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Application of Value Chain Strategy to Ensure the Sustainability of Online Transportation Services

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ABSTRACT

Technological advancements have greatly impacted various aspects of modern life, including the transportation industry. The aim of this research is to enhance organizational efficiency by implementing lean supply chain principles to online transportation services in Indonesia. This study employed an exploratory analytical qualitative approach to analyze the research variables. The methodology used involved distributing questionnaires and conducting interviews with 120 users of online transportation services. The novelty of this research is to examine the application of the value chain in the service industry, specifically in online transportation service. The study concludes that online transportation service apps should increase traceability to ensure that the driver closest to the client receives the order, implementing a user-friendly feature, enhance the application's performance, and increase the response time.

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INTRODUCTION

Technology has changed many elements of modern life, including transportation. Most Indonesians use internet-based transportation daily [1]. Online transportation is preferred among Indonesians for its convenience. Online transportation is fast and convenient [2]. Even in Indonesia's recession, online transportation can reduce unemployment. Customers can book this online transportation service using an app [3]. In response to this opportunity, many local firms have entered the ride-hailing sector [2]. Unfortunately, several have closed. Topjek, Call Jack, Lady Jek, Ojekkoe, Bangjek, Uber, Blujek, OjekArgo, Ojesy, and Omjek declared bankruptcy [2].

The various conveniences and services offered to address transportation demands can attract attention and have a significant impact on the community [4]. The Banyumas community considers three factors when selecting online transportation services: convenience, safety, and efficiency [5]. Internet travel offers security, transparency, pragmatism, and free safety gear. Online transportation has drawbacks such network issues, lack of driving safety knowledge, careful personal data dissemination, damaged vehicle facilities, and disagreeable drivers [6].

Indonesia's online transportation industry has many potential opportunities. Due to rising smartphone and internet use and desire for simple, safe, and rapid transportation, agreements with e-commerce companies or other apps can be profitable [2]. Food deliveries and daily needs might also increase usership. Create loyalty programs and promotions to keep customers. Opportunity exists to expand to smaller cities with untapped markets. Government support and favorable legislation promote online transportation [2].

Online transportation is risky and promising. Intense competition from online and traditional transportation companies, adoption of new technologies by competitors to increase competitiveness, security issues that can damage reputation and user confidence, government regulations that can affect online transportation operations, and driver safety issues are threats [7]. When assessing internet transportation, these criteria are crucial. Controversies with related groups, such as transportation bases or conventional taxis, natural disasters or unexpected events, reliance on technology and servers, and public trends and preferences that can affect demand are possible issues [8].

A lean distribution program takes a holistic approach to supply chain management (SCM), rather than concentrating on a particular area of the supply chain [9]. Technological uncertainty might spur supply chain lean. The focal firm gains stability and performance, making it more competitive [10]. LSCM can facilitate the adoption of strategic I4.0, while I4.0 technologies have the potential to enhance LSCM processes operationally [11].

Based on the above explanation, the research gap identified is that lean supply chain principles have not been widely used in the service industry. This study aims to apply lean supply chain principles to online transportation services in Indonesia to boost organizational productivity. The advantages of this study include strengthening the value chain of online transportation businesses

Supply Chain Management

This study's overarching theory is supply chain management, which includes strategic planning, efficient management, and effective product execution. Each activity is cost-effectively done [12]. Effective supply chain management maximizes profits. By streamlining internal operations, improving transportation efficiency, expanding warehouse networks, and exploring vertical integration opportunities, online transportation services can construct more strong and competitive value chains that satisfy evolving customer and market demands [13]. Online transportation service providers can gain a competitive edge and succeed in a changing industry by adopting these technical advancements and best practices into their supply chain management strategy [14].

Lean Thinking

This research's middle-range theory is Lean Thinking, which eliminates waste to create customer value. Any activity or procedure that wastes resources, time, or money without adding value for consumers is eliminated. Lean Thinking emphasizes customer value [15]. Lean thinking can help online transportation services provider more responsive and competitive, improve overall efficiency, allows for lower overall transportation costs, and ensure that services are sustainable [16]. Value Stream can help online transportation service providers increase efficiency, reduce environmental impact, improve customer experience, and eliminate waste and excess capacity [17]. Identifying waste, streamlining operations, fostering collaboration, and adhering to the principles of the physical Internet are just a few of the ways that value stream mapping can help make online transportation services more sustainable [18]. Ensuring the sustainability of online transportation services within the value chain requires placing a higher priority on information transfer than on physical goods when it comes to transportation services [19].

Lean Supply Chain

This study applies Lean Thinking to the entire supply chain using the Lean Supply Chain theory. Supplier management, distribution network management, and supply chain integration are all covered by lean supply chain management. From supplier raw material production to end-user product delivery, lean supply chain management eliminates non-value-added time and reduces lead time [20]. The value chain perspective plays a critical role in explaining how various supply chain activities create value for stakeholders and customers in the context of online transportation assets [9]. Understanding the link between lean manufacturing and digital supply chain dimensions helps sustain online transportation services. This shows the need of efficiency and technology integration throughout the value chain [21]. Combining LSCM with I4.0 in online transportation services improves operational efficiency and value chain sustainability. Businesses can gain a competitive edge and meet their social and environmental responsibilities by carefully deploying these technologies [11]. An effective GLSCM system can boost online transportation service profitability by lowering costs, improving operational efficiency, promoting environmental sustainability, reducing risk, and strengthening brand reputation and differentiation within the value chain [22].

Existing Conditions of Lean Supply Chain Implementation in Online Transportation Services.

Due to the complexities and uncertainties of transportation operations, lean implementation in online transportation services may not be optimal, but it can enhance efficiency and decrease waste in specific supply chain aspects [23]. Online transportation services' lean supply chain difficulties demonstrate the need for expertise and a thorough understanding of lean principles. Lean supply chain management in transportation services may not be fully effective without this foundation [24]. Online transportation services with a lean supply chain depend on organizational strengths, notwithstanding potential obstacles. Strong organizations may overcome these barriers and use a lean supply chain to increase operational efficiency over time [25].

P_1: The implementation of online transportation services with a lean supply chain is not ideal.

Expected Condition of Lean Supply Chain Implementation in Online Transportation Services

These limits present operational issues for the Internet transportation company's lean supply chain architecture. Fixing these issues—whether through better people management, supplier collaboration, or production issues—will boost the company's performance and keep it competitive [26]. The lean supply chain method used by online transportation is still failing. Failure to recognise consumer preferences for green services, focusing too much on cost reduction without considering long-term implications, or prioritising environmental sustainability may be to blame [27].

P_2: The online transportation's lean supply chain strategy continues to perform poorly.

Problems that Occur in the Implementation of Lean Supply Chain in Online Transportation Services

Strategize and include stakeholders. Whether through technology collaborations, experimental projects, or regulatory advocacy, each organization's specific difficulties must be examined and customized solutions devised. By addressing these challenges, online transportation companies may maximize lean supply chain systems' efficiency and transparency, just like IoT adoption does [28]. Without sufficient research, choosing Industry 4.0 technology for lean manufacturing in transportation services is difficult. Without clear guidelines on which technologies to utilize and how to integrate them, companies may struggle to make lean decisions[29].

P_3: Implementing a lean supply chain system in online transportation services can be challenging.

Lean Supply Chain as a Sustainability Strategy for Online Transportation Services

Online transportation services using VALSAT technology are a measured move toward a more responsive, capable, and adaptable supply chain ecosystem. By reducing costs, improving cooperation, and improving supply chain visibility, traceability, and decision-making, firms may give greater value to their customers [30]. This technology integration promotes economic growth by improving transportation and boosting industry innovation. As Indonesia enters the digital age and Industry 4.0, VALSAT-powered online transportation services will shape its transportation future [31]. VALSAT technology can improve operational efficiency, customer satisfaction, environmental impact, and risk management for online transportation services by incorporating green logistics, data security, and contingency plans [32].

P_4: The online transportation services utilize VALSAT technology to develop efficient supply chain solutions.

RESEARCH METHOD

The research variables were examined using exploratory analytical qualitative methods. It tries to describe and explore the field's results and interpretations. The study examined Gojek, GrabBike, GoCar, and GrabCar business operations.

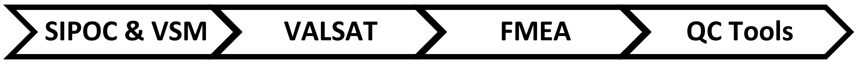

Figure 1. Research Design
Source: Processed Data (2023)

As illustrated in Figure 1, the research design process is comprised of multiple stages:

1. In the first stage, an identification process is carried out to capture the existing conditions at the research site using two tools: the SIPOC (Supplier-Input-Process-Output-Customer) diagram to visualize the value chain in online transportation services, and Value Stream Mapping to map the waste that occurs in online transportation services, which will be analyzed later.
2. In the second stage, we will analyze the VALSAT tools to identify key waste that must be rectified swiftly to enhance the value chain of online transportation services.
3. After mapping with VALSAT tools, the third stage will undergo evaluation using Failure Mode and Effect Analysis (FMEA) to assist management in making decisions about future improvement initiatives. Senior management will review the improvement results. If they are satisfactory, they will be forwarded to the ultimate level, which is the control stage. If the improvements are not adequate, the FMEA method will be repeated.
4. The final stage is the control stage. QC devices are utilized to ensure that online transportation services meet the required standards.

RESULTS & DISCUSSION

The study surveyed individuals aged 17 to 40 who had utilized one of four online transportation services: GrabBike, Gojek, GrabCar, or GoCar. Waste detection and cycle time determination for each business process of online transportation services were conducted through interviews with the drivers of each service, using a questionnaire. An examination of the characteristics of respondents who completed the questionnaire is provided in Table 1.

Table 1. Respondent Characteristics

Gender	%	Services	%	Age	%	Education Level	%	Occupation	%
Male	63	Gojek	36	15 – 25	58	Senior High School	22	Student	22
Female	37	GoCar	25	26 – 35	32	Diploma 1	15	Unemployment	3
		GrabBike	27	36 – 45	20	Diploma 3	20	Civil servants	15
		GrabCar	13	46 - 55	5	Bachelor degree	27	Private employee	60
						Master degree	16		

Source: Processed Data (2023)

The results of the validity and reliability tests of the respondents' responses from the distributed questionnaires can be observed in Table 2.

Table 2. Validity and Reliability Test

Waste	Validity	Reliability
Over Production	0,709 – 0,815	0,623
Waiting	0,631 – 0,794	0,664
Excessive Transportation	0,544 – 0,865	0,635
Inappropriate Processing	0,752 – 0,854	0,714
Unnecessary Inventory	0,747 – 0,816	0,701
Unnecessary Motion	0,723 – 0,802	0,647
Defect	0,663 – 0,871	0,804

Source: Processed Data (2023)

Table 2 shows that respondents' replies to waste in online transportation services are valid and reliable. The validity test results for the seven wastes are all above 0.3, as determined by the product moment table. Additionally, all data falls into the reliable group, with test values greater than 0.6, as determined by Cronbach Alpha. The interval scale is classified into three categories: low for moderately agree to disagree responses, medium for agree statements, and high for strongly agree statements. The interval scale is illustrated in Table 3.

Table 3. Interval Scale

No.	Description	Interval
1	Low → Disagree – Disagree Less	1,00 – 2,00
2	Medium → Agree	2,01 – 3,00
3	High → Strongly Agree	3,01 – 4,00

Source: Processed Data (2023)

The results of respondents' responses regarding waste that occurs in online transportation services, especially Grab and Gojek, are displayed in Table 4. The waste assessed in this study encompasses overproduction, excessive transportation, inappropriate processing, unnecessary inventory, unnecessary motion, waiting, and defects

.

Table 4. Statistic Descriptive

Waste	KP1	L	M	H	Average
Over Production	OP_1	28	65	27	2,858
	OP_2	32	66	22	
	OP_3	36	75	9	
Waiting	W_1	24	84	12	2,888
	W_2	25	76	19	
	W_3	16	95	9	
	W_4	27	77	16	
Excessive Transportation	ET_1	18	73	29	2,897
	ET_2	38	65	17	
	ET_3	31	73	16	
Inappropriate Processing	IP_1	33	83	4	2,697

Waste	KP1	L	M	H	Average
	IP_2	40	71	9	
	IP_3	40	67	16	
Unnecessary Inventory	UI_1	30	68	22	2,797
	UI_2	32	77	11	
	UI_3	36	71	13	
Unnecessary Motion	UM_1	37	75	8	2,753
	UM_2	39	69	12	
	UM_3	42	55	23	
Defect	D_1	37	67	16	2,646
	D_2	53	61	6	
	D_3	41	57	22	
	D_4	40	74	6	

Source: Processed Data (2023)

Table 2 shows that the highest amount of waste is generated by excessive transportation, with a value of 2.897, falling into the high category. This is followed by waste waiting and overproduction.

Identify

During the identification phase, we identified the flow process of online transportation services, including Gojek, GoCar, GrabBike, and GrabCar. We used SIPOC diagrams (Supplier-Input-Process-Output-Customer) .

Table 4 presents the descriptive statistics for lean thinking, which categorizes respondents' assessments of online transportation services into three groups: low, medium, and high. Additionally, Table 4 illustrates the respondents' perceptions of waste associated with online transportation, including overproduction, waiting, excessive transportation, inappropriate processing, unnecessary inventory, unnecessary motion, and defects.

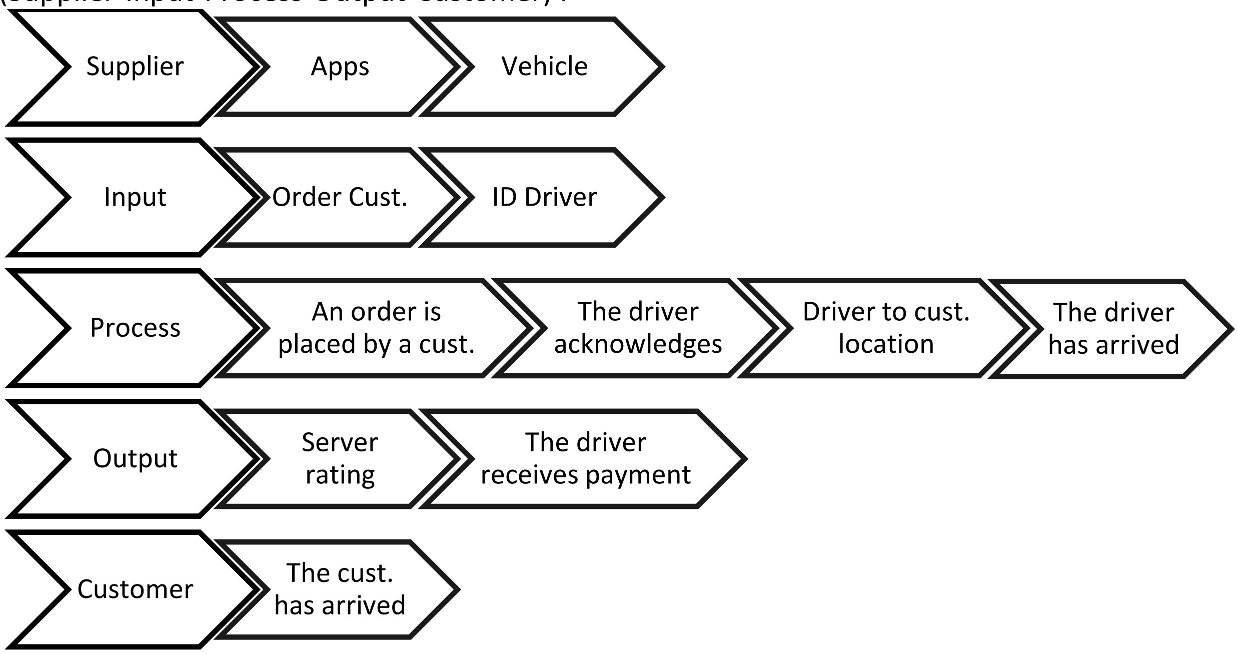

Figure 2. SIPOC Diagram of Online Transportation Services
Source: Processed Data (2023)

Figure 2 shows that internet transportation providers are application providers and automakers are vehicle suppliers. Customers' online transportation requests and driver IDs who accept them are inputs. The online transportation service application is used to order services. The driver picks up the customer at the agreed-upon place and takes them to the advertised destination. Customers will depart the vehicle, pay, and rate the internet transportation service when they arrive.

Figure 2 illustrates the concept of supply chain management, which can be defined as a business process that occurs when utilizing online transportation services from a variety of perspectives, including those of suppliers, inputs, processes, and outputs to customers. This is commonly represented in SIPOC diagrams.

Table 5. Cycle Time of Online Transportation

Act	GrabBike		Gojek		GrabCar		GoCar	
Act$_1$	3,80		3,86		3,88		3,95	
Act$_2$	4,27	10,87	4,50	11,19	4,56	11,33	4,60	11,54
Act$_3$	2,80		2,84		2,89		2,99	
Ave.	**11,03 minutes**				**11,43 minutes**			
			11,23 minutes					
Act$_4$	1,81		1,81		1,96		1,99	
Act$_5$	1,86	6,51	1,87	6,61	1,99	6,89	3,15	8,14
Act$_6$	2,84		2,93		2,94		3,00	
Ave.	**6,56 minutes**				**7,51 minutes**			
			7,04 minutes					
Act$_7$	7,84	28,99	7,86	30,08	8,51	30,86	9,01	32,65
Act$_6$	21,15		22,22		22,36		23,64	
Ave.	**29,54 minutes**				**31,75 minutes**			
			30,64 minutes					
Act$_6$	2,23	4,44	2,23	4,59	2,41	4,82	2,59	5,25
Act$_6$	2,21		2,36		2,42		2,66	
Ave.	**4,51 minutes**				**5,04 minutes**			
			4,78 minutes					

Source: Processed Data (2023)

Table 3 shows that the longest cycle time is in process 3, which is the time it takes for the driver to transport the client from the pick-up site to the destination location. The cycle time ranges from 28.99 to 32.65 minutes.

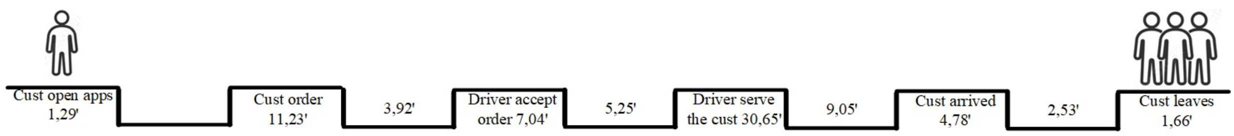

Figure 3. Value Stream Mapping of Online Transportation Services
Source: Processed Data (2023)

Figure 3 illustrates four non-value-added activities, including waste waiting. The longest waiting period occurs between the customer pick-up and delivery to the destination location, with an average time of 9.09 minutes based on the results of four online transportation services analyzed in this study.

.**Table 6.** VSM Identification of Online Transportation Services

Act.	GrabBike		Gojek		GrabCar		GoCar	
	%	Time	%	Time	%	Time	%	Time
VA	55,58	35,82	54,08	36,97	46,64	38,12	44,52	40,22
Ave		**50,20%**				**37,78 minutes**		
NNVA	23,24	14,98	22,68	15,50	19,31	15,78	19,22	17,36
Ave		**21,11%**				**15,91 minutes**		
NVA	21,18	13,65	23,24	15,89	34,05	27,83	36,26	32,75
Ave		**28,68%**				**22,53 minutes**		
LT		64,45		68,36		81,73		90,33
Ave				**76,22 minutes**				

Source: Processed Data (2023)

According to Table 5, GrabBike is the most efficient online transportation service with a value of value-added activities of 55.58%, equivalent to 35.82 minutes.

Analyze

GrabBike, Gojek, GrabCar, and GoCar use VALSAT to analyze online transportation service flow waste. The four online transportation companies' clients are surveyed to measure waste. The four online transportation providers' consumers completed the questionnaire and provided information. With 120 responders, the survey accurately reflects field conditions. Students used research tools to obtain data.

Table 7. VSM of Online Transportation Services

No	Waste	Activities	L	M	H	Score
1	Over Production	The driver canceled the purchase since they couldn't reach the buyer.	28	195	243	3,443
2		The order was canceled by the driver without prior notification.	32	198	198	
3	Waiting	The customer cancelled the order without notifying.	36	225	81	3,317
4		Slow response from the driver	24	252	108	
5		There has been a delay in the customer's response.	25	228	171	
6		The driver arrived late	16	285	81	
7		Drivers are experiencing excessive wait times	27	231	144	
8	Excessive Transportation	The certainty of the information is unclear.	18	219	261	3,550
9		The driver experienced difficulty locating the passengers' pickup location.	38	195	153	
10		The driver became disoriented while dropping off passengers.	31	219	144	
11	Inappropriate Processing	Passenger safety is not being ensured by drivers	33	249	36	2,881
12		There are numerous drivers who pick up.	40	213	81	
13		The customer was picked up by the wrong driver.	40	201	144	
14	Unnecessary Inventory	There is a service fault	30	204	198	3,222
15		Driver received multiple orders simultaneously.	32	231	99	

16		The driver received an invalid order.	36	213	117	
17	Unnecessary Motion	The responsiveness of the driver is reduced.	37	225	72	3,061
No	**Waste**	**Activities**	**L**	**M**	**H**	**Score**
18	Defect	Customers are not as receptive.	39	207	108	2,913
19		The driver's service has received negative feedback from customers.	42	165	207	
20		The driver ID does not match.	37	201	144	
21		The driver's vehicle is inadequate.	53	183	54	
22		The cleanliness and comfort of vehicles is inadequate.	41	171	198	
23		The vehicle is not ready for use.	40	222	54	

Source: Processed Data (2023)

Table 6 shows that the highest value stream in online transportation services is excessive transportation waste, which has a value of 3.550 and is classified as high. This is followed by overproduction waste and waiting waste. Table 5, Figure 3, Table 6, and Table 7 show the application of lean thinking, where Table 5 shows the cycle time of online transportation services based on the business processes that occur, Figure 3 shows the value stream mapping of online transportation services, Table 6 shows the identification of value stream mapping in online transportation services consisting of 3 activities, namely value-added activities, non-value-added activities, and important but non-value-added activities. while Table 7 is a grouping of waste that occurs based on the business processes carried out in online transportation services.

Table 8. Value Stream Analysis Tools of Online Transportation Services

Waste / Structure	**Mapping Tools**						
	Process Activity Mapping	Supply Chain Response Matrix	Production Variety Funnel	Quality Filter Mapping	Demand Amplification Mapping	Decision Point Analysis	Physical Structure (a) Volume (b) value
Over Production	L = 87	M = 633		L = 87	M = 633	M = 633	
Waiting	H = 504	H = 504	L = 92		M = 996	M = 996	
Excessive Transportation	H = 522						L = 96
Inappropriate Processing	H = 261		M = 663	L = 113			
Unnecessary Inventory	M = 648	H = 414	M = 648		H = 414	H = 414	L = 98
Unnecessary motion	H = 387	L = 118					
Defect	L = 171			H = 450			
Total	2580	1669	1403	650	2043	2043	194

Source: Processed Data (2023)

Based on the results of mapping using value stream analysis tools in table 7, the process activity mapping tool is the most suitable for analyzing the value chain of online transportation services. It yielded the highest total value of 2580, followed by demand amplification mapping and decision point analysis.

Table 9. Process Activity Mapping of Online Transportation Services

No	Activities	Device	Process (Minutes)					Identification
			O	I	T	D	S	
1	The user accesses a transportation application online.	Cell phone	1,3					NNVA
2	Customers choose features on transportation apps online.	Cell phone		3,9				NNVA
3	The customer selects their destination.	Cell phone		4,5				NNVA
4	Customers receive information about the costs, drivers, and vehicles.	Cell phone				2,9		VA
5	The customer awaits the driver's acceptance of the order.	Cell phone				3,9		NVA
6	The order is received by the driver.	Cell phone		1,9				VA
7	The server sends a confirmation to the customer.	Cell phone	2,2					NNVA
8	The customer receive confirmation.	Cell phone				2,9		NNVA
9	The driver will transport the client to their destination.	Vehicle			15,3			VA
10	The client awaits the arrival of the driver.	Cell phone				9,1		NVA
	Total		3,5	10,3	15,3	18,8		

Source: Processed Data (2023)

Based on the investigation that utilized process activity mapping tools, table 8 shows that the most significant waste is caused by delays, which accounted for 18.8 minutes. This was followed by waste caused by transportation and inspection.

Lean supply chain adoption is seen in Tables 8 and Table 9. Table 8 describes selecting value stream analysis tools for online transportation service business operations. Seven tools include process activity mapping, supply chain response matrix, and production. Table 8 shows variety funnel, quality filter mapping, demand amplification mapping, decision point analysis, and physical structure (a) volume (b) value. Process activity mapping, one of the specified value stream analysis tools, calculates process time for operations, inventory, transportation, delay, and storage in Table 9.

Improve

The enhance section will investigate the factors that contribute to waste in online transportation services provided by GrabBike, Gojek, GrabCar, and GoCar. The following activities will be examined:

1. To select service features and destinations, customers must devote 8.01 to 8.55 minutes. Avoiding time wasting is hard. With a detection value of 6, incidence value of 7, and severity value of 5, the risk

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priority number is 210. The corporation will add a user-friendly function to their online transportation service app to fix this. Choosing options and locations will be easier with this functionality, saving time.

2. Waste in customer activities: The confirmation process for car and driver information takes between 2.84 and 3.00 minutes, resulting in waste that is difficult to avoid. The occurrence value is 8, the detection value is 3, and the severity value is 3, resulting in an RPN value of 72. To reduce customer waiting time for confirmation from the server, the developer can increase the response time of the online transportation service application, resulting in faster car and driver pickup confirmation.
3. The next waste occurs when the customer waits for the driver to arrive and deliver to the destination, which takes between 8.33 to 13.54 minutes. This waste cannot be prevented as long as the detection value is 8, the incidence value is 9, and the severity value is 7, resulting in an RPN value of 8 x 9 x 7 = 504. To reduce waste, online transportation service apps should increase traceability to ensure that the driver closest to the client receives the order, reducing wait times for consumers to acquire a pickup.
4.
5. The wait time for the server to receive payments and ratings from clients who have utilized online transportation services ranges from 2.21 to 3.68 minutes. This delay is difficult to avoid due to the detection value of 2, an incidence value of 8, and a severity value of 7, resulting in an RPN value of 112. To improve the online transportation service, it is preferable to enhance the application's performance. This will reduce the time it takes for the server to receive payments and ratings from consumers who have used the service.

Control

Control operations will be conducted based on the Risk Priority Number determined in the enhance stage.

Table 10. Online Transportation Services based on Risk Priority Number

No	Activities	RPN	Control Action
1	The customer waits for the driver to arrive and deliver to the destination	504	Online transportation service apps should increase traceability to ensure that the driver closest to the client receives the order
2	Customers select service features and destinations, which require a time commitment.	210	Implementing a user-friendly feature in their online transportation service application
3	The wait time for the server to receive payments and ratings from clients who have utilized online transportation services	112	It is preferable to enhance the application's performance
4	The confirmation process for car and driver information	72	the developer can increase the response time of the online transportation service application

Source: Processed Data (2023)

http://doi.org/10.30998/ jmil.v9i1.1421

Existing Conditions of Lean Supply Chain Implementation in Online Transportation Services

Based on the responses of 120 individuals who have used online transportation services such as GrabBike, Gojek, GrabCar, and GoCar, the research findings indicate that the highest waste value in online transportation services occurs due to excessive transportation, which falls into the middle range (2.000 - 2.999) with a value of 2.897. The study's conclusions fully verify Proposition 1, which states that the application of lean supply chain in online transportation services is not ideal.

In this environment, a more personalized and nuanced strategy that blends lean principles with strategies to meet customer expectations and improve efficiency may be important to improving the entire supply chain [23]. Without the coordination and experience necessary for effective Lean implementation, online transportation companies may find it difficult to optimize their supply chains and achieve desired efficiencies [24]. This underscores the need not only to adopt lean concepts, but also to have the skills to apply them in the context of the technical and operational dynamics of the industry [25].

By addressing these issues and aligning supply chain operations with GSCM objectives, online transportation providers can improve their sustainability initiatives and make a significant contribution to environmental protection [33]**.** According to the study, prioritizing customer satisfaction and addressing quality issues immediately can counteract the negative impact of returns on customer loyalty and supply chain performance, but a lean approach may not be appropriate [34]**.** As a result, while efficiencies have been achieved in some areas, the overall effectiveness of lean supply chain implementation in this specific context is limited, as noted in Proposition 1 [35].

Expected Condition of Lean Supply Chain Implementation in Online Transportation Services

In the study, value-added activities were 50.20% more useful than necessary but non-value-added tasks and 49.80% more valuable than non-value-added activities. The lean supply chain model of online transportation continues to underperform, confirming the second argument.

Despite the potential benefits, supply chain collaboration remains a hurdle to blockchain adoption. Though limited, personal data protection remains a primary issue. Improving supply chain efficiency and security in future research and practice requires addressing these issues while stressing privacy [36]. By establishing clear standards and procedures, governments can encourage the adoption of innovative solutions and facilitate industry transformation [37]. The confirmation of the second hypothesis emphasizes the need to increase blockchain application standards. Blockchain technology will be seamlessly integrated into online transportation, improving industry performance and efficiency [38].

Overall, these data provide strong evidence that the proposed production line is indeed more efficient than the original line, thus testing the second hypothesis regarding the underperformance of the lean supply chain model in online transportation [39]. Students can be better prepared for the changing demands of logistics and supply chain management in the digital age by incorporating Industry 4.0 principles into the curriculum and prioritizing the development

http://doi.org/10.30998/ jmil.v9i1.1421

of necessary skills, such as fluency in English and the ability to search for data [40].

Lean Supply Chain as a Sustainability Strategy for Online Transportation Services

Multiplying respondents' questionnaire responses identifies VSM in online transportation services. Waste with extensive transportation has a maximum score of 3,550 since low (L) responses are multiplied by 1, medium (M) by 3, and high (H) by 9. Data is entered into Value Stream Analysis Tools in order of appearance. The

maximum total value of 2580 from Process Activity Mapping proves premise 3. This proves lean supply chain implementation in online transportation services is difficult. Comprehensive training and change management programs to overcome employee resistance, careful planning to integrate technology seamlessly, and targeted research to find the most suited sectors are needed to overcome these challenges. Ideas for improving lean supply chain in online transportation [29]. Online transportation services may face challenges in developing a lean supply chain system, however Industry 4.0 and LSC 4.0 could improve supply chain efficiency, sustainability, and resilience [41].

Addressing issues related to data accuracy, ethical considerations, and privacy concerns should be a priority to ensure the successful adoption and long-term operation of these advanced technologies in supply chain contexts [42]. To reap the full benefits of these supply chain optimization tactics, success depends on fostering teamwork, creating a culture of continuous improvement, and adapting to changing market conditions [43]. Using a BI system to analyze and visualize herbal supply chain data can enable companies to uncover inefficiencies, capitalize on opportunities,

and ultimately design more efficient ways to improve their operations [44].

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Transportation process activity mapping showed the largest delay was 18.8 minutes during pickup and delivery. Risk Priority Number (RPN) combines severity, frequency, and detectability. Increase the online transportation service application's traceability to reduce driver pickup wait times. The maximum RPN value of 504 in the customer activity of awaiting the driver's

arrival and delivery to the selected destination makes it clear that drivers must accept orders based on proximity to the client. 4: Internet transportation services use VALSAT technology to solve supply chain problems has been proven.

Logistics management solutions may lower costs, improve supplier and customer collaboration, increase product and information visibility and traceability, and help all supply chain stakeholders, including end users, make decisions [30]. In response to demand, many enterprises have formed, such as ride-hailing apps. Online transport has evolved to address Indonesia's chaotic transit system. Non-users of internet transportation favor modern modes. Current 4.0 technology drives this inclination [31]. Green logistics is crucial to digitalization's environmental conservation. Additionally, enterprises and people should handle data storage and transmission security. Manual process control should be considered in the event of an information system failure [32]. System dependability is 89.24%, MTS response 96%, MTO responsiveness 62%, and cost 83.32%. Agility is 100%, asset management 79.63%. Health Insurance and Safety Tools scored 100% socially, Basic Allowance 70%, Annual Allowance 100%, Appropriate Work Hours 67%, and Reward

70%. Environmental conditions: temperature 100%, pH 62.0%, BOD 100%, COD 64.7%, TSS 7.4%. The Customer Order Decoupling Point (CODP) increased MTO Responsiveness performance by 8.25% in the improvement framework [45]. Standardized components can reduce schedule inconsistencies for both manufacturers and suppliers. Studies have shown that suppliers are more affected by uncertainty than manufacturers [46].

CONCLUSIONS

The implications of this study are as follows The online transportation service application should increase traceability to ensure that the order is delivered to the nearest driver to the client. Additionally, user-friendly features should be included. To improve application performance, developers could ideally boost the response time of the online transportation service application. This study focuses on the application of lean supply chain in Indonesian online transportation services, specifically Gojek and Grab. Other services offered by Gojek and Grab are not included in this study. Additionally, this study does not cover other existing transportation services. Gojek and Grab are popular among Indonesians. This study has not covered other tools that address the customer's voice, such as Quality Function Deployment (QFD), Service Quality, and Supply Chain Operation Reference (SCOR). In addition, the limitations in this study are respondents who are not homogeneous, limited research time, and limited research area . Investigating the adoption of lean supply chain in additional service businesses and public services is recommended. It is suggested to integrate lean supply chain technologies with additional tools such as Quality Function Deployment (QFD), Service Quality, and Supply Chain Operation Reference (SCOR).

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