); The Quality of Regional Hospital Services in the Greater Malang and Pasuruan Areas; The Influence of Service Quality and Retail Mixes that Affect Customer Satisfaction and Its Impact on Customer Loyalty (Study on Giant MOG customers in Malang City); The Effect of Working Mother Contributions on Increased Income Working in Malang Regency; Effect of Retail Service Quality on Customer Satisfaction, Members and Managers of the Batam Indonesian Secretary Association, Member of the Indonesian Marketing Association Batam, Indonesian Lecturer Association.



**Bambang Hendrawan**, Master of Management Science, University of Indonesia (2010), research that has been carried out: Measurement and Analysis of Hang Nadim Airport Staff Workload; Marketing Communication Strategy Analysis of PT. Indonesia VillaJaya in an Effort to Build Customer Loyalty; The Effect of Supply Chain Integration and the Just In

Time Method on the Smooth Production Process at Assembly Companies in Batam Kepulauan Riau; Factors that Influence the Entrepreneurship Intention of Polytechnic Students; Identification of Regional Potential in the context of the Implementation of Digital Financial Services in the Riau Islands Province; Development Growth Venture Baseline Assessment in Batam; Factors Affecting Polytechnic Student Entrepreneurship Intention; Impact of Entrepreneurship Learning Program on Student Polytechnic Intention for Entrepreneurs, Member of the Indonesian Marketing Association Batam, Indonesian Lecturer Association.