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## E-commerce expansion in the Japanese apparel market

### Abstract

The purpose of this study is to highlight the expansion of e-commerce (EC) in the Japanese apparel market and investigate the impact of online sales on the performance of the Japanese apparel makers. Descriptive statistics and a regression analysis are used to tackle this issue. The findings of this study are as follows. First, it was clarified that the EC penetration rate of the apparel market is greater than the average of Japan as a whole and this rate is increasing. It was also revealed that EC efforts of apparel companies have a significant positive impact on the performance for relatively large companies. This indicates that the EC efforts of apparel companies are an important strategy as the EC penetration rate continues to grow steadily in the Japanese apparel market.

Keywords: E-commerce, Japanese apparel market, Firm's performance, Regression analysis

### 1. Introduction

E-commerce (EC) is expanding rapidly today, and it has potential for removing geographical obstacles to economic growth in developing as well as in industrialized countries. (Gibbs *et al.*, 2003) The OECD regularly compiles reports on this in which it defines EC as follows: "An e-commerce transaction is the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online. An e-commerce transaction can be between enterprises, households, individuals, governments, and other public or private organizations." The OECD supplements that this definition includes "orders made in web pages, extranet or EDI," but does not include "orders made by telephone calls, facsimile, or manually typed e-mail." [OECD, 2011, p.72, Table 5.2.]

Based on this definition, Japan's Ministry of Economy, Trade and Industry (METI) compared the EC penetration rate of Japan with the United States and the United Kingdom; the EC penetration rates in the United States and the United Kingdom in 2018 were 9.85% and 20.67%, respectively, whereas in Japan they were only 6.22%. METI proposed the low penetration was because physical stores had become widespread and access to these stores were accessible in Japan, e.g., population per retail stores is 128 in Japan, 306 in the US, and 216 in the UK, indicating that the number of stores per capita is greater in Japan and relatively smaller in both the US and the UK.

Therefore, Japanese shopping behavior is more likely undertaken in physical stores than online. Not surprisingly, Japan has an EC market penetration rate around half that of the global average EC conversion rate of 14.1% in 2018. However, the size of the EC market has expanded around 2.5 times in the past 10 years (from 7.79 billion JPY in 2010 to 19.36 billion JPY in 2019), and corporate efforts toward EC will become, or have already become an unavoidable business strategy in Japan. [METI, 2020]

Even in the apparel industry, which is the subject of this paper's analysis, it is an unavoidable consequence of doing business and Japanese companies have to adopt a business strategy to respond to consumer demands stimulated by EC. Historically, the deregulation of the Large-scale Retail Law in 1990 led to the rapid expansion of large-scale retail stores and intensified price competition for products. (Matsuura and Sunada, 2009; Min, 1996) In the apparel industry, in order to avoid excessive price competition, apparel makers decided to strengthen their own brands and to expand their directly managed stores. This is the so-called SPA<sup>1</sup> in Japan, a vertically integrated business model, is actually an effective strategy for not only for large companies but also for SMEs. (Inoguchi *et al.*, 2012; Urakami *et al.*, 2009, 2010; Urakami and Wu, 2010, 2017; Wu, 2016, 2018) After the collapse of Japan's bubble economy in the early 1990s, the momentum of market competition has not diminished even due to the entry of foreign-affiliated companies. (Porter and Sakakibara, 2004) UNIQLO, one of the most successful big apparel retailer in the world, began to grow its business performance even in late 1990s, and its momentum accelerated sharply in the 2000s. (Usui *et al.*, 2017) In summary, in the 1990s, apparel makers first adopted a strategy of converting to a vertically integrated SPA by entering retail business (here after Maker-type SPA), and then in the 2000s, fashion retailers also adopted SPA strategy by developing their own private brands (PB) (here after Retailer-type SPA).

However, in the mid-2000s, pioneering apparel companies began to implement EC transactions such as online sales, which has expanded significantly since 2010. (Kubo, 2016) As a result, the management strategy of apparel companies has been shifting from multi-channel where companies manage both a physical store and a virtual store at the same time, to cross-channel/omni-channel where companies are integrating real and virtual store inventory management and customer management. (Jocovski *et al.*, 2019; Lazaris and Vrechopoulos, 2014; Mishra *et al.*, 2021)

There is a great deal of research on EC transactions in the apparel industry, especially online sales focusing on analyzing consumer intention and/or behavior. (Cho and Fiorito, 2009; Dawson and Kim, 2010; Goldsmith and Goldsmith, 2002; Ha and Stoel, 2012; Kang, 2019; Kang *et al.*, 2014; Kautish and Rai, 2019; Kautish and Sharma, 2018; Park and Stoel, 2005; Rahman and Mannan, 2018; Xu and Paulins, 2005) On the other hand, there are a number of studies evaluating the strategies of apparel companies. (Åkesson *et al.*, 2007; Campaniaris *et al.*, 2015;

Faizurrohman *et al.*, 2021; Fratto *et al.*, 2006; Su and Gargeya, 2012; Urakami *et al.*, 2009; Urakami and Wu, 2010, 2017; Wu *et al.*, 2018; Yu and Lindsay, 2011) However, no study has empirically revealed how online sales affect the performance of apparel companies.

Therefore, in this study, we will first give an overview of the historical transition of the Japanese apparel market, and then clarify the trend toward EC. Then, using the individual data of apparel makers, we will conduct an empirical analysis of clarifying how online sales affect corporate performance of apparel makers.

The paper is structured as follows: First, we describe the Japanese apparel market; Second, we summarize previous studies which have addressed online sales and management strategies in the apparel industry. Third, the method and data used in this analysis will be set out, followed by the results of the multiple regression analysis. The paper concludes by reviewing the results and the areas for potential future research.

## 2. Japanese apparel market

The textile and apparel industries were the most successful amongst other industries in Japan. (Yuasa, 2001) However, as in other developed countries, manufacturing functions have moved overseas in search of cheaper labor, and the domestic apparel manufacturing industry has declined. In addition, the retail business has become larger in scale due to the deregulation of the Large-scale Retail Law, so retailers and manufacturers are bypassing wholesalers entirely and dealing directly (this is so-called *Oroshi-no-Nakanuki* in Japan). This situation has been further spurred by the growth of logistics companies and the progress of information technology (IT). (Urakami *et al.*, 2009, 2010; Urakami and Wu, 2010)

Table 1 shows changes in the number of textile and apparel manufacturers, textile and apparel wholesalers, and apparel retailers based on *the Industrial Statistics* and *the Commercial Statistics* compiled by METI. In early 1990s, Japan's bubble economy collapsed, and its high economic growth period came to an end. However, the numbers of apparel manufacturers and all manufacturing companies are greater in 1991 than in 1972, however, the textile manufacturing industry has significantly reduced over the same period. However, in the latter half of the 1990s, competition in the apparel market intensified due to the import of cheap apparel products from overseas and the entry of overseas apparel companies, and the number of apparel manufacturers decreased sharply. Subsequently, the numbers of textile/apparel wholesalers and apparel retailers decreased, and in particular the share of textile/apparel wholesalers decreased dramatically from 12.3% in 1972 to 6.0% in 2016 due to the above-mentioned bypassing wholesalers, progress of IT and growing of logistics companies.

[Table 1. here]

Rapid changes in the market environment and intensifying market competition since the 1990s have been a major impetus for apparel companies to change their strategies. Figure 1 shows the transition of the Japanese apparel market environment. During the period of high economic growth in the 1980s, apparel companies imported luxury and designer brands from overseas and rapidly increased their sales. However, when the bubble economy collapsed in the early 1990s, while business performance continued to hang low, market competition remained fierce, and apparel makers owned and strengthened their own brands and switched to sales channels through directly managed stores. As already mentioned earlier, this vertically integrated business model developed by apparel makers is called Maker-type SPA. In 2000s, fast fashion such as Zara and H&M expanded rapidly in the Japanese apparel market, exposing the fashion retail market to further competition. To counter this movement, apparel retailers expanded the handling of their own private brands (PBs). (the apparel retailers that are strongly committed to apparel planning and manufacturing is called Retailer-type SPA.)

In the 2010s, the EC market expanded rapidly, and apparel companies entered the online sales in addition to sales in real stores (multi-channel), and gradually integrated online sales and in-store sales inventory management and customer management (omni-channel).

[Figure 1. here]

Table 2 shows the trends of BtoC-EC sales and EC penetration rates estimated by METI. BtoC-EC sales consists of three categories: product sales, service sales, and digital sales. As we can see from the table, the entire BtoC-EC market has continued to expand during the sample period, and the EC penetration rate of product sales is also increasing, and therefore EC is expected to expand in the future. Regarding the sales of apparel products, the situation before 2012 is unknown due to the change in the product category classification in 2013, but after 2013, the EC penetration rate for apparel product has exceeded the overall product sales. Moreover, the speed of EC apparel sales growth outperforms that of overall product sales. Therefore, it is expected that EC penetration rate for apparel products will continue to increase in the future, and it is thought that online sales are considered to be one of the important business strategies for apparel companies.

[Table 2. here]

### 3. Literature review

In the apparel industry, there are many previous studies analyzing EC, or online sales. Table 3 summarizes the previous studies regarding their purpose of the study, the samples used in the analysis, and the main findings. We can see from this table that most studies have analyzed the relationship between online sales and consumer intention and/or behavior with the data obtained from questionnaire surveys.

[Table 3. here]

Five out of nine studies conducted questionnaire surveys using college students (Goldsmith and Goldsmith, 2002; Ha and Stoel, 2012; Kang *et al.*, 2014; Park and Stoel, 2005; Xu and Paulin, 2005) revealing some interesting results which suggested online purchasing experiences facilitates the next purchase (Goldsmith and Goldsmith, 2002; Ha and Stoel, 2012; Park and Stoel, 2005), whereby the more people who use the Internet are those most likely to do online shopping (Goldsmith and Goldsmith, 2002; Xu and Paulin, 2005), brand familiarity and online reputation such as eWOM in SNSs for fashion products are significantly related to online shopping (Kang *et al.*, 2014; Park and Stoel, 2005), and etc. Cho and Fiorito (2009) analyzed online customization of apparel products using survey data from 300 female adults in the US and found that useful and competent websites can increase customer satisfaction with online customization. Two studies conducted outside the US (Kautish and Sharma, 2018 in India ; Rahman and Mannan, 2018 in Bangladesh) and Rahman and Mannan (2018) also verified that as in the US, online purchase experience and useful information perceived from the apparel website have a positive impact on additional online shopping. Kautish and Sharma (2018) focused on the convenience of the terminal when using the Internet, concluding that instrumental and terminal value significantly affect the fashion consciousness of online shopping. Another two recent studies also conducted questionnaire survey and collected data for the analysis (Kang, 2019; Kautish and Rai, 2019). Kang (2019) focused on social-local-mobile (SoLoMo) consumers and investigate the interrelationships among fashion lifestyle of SoLoMo consumers. The main result obtained in this article is that SoLoMo consumers' perceptions of the value of showrooming and webrooming are antecedents of their omnichannel shopping intention. Kautish and Rai (2019) conducted primary research in order to understand and discover Indian customers' experiences and insights about fashion portal service attributes, concluded that fashion consumers were influenced by the service convenience paradigms of fashion portals. Dawson and Kim (2010) conducted interview analysis rather than questionnaire surveys together with website surveys of apparel retailers to investigate the relationship between website content and corporate sales, concluding a significant positive correlation

between both these factors.

As for the apparel firms' strategy, there are many previous studies as well, and Table 4 summarizes the papers regarding their purpose of the study, the samples used in the analysis along with the main findings.

[Table 4. here]

Researchers conducted analyses on different strategies: outsourcing strategy (Åkesson *et al.*, 2007; Su and Gargeya, 2012; Yu and Lindsay, 2011), vertical integration/cooperation strategy (Campaniaris *et al.*, 2015; Urakami and Wu, 2010), brand strategy (Urakami *et al.*, 2009; Urakami and Wu, 2017; Wu *et al.*, 2018), pricing strategy (Fratto *et al.*, 2006), and digital business strategy (Faizurrohman *et al.*, 2021). Su and Gargeya (2012) found that strategic sourcing led to positive impacts on firm's performance, however Åkesson *et al.* (2007) and Yu and Lindsay (2011) argued that various sourcing strategies had different impacts on firm's performance and competencies (e.g., cost, quality, flexibility, and delivery). Both Urakami and Wu (2010) and Campaniaris *et al.* (2015) analyzed SME's vertical integration/cooperation strategy and Urakami and Wu (2010) found vertical integration did not always improve financial performance for large companies, and Campaniaris *et al.* (2015) found little evidence based on vertical cooperation. Urakami *et al.* (2009), Urakami and Wu (2017) and Wu *et al.* (2018) analyzed brand strategy in Japan and South Korea, concluding that owing brands turned out to be an effective strategy for both apparel wholesalers and manufacturers. Fratto *et al.* (2006) focused on competitive pricing strategy and found that apparel retailers and brands could be successful with a price tier strategy. Faizurrohman *et al.* (2021) tackled to analyze the gap between actual and expected conditions, to identify business environment factors, and to formulate digital business strategies. They concluded that internet was needed to increase the intensity of the company's market development, and digitization needed to be focused on market development.

So far, we have reviewed the research that analyzed online sales and the strategies in apparel industry. However, there are no previous studies which have empirically demonstrated the relationship between online sales implementation and the performance. In this regard, Šaković Jovanović *et al.* (2020) surveyed empirical analyses of EC and firm performance in industries other than the apparel industry. They stated that no certain conclusions had been reached about the relationship between EC and firm performance and pointed out that the effect of EC might vary across industries and distribution channels.

Therefore, in the following sections we will analyze whether online sales have improved the firm's performance using individual data of Japanese apparel makers based on the hypothesis below.



H<sub>1</sub> EC has a positive effect on firm performance.

#### 4. Method and Data

##### 4.1 Method

In this study, we adopt the simple multiple regression model used in Wu (2016)<sup>2</sup>. The regression equation is as follows.

$$\begin{aligned} Sales = & \alpha_{CONS} + \alpha_l Labor + \sum \beta_i Channel_i + \sum \beta_j Item_j + \gamma_k Dummy_k \\ & + \sum \gamma_{lk} Labor * Dummy_k \end{aligned} \quad (1)$$

Dependent variable (*Sales*) is defined as the index of a firm's performance, and we use the financial outcome of sales. Wu (2016) reviewed the variables of a firm's performance from previous studies by analyzing management strategies as published in *the Strategic Management Journal*, and clarified that there were so many kinds of performance indices being adopted e.g., sales, sales growth, asset growth, net income, ROA, ROE, stock market return, number of patents, etc. It was also pointed out that these were selected according to the purpose of the researcher's own analysis and the availability of data. Wu (2016) examined sales, sales per employee, sales growth rate, and profit growth rate as proxy variables for firm's performance available in the Japanese apparel industry and concluded that sales was the most appropriate. Therefore, sales will be used as a proxy variable for firm's performance in this study.

*Labor* is the number of employees and is adopted as a proxy variable for company size. *Channel* is the ratio of sales channels, and *Item* is the ratio of products handled. Wu (2016) adopted all these variables in her empirical studies, and she also used manufacturing types (in-house manufacturing, outsourced manufacturing, and mixed) and non-store sales channels (TV shopping, catalog sales) based on questionnaire surveys from Japanese apparel manufacturers. These additional variables cannot be used in this study due to limited data availability.

*Dummy* is a dummy variable for online sales and diversification. The main purpose of this analysis is to clarify how online sales affect firm's performance, so it is desirable to adopt the proxy variables of cross-channel and/or omni-channel which also accounts for inventory management and customer management. However, such information was unavailable in the published data we used this time, so this factor is an important issue for the future analysis, and further data is thus necessary. Therefore, we use only the information about the presence or absence of online sales and create the dummy variable. On the other hand, diversification strategy is generally discussed as an effective strategy for companies facing a declining industry,

and the Japanese textile industry is just that declining industry. (Itami, 2001) Therefore, we decided to examine the impact of diversification on the firm's performance based on the following hypothesis.

H<sub>2</sub> Diversification has a positive effect on firm performance.

As for the diversification variable, a dummy variable for the presence or absence of diversification is created in the same way as the variable for online sales. Furthermore, online sales and diversification may be affected by the size of the company, and in order to control this, we decided to adopt a cross term with the number of employees (*Labor \* Dummy*).

So far, we have constructed our model based on Wu (2016), but the present model has been improved to explicitly include the variable of online sales, which has not been done in the previous studies, to clarify its effect for the purpose of this study.

#### 4.2 Data and Variables

The data was sourced from the individual company data of Maker-type SPA companies listed in the "*Market Report of SPA Business*" compiled by Yano Research Institute Ltd. This database is published every year in principle, but a merged issue comprising data from two years may be published once every few years, therefore we have employed data covering four years 2007, 2011, 2014, and 2017. Furthermore, this database only contains basic company information: financial data of capital, sales, and profits, and other business data of the year established, business partner name, sales channel ratio, and product/item ratio. Unfortunately, there is no information on the status of EC transactions, the presence or absence of online sales, etc. Therefore, in this study, we supplemented the data of online sales and diversification by searching the websites of companies sampled from the 2017 database.

As mentioned earlier, number of sales is used as the dependent variable (*Sales*). As the explanatory variable, we first used the number of employees (*Labor*) as a proxy variable for the company scale. This number of employees includes both permanent and temporary employees. For the sales channel ratio (*Channel<sub>i</sub>*), it is defined as the ratios of directly managed stores (*i = OWN*), specialty stores (*i = SPC*), department stores (*i = DEP*), and mass retailers (*i = MAS*). The ratio of products handled (*Item<sub>j</sub>*) is defined as the ratio of men's clothing (*j = MEN*), women's clothing (*j = WMN*), and children's clothing (*j = KID*). For dummy variables (*Dummy<sub>k</sub>*), search the webpage of each company only in the most recent year and define online sales (*k = WEB*) and diversification (*k = DVR*) take 1 if there is an actual situation of online sales and diversification, otherwise 0. Descriptive statistics of all variables are shown in Table 5.

[Table 5. here]

The companies recorded in "*Market Report of SPA Business*" are not all companies represented by the industry as some of them were excluded because of bankruptcy. Therefore, we should be careful in generalizing and discussing the time-series changes of each variable. However, it is worth mentioning that the size of companies has dropped significantly since 2011, the year of the Great East Japan Earthquake. Furthermore, it is evident that 71.5% of the sample companies are conducting online sales. In addition, 15.8% of companies are implementing diversification, e.g., restaurant management, publishing business, media business, real estate business, etc.

## 5. Estimation Results

The program STATA MP Ver16 is used in our analysis and the coefficient estimates are shown in Table 6.

[Table 6. here]

First, a coefficient estimates of the number of employees ( $\alpha_i$ ), which is a proxy variable for company size is positive and statistically significant at 1% level in all cases. Therefore, when looking at the impact of other variables on firm's performance, it can be thought that the company size is controlled properly. Regarding sales channels, the coefficient estimates of the ratio of directly managed stores ( $\beta_{OWN}$ ) is negative in 2014 and statistically significant at 10% level. This is very interesting in that, as pointed out by Urakami & Wu (2010), SPA as a vertically integrated business model has been actively adopted by many apparel makers to avoid excessive price competition and increase added value of their own brands in Japan since the 1990s, but here the coefficient estimate is negative and statistically significant. The coefficient estimates are statistically insignificant and are positive in 2007 and 2011 but negative in 2017. This suggests that although the SPA business model could have been an effective business strategy to some extent until the early 2000s, sales at physical stores have become extremely difficult due to the subsequent expansion of the EC market. This is the same when looking at the coefficient estimates of specialty stores ( $\beta_{SPC}$ ), department stores ( $\beta_{DEP}$ ), and mass merchandisers ( $\beta_{MAS}$ ). For specialty stores, the coefficients are positive and statistically significant at 10% level in 2007, and for mass merchandisers it is positive and significant at 5% level in 2011, but otherwise no significant results have been obtained.

Coefficient estimates of the percentage of products handled show negative in all cases ( $\beta_{MEN}$ ,  $\beta_{WMN}$ ,  $\beta_{KID}$ ), with statistically significant results for men's clothing in 2011 and 2014 and for

women's clothing in 2007, 2011 and 2017. Many previous studies have shown that the Japanese apparel market is extremely competitive (Inoguchi et al., 2012; Urakami et al., 2009, 2010; Urakami and Wu, 2010, 2017; Wu, 2016, 2018), and the analysis of this study also revealed that all product groups are in extremely difficult conditions.

Regarding online sales, the single term model ( $\gamma_{WEB}$ ) does not show statistically significant results, but the cross-term model with company size ( $\gamma_{I*WEB}$ ) is positive and statistically significant at 1% level. This reveals that relatively large companies are improving their firm's performance by implementing online sales. (H<sub>1</sub>)

Regarding diversification, positive and significant results are obtained both in the single term model ( $\gamma_{DVR}$ ) and the cross-term model with company size ( $\gamma_{I*DVR}$ ). This is because, as we have mentioned many times, the apparel market is very competitive, and it is becoming very difficult for the apparel business to survive as a single entity while the market is in the maturity stage. Therefore, our analysis shows that there is a possibility that diversification could improve the firm's performance. (H<sub>2</sub>) However, since there are not many companies that are diversifying at this time, it is necessary to further deepen research on diversification between the apparel business and other businesses.

## 6. Conclusions

The purpose of this study was to clarify the expansion of EC in the Japanese apparel market and whether the EC efforts of apparel companies such as online apparel sales are affecting firm's performance.

As seen in Section 2, the EC penetration rates of Japan as a whole are still not high compared to other countries, but the EC penetration rates of the apparel market are greater than the market average, and its growth rate is also increasing. In other words, it is thought that EC initiatives will become an important strategy for not only for apparel retailers but also for apparel makers. In this study, we adopted a simple multiple regression model using individual company data of Maker-type SPA to verify whether EC efforts, specifically online apparel sales affect firm's performance. As a result, it became clear that the implementation of online sales has a positive impact on firm's performance in relatively large companies. This indicates that further strengthening of online sales will be an important management strategy for apparel companies as the EC market is expected to continue expanding in the future.

Despite of the significant contributions of this study, it is subject to some limitations. The database used in this study is publicly available, but the data availability is limited because it is not a complete survey and contains only basic data on finance and business. Further, the method adopted is a simple multiple regression model, which clarified the relationship between online

sales implementation and performance of apparel makers, but the implementation of online sales within the company, e.g., inventory management and/or customer management, and their impacts on the performance have not been clarified yet.

Therefore, it is necessary to examine further the fusion of online sales and physical stores as well as optimal inventory management and customer management and clarify the relationship between these and firm's performance. In addition, in the future, we would like to conduct a questionnaire survey of apparel companies to investigate the actual situation of EC efforts in more detail with cross-channel and omni-channel discussions and then try to analyze the impact of them on firm's performance.

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Note:

1 Donald Fisher, ex-CEO of The Gap, Inc., in 1986, defined the company's business category as 'Specialty store retailer of private label apparel', and was featured as 'SPA' in the Japan's fashion daily, THE SENKEN, published by the Senken Shinbun Company. (Yamazaki, 2007)

2 Hambrick (2007) noted that 120 articles were published in the 2005 volumes of the *Academy of Management Journal*, *Administrative Science Quarterly*, and *Organizational Science*, highlighting the fact that 100 percent of them contained some variation of the word "theory" in the text. Furthermore, only 78 percent of the 178 articles published in 2005 in the *Journal of Marketing*, *Journal of Finance*, and *Accounting Review* contained any such words. Hambrick cautioned that recent studies put too much emphasis on the theory, as well as pointed out the importance of researching fact-finding approaches. We recognize the importance of theory and will work on theory-based research from the stage of questionnaire design when conducting questionnaire surveys in the future. In this sense, this research is based on a fact-finding approach.



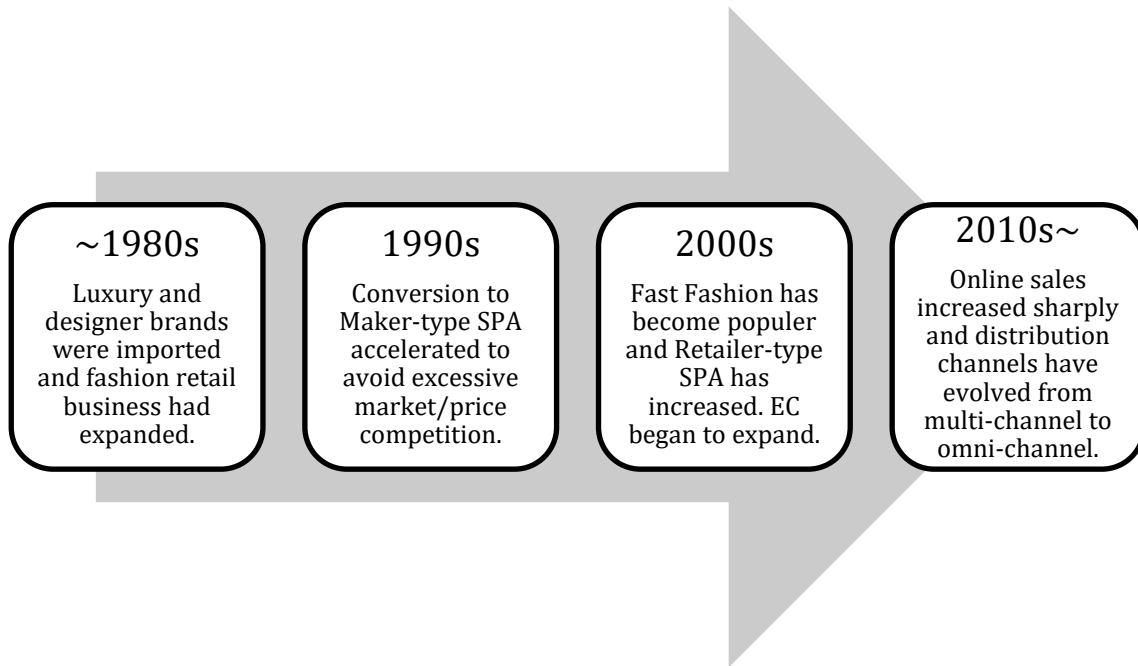


Figure 1. Transition of the Japanese apparel market environment

Table 1. Trends in the number of firms

	1972	1991	2007	2016
Manufacturer Total	421,156	430,414	258,232	191,339
	100%	100%	100%	100%
Textile Manufacturer	51,110	21,163	6,785	4,045
	12.1%	4.9%	2.6%	2.1%
Apparel Manufacturer	23,415	40,240	12,748	8,126
	5.6%	9.3%	4.9%	4.2%
Wholesaler Total	259,163	475,983	334,799	382,354
	100%	100%	100%	100%
Textile and Apparel Wholesaler	31,931	44,749	25,061	22,883
	12.3%	9.4%	7.5%	6.0%
Retailer Total	1,495,510	1,591,223	1,137,859	990,246
	100%	100%	100%	100%
Apparel Retailer	205,979	240,994	166,732	140,465
	13.8%	15.1%	14.7%	14.2%

Source: Census of Commerce, Census of Manufacture and Economic Census of Business Activity

Note: The figures of manufacturer show the number of firms with 4 employees or more.

Percentage numbers show the percentage against the industry total.

Table 2. BtoC-EC sales and EC penetration rates

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
BtoC-EC Total (in billion)	7,788	8,459	9,513	11,166	12,797	13,775	15,136	16,505	17,985	19,361
EC penetration rates (Product sales, %)	2.84	3.17	3.40	3.85	4.37	4.75	5.43	5.79	6.22	6.76
BtoC-EC Apparel (in billion)	-	-	-	1,164	1,282	1,384	1,530	1,645	1,773	1,910
EC penetration rates (Apparel, %)	-	-	-	7.47	8.11	9.04	10.93	11.54	12.96	13.87

Source: E-Commerce Market Survey

Note: - data is not connected because the classification of products before 2012 is different from that of after 2013.

Table 3. A survey of previous studies regarding apparel online sales

Author	Purpose	Sample	Main Findings
Goldsmith & Goldsmith (2002)	Investigate different characteristics between consumers who have purchased apparel online, or those not	263 men and 303 women students US	Online buyers were more likely to buy online in the future than non-buyers; age, sex and race were unrelated to online apparel buying.
Park & Stoel (2005)	Examine the effect of brand familiarity and previous shopping experience on perceived risk and purchase intention	166 students US	Brand familiarity and previous shopping experience have a significant impact on perceived risk and purchase intention
Xu & Paulins (2005)	Study college students' attitudes toward and behavioral intention of shopping online for apparel products	347 in rural university, 323 in urban university US	Internet usage, employment status, and car access had significant influence on students' attitudes toward online shopping
Cho & Fiorito (2009)	Identify the determinants of successful customization of apparel in e-retailing and to provide managerial suggestions	300 female adults US	Customers recognize the benefits of online customization of apparel when they perceive the website to be useful and competent
Dawson & Kim (2010)	Investigate whether the external cues on apparel web sites encourage impulse buying	15 participants, 60 apparel web sites US	Positive relationship existed between retailers' web sales and the number of external cues present on their web sites
Ha & Stoel (2012)	Examine e-shopping quality factors influence consumer shopping outcomes	298 college students US	Functionally and experiential quality have significant impact on e-shopping satisfaction/intention
Kang et al. (2014)	Examine whether the opinion seeking in SNSs relates to decision making of purchasing apparel products online	304 college students US	Novelty/fashion consciousness decision-making was highly correlated with the opinion seeking using eWOM in SNSs
Rahman & Mannan (2018)	Investigate the influence of information adoption, online brand experience, etc. on consumer purchase behavior	273 questionnaires Bangladesh	Consumer information adoption and online brand experience were found to influence consumer online purchase behavior positively
Kautish & Sharma (2018)	Examine the relationships among instrumental and terminal values, fashion consciousness and behavioral intentions	395 responses India	Fashion consciousness is significantly affected by instrumental and terminal values, and has a significant impact on behavioral intentions
Kang (2019)	Investigate the interrelationships among fashion lifestyle of SoLoMo consumers	601 SoLoMo consumers US	SoLoMo consumers' perceptions of the value of showrooming/ webrooming were antecedents of their omnichannel shopping intention
Kautish & Rai (2019)	Understanding and discovering Indian customers' experiences and insights	215 questionnaires India	Fashion consumers are influenced by the service convenience paradigms of fashion

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about fashion portal service attributes

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Table 4. A survey of previous studies regarding apparel firm's strategy

Author	Purpose	Sample	Main Findings
Fratto et al. (2006)	Investigate competitive pricing strategies of apparel brands and retailers	3 retail/brand firms US	Retailers and brands can be successful with a price tier strategy, unless they fail to differentiate between tiers on factors
Åkesson et al. (2007)	Examine how various sourcing strategies are related to the apparel firm's characteristics and performance	116 firms Sweden	The most frequently applied strategy is sourcing directly from manufacturers in Asia; however, the performance varies for different strategies
Urakami et al. (2009)	Examine what factors affect the recent trend of having self-planning functions within Japanese apparel wholesalers	3,008 apparel wholesalers Japan	Large wholesalers in urban areas tend to have their own planning functions, whereas small wholesalers in rural areas tend not to have self-planning functions
Urakami & Wu (2010)	Investigate the characteristics of apparel wholesalers who own or intend to establish specialty private label stores	3,008 apparel wholesalers Japan	Large wholesalers tend to own specialty private label stores, but they experience a worse financial outcome
Yu & Lindsay (2011)	Clarify the impact of international outsourcing on manufacturing strategy and performance	6 manufacturing firms New Zealand	International outsourcing has both positive and negative effects on the firm's competencies, e.g., cost, quality, flexibility, and delivery.
Su & Gargeya (2012)	Examine how strategic outsourcing and sourcing capability impact firm performance	152 firms US	Strategic sourcing leads to greater emphasis on sourcing capability and positively impacts firm performance
Campaniaris et al. (2015)	Determine whether a cluster strategy is being applied or applicable to Canada's apparel companies	36 apparel SMEs Canada	Little evidence was shown as favoring cluster development as a strategic response for the Canadian apparel SMEs
Urakami & Wu (2017)	Highlight the own brand strategy of Japanese apparel manufacturers and illuminate the characteristics	1,211 manufacturers Japan	Apparel manufacturers having access to external designers; collecting information relating to consumer needs tend to have their own brands
Wu et al. (2018)	Identify factors affecting the own brand strategies adopted by Japanese/Korean apparel manufacturers	1,211/308 manufacturers Japan/South Korea	Large apparel manufacturers in South Korea and relatively small apparel manufacturers in Japan tend to have their own brands
Faizurrohman et al. (2021)	Analyze the gap between actual/ expected conditions, identify business factors, formulate digital business strategies	n.a. Cikarang, Bekasi, West Java, Indonesia	Internet is needed to increase the intensity of the company's market development, and digitization needs to be focused on market development.

Table 5. Descriptive Statistics

Variable	Unit	2007			2011			2014			2017		
		Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
<i>Sales</i>	billion JPY	18.3	0.1	331	18.6	0.4	330	20.4	0.1	282	18.3	0.55	243
<i>Labor</i>	person	601	10	11,203	587	3	8,989	729	3	18,986	805	3	21,675
<i>Channel<sub>OWN</sub></i>	%	34.4	0	100	37.1	0	100	35.2	0	100	30.7	0	100
<i>Channel<sub>SPC</sub></i>	%	5.5	0	85	14.3	0	94	13.7	0	94	14.3	0	94
<i>Channel<sub>DEP</sub></i>	%	13.7	0	94	8.0	0	85	7.7	0	100	6.6	0	76
<i>Channel<sub>MAS</sub></i>	%	7.1	0	76	4.0	0	70	4.2	0	80	5.3	0	80
<i>Item<sub>MEN</sub></i>	%	12.1	0	262	12.5	0	100	12.4	0	100	12.1	0	100
<i>Item<sub>WMN</sub></i>	%	46.5	0	100	49.2	0	100	52.6	0	100	47.4	0	100
<i>Item<sub>KID</sub></i>	%	4.8	0	100	5.6	0	100	7.1	0	100	5.9	0	100
<i>Dummy<sub>WEB</sub></i>	0,1	-	-	-	-	-	-	-	-	-	0.715	0	1
<i>Dummy<sub>DVR</sub></i>	0,1	-	-	-	-	-	-	-	-	-	0.158	0	1
n	firm	216			206			197			158		

Note: n is the number of firms in the database for the year, and there were cases that some observations were excluded in the calculation of the statistics due to missing data.

Table 6. Estimation Results

parameter	2007		2011		2014		2017		2017		2017	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
$\alpha_{CONS}$	12.305	4.584 ***	17.874	5.996 ***	21.017	4.645 ***	20.079	4.138 ***	17.158	5.051 ***	25.014	4.447 ***
$\alpha_l$	0.017	0.002 ***	0.016	0.002 ***	0.014	0.001 ***	0.009	0.001 ***	0.008	0.001 ***	-	-
$\beta_{OWN}$	0.093	0.059	0.062	0.071	-0.114	0.059 *	-0.086	0.062	-0.097	0.063	-0.109	0.066
$\beta_{SPC}$	0.215	0.124 *	-0.056	0.117	-0.060	0.095	-0.075	0.091	-0.066	0.091	-0.101	0.097
$\beta_{DEP}$	0.074	0.093	0.136	0.152	-0.113	0.120	-0.099	0.121	-0.133	0.121	-0.117	0.130
$\beta_{MAS}$	-0.013	0.126	0.466	0.184 **	0.147	0.131	0.166	0.132	0.168	0.133	0.146	0.141
$\beta_{MEN}$	-0.079	0.066	-0.216	0.098 **	-0.116	0.079 *	-0.102	0.082	-0.099	0.081	-0.123	0.088
$\beta_{WMN}$	-0.170	0.054 ***	-0.201	0.067 ***	-0.110	0.057	-0.080	0.056	-0.073	0.055	-0.106	0.060 *
$\beta_{KID}$	-0.124	0.110	-0.163	0.133	-0.118	0.091	-0.098	0.093	-0.107	0.092	-0.140	0.099
$\gamma_{WEB}$	-	-	-	-	-	-	-	-	2.245	4.369	-	-
$\gamma_{DVR}$	-	-	-	-	-	-	-	-	10.485	5.177 **	-	-
$\gamma_{l*WEB}$	-	-	-	-	-	-	-	-	-	-	0.006	0.002 ***
$\gamma_{l*DVR}$	-	-	-	-	-	-	-	-	-	-	0.008	0.001 ***
n	181		169		150		145		145		145	
R <sup>2</sup>	0.499		0.407		0.678		0.501		0.517		0.437	
adjusted R <sup>2</sup>	0.476		0.378		0.659		0.471		0.481		0.399	

Note: \*p&lt;0.1, \*\*p&lt;0.05, \*\*\*p&lt;0.01