

Uncertain Supply Chain Management

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Improvement of supply chain performance of printing services company based on supply chain operation references (SCOR) model

Zulfa Fitri Ikatrinasari^{a*}, Nanang Harianto^a and Eka Indah Yuslistyari^b

^aIndustrial Engineering Study Program, Universitas Mercu Buana, Jakarta, Indonesia

^bIndustrial Engineering Study Program, Universitas Serang Raya, Banten, Indonesia

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ABSTRACT

Supply chain is the most important factor in increasing competitiveness since the biggest cost of a product is in the supply chain. PT. EJI is a printing and merchandising Services Company that has several suppliers and almost all processes are inseparable from the supply chain system. Supply chain problems at PT EJI are in the production process, delivering orders, PO In and PO Out. Repairing the supply chain can be accomplished through the Supply Chain Operation Reference (SCOR) Method. This study recommends improving supply chain based on the results of performance measurement with the SCOR method which consists of 4 performance criteria, namely: 1) Reliability Criterion: Perfect Order Fulfillment (POF); 2) Responsiveness Criterion: Order Fulfillment Cycle Time (OFCT); 3) Cost Criterion: Cost of Goods Sold (COGS); 4) Assets Criterion: Cash to Cash Cycle Time (CTCCT). The results of the performance measurement show that the delivery process was 80.0, which is the lowest compared with other metrics, namely Make 99.0 and Source 95.0. Supply Chain improvement recommendations are shipping improvements (delivery) through the separation of shipping routes for shipping Online and Offline, checking the quality of invoice documents to avoid incomplete documents, making SOPs for shipping, and providing dietary at the time of delivery to avoid mismatching goods.

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1. Introduction

Organization must adapt to the changing business environment quickly and make strategic decisions that are suitable for organization, compete effectively, improve performance through quality improvement, minimize costs, and produce different products and services with other competitors (Kosasih *et al.*, 2020). Over the past few years, the advantages of supply chain optimization and integration have been the focus of several large corporate organizations in the world. There has been an increase in business competition and rapid technological development. There is a high level of business competition in various industrial fields, especially the merchandise printing service industry where there is an increase in the company's competitiveness in the form of increased efficiency and productivity. One of the ways to improve efficiency is by integrating the company's supply chain activities, so there are no difficulties in the supply chain operational planning process (Mutakin & Hubeis, 2011). The concept of supply chain management SCM (Supply Chain Management) is capable of integrating the management of various management functions in inter-organizational relationships to form an integrated system and support each other. The key to have effective SCM is to help suppliers in the company's strategy meet an ever-changing market (Heizer & Render, 2005).

Theories and practices in supply chain management have been widely applied to companies both large and small. However, apparently the application of existing SCM still faces problems including not being able to efficiently and effectively manage and maintain suppliers, in order to remain loyal to the company. One company that has implemented the SCM concept is PT. EJI. This company, which is engaged in printing and merchandising services, has several suppliers whose almost all processes are inseparable from the supply chain system, which also has the same problem. One of SCM's performance measurements is the Supply Chain Operation Reference (SCOR) model, which is designed by the Supply-

* Corresponding author

E-mail address: zulfa.fitri@mercubuana.ac.id (Z. F. Ikatrinasari)

Chain Council (SCC) and can measure good supply chain management control between suppliers, companies and customers. In this case, there are several versions of SCOR. At present SCC has released version 12 of the SCOR model (www.supply-chain.org). The SCOR model is one of the supply chain operations models, which is a process-based model that integrates three (3) main elements in management, namely Business Process Reengineering (BPR), Benchmarking and Best Practice Analysis (BPA) into the cross-supply framework. SCOR divides supply chain processes into five (5) core processes, namely plan, source, make, deliver and return. SCOR has three (3) levels of process from general to detailed (Bol-stroff & Rosenbeum, 2013). According to Wahyuniardi et al. (2017) most measurements use the SCOR approach to the hierarchical model at the beginning adjustment of company conditions. While normalization functions to equalize the matrix can also be used as an indicator of the measurement. According to Wibowo and Sholeh (2015) Supply Chain plays an important role in the process of material flow from the supply of raw materials by suppliers to finished products into the hands of consumers; which is to determine the extent to which the company's supply chain performance has been achieved. In improving supply chain performance, there are 3 improving tools are required; namely quality campaign, shop floor improvement and cost control management according to Rakhman et al. (2018).

The purpose of this study is to determine the appropriate indicators and measurement of performance using SCOR on a printing services company, calculate the performance of SCM and then provide recommendations for improvements to increase performance SCM.

2. Literature Review

2.1. Supply Chain Management (SCM)

The term Supply Chain Management in the business world is often identified with logistics and operation management. However, the service-based business activities in the SCM process is how consumers are satisfied with the performance results of a service company or can also be interpreted as a series or network of companies that work together to create and distribute products or services to end customers. In general, existing efforts put more emphasis on improving performance in the process. Simchi-Levi et al. (2000) defines SCM as an approach used to achieve efficient integration of suppliers, manufacturers, distributors, retailers, and customers. Pires et al. (2001) define SCM as a network of suppliers, manufactures, assembly, distribution, and logistical facilities that shape the purchasing function of materials, transformation of materials into semi-finished and finished products, and the distribution process of products to consumers.

Heizer and Rander (2008) define SCM as the activity of managing activities in order to obtain raw materials into process goods or semi-finished goods and finished goods then send the product to consumers through a distribution system. Chow et al. (2006) define SCM as a holistic and strategic approach in terms of demand, operations, purchasing, and management of logistics processes. The concept of supply chain management is managing the flow of goods from upstream to downstream or from producers to customers. The flow of goods applies in the same direction from producers to consumers. Supply chain management is an integrated method, tool or approach for managing the flow of products, information, and money in an integrated manner involving parties ranging from upstream to downstream consisting of suppliers, factories, distribution networks and logistics services (Ghassemi et al., 2018). According to Heizer and Render (2008), supply chain also includes all interactions between suppliers, producers, distributors and customers. This chain includes transportation, planning information, money transfers by credit or cash, as well as the transfer of ideas, designs and materials.

2.2. Supply Chain Operation Reference (SCOR) Method

In 2002, the Supply Chain Council (SCC) introduced and developed a known supply chain performance measurement (SCOR) that was developed to describe the management process associated with all phases involved to meet customer demand. There are five main supply chain management processes defined in this model, namely: plan, source, make, deliver, and return. SCOR is developed and supported by an independent non-profit organization called the Supply Chain Council (SCC). The SCC Institute is the PRTM consulting agency and McGrath from AMR Research. (Basheer et al., 2019). SCC has been developed because of the formation of a consortium of 70 practitioners from companies located in West America. In general, industry practitioners define SCM as a definition of the desired processes and measurements between consumers and suppliers. The SCOR model is a standard model that can be used as a guide in the expansion of information between elements in the SCM.

The ability of the SCOR model is to define the relationship between the process and demand elements. SCOR models are based on descriptions that occur in supply chains with approaches between organizations, industry segments and geographies. These five management processes are broken down into three levels of detail. At level one, SCOR performance can be directly applied to the organization's business goals. Level two and three process elements explain in more detail the activities in order to give a broader shift into SCOR operations. Because this model encompasses organizations and each organization is unique, the model must be extended to level four. According to Ul-Hameed et al. (2019), in terms of

increasing the ability to understand and manage, the SCOR model describes into five dimensions, namely reliability, responsiveness, flexibility, cost and efficiency of asset use. As the hierarchy is structured in the process, it also makes it easier for us in SCM and sets out measurements to test certain elements of performance within SCOR elements.

Table 1
Prior Research

No	Author	Method	Results and Conclusions
1	Wahyuniardi et al. (2017)	Supply Chain Operation Reference (SCOR) Model	The study was conducted to measure the performance of the company's supply chain using the Supply Chain Operation References (SCOR) approach. The initial hierarchy model of performance measurement is adjusted to the condition of the company to measure the performance of its supply chain, while the normalization of Snorm De Boer serves to equalize the matrix value used as an indicator of measurement. The importance of performance attributes is measured by weighting with subjective questionnaires. The value of the performance attributes obtained reliability 19.74, responsiveness 16.91, agility 11.00; and asset management 12.26. The total value of performance is 59.90. This value shows that the company's supply chain performance is in an average position.
2	Wibowo and Sholeh (2015)	Supply Chain Operation Reference (SCOR) Model	According to research on canned companies using the SCOR method, the value of the achievement of the company's overall supply chain performance is 7.48. By weighting using AHP and calculating the scoring system using OMAX, it can be seen 2 supply chain performance indicators that need to immediately get corrective action, namely indicators that are in the red category, namely the percentage level of deviation of actual demand with the number of production plans with a value of 3.34 and the effectiveness of periodic checking machines with a value of 3.38. Making improvements to these indicators is expected to help improve supply chain performance in the company.
3	Rakhman et al. (2018)	Supply Chain Operation Reference (SCOR) Model	Supply chain actors at PT. XYZ consists of suppliers, subcontracted materials, PT. XYZ, subcont services finishing, customer OEM, customer simplification, customer export, and customer after-market. The results of measurements at the level of performance attributes are Reliability (92% - Excellent), Responsiveness (70% - Average), Flexibility (71% Good), Cost (71% - Good), and Asset (60% - Average). In improving supply chain performance at PT. XYZ has to do with 3 improve tools namely, quality campaigns, shopfloor improvement, and management cost control.
4	Irfan et al. (2008)	SCOR Model	This paper presents supply chain management efforts, key challenges and opportunities in the industry sector and the most successful organizations in Pakistan and the business chain 'from seed to smoking' using a leading supply chain operations reference model.
5	Georgise et al. (2013)	Supply Chain Operation Reference (SCOR) Model	This paper discusses the implementation of best practices and challenges encountered during the adoption process. Research methodologies include literature review, questionnaire surveys and semi-structured interviews. Ethiopian manufacturing companies were sampled for empirical studies. The research survey is based on the best practices of the SCOR model. The findings show that most of the respondent companies have shown interest and are trying to implement some of them. But, the results are below expectations. The adoption of best practices has faced various challenges and the unavailability of required supporters. Therefore, there is a need for developing countries to analyze their scenarios and then adapt best practices that take into account their real situations.
6	Jamehshooran et al. (2015)	SCOR Model	The results revealed a significant positive relationship between business analysis and supply chain performance. This study combines resource-based theory; resource dependency theory develops a new theoretical framework to demonstrate the importance of business analysis; in improving supply chain performance.
7	Zhou et al. (2011)	Supply Chain Operation Reference (SCOR) Model	The purpose of this study is to empirically validate the SCOR model (eg, test the structure of the SCOR model). Data from 125 North American manufacturing companies was collected. The results show that the relationship between supply chain processes in the SCOR model is generally supported. The Plan process has a significant positive effect on the Source, Make, and Deliver processes. The Source process has a significant positive effect on the Make process and the Make process has a significant positive effect on the Deliver process. The Source process mediates the impact of the Plan process on the Make process and the Make process mediates the impact of the Plan process on the Deliver process. This finding provides empirical evidence to managers that the SCOR model is valid.
8	Sutawijaya & Marlapa (2018)	SCOR Model	This study analyses the application of the Supply Chain Operation Reference Model (SCOR) at PT. Indoturbine. Based on the stages of the process contained in each section on level 1 chain supply there are some processes that experience errors. This research shows that the supply chain conditions at PT. Indoturbine is less efficient because of measurement metrics owned by PT. Indoturbine especially the POF and OFCT values are below the median value the industry is the Advantage Data Benchmark value. The comparison is as following: POF value of 64.03% while the value of the POF Advantage Data Benchmark is 71.8% while OFCT value is 92 days while OFCT Advantage Data value Benchmark of 90 days.
9	Kasi (2005)	Supply Chain Operation Reference (SCOR) Model	This paper aims to discuss one aspect of SCOR while at the same time giving a brief description of the concept and its use. Specifically, we examine SCOR from a methodological perspective, by adopting a system development framework and using a social-technical lens as a basis for assessment. To carry out such an assessment, a fictitious corporate time instrument (Timewise) tool is used to create the context for developing and assessing SCOR approaches. It was found that SCOR is strong in technical dimensions such as modelling processes and techniques but weak in social dimensions. Contributions from this paper include an overview of SCOR and systemic assessment methods for developing SCOR models to highlight the strengths and limitations of the approach and to guide future research in this domain.
10	Rahayu & Kusumah (2017)	SCOR Model	Company performance can be measured in two perspectives, financial and non-financial. Current conditions, PT API as a manufacture of ready-to-drink juice (RTD) drinks is more focused only on financial measures. Weakness financial performance is less able to measure operating performance. The supply chain is one of the most operations important as one measurement of non-financial performance. The purpose of this study is to measure performance the supply chain of PT API using SCOR as a performance measurement framework. From data quantitative, obtained value of supply chain measurement of PT. API is 61.85, which means Supply chain performance at PT. The API is not yet included in the category of good performance or still at an average level.

2.3. Measurement of Supply Chain Performance Based on the SCOR Model

The Supply Chain Operation Reference is abbreviated as SCOR model. One way to understand the supply chain is to use a process model. The Supply Chain Council created the SCOR model as a way for companies to communicate. More than 400 companies use the SCOR model to understand and improve their supply chains. Aerospace companies include producers and defense, large consumer product manufacturers, and third-party logistics providers. SCOR combines several elements namely Business Process Engineering, benchmarking and applications that lead to a framework. One of SCM's performance measurements, the Supply Chain Operation Reference (SCOR) model, a model designed by the Supply-Chain Council (SCC), can measure good supply chain management controls between suppliers, companies and customers. In this

case, there are several versions of SCOR. At present SCC has released version 12 of the SCOR model (www.supply-chain.org). The SCOR model is one of the supply chain operations models, which is a process-based model that integrates three (3) main elements in management, namely Business Process Reengineering (BPR), Benchmarking and Best Practice Analysis (BPA) into the cross-supply framework. SCOR divides supply chain processes into five (5) core processes, namely plan, source, make, deliver and return. SCOR has three (3) process levels from general to detailed (Alzoubi et al., 2019). The process in SCOR consists of 3 levels. Level 1 is a top level consisting of 5 key processes namely Plan, Source, Make, Deliver and Return. Level 1 metrics characterize performance based on two perspectives. The first perspective is from the customer side and the second perspective is based on an internal perspective. At this level, a definition of the basic competition to be achieved is carried out along with instructions and ways to meet the basic competition. Level 2 is the Configuration Level and is closely related to the categorization of processes. At level 2, defining the categories of each process at level 1. At this level, the processes are arranged in line with the supply chain strategy. The goal to be achieved at level 2 is to simplify the supply chain and increase the flexibility of the entire supply chain (Arifin et al., 2019). At this level 2, market constraints, product constraints and company constraints for developing inter and intra-company processes. Level 3 is the level of the process element and is the lowest level in the scope of the SCOR model. At the implementation level, which is a level below level 3, the process elements are broken down into tasks and advanced activities. This level of implementation does not cover the scope of the SCOR model. Level 3 allows the company to define in detail the processes identified as well as performance measures and best practices in each activity. Performance levels and practices are defined for the processes of this element. At this level, benchmarking and the required attributes are also needed to enable software. Level 3 also includes input output and basic logic flow from the process elements. At level 4, the implementation of the supply chain takes a role. At this level, the tasks in each activity required at level 3 are described in detail in order to implement and manage a daily-based supply chain (Suryanto & Komalasari, 2019; Hamali et al., 2020; Janaki, 2019; Goodarzi & Soltani, 2020; Ridwan et al., 2019; Mathew & Sahu, 2018).

3. Research Methods

Data analysis techniques used to manage and analyse the data that has been collected consists of the following stages of data management:

1. Calculation of SCOR Model 1 level metric performance attributes

Calculations that are used are based on the standard calculations listed in SCOR performance as follows:

- Perfect Order Fulfilment (POF)
POF is the percentage of orders that are sent in full and in due time in accordance with customer requests and the goods sent do not have quality.
- Order Fulfilment Cycle-Time (OFCT) Fulfilment Order
OFCT is the amount of time (days) needed from the time the order is received until the product is received at the customer's place. The value of OFCT can be measured from the average number of days needed, from the customer ordering the goods to the goods reaching the customer's hands.
- Upside Supply Chain Flexibility (USCF)
USCF is the number of days needed (Process Plan, Source, Make, Delivery) to achieve a continuous unplanned increase of 20% of the number of products shipped
- Upside Supply Chain Adaptability (USCA)
USCA is presenting an increase in the maximum number of sent that can be maintained (sustainable) and can be achieved 30 days.
- Downside Supply Chain Adaptability
This is a reduction in the quantity ordered 30 days before delivery without inventory or additional costs.
- Supply Chain Management Cost (SCMC)
This is the direct and indirect costs for the planning, sourcing, delivery and return processes.
- Cost of Goods Sold (COGS)
COGS is a direct cost for material and wage costs needed to make a product. COGS is defined as Cost of Goods Sold.
- Cash-to-Cash Cycle Time (CTCCT)
This metric (Table 1) measures the speed at which supply chains convert inventory into money. The shorter the time required, the better the supply chain. Good companies have a short cash-to-cash cycle. Of the three (3) components, CTCCT is calculated as follows:

$$\text{CTCCT} = \text{inventory days of supply} + \text{average days of account receivable} - \text{average days of account payable}$$

2. Supply Chain Condition Analysis

Supply chain condition analysis is analysed using descriptive methods following the process framework defined by Van Der Vorst (2005)

3. Supply Chain Performance Measurement

Performance measurement refers to SCOR modelling. Aramyan et al. (2006), states that SCOR has the advantage of being able to assess the overall performance of the supply chain in various dimensions.

4. Improvement

Based on performance measurement and analysis, improvement here can be divided into two main subdivisions. First, by analysing the level of importance and the relationship between performance measures. Second, gap analysis and process reengineering can improve the performance of the actual supply chain.

4. Results and Discussion

4.1. Level 1 Mapping

PT EJI in carrying out its operations applies a supply chain that involves various stages of the chain from suppliers to customers. PT EJI supply chain has 2 supply lines where the finished goods process and the second line process are called physical processes. Demand for merchandise printing needs in PT EJI is on the first track through several vendors where each vendor has a variety of products and services. The function of the vendor here is to make products and services to meet the needs of PT EJI customers. With a variety of products that are certainly useful for attracting new customers. All orders collected, are processed through the PAS (Printout Administration System) system and can then be opened by each vendor account to be further processed. In this PAS system, selection of customers who are paid or unpaid, where for online orders (Application or Website), customers must pay in advance. Whereas those who order through the Account Manager will immediately be processed according to the limit that the company has given to the customer.

Orders are sorted by marketing area to determine dispatch origin, that is, distribution centers, both suppliers and customers. The purpose of determining dispatch origin is for cost efficiency. PAS administration panel can download PO (Purchase Order) and DO (Delivery Order) and all can be printed from the system. Dispatch Origin determines vendor working time and delivery time in accordance with customer wishes, i.e. delivery expectations stated in the order processing data. Furthermore, once the process is complete, the order will be sent to the customer.

Calculation of Performance Attributes for metric level 1

Calculations that are used using the standard calculations listed in SCOR performance are as follows:

Perfect Order Fulfilment (POF)

POF is the percentage of orders that are sent in full and in due time in accordance with customer requests and the goods sent do not have quality. How to determine POF is:

Table 2
Perfect Order Fulfilment (POF)

Month	Order Total	Actual Number of order in problem	POF (%)	Order Total	B2C Number of order in problem	POF (%)	Order Total	B2B Number of order in problem	POF (%)
January	45	5	89	11	3	79	34	2	94
February	35	4	89	9	2	78	26	2	92
March	55	6	89	19	4	79	36	2	94
April	74	7	91	14	3	79	60	4	93
May	84	11	87	19	5	74	65	6	91
June	56	4	93	11	3	73	45	1	98
July	84	9	89	21	2	90	63	7	89
August	104	14	87	29	7	76	75	7	91
September	76	7	91	17	4	76	59	3	95
October	34	2	94	9	2	78	25	0	100
November	38	2	95	13	1	92	25	1	96
December	51	5	90	16	2	88	35	3	91
Average			90	Average		80	Average		94

Cycle-Time (OFCT) Fulfilment Order

OFCT is the amount of time (days) needed from the time the order is received until the product is received at the customer's place. The value of OFCT can be measured from the average number of days needed, from the customer ordering the goods to the goods reaching the customer's hands.

Table 3
Order Fulfilment Cycle Time (OFCT)

Month	Order Total	Actual			B2C			B2B		
		Average Production Time (Days)	OFCT (Day)	Order Total	Average Production Time (Days)	OFCT (Day)	Order Total	Average Production Time (Days)	OFCT (Day)	
January	45	9	9	11	4	4	34	7	7	
February	35	7	7	9	3	3	26	4	4	
March	55	8	8	19	7	7	36	7	7	
April	74	12	12	14	5	5	60	11	11	
May	84	19	19	19	3	3	65	12	12	
June	56	14	14	11	2	2	45	14	14	
July	84	7	7	21	4	4	63	9	9	
August	104	9	9	29	7	7	75	7	7	
September	76	8	8	17	3	3	59	7	7	
October	34	6	6	9	2	2	25	7	7	
November	38	11	11	13	2	2	25	14	14	
December	51	14	14	16	3	3	35	9	9	
Average			10		Average	4		Average	9	

Cost of Good Sold (COGS)

COGS is a direct cost for material and wage costs needed to make a product. COGS is defined as Cost of Goods Sold.

Table 4
Cost of Goods Sold (COGS)

Month	Actual				B2C				B2B			
	Sales	COGS	Gross	COGS	Sales	COGS	Gross	COGS	Sales	COGS	Gross	COGS
January	5,966,080	5,061,460	904,620	18	4,135,898	3,455,786	680,112	20	1,830,182	1,605,674	224,508	14
February	1,017,826,985	59,906,829	257,920,156	34	3,822,000	2,110,878	1,711,122	81	1,014,004,985	757,795,951	56,209,034	34
March	28,366,461	20,045,765	8,320,696	42	2,447,500	1,576,990	870,510	55	25,918,961	18,468,775	7,450,186	40
April	62,430,252	45,087,553	17,342,699	38	6,322,792	4,057,879	2,264,913	56	56,107,460	41,029,674	15,077,786	37
May	214,708,770	165,088,635	49,620,135	30	1,543,000	985,088	557,912	57	213,165,770	164,103,547	49,062,223	30
June	223,420,600	176,253,192	47,167,408	27	1,852,600	1,378,675	473,925	34	221,568,000	174,874,517	46,693,483	27
July	416,372,640	346,604,729	69,767,911	20	1,662,480	1,150,455	512,025	45	414,710,160	345,454,274	9,255,886	20
August	621,059,483	525,434,183	95,625,300	18	2,599,860	1,987,650	612,210	31	618,459,623	523,446,533	5,013,090	18
September	210,913,638	154,236,880	56,676,758	37	3,495,496	2,768,978	726,518	26	207,418,142	151,467,902	5,950,240	37
October	128,783,913	78,664,233	50,119,680	64	3,179,250	2,050,367	1,128,883	55	125,604,663	76,613,866	8,990,797	64
November	126,270,070	76,559,087	49,710,983	65	4,341,492	2,857,354	1,484,138	52	121,928,578	73,701,733	48,226,845	65
December	459,808,487	325,588,834	134,219,653	41	2,280,484	1,347,967	932,517	69	457,528,003	324,240,867	33,287,136	41
Total	3,515,927,379	2,678,531,380	837,395,999	31	37,682,852	25,728,067	11,954,785	46	3,478,244,527	2,652,803,313	825,441,214	31

Cash-to-Cash Cycle Time (CTCCT)

CTCCT, this metric measures the speed of supply chains turning inventory into money. The shorter the time required, the better the supply chain. Good companies have a short cash-to-cash cycle. Of the three (3) components, CTCCT is calculated as follows:

$$\text{CTCCT} = \text{inventory days of supply} + \text{average days of account receivable} - \text{average days of account payable}$$

Table 5
Cash To Cash Cycle Time (CTCCT)

Month	Actual				B2C				B2B			
	Days Supply (Days)	Average Days of Account Receivable (Days)	Average Days of Account Payable (Days)	CTCCT (Days)	Days Supply (Days)	Average Days of Account Receivable (Days)	Average Days of Account Payable (Days)	CTCCT (Days)	Days Supply	Average Days of Account Receivable (Days)	Average Days of Account Payable (Days)	CTCCT (Days)
January	4	4	24	16	4	7	1	10	7	8	45	30
February	3	3	35	29	3	4	2	5	4	14	36	18
March	7	6	28	15	7	7	2	12	7	21	45	17
April	5	4	24	15	5	11	1	15	11	11	30	8
May	3	2	32	27	3	12	2	13	12	13	28	3
June	2	5	21	14	2	14	2	14	14	21	45	10
July	4	6	18	8	4	9	2	11	9	19	36	8
August	7	5	24	12	7	7	2	12	7	27	45	11
September	3	7	21	11	3	7	1	9	7	32	60	21
October	2	3	19	14	2	7	2	7	7	23	45	15
November	2	4	28	22	2	14	1	15	14	8	32	10
Average	4	5	25	17	4	9	2	11	9	18	41	14

PT EJI Supply Chain is measured by level 1 (one) performance metric, namely the performance of PT EJI delivery. Bolstorff (2003) explains that level 1 (one) analysis begins by defining the company's business goals. This is done so that the supply chain performance evaluation will be carried out in line with the company's strategy and focus on the main objectives to be achieved. Based on company data we can know that the business objectives of PT EJI are defined as follows:

1. Providing the Best Service (Diverse products, transparent prices and cheap delivery)
2. Increase company profits.

After knowing the business objectives above, the next step is to measure the metrics in SCOR according to the business objectives. Based on calculations, the metrics provided by SCOR can be seen in the actual data column in Table 6. For the first business purpose (1), the available data are POF and OFCT. While for the second purpose (2), it is COGS and CTCCT.

Table 6
SCOR Model Level 1 metrics

Performance Attribute	Level 1 Metric	Actual Data (a)	B2C (b)	B2B (c)	Requirement gap	Opportunity
Supply Chain Reliability	POF (%)	90	80	94	4	(780,738,796)
Supply Chain Responsiveness	OFCT (Day)	10	4	9	6	Increase
Supply Chain Cost	SCM Cost	N / A	N / A	N / A	N / A	N / A
	COGS (%)	31	46	31	15	(663,627,976)
Supply Chain Asset Management	CTCCT (Day)	17	11	14	4	Reduce interest expense
	Return on Supply Chain Asset	N / A	N / A	N / A	N / A	N / A

After getting the actual data and calculating based on the four (4) metrics, the next step is to determine the actual position and determine the target performance for each metric based on benchmark data. Benchmark data are used to determine target performance, giving an overview of the magnitude of the gap between company performance. Benchmark data is used as a reference in benchmarking data and performance trends from year to year, and helps in directing the development of supply chains. Benchmark values continue to assume the target to be achieved for the next year. Based on Table 7, it can be seen that business objectives provide the best level of service. In the SCOR Model, it is not recommended that there be more than one business objective with target performance in the B2C position. The complex scope of supply chain development requires restrictions on B2C, so that improvement efforts are made on only one business objective. After determining the target performance, the next step is to conduct a gap analysis aimed at calculating the magnitude of the difference between the actual and targeted conditions. The magnitude of the difference translates into an increase in income, if the performance is improved until it reaches the target (Bolstorff & Rosenbeum, 2003). In Table 7, it can be seen the amount of gap analysis, where the B2C column is filled with the magnitude of the increase in income, if the performance for these metrics is improved to reach the targeted position. To calculate the opportunity, we need the total value of revenue and the percentage of gross profit generated (Bolstorff & Rosenbeum, 2013)

Table 7
Calculation of B2C & B2 B opportunities for POF with LOM

Component	The calculation results	
	B2C	B2B
Total Revenue (Rp)	3,515,927,379	3,515,927,379
Current POF (%)	90	90
Target POF (B2C); %	80	94
Total Revenue x ((Actual 100-POF) / 100); Rp	344,215,476	344,215,475.61
Total Revenue x ((100-POF Target) / 100); Rp	718,334,293	220,772,384.71
Difference (a) and (b); Rp	374,118,817	123,443,091
Gross profit	209%	64%
Gross Profit x Difference (Opportunity); Rp	780,738,796	79,173,737

The magnitude of the difference based on gap analysis is presented in Table 7, where the opportunity column is filled with the size of the income level, if the performance for the metrics is increased to the targeted position. To calculate the opportunity, we need the total value of revenue and the percentage of gross profit generated. However, due to confidential financial data, the magnitude of opportunity is calculated using a number of approaches. First, gross profit is taken from the data of the last 1 year, which is divided into 4 quarters. Q1-Q4 2018. Total revenue is calculated in the last one (1) year. In this case, there are several methods in the SCOR Model that can be used to calculate the amount of opportunity for

POF. One method used in this method is LOM (Bolstroff & Rosenbeum, 2003). With this method we can find out the magnitude of lost opportunity to earn certain income based on the current performance of POF and COGS, where as for the calculations in Table 7. The magnitude of opportunity for OFCT metrics in achieving targets is in line with the opportunities that come from POF. If OFCT is lower, it means that the waiting time is getting shorter, then automatically makes the POF value higher and has an impact on increasing revenue. Opportunity for the COGS metric is obtained by calculating the amount of COGS decrease when the reduction target has been reached. The decrease directly signifies an increase in gross profit (Nguyena et al., 2020).

4.2. Level 2 Mapping

Each core process in SCOR is presented in more detail from three types of SCOR processes, namely Planning, Execution and Enable. Level 2 supply chain review aims to detail the identification of the calculated metric values. Mapping level two (2) can be seen in the following figure:

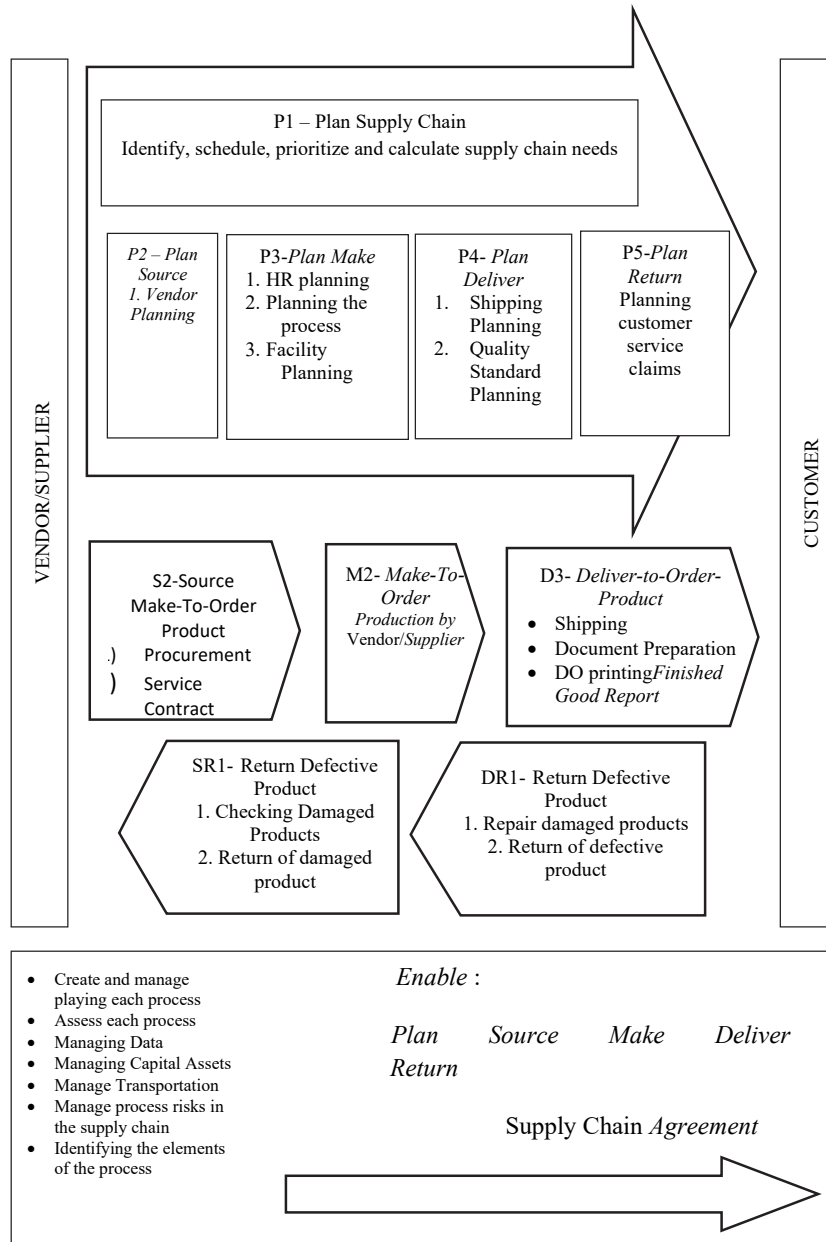


Fig. 1. Mapping Level 2 Merchandise Product Supply Chain

In calculating POF and OFCT, it is necessary to pay attention to on time, quantitative accuracy (in full) and the completeness of supporting documents, and the condition of goods in perfect condition. If any of the above conditions are not met, then the services provided by PT EJI are not good. Based on conditions that have occurred in the past 1 (one) year, it is known that the cause of imperfections in fulfilling orders is due to the delivery of goods that are not on time (not in time).

Table 8
POF and OFCT values in Deliver, Make and Source processes

Metric	Deliver	Make	Source
POF (%)	80	99	95
OFCT (Day)	4	7	2

Based on these three values, it appears that the delivery process has the lowest performance. Presentation Value (%) POF in the delivery process we can know that has a value of 80% and OFCT 4 Days, this data can be seen in the column table of POF and OFCT values. Inaccurate delivery by PT EJI as a whole can hamper the company's business goals, namely: providing the best service. Henceforth, level 3 (three) mapping can be done.

4.3. Level 3 Mapping

A level 3 mapping analysis is carried out to see even more detail than processes that have lower performance values based on level 2 analysis. This is so that we can find out the next process for improvisation. Level mapping (3) is carried out on all activities in the delivery process, which can be seen in level 3 (three) mapping.

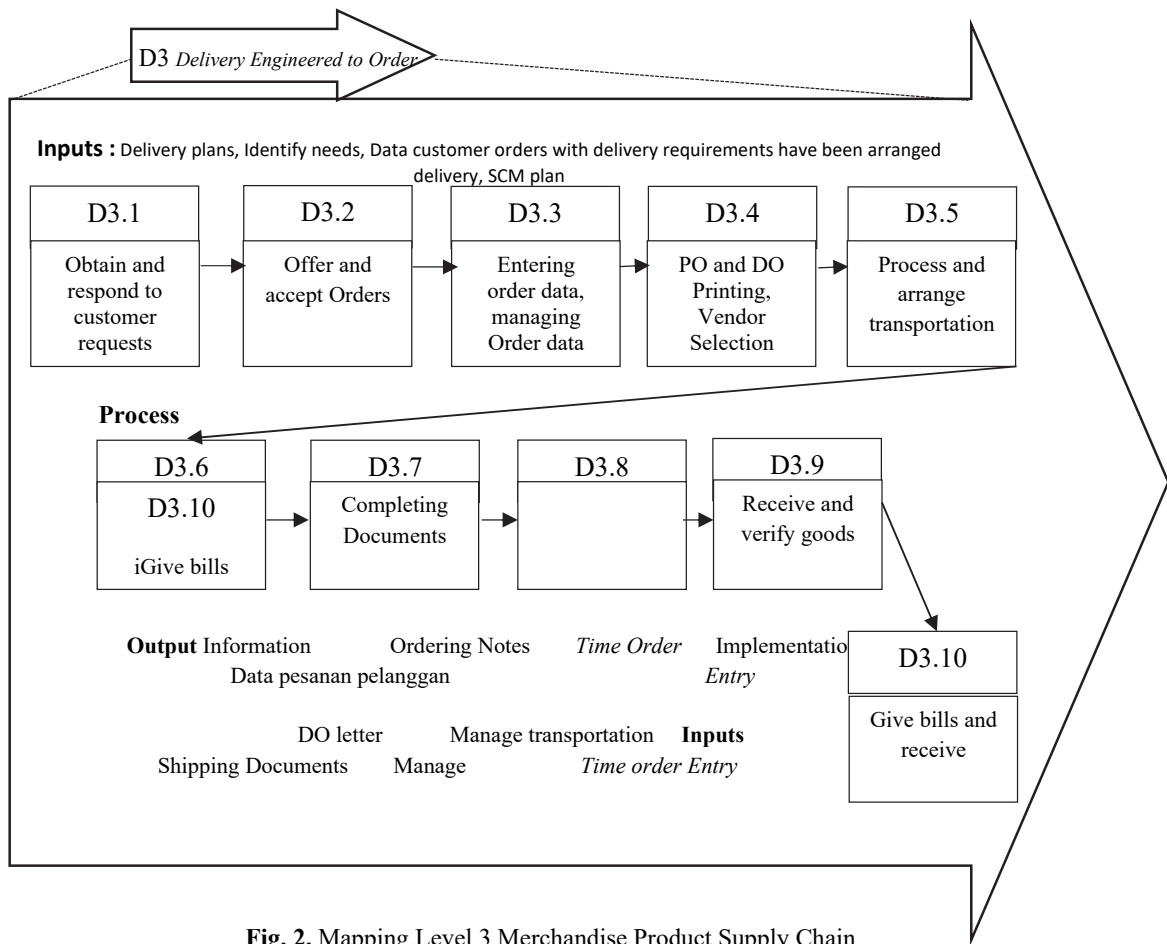


Fig. 2. Mapping Level 3 Merchandise Product Supply Chain

The cause of the delivery of goods that are not timely starts from downstream to upstream can be traced to the process of delivery, make and source. In the process of delivery, the process elements in the delivery often experience problems so that delivery is hampered. It can also be seen that an 80% POF value on delivery is obtained from an estimate of what percentage of the accuracy of the shipment of goods in terms of the quantity in accordance with the demand for goods. While the OFCT score is around 4 (four) days. This figure is obtained from the average delivery of goods to the customer in accordance with the expectations of shipping to the customer. In the make process the POF value is almost 100%. This figure is obtained based on estimates of what percentage of the needs that can be met by the vendor. This is also supported

by the location of the Vendor with the customer. A POF value of around 95% in the Source process is obtained based on an estimate of what percentage of the number of orders the vendor can fulfil to customers.

Improvement

Improvement is done by brainstorming with the TopLevel Management of PT. EJI. Where during the discussion the researcher explained the results and previous discussions to the Top Level Management of PT. EJI. The results of the brainstorming accomplished is the Top Level Management PT. EJI will fix the performance of the process of delivering the following:

1. Separate from sending routes by adding couriers to support shipping both Online and Offline
This is done because for now the couriers at PT EJI only amount to 1 person and load from the couriers on every day full delivery from morning to night. This decision was taken because in addition to separate between the delivery of offline / online also helps to speed so fast goods deliver.
2. The existence of QC on invoice documents by PT EJI admin finance to avoid incomplete documents.
QC documents are very necessary at the time of delivery because it allows the documents that we send to each company have different procedures, therefore the admin must crosscheck the documents to be sent.
3. Delivery SOP is made so that the shipping process can be delivered in accordance with the specified address.
SOPs for shipments are made to help the relevant teams profiling product data that has been delivered and invoiced.
4. Provide Inchiect at the time of delivery to avoid mismatching goods.
For certain items, the diet will be given a diet instead of printed products, where the diet is to avoid deficiencies of the products that have been transferred. The number of inches given is around 5% of the quantity of goods or 1-3pcs for merchandise products.

5. Conclusions

After the collection, management, analysis and discussion of this research, the conclusion is as follows,

1. Metric or supply chain performance measurement indicators for PT. EJI used for measurement using the SCOR Model which consists of 4 performance criteria attributes consisting of 1 metric level used as an indicator. Based on the level of importance as follows:
 1. Reliability: Perfect Order Fulfilment (POF)
 2. Responsiveness: Order Fulfilment Cycle Time (OFCT)
 3. Cost: Cost Of Goods Sold (COGS)
 4. Assets: Cash to Cash Cycle Time (CTCCT)
2. The results of the performance measurement show that the delivery process is 80.0, where the value is the lowest compared to other metrics, namely Make 99.0 and Source 95.0. Recommendations for improvement in Supply Chain are to improve delivery by separating shipping routes for Online and Offline shipping, checking the quality of invoice documents to avoid incomplete documents, making SOP for shipping, and providing a diet at the time of delivery to avoid mismatching goods.

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