Investigation and Analysis of Omni-channel Logistics Models: A Study in the Retail Industry in Indonesia

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Abstract: Retail industry has undergone several transformations over the years. There are three types of retail channel from a logistical perspective. The first type is single-channel logistics, where retail traders operate one sales channel and the logistic system is dedicated for one channel. The second type is multi-channel logistics, where retail traders use several channels, such as store and direct sales. The third type is omni-channel logistics, where retail buyers and traders do not differentiate channels. Shared logistics management is usually available through e-commerce and online sales. The objectives of this research are to investigate retail transformation trend from offline retail traders to multi/omni-channel logistics and identification of suitable business strategy. By using an empirical quantitative approach in the form of a survey, data from 114 electronic retailers have been collected, consists of 70 respondents are retail stores that have both offline and online stores and 44 respondents only have offline stores. The result of analysis shows that most retail transactions are offline transactions where buyers have to go to the retail stores to claim their products. However, there is enough empirical evidence that retail that use multi-channel and omni-channel logistics have better financial performance compared to offline stores only. Three critical factors have been identified to contribute to the total retail sales increase. Firstly, price discrimination in product delivery, secondly, the existence of dedicated resources (space and staff) that are optimally used in terms of work time efficiency and buyer service, and thirdly, the ability for consumers to see every goods or stocks in all retail shops/warehouses.

1 BACKGROUND

Retail has undergone several transformations over the years and encountered many shiftings. The main cause is as a result of the digitalization that is happening in business, transforming all processes and, as an effect, consumer behavior (Waker, Nääs, Duarte, & Papalardo, 2018). The internet has grown rapidly as a commercial tool for retail owners in conducting business. The advancement in technology and internet connection infrastructure that is easily accessible by smart phones has made Indonesian consumers increasingly confident in conducting online transactions. Consumers are increasingly shifting from offline transactions to online transactions. The size of the online shopping market in Indonesia continues to increase, estimated at 8.59 billion US dollars in 2018, up from 5.78 billion US dollars in 2016 (Statista, 2018). The trend of e-commerce has given rise to many new express shipping services. However, shipping services still have problems including imperfect shipping systems, poor service levels and inadequate customer databases, unimproved mode of operation, lack of scientific practice and efficiency in choosing patterns, shipping modes and packaging services.

Online retailing, also known as e-commerce, has dramatically increased the number of sales for the past two decades, both nationally and globally. These trends have prompted the immense development of Internet-based retail just as the difficulties and opportunities for the retail business. The Amazon drove the way, setting up an incredible upper hand over generally retailers. In June 2017, Amazon reported it had procured Whole Foods, an across the nation market chain in the United States, with almost 500 stores, for $ 13.7 billion in real money (Cusumano, 2017). It is also found that omni-channel shoppers' spending is 15-30 percent

bigger than traditional shoppers' (Murfield, Boone, Rutner, & Thomas, 2017).

This development has made traditional stores also move to sell online to compete with online retailers that do not have physical stores. There was an increase in slices between online and conventional retail, mainly due to the fact that traditional retailers expanded their activities to e-commerce, thereby increasing turnover from online sales. However, despite the expansion in online deals, physical stores continue acts as the primary shopping venue, and traditional stores adopt multi-channel strategies or omni-channel strategies by incorporating online sales into their business. Recent research by IBM (2015) has shown that combination of offline and online retail enable traditional stores to provide resistance to pure online retail traders. The study found that physical stores offer services that cannot be achieved by pure online retail traders using the right omni-channel model that requires digital integration throughout the organization.

Hübner, Holzapfel, & Kuhn (2016) defines three types of retail channel from a logistical perspective. The first type is single-channel logistics, where retail traders operate one sales channel and the logistic system is dedicated for one channel. The second type is multi-channel logistics, where retail traders use several channels, such as store and direct sales. Generally, multi-channel logistics have separated system for operation and logistic. Buyers get products either in the store or through direct delivery. Operational and logistical processes are not integrated. An example is retail traders who have offline stores and online stores that serve buyers without operational coordination or exchange of goods between channels. The third type is omni-channel logistics, where retail buyers and traders do not differentiate channels (Bell, Gallino, & Moreno, 2014; Brynjolfsson, Hu, & Rahman, 2013; Verhoef, Kannan, & Inman, 2015). Simultant logistics management is available, for example orders via e-commerce can be processed through an offline store or items in the store are used for shipping online sales. Figure 1 provides an illustration and the difference between the three types of logistics channels.
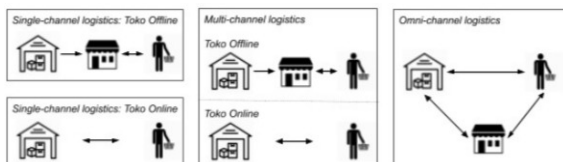
According to Zhang et al. (2018), the need to understand the multi-channel and omni-channel strategies is not new. Companies should be aware that besides managing their channels, they need to be aware of other strategies that will affect their performance. Regardless of the channels used, technology is crucial for retailers, specifically saying in how they sell their goods and deliver them. Technology enables a customer to connect with the business in "all routes and all areas", including website, smartphones, PC or laptop, on TV and in-store" (Saghiri, Wilding, Mena, & Bourlakis, 2017). Here, customers can submit their requests in a single channel, e.g., on a smartphone, then pick up the purchased product through another channel, e.g., home delivery, and return items in a third channel e.g., physical store (Brynjolfsson et al., 2013; Saghiri et al., 2017). The challenge is to build a business that utilize this multi channels including inside logistics coordination of retailers and in the structure and procedures of the store network/supply chain. It is also important to investigate why and how retailers use a single-channel logistics model to multi-channel and omni-channel logistics. In addition, there is an urgency to examine the logistics model (as a combination of logistical variables) that is optimally used by retail companies in implementing omni-channel logistics strategies. The study by PWC (2015) shows that omni-channel logistics strategies are very important for the success and prosperity of the future of the retail industry.

The objectives of this research are to investigate why and how offline retail traders move from single-channel logistics to omni-channel logistics and to identify what is the relevant business logistics model (as a combination of logistical variables) implemented by the company in applying omni-channel logistics strategy. The change in the business paradigm from brick-and-mortar business to online / internet business has caused problems in managing the logistics system and distribution of goods delivery. The omni-channel logistics concept is a new reference for winning the competition. Therefore, a comprehensive scientific study is needed to fully understand the ideal omni-channel logistics model in the Indonesian perspective and is highly competitive. Existing logistical models must be tested or validated for both endogenous and exogenous variables that influence the optimization of logistics management.

Figure 1. Types of Logistic Channels

2 LITERATURE STUDY

The use of the internet as a commercial media has developed rapidly, especially for retail traders in conducting business activities. These business activities, known as e-commerce, have managed to increase sales significantly over the past two decades in all major markets, both national and global. Zwass (1996) defines e-commerce as "business information disclosure, maintaining business relationships and conducting business transactions through telecommunications networks". E-commerce uses an electronic transactions payment system, generally through the internet or cellular media, where consumers use computers and smartphones to get information and shop online. E-commerce processes and activities are a union of business processes, information processes, payment processes and logistics (Xianglian & Hua, 2013).

Logistics is very important in the context of e-commerce business because it affects various performance -measures such as product and service availability, communication speed between buyers and sellers, lead time, scope of activities, flexibility and reliability of supply (Kadłubek, 2015). The study by PWC (PWC, 2015) mentions that there are three important conditions to be considered for the success of the omni-channel logistics strategy. First is the readiness of technological infrastructure. This readiness is assessed from the sophistication of network and communication technologies such as the use of mobile Internet broadband and smartphone penetration; services that offer products and product promotions to buyers according to where they are; sophisticated application that is able to provide depth of product information, buyer reviews and price comparisons. Second is the ability to meet high buyer expectations. Buyers may demand the same online shopping experience as shopping offline. Third is the readiness of retailers themselves. To run the omni-channel model, retail traders need to transform their thinking, including renewing organizational culture. They must be able to strategize and treat online and offline businesses as a whole. Likewise, system integration, application development and innovation to attract buyers into the company's ecosystem.

The large online shopping market in Indonesia has reached 7 billion dollars in 2017 and is projected to exceed 8.59 billion US dollars in 2018 (Statista, 2018). Table 1 shows media products, electronic devices, clothing and shoes, food and beverages, and home care are the five most dominant retail industry categories in online retail in Indonesia.

Table 1. Online Sales based on the Retail Industry Category

IDR billion	2015	2016	2017
Media product	8,153	11,129	14,306
Electronic devices	7,061	8,322	9,406
Clothes and shoes	4,859	5,708	6,080
Food and beverage	586	762	956
Home care	493	662	877
Health	478	556	629
Accessories	349.80	497.20	595
Beauty	313	393	440
Household appliances and furniture	243	314	399
Personal equipment	190	231	336
Improved home and garden	14	19	25
Animal care	12	18	25
Simple games	3.7	4	6.4
Hardware in the form of a game	0.4	0.4	0.5
Other online retail	3,773	7,199	12,486
Total online retail	26,535	35,822	46,573

The main activities in electronic commerce generally consist of payment and logistics information platforms (Hua & Jing, 2015). Logistics part in e-commerce is not only to support the platform or to engage the last link of e-commerce last link, it is also happened to be the most crucial factor in the success of e-commerce. However, once the necessary infrastructure is available, the biggest obstacle lies in the readiness of retail traders - or, in other words, in focusing on how customer experience it and their willingness to invest in a

certain technology that helps the adoption of omni-channel logistics strategies. (PWC, 2015). One of the most significant drivers for selling goods online is the best logistical strategy choice (Ghezzi, Mangiaracina, & Perego, 2012).

It is a general idea that logistics involves transferring physical goods from one location to another (Lummus, Krumwiede, & Vokurka, 2001). Logistics is the process of planning, implementing, and controlling the flow of efficient, effective and storage of goods, services and related information from the origin to consumption point for the destination according to the buyer's request. Joong-Kun Cho et al. (2008) stated that there is a positive relationship between logistics performance and company performance in the e-commerce market. Logistics performance here is an important requirement to produce superior company performance in the world of e-commerce.

From the literature studies that have been conducted, it can be summarized that there are three logistical model perspectives consisting of the Classical Logistics Model, the Logistics Model with the Integration of Functions and Processes, and the Omni-channel Logistics Model. The Classical or Traditional Logistics Model starts from the order transaction by the customer, continues with a trip to the store, picking up the goods which is continued from the distribution center, to a smaller distribution place, then directly to the destination (customer). The second logistics models have function & process integration (Saghiri et al., 2017). In the model, there are 4 main processes for logistics, namely Pre-Purchase (referring to integrated promotion), Payment (referring to transactions and integrated pricing), Delivery (referring to integrated order fulfillment), and Return (referring to reverse logistics).

The third is the omni-channel logistics model suggested in the study of Marchet, Melacini, Perotti, Rasini, & Tappia, (2018). The omni-channel logistics model shows four sets of processes, namely delivery services, distribution arrangements, fulfillment strategies and return management. In the delivery service process, there are four logistical variables, namely delivery mode, speed, time slot and slot price differentiation. Furthermore, in the distribution arrangement process there are three variables, namely choosing locations, shipping areas, and transportation services. In the third process, namely the fulfillment strategy, there are three variables consisting of automation, integration, and order allocation. Whereas for return management, there is the only logistics variable, namely the return mode.

Strategic Area	Logistics Variable	Options				
Delivery service	Delivery mode	Attended HD	Unattended HD	In-store C&C	Attached C&C	Solitary C&C
	Velocity	Same day		Next day	Two or more days	
	Time slot	Specific		Undefined		
	Slot price differentiation	Yes		No		
Distribution setting	Picking location	Central warehouse	Seperate fulfilment centre		In-store	
	Delivery area	Local	Regional	National	International	
	Transport service	Milk run	LTL - express courier	LTL - courier	FTL + local distribution	
Fulfilment strategy	Automation	Manual	Semi-automated		Fully-automated	
	Integration	Separated	Integrated		Capacity-optimised and integrated	
	Order Allocation	Static		Dynamic		
Returns management	Returns mode	No returns	CEP returns		In-store returns	

Figure 2. Omni-channel Logistics Model

Based on these three logistic models, we find that the omni-channel logistics model (Marchet et al., 2018) offers a more comprehensive logistic model for managing logistics management. This model has also been adapted to e-commerce, so that each variable is more suitable for e-commerce. In addition, because this model has just been published, this model is considered more suitable for the current situation.

3 METHOD

This study consists of four stages: first, the definition of the scope of the relevant research in the perspective of omni-channel logistics. Second, literature studies to understand the development of the latest research for the scope of research. Third, identification of gaps in existing studies to create research designs. The fourth and final stage is to carry out the research design.

This study uses an empirical quantitative approach in the form of a survey. Surveys are quantitative research methods that use a standard format, for example questionnaires, which are used to define or explain variables, and to analyze relationships between variables (Malhotra & Grover, 1998). The research framework was adapted from the study by Marchet (2018), consisting of four areas of the company's logistical decisions namely: shipping services, distribution arrangements, fulfillment strategies and return management. Each logistic decision field (also called endogenous variable) consists of different logistical variables (also called exogenous variables) that represent the

design parameters to be applied, with several options available for each variable. The first factor has 4 items that refer to Shipping Mode. While the second factor has 3 items that refer to distribution arrangements. The third factor has 3 items that refer to the fulfillment strategy, and the last is the fourth factor with 1 item that refers to the return arrangement.

The survey questionnaire prepared in this study will be distributed to the main respondents, namely companies engaged in the retail industry. The use of companies as respondents in logistics research was common in past studies, i.e. study by Joong-Kun Cho et al. (2008), Ghezzi et al. (2012), and Marchet (2018). The survey data obtained will then be analyzed using descriptive statistical analysis and parametric statistics to identify dominant factors and see the relationships between variables to get answers to the research questions set in the purpose of this study.

4 RESULTS AND DISCUSSION

This study, based on the results of a survey of traditional retailers, describes the extent and operational nature of their logistics operations and examines the statistical profile of traditional retailers. Differential demographic, behavioral, and attitudinal characteristics of respondents are provided. From 114 respondents, 70 respondents (or 61.4% of total respondents) are retail stores that have both offline and online stores. There are 42 respondents whose store profile are both offline and online have integration in fulfilling buyer's orders. This profile has the highest number of respondents compared to the other profiles and it represents 36.8% of total respondents. The other 28 respondents are stores that do not have integration between their offline and online-based operations. Then, there are 44 respondents that only have an offline store, either with no branches or with branches / warehouse. The distribution of respondents suits the objective of this research in the context of omni-channel logistics. Table 2 presents the respondents profile.

Table 2. Frequency distribution of respondents

	Frequency	Percentage
Offline only, no branches	23	20.2
Offline only, with branches or warehouse	21	18.4
Offline and online, with integration in fulfilling buyer orders	42	36.8
Offline and online, no integration in fulfilling buyer orders	28	24.6
Total	114	100.0

All respondents were retailers located in Great Jakarta area and focusing their business on electronic devices. Most are doing business in big shopping malls in central Jakarta and the rest are small street stores. From the total of 114 respondents, there were more male respondents than female respondents. There were 63 male respondents (55.3% of total respondents), while the remaining 51 people are female respondents (44.7% of total respondents). Table 3 presents the frequency of respondents job status. 71.9% respondents were permanent workers (82 people). This number is the highest number compared to other employment statuses. Then 13.2% respondents are part-time workers. There were also respondents who owned direct retail shop. These respondents were divided into 2, which were owners who worked full time (10.5%) and owners who worked part time (2.6%). Two respondents (1.8%) were relatives to the store owner. Therefore, 97 respondents (85.1%) whose status were workers and 15 respondents (13.1%) whose status were shop owners.

Table 3. Type of respondent's job status

Respondents job status	Frequency	Percentage
Store owner (work full time)	12	10.5
Store owner (work part time)	3	2.6
Family (Child, Wife, Close relative)	2	1.8
Permanent worker (Staff)	82	71.9
Part-time worker	15	13.2
Total	114	100.0

Customers of the respondents are end customers, resellers or both of them. Most respondents (69.3%) are retail stores that have both end customers as well as resellers. There are stores that only serve end customers (28.9%), while only 2 stores serve only resellers (1.8%). Table 4 presents type of product sold by respondents. From 114 respondents, there were 107 respondents who expressed their primary products and 98 respondents who also expressed their secondary products. For primary products, the highest number is handphone, followed by laptop, handphone accessories, computer accessories, PCs and laptop accessories. No respondents mention tablets for primary products. For secondary products, handphone accessories is the highest, followed by laptop accessories, computer accessories, laptops, PCs, mobile phones, and tablets. Therefore, it is reasonable to assume that the items that most often sold by our respondents from the survey results are handphone and handphone accessories.

Table 4. Type of product sold by respondents

Type of product	Primary	Secondary	Total
Handphone	40	9	49
Laptop	33	10	43
PC	9	10	19
Tablet	0	1	1
Handphone Accessories	11	34	45
Laptop Accessories	4	22	26
Computer Accessories	10	12	22
Total	107	98	

Handphone and Laptop are the two most popular products for electronic retailers. As can be seen from Table 5, offline and online stores without integration in fulfilling buyer's orders has the highest range of average revenue for both products. The second rank is offline only stores with branches / warehouses for hand phones and Offline and online stores with integration for laptops. Stores with the lowest average revenue is offline only stores without branches for both products. Thus, it is reasonable to assume that handphones and laptops are best sold in offline and online stores without integration in fulfilling buyer's orders.

The result of the analysis also shows that most transactions (80%) are offline, which means that buyers have to go to the retail stores to claim their products. Although offline and online stores without integration in fulfilling buyer's orders have the highest sales among other types of stores, only about 10% of the transaction is online transaction in which products are delivered to the customers. Multi-channel retailers tend to have bigger revenues than omni-channel retailers. The main reason of this phenomenon probably the multi-channel retailers are most likely big store, while omni-channel retailer is a novel thing in Indonesia; these stores tend to be in the development stage.

Table 5. Handphone and Laptop Sales per-Retailer

Type of Retailer	Average Monthly Sales (in hundred million Rupiah)	
	Handphone	Laptop
Offline only, no branches	2.80	2.25
Offline only, with branches or warehouse	5.18	3.00
Offline and online, with integration in fulfilling buyer orders	3.57	4.25
Offline and online, no integration in fulfilling buyer orders	5.90	4.82
Average	4.50	4.00

The next analysis is inferential statistics using SPSS. The first analysis is to test whether different types of store's profile have any differences on sales. Using ANOVA test, we find F-value = 3.967 and a small p-value = 0.01. It means at alpha 5%, reject the null hypothesis or there is at least 1 store's profile that has different amount of sales. Based on the descriptive statistics, offline and online stores without integration has the highest monthly revenue, which is Rp. 200-250 million and the lowest is offline only retailers without branches with range of monthly revenue Rp. 50-100 million. These suggest that omni-channel logistic system is not necessarily needed by retail stores in Indonesia. The result of hypothesis test can also imply that offline retail stores without any branch in Indonesia have two ways to increase their sales. The first way that can

be done is by opening branches or warehouses in different places. However, this first way is hard to be done due to the requirement of high capital. The second way that can be done is to open an online store to reach more customers in other places.

Table 6 presents further ANOVA test (Post Hoc Tests) using Tukey's HSD. Post Hoc Tests using Tukey's HSD which compare offline only retailers (no branch) with offline-online retailers (no integration) shows small p-value (0.007). This also confirms that retailers with offline only operations (single channel) have different sales performance compared to retailers that combine offline and online operations (multi-channel).

Table 6. Post Hoc Tests using Tukey's HSD

(I) Profile	(J) Profile	Mean Diff (I-J)	Std. Error	Sig.
Offline only, no branches	Offline only, with branches or warehouse	-1.827	0.786	0.1
	Offline and online, with integration in fulfilling buyer orders	-1.149	0.687	0.344
	Offline and online, no integration in fulfilling buyer orders	-2.451*	0.740	0.007

Dependent Variable: Monthly sales revenue
* The mean difference is significant at the .05 level.

The second hypothesis test is to understand delivery service where different types of retailers may have any differences in terms of time slot and price differentiation. Time slot means buyer may determine the hours / time when the goods will arrive at the buyer's place. Price differentiation in delivery service occurs when each selected time slot has a different price depending on the seller. After conducting ANOVA test, researcher get a p-value 0.099. Since the p-value is greater than alpha (0.05), we fail to reject H0. Thus, it can be concluded that every retailer does not have any differences in terms of slot time and price differentiation.

The third hypothesis test is to understand how retailers have any differences in the availability of dedicated resources (space and staff) to serve buyers. Since the p-value is less than alpha (0.05), it can be implied that researcher rejects H0 or there is at least one store type that has differences in the

existence of dedicated resources (space and staff) that are optimally used in terms of work time efficiency and buyer service. As seen from Table 7, it is the Offline and online, with no integration in fulfilling buyer orders. The descriptive statistics shows there are 50% offline and online stores without integration have optimally used dedicated resources in fulfilling buyer's orders. Researcher presumes that these stores have the most sales, but they do not have integrated stocks and systems between channels. Thus, it is necessary for those stores to have dedicated resources (space and staff) in order to stabilize their sales with their stocks and their lead times. On the contrary, offline and online stores with integration in fulfilling buyer's orders seem to be the least to use dedicated resources system. In fact, there are only 9.5% online and offline stores with integration use dedicated resources system. It is reasonable to assume that this type of stores does not need this dedicated resources because the stocks and systems between each channel are already integrated, enabling them to control the availability of stocks and lead times.

Table 7. Post Hoc Tests using Tukey's HSD

(I) Profile	(J) Profile	Mean Diff (I-J)	Std. Error	Sig.
Offline and online, no integration in fulfilling buyer orders	Offline only, no branches	.326*	0.109	0.018
	Offline only, with branches or warehouse	.357*	0.112	0.010
	Offline and online, with integration in fulfilling buyer orders	.405*	0.094	0.000

Dependent Variable: The availability of dedicated resources (space and staff) to serve buyers
* The mean difference is significant at the .05 level.

5 CONCLUSIONS

This study shows the extent and operational nature of logistics operations in traditional electronic retailers. Differential demographic, behavioral, and attitudinal characteristics of respondents are provided. Handphone and Laptop are the two most popular products for electronic retailers. Offline and online stores without integration in fulfilling buyer's orders has the highest range of average revenue for both products while stores with the lowest average revenue is offline only stores without branches for both products. The result of the analysis also shows that most transactions (80%) are offline, which means that buyers have to go to the retail stores to claim their products. Multi-channel retailers tend to have bigger revenues than omni-channel retailers. The main reason of this phenomenon probably the multi-channel retailers are most likely big store, while omni-channel retailer is a novel thing in Indonesia; these stores tend to be in the development stage.

After conducting an analysis test using the SPSS application, it can be concluded that there are 3 important factors that can increase total sales and revenues of retail stores. These 3 factors are time slots that have different prices in product delivery, the existence of dedicated resources (space and staff) that are optimally used in terms of work time efficiency and buyer service, and the ability for consumers to see every good / stock in all shops / warehouses (not limited in only 1 shop). In the Marchet table (2018), time slots with different prices is the "yes" option in the delivery service category with slot price differentiation logistics variable. The existence of dedicated resources (space and staff) that are optimally used in terms of work time efficiency and buyer service is the "capacity-optimized and integrated" option in the fulfillment strategy category with integration logistics variable. The last factor, which is the ability of consumers to see every good in all shops / warehouses, is the "dynamic" option in the fulfillment strategy category with order allocation logistics variable.

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