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An Empirical Analysis of Category Extension in the Online Luxury Fashion Market

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Abstract The purpose of the present study is to reveal the actual circumstances of brand extension in the luxury fashion market by shedding light on category extensions and their relationship to the pricing strategies of each fashion brand. To perform a comprehensive empirical analysis of luxury fashion products, the study analyzed 308,154 unique products from 2,513 individual brands sold on online platforms. The study further estimated product sales according to brand category and sub-category. The research results reveal how estimated sales for clothing, bags, footwear, accessories, and jewelry confirm the fact that horizontal brand extension for luxury fashion brands result in increased sales. Furthermore, the estimated sales by sub-category reveal a complementary relationship between flagship products and affordable products. These complementary relationships enable a diagonal brand extension that prevents brand dilution and cannibalization. In short, the results reveal how effective brand extension reflects brand equity, which in turn is useful for the growth of emerging brands. Existing studies on the brand extension of luxury fashion products were limited to a consumer-centered approach, but the present study is significant in that it quantitatively analyzes brand extension for luxury brands in the online market.

Keywords Brand extension, Luxury fashion brand, Online fashion platform, Estimated online sales

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Introduction

The worldwide private luxury market, including clothing, bags, footwear, watches, jewelry, perfume, and cosmetics, reached 281 billion euros in value in 2019, with a 7.0% compound annual growth rate (CAGR) (Bain & Company, 2020) driven by rapid economic growth in emerging countries. Tangible and intangible value-added features are significant factors as they fascinate consumers and shape luxury products (Ross & Harradine, 2011). However, these are quite different from commodities characterized by high quality but low prices. The fashion market has often been modeled as a pyramidal structure comprising several layers (Kapferer, 1997). In the top luxury market layer, conglomerates such as Moët Hennessy Louis Vuitton (LVMH) and Kering—with many luxury brands under their corporate umbrellas—have been commercially successful thanks to their sophisticated brand management (Cavender & Kincade, 2014; Donzé, 2018).

Since the 1970s, brand extension has been a well-known marketing strategy (Morein, 1975); it has also

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played a significant role in helping luxury brands expand their business (Stegemann, 2006). Downscale brand extension launches new low-priced products, with the potential to have a negative impact on luxury brands (Aaker, 1997; Magnoni & Roux, 2012) by way of dilution and cannibalism. With regard to brand extension, research topics focus on case studies concerning specific products and brands (e.g. Aaker, 1990; Birtwistle & Moore, 2005; Moore & Doyle, 2010) or statistical analysis of consumer behavior (e.g. Aaker & Keller, 1990). Findings for case studies on commodities are not entirely adequate for luxury fashion products. Findings concerning consumer behavior dependent on product category and brand are not entirely adequate for luxury fashion products. Although new challenges have been made to explore complicated brand extensions by considering varied, multiple conditions (Boisvert & Ashill, 2018; Childs, Jin & Tullar, 2018; Dall'Olmo Riley, Pina & Bravo, 2013), these challenges have failed to deal with diverse brands.

Existing studies related to the brand extension of fashion brands can be classified as consumer behavior analyses (e.g. Childs et al., 2018; Dall'Olmo Riley et al., 2013) and case studies on marketing strategy for fashion brands (e.g. Moore & Birtwistle, 2004; Moore & Doyle, 2010). With regard to consumer behavior analyses, research questions derived from the relevant studies were quantitatively verified by questionnaire surveys. However, fashion brand behavior, i.e., marketing strategies for fashion brands, was yet to be quantitatively analyzed. Case studies focusing on several fashion brands are useful for understanding the dynamics of markets comprised of consumers and producers although it is difficult to generalize these findings. Therefore, this paper aims at unveiling the dynamics of the luxury fashion market in terms of producers, based on online retail analysis.

Our knowledge, in terms of brand extension carried out for luxury fashion brands, is fragmental and incomprehensive. To reveal the actual situation of brand extension in the luxury fashion market, the study sheds light on category extension (Morein, 1975; Tauber 1981) and its relationship to the pricing strategy of the respective fashion brand. The main drawbacks of brand extension are categorized as dilution of brand image (e.g. Loken & Roedder-John, 1993), damage to brand equity (Aaker, 1997; Keller, 1993; Kim & Lavack, 1996), and cannibalization of main and sub-brands as well as product lines (Aaker, 1990; Faqruhar, 1989; Kim & Lavack, 1996). In terms of consumer behavior, studies have discussed flagship products that prevent the dilution of brand image (John, Loken & Joiner, 1998), distancing techniques that prevent damage to brand equity (Kim, Lavack & Smith, 2001; Reddy, Terblanche, Pitt, & Parent, 2009), and sub-branding strategies that prevent cannibalization (Kirmani, Sood & Bridges, 1999). The range of brands and products were limited in these consumer behavior analyses due to the feasibility of the questionnaire surveys. Despite the rational results obtained by academically sophisticated techniques within limited conditions, questions persisted about their generalization. This paper sheds light on the online market of luxury fashion and aims at revealing how luxury fashion brands can prevent the drawbacks of brand extension.

The rest of this paper proceeds as follows. Section 2 briefly reviews the brand extension literature, as brand extension is a complicated concept comprised of various marketing strategies that require rearrangement. Section 3 describes the online retail of luxury fashion products and introduces sources and data. Sections 4 and 5 propose sales analysis, disclosing the results. Section 6 discusses brand extension for representative luxury fashion brands and concludes the study.

Literature Review

Brand Extension

Since the 1970s, brand extension has been a well-known marketing strategy for increasing the sales revenue of various products including luxury fashion products. In brand extension, the efficient reuse of existing supply chains and distribution channels, as well as effective marketing communications vis-à-vis advertising and public relations based on the core brand's popularity, suppresses investment costs and the risk of failure. Brand extension is a comprehensive concept that comprises line extension, category extension (Farquhar, 1989) and brand name extension (Tauber, 1981). Figure 1(a) formulates a brand extension matrix composed of category and brand name factors, wherein each factor was sub-divided into new and existing elements. Horizontal and vertical axes were introduced to overlook brand extension (Kim & Lavack, 1996; Kim et al., 2001; Pitta & Katsanis, 1995). The horizontal axis unifying line and category extensions indicates the distance from the core product to the extension. However, the horizontal axis should be subdivided into a product distance axis and a brand name distance axis, as shown in figure 1(b). The vertical axis indicates the price and quality of products; the vertical extension is divided into upscale (step-up) and downscale (step-down) brand extensions.

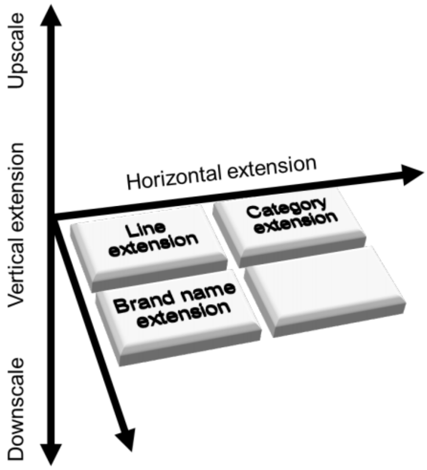
Line Extension. In the context of a competitive environment such as a saturated market as a result of oversupply, increased advertising, and promotion expenses, companies have introduced line extensions that launch new products in existing category markets using well-known brand names (Morein, 1975). In line extension, well-known brand names suppress advertising and promotion expenses. Furthermore, existing categories do not need to create new supply chains (Aaker, 1990; Morein, 1975). An example of line extension for luxury fashion brands is the expansion of variants of the core product within the same category.

Market growth in a category is limited (Morein, 1975); cannibalization often occurs between products in the same brand within a category (Aaker, 1990; Farquhar, 1989; Tauber, 1988). Excessive line extension propels filler products that make insignificant contributions to revenue while increasing stock keeping costs (Quelch & Kenny, 1994). Downscale line extension launches low-priced and low-quality products and dilutes consumer beliefs about the brand (Aaker, 1997; Loken & Roedder-John, 1993), harming brand equity (Randall, Ulrich & Reibstein, 1998). The downscale line extension of luxury brands, in contrast to that of non-luxury brands, negatively impacts brand equity (Hennigs, Wiedmann, Behrens, Klarmann & Carduck, 2013; Magnoni & Roux, 2012).

Category Extension. Category extensions that launch new products in a new category of expected market growth by using a well-known brand name are introduced with the purpose of overcoming limited market growth in a category (Morein, 1975; Tauber, 1981; Tauber, 1988). In category extension, well-known brand names reduce the amount of newly required investment and reuse brand equity. Category extension often licenses the brand name to other companies

		Category	
		Existing	New
Brand name	Existing	Line Extension + suppression of newly required investment - limited market growth in a category - cannibalization in the same brand - harmful effect of filler products - dilution by low-priced and low-quality product	Category extension + suppression of newly required investment + unlimited market growth in a different category + effective for prestigious brand - strong connection with the core products inhibit association - negative impact by the isolation from the core product - excessive extension tarnishes the brand image
	New	Brand name extension + effective distancing technique to avoid drawbacks of line and category extensions - difficult to establish brand awareness - cannibalization between parent and sub-brands	

(a) Brand extension matrix



(b) Spatial model of brand extensions

Figure 1. Brand extension model

that produce the product in a new category (Aaker, 1990; Tauber,1988;). Successful category extension requires similarity and perceived fit with the core product (Aaker & Keller, 1990; Broniarczyk & Alba, 1994; Eren-Erdogmus, Akgun & Arda, 2018; Park, Milberg & Lawson, 1991), congruency of perceived quality (Aaker & Keller, 1990), and consistency of brand identity (Viot, 2011). Category extension fits prestige brands that launch high-quality products (Keller & Aaker, 1992; Park et al.,1991; Reddy et al., 2009) by having the brand name remind consumers of the prestigious brand's unique, positive traits (Park et al., 1991). A cohesive product portfolio shows that categorizing Louis Vuitton, Cartier, and Hermes into star brands is very important for the category extension of luxury fashion brands (Reddy et al., 2009). The category extension of luxury fashion brands is often shown in watch products produced by OEMs.

A strong connection between a core product and its brand image inhibits the association between the core product and the extension (Aaker, 1990; Tauber, 1981). For example, the commercialization of business suits by the casual fashion brand Levi's is an identifiable example of category extension failure (Aaker, 1990). Category extension, isolated from the core product that represents the brand, negatively impacts consumers (Milberg, Park & McCarthy, 1997). Excessive category extension dilutes its association with the core product (Tauber, 1981) and tarnishes the brand image (Reddy et al., 2009).

Brand Name Extension. Distancing techniques play a significant role in avoiding the failure of downscale line and category extensions—i.e., the cannibalization of products and extensions and dilution of and negative impact on the brand (Aaker, 1997; Kim et al., 2001). Downscale line extension by low-priced, limited-function products is effective for function-oriented products (Pitta & Katsanis, 1995). However, it is not effective for prestige-oriented products due to the negative impact of low-priced, low-quality products. The negative impact caused by downscale line extension increases the risk of losing existing consumers (Kim & Lavack, 1996; Kirmani et al, 1999, Pitta & Katsanis, 1995), a serious threat to luxury fashion brands. Brand name extension is introduced as a distancing technique that helps avoid these issues. A typical brand name extension includes the parent brand name in the sub-brand name—e.g., See by Chloé and RED Valentino contain the parent brand name.

It is difficult for brand name extensions to establish brand awareness by creating sub-brands (Aaker, 1997). In luxury fashion brands, cannibalism between parent brands and sub-brands has caused the discontinuation of these sub-brands—e.g., D&G, a sub-brand of Dolce and Gabbana, and Marc by Marc Jacobs, a sub-brand of Marc Jacobs.

Online Retail of Luxury Fashion Products

Distribution Channels

The management of fully controlled product distribution channels is an important factor for luxury fashion brands as it helps them create value-added features such as prestige, exclusivity, and extraordinary experiences (Kapferer & Bastien, 2009; Keller, 2009). Figure 2 classifies distribution channels for luxury fashion products, based on a case study about Burberry's distribution channels (Moore & Birtwistle, 2004) and its share of distribution channels (Bain & Company, 2020).

Primary distribution covers unused products, brand-new products, and products newly in stock. Secondary distribution includes second-hand products previously used by consumers. The diagram in Figure 2 sub-divides primary distribution channels into directly managed stores, distributors, and online retailers. Directly managed stores include flagship stores, regular price retail stores, department store concessions, and designer outlet factory stores. In Figure 2, the sales product range determines the vertical position of each distribution channel. The top flagship stores carry all of a brand's products. However, the designer outlet factory stores also sell a limited number of discounted luxury brand products. Distributors include department stores, specialty stores, and airport duty-free shops.

Online retailers comprise official online stores, multi-brand online stores, online platform services, and online auction services for products newly in stock. Multi-brand online stores, such as Net-A-Porter and Yoox,

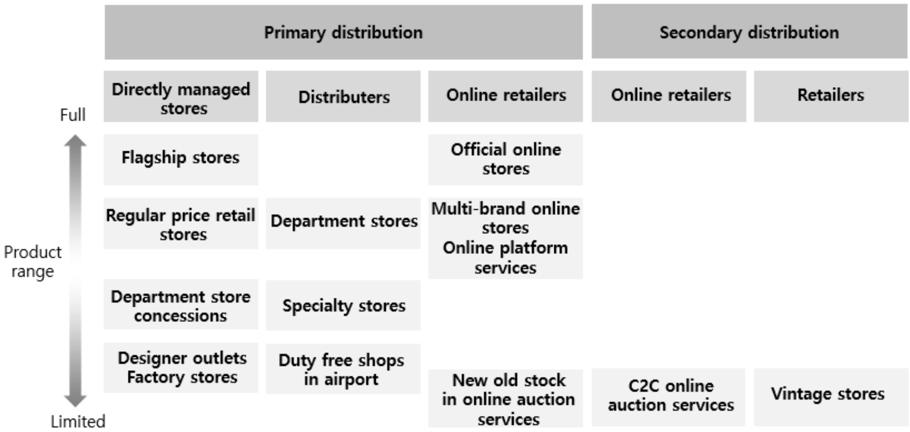


Figure 2. Distribution channels for luxury products

sell many luxury fashion brand products. The online platform Farfetch aggregates independent online retailers and sells many different products produced by various luxury fashion brands. Luxury fashion products newly in stock are often sold through online auction services such as eBay. In secondary distribution, online stores include consumer-to-consumer (C2C) online auction sites and online consignment services. For example, The RealReal, a major online consignment service, receives and sells second-hand luxury fashion products through its online store, attracting interest from consumers thanks to its environmentally positive influence (reducing carbon dioxide (CO_2) emissions and water consumption by promoting product recycling). Retailers in secondary distribution channels also include conventional vintage stores.

According to the Bain and Company's 2020 market analysis, directly managed stores and online retailers each accounted for 31% and 12% of the luxury market in 2019. Nevertheless, directly managed stores and online retailers reported CAGRs of 12% and 22% respectively. Therefore, the current market share of online retailers is not as large as it could be. Notwithstanding, its increasing CAGR indicates rapid growth. Moreover, multi-brand online stores and online platform services in the online retailer category offer to sell many luxury fashion brands, representing a significant advantage in terms of exploring the luxury fashion market.

Online Platform Service

Farfetch is an online platform service founded in 2008. It provides and operates an online marketplace for independent retailers. By 2019, Farfetch acquired 1.7 million active users and achieved US$1.5 billion in gross merchandise volume (GMV), a figure 5.3 times larger than its 2015 GMV. The CAGR of its GMV between 2015 and 2018 was 55% per year (Jordan, 2019). The distinctive feature of the Farfetch platform is its external dependency for stock management notwithstanding the fact that the online platform service manages order processing and distribution tasks by itself. This business model isolates non-scalable functions that are limited by physical constraints and focuses on enhancing scalable functions using information technology. For example, the possible number of products in stock is physically limited by the size of its warehouses and distribution capability. However, Farfetch can increase the number of products sold on its online platform without being limited by the physical constraints of stock management. Specifically, Farfetch is able to maintain 300 million stock keeping units for more than 3,200 brands, a feat previously unattained by any multi-brand online store featuring stock management (Jordan, 2019).

A key factor in modern services such as mobile phones and social network services, network externality is used by a huge number of users to improve the usability and convenience of said services (Katz & Shapiro, 1985). Although, at a glance, the Farfetch online platform might be similar to multi-brand online stores such as Net-A-Porter and Yoox, it differs in terms of scalability. This fact allows Farfetch to vastly increase the number of its products and users, creating new value fundamentally different from existing multi-brand online stores. Therefore, this study selected Farfetch as the source for deriving luxury fashion product data with the purpose of conducting an empirical analysis.

Sales Analysis

Estimation of Sales

This study investigates product attributes such as brand and product names, product categories and sub-categories, regular and sales prices, and number of items in stock. These product attributes can be found on webpages that describe the Farfetch online platform service. Because it was impossible to check Farfetch's purchase and payment information from the data on its webpages, the study estimates the sales of each product using said product attributes to analyze the online luxury market.

Web pages for products on online retailers include product name, regular price, sales price, and number of products in stock. Some variables may often not be visualized on the rendered webpage, and the source files denote these variables. Analysis of these variables allows us to estimate sales for a huge number of products. For example, one decrease in the number of stock means that one product was sold. Hence, sales revenue from a product can be estimated by multiplying the decrease in the number of products in stock and the selling price.

This study reveals the sales price and the number of stocks for item i at time t by $x_{sp,i}(t)$ and $f_i(t)$, respectively. The temporal derivative of the items in stock $df_i(t)/dt$ shows changes in stock. If it is assumed that the total sales of item i is calculated by the product of its selling price, $x_{sp,i}(t)$, and the decrease in the number of items in stock, $-df_i(t)/dt$, then the estimated sales $s_i(t)$, can be calculated using the following formula:

$$s_i(t) = \begin{cases} 0, & \left(\dfrac{df_i(t)}{dt} \geq 0\right) \\ -x_{SP,i}(t)\dfrac{df_i(t)}{dt}, & \left(\dfrac{df_i(t)}{dt} < 0\right) \end{cases} \tag{1}$$

In Equation (1), $s_i(t)$ indicates the multiplication of the sold price and the number of sold products. If the number of items in stock increases, $df_i(t)/dt \geq 0$, the estimated sales $s_i(t)$ do not reflect this change. The total sales of item i between $t = t_0$ and $t = t_1$ can be calculated using the definite integral of estimated sales, $s_i(t)$, as follows:

$$s_i = \int_{t_0}^{t_1} s_i(t)dt \tag{2}$$

This model does not consider: (a) refunds or decreasing sales, which might increase the number of items in stock, or (b) any decrease in the number of items in stock without corresponding sales (e.g., if products were destroyed, defective, etc.). Therefore, the sales revenue calculated by using this method might be overestimated due to errors attributable to the aforementioned considerations.

Source of the Data

Products geared toward women and sold on the Farfetch platform in the US market were examined for 200 days, specifically, from 25 May 2019 to 19 December 2019. There were 308,154 unique items and 29,281,286 items in total, all of which were sold on behalf of 2,513 individual brands. We used web scraping techniques to analyze product names, selling prices and the number of products in stock. The product attributes of each item in stock corresponded to the webpage count size variants of products as identical items. Color variations for a fashion product serve as an important factor that attracts consumers.

Figure 3 illustrates the products investigated according to brand and product category and lists 57 brands featuring more than 1,000 unique items. Prada sold 5,183 unique items during the investigation period, the largest number of items

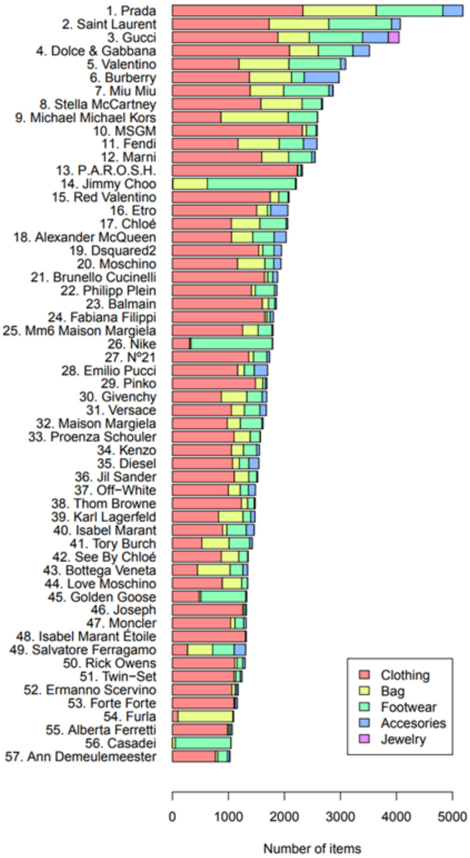


Figure 3. Number of unique items by brand and category

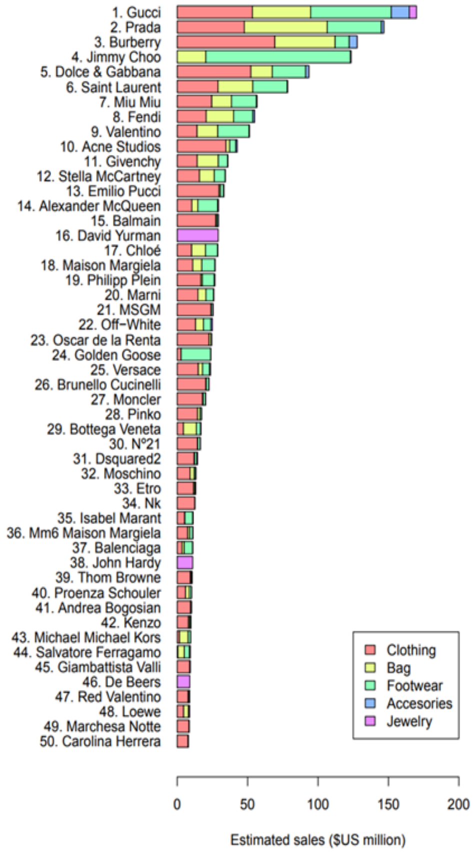


Figure 4. Estimated sales by brand and category

out of all the brands investigated. Saint Laurent and Gucci each sold 4,066 and 4,044 items. With respect to the number of unique items, European luxury fashion brands accounted for the higher ranked brands. Figure 3 lists affordable luxury brands (Nueno & Quelch, 1998; Truong, Simmons, McColl & Kitchen, 2008), such as Michael Kors, Red Valentino, and MM6 Maison Margiela, etc., which provide reasonably-priced consumer products. The Farfetch platform also carried luxury brands, casual fashion brands such as MSGM, and sports brands like Nike. Prominent and prestigious luxury brands, often called *true luxury brands* (Chevalier & Mazzalovo, 2008)—e.g., Hermès, Chanel, and Dior—do not appear in Figure 3 as they limit their online distribution channels to their own official online stores.

The higher-ranked brands in Figure 3, namely, Prada, Saint Laurent, and Gucci, exhibited high percentages in category shares for bags, footwear, and accessories. The lower ranked brands in Figure 3, namely, Tory Burch, Bottega Veneta, and Salvatore Ferragamo, exhibited high percentages for the bag, footwear, and accessory categories. Meanwhile, Jimmy Choo, Nike, Golden Goose, and Casadei exhibited high percentages in the footwear category. Furla exhibited a high percentage in the bag category.

Estimated Sales

Estimated Sales by Category

Figure 4 illustrates estimated sales for the top 50 brands by category. Gucci's estimated sales during the investigation period totaled US$169,941,100, the highest sales among all brands. Prada was in second place with a total of US$146,681,400, followed by Burberry (US$127,731,400), Jimmy Choo (US$123,413,100), Dolce & Gabbana (US$93,444,640), and Saint Laurent (US$78,447,250). The Jimmy Choo specialty footwear brand, founded by Jimmy Choo and Tamara Mellon in 1996, would be an exception to these brands. Popular European luxury fashion brands accounted for the majority of the higher ranked brands. However, casual fashion brands (e.g., Acne Studios, MSGM, and DSquared2), relative to product and price levels, were also represented. Acne Studios was founded by creative director Jonny Johansson in Stockholm in 1996. Massimo Giorgetti founded MSGM in Milan in 2009. Canadian brothers Dean and Dan Caten founded Dsquared2 in Milan in 1995. Despite being an emerging brand, Off-White, a company founded by Virgil Abloh in 2021 and known as a "street" luxury brand, placed 22nd in Figure 4. Jewelry brands, such as David Yurman, John Hardly, and De Beers, are also highly ranked because high unit prices for jewelry products increase their estimated revenue.

Estimated sales for higher-ranked brands comprised sales in the clothing, bag, and footwear categories except for specific footwear brands such as Jimmy Choo. The result suggests that the horizontal brand extension of luxury fashion brands expanded their business scale. This study focuses on striking a balance between the clothing, bag, and footwear categories. To do so, the study created a triangular bubble chart that visualizes the relationship between category balance and estimated sales. In Figure 5, bubble diameter indicates the total of estimated sales in the clothing, bag, and footwear categories. Bubble position indicates the percentage of sales that the clothing, bag, and footwear categories each contribute in terms of estimated sales. The center of the bubble coincides with the top of the triangle if estimated clothing sales accounts for 100% of the total sales. Similarly, the center of the bubble coincides with the left or right bottom vertex of the triangle if estimated bag or footwear sales revenue accounts for 100% of the total sales. The bubble is located at the center of the triangle if the ratio of clothing, bag, and footwear sales is equally one-third.

In Figure 5, the bubble positions are concentrated at the center and top regions of the triangle, except for Jimmy Choo. The result suggests that luxury fashion brands, as observed on online platforms, are classified into clothing-specialized brands and category-balanced brands that operate horizontal brand extensions. Large bubbles tend

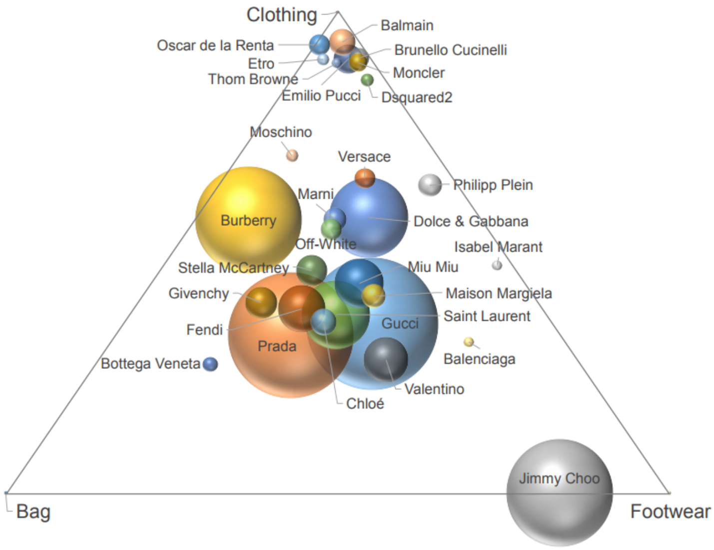


Figure 5. Estimated sales and the percentages attributed to clothing, bags, and footwear

to concentrate at the center of the triangular chart, revealing how the distribution of sales revenue between the clothing, bag, and footwear categories make contributions toward generating huge sales revenue. This result supports the effectiveness of horizontal brand extension in terms of luxury fashion brands.

The large bubbles representing Gucci, Prada, Burberry, and Dolce & Gabbana are located at the center of the triangle. However, these brands exhibited several differences. The bubble for Gucci moved slightly to the right from the center of the triangle, suggesting its footwear category is more intensive than its competitive brands. The bubble for Prada moved slightly to the left from the center of the triangle, suggesting its bag category is more intensive than its competitive brands. The bubbles for Burberry and Dolce & Gabbana moved upward, suggesting their clothing products are intensive for their brands. The bubble representing Burberry is also located near the edge that connects the clothing and bag category vertices of the triangle. This supports the fact that the clothing and bag categories were crucial for Burberry products. Although horizontal brand extension is necessary to expand business scale, intensive product categories differ depending on the luxury fashion brand.

Estimated Sales by Sub-Category

In order to reveal the detailed characteristics of brand extension for each luxury fashion brand, the study discusses estimated sales by sub-category. Figure 6 illustrates the top 10 sub-categories in estimated sales for the highest selling brands investigated in this study—specifically, Gucci, Prada, Burberry, and Dolce & Gabbana. The pie chart includes the names, percentages, and mean sales prices of the sub-categories, with the colors red-to-orange, yellow, green, blue, and purple each representing the categories of clothing, bags, footwear, accessories, and jewelry. The mean sales price is calculated by dividing the estimated sales revenue of a sub-category by the number of items sold.

Gucci. Figure 6(a) shows the top 10 sub-categories accounting for 54.9% of Gucci's total estimated sales. The highest percentage sub-category was tote bags, which accounted for 10.1% of Gucci's estimated sales. The higher percentage sub-categories that followed were sneakers (9.2%), belts (6.6%), and mini bags (5.9%). The footwear sub-categories including sneakers, sandals, loafers, boots, and pumps accounted for a large percentage of the top 10 sub-categories. The bag sub-categories including tote bags, mini bags, and shoulder bags also accounted for a certain percentage of sales. Footwear was a major category in terms of estimated sales in Gucci's top 10 sub-categories. The composition of the sub-categories seems to reflect the history and heritage of the brand. Founded in Florence in 1921, Gucci has a historical foundation in the manufacturing and sale of leather products including footwear and bags.

The mean sales prices in the footwear sub-categories ranged from US$686 for sandals to US$1,294 for boots. These prices represent relatively lower price levels considering prices for luxury fashion products often exceed US$2,000 (Furukawa, Nakazawa, Miura, Kai & Mori, 2020). On the subject of mean sales prices for these sub-categories, day dresses were the highest with a mean sales price of US$2,775, followed by tote bags with US$2,176. The mean sales prices for mini bags (US$1,115) and shoulder bags (US$1,168) also reflected relatively lower price levels when compared to tote bags. The result suggests that relatively lower-priced products such as shoes, belts, and bags (except for tote bags) made contributions toward the total of Gucci's sales.

Prada. Figure 6(b) shows the top 10 sub-categories accounting for 65.0% of Prada's total estimated sales. The highest percentage sub-category was tote bags, which accounted for 27.7% of estimated sales, exceeding one-quarter of all the tote bags sold. This was followed by the sub-categories of sneakers (8.0%), boots (6.5%), sandals (5.1%), and pumps (4.4%). Bag sub-categories, including tote bags, shoulder bags, backpacks, and mini bags, accounted for a large percentage. Moreover, footwear sub-categories, including sneakers, boots, sandals, and pumps, also accounted for a large percentage. Among Prada's top 10 sub-categories, the bag and footwear categories were equally balanced in terms of sales. The composition of these sub-categories reflects the heritage of the Prada brand, which was founded in Milan in 1913 with its origins in the manufacturing and sale of leather products (coinciding with the history of the Gucci brand). The large percentage of tote bags and the absence of belts in Prada's pie chart show how the brand differs from Gucci.

The mean sales price of tote bags was US$2,137, the highest among Prada's top 10 sub-categories and almost equal to that of Gucci. The mean sales prices for shoulder bags, backpacks, and mini bags ranged from US$960 to US$1,522—a price range lower than that of tote bags. Footwear sub-categories ranged from US$686 for sneakers to US$946 for boots, representing relatively lower price levels. For Prada, over one-quarter of estimated sales was represented by tote bags as they are obviously leading representative products for the brand; however, relatively lower-priced products such as sneakers, sandals, pumps, shoulder bags, and mini bags also helped Prada achieve high sales figures. In terms of estimated sales, the significance of Prada's relatively lower-priced products coincides with Gucci's sub-category mix of profitable products.

Burberry. Figure 6(c) shows the top 10 sub-categories accounting for 67.3% of Burberry's total estimated sales. The sub-category that exhibited the highest percentage of sales was trench coats and raincoats, which accounted for 20.5% of estimated sales. The higher percentage sub-categories that followed were tote bags (15.4%), shoulder bags (9.8%), and backpacks (4.5%). Clothing sub-categories, including trench coats and raincoats, shirts, single-breasted coats, down jackets, and day dresses, accounted for a large percentage of sales, as did bag sub-categories, including tote bags, shoulder bags, and backpacks. For Burberry, the composition of sub-categories in the pie chart differed from those of Gucci and Prada following the large percentage of clothing sub-categories and the small percentage of footwear sub-categories. In Burberry's top 10 sub-categories, the clothing and bag categories were equally balanced in terms of their sales figures. The highest percentage sub-category, trench coats and raincoats, reflects the history and heritage of the brand. Founded in 1856, Burberry is well-known for its waterproof trench coats introduced as military uniforms during World War I (WWI). The trench coat became a symbolic, representative, and popular Burberry product after the war. The pie chart supports the fact that the trench coat is a leading and representative Burberry product.

The mean sales price for trench coats and raincoats was US$1,819, the highest among Burberry's top 10 sub-categories. The mean sales prices for bags ranged from US$1,257 for shoulder bags to US$1,492 for tote bags, a price range a bit lower than that of trench coats and raincoats. The highest mean sales price for a Burberry tote bag was more than US$600, a figure lower than the that of Gucci and

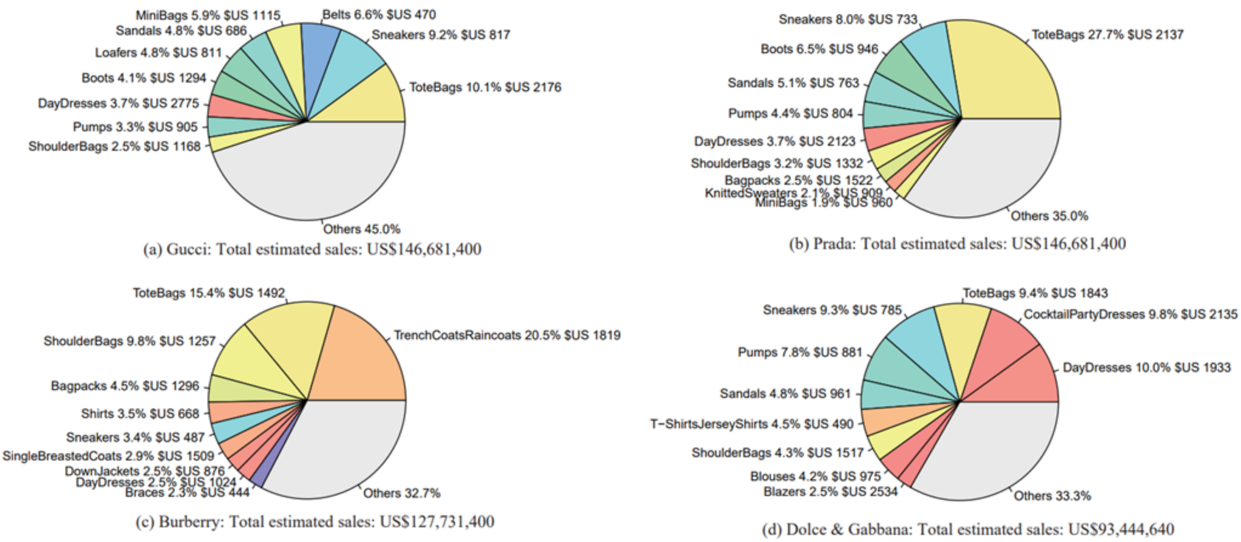


Figure 6. Estimated sales in each sub-category during the investigation period

Prada tote bags. Footwear sub-category prices ranged from US$686 for sneakers to US$946 for boots, a price range relatively low considering the luxury fashion market. For Burberry, trench coats and raincoats are representative products symbolizing the brand and accounting for 20.5% of estimated sales. However, tote bags and shoulder bags also contribute to the brand's high sales figures.

Dolce & Gabbana. Figure 6(d) shows the top 10 sub-categories accounting for 66.7% of Dolce & Gabbana's total estimated sales. The highest percentage sub-category was day dresses, which accounted for 10.0% of estimated sales. The sub-categories with higher percentages were cocktail party dresses (9.8%), tote bags (9.4%), sneakers (9.3%), pumps (7.8%), and sandals (4.8%). For Dolce & Gabbana, the composition of sub-categories in the pie chart also differed from that of Gucci, Prada, and Burberry following the large percentage of clothing and footwear categories. Among the top 10 sub-categories, the clothing and footwear sub-categories were almost equally balanced in sales. Founded in 1985 by Domenico Dolce and Stefano Gabbana, Dolce & Gabbana has a shorter history than the aforementioned three brands, all of which have histories that go over a century back.

The mean sales price for day dresses was US$1,933. This was followed by the large percentage sub-categories of cocktail party dresses (US$2,135), tote bags (US$1,843), sneakers (US$785), pumps (US$881), and sandals (US$961). The mean sales prices for footwear were less expensive than the top three sub-categories of day dresses, cocktail party dresses, and tote bags. The top three mean sales prices were for blazers, cocktail party dresses, and day dresses. For Dolce & Gabbana, day dresses and cocktail party dresses represent the most common products that comprise its estimated sales.

Discussion

Simple category extension often shows drawbacks such as dilution of the brand image and damage to brand equity. Downscale category extension dilutes brand beliefs due to low quality products in a different category (Loken & Roedder-John, 1993). The category extension of Pierre Cardin is a famous example of success and failure in the licensing business. Category extension to fragrance and cosmetics products increased sales in the 1960s. However, category extension to cigarettes and wines, which were not relevant to the core brand, destroyed the prestigious brand image in the 1980s (Reddy et al. 2009).

This study analyzed brand extension from a producer-side approach and unveiled some commonalities and differences between the top four luxury fashion brands, namely, Gucci, Prada, Burberry, and Dolce and Gabbana in terms of estimated sales. For Gucci and Prada, tote bags were the highest percentage sub-categories in terms of estimated sales, reflecting the history and heritage of these luxury fashion brands as they both originated from the manufacturing and sales of leather products. For Burberry, trench coats and raincoats exhibited the highest percentage of sales, a fact consistent with Burberry's brand history involving the design of officer trench coats during WWI over a century ago. The product has since become emblematic of the brand. Prada tote bags and Burberry trench coats were remarkable as flagship products due to their premium prices and because their high percentage sales exceeded 20% in estimated sales. These results support the fact that product integrity, premium prices, history, and heritage shape the success of luxury fashion brands in the marketplace (Fionda & Moore, 2009; Keller, 2009).

Complementary Relationship between Flagship and Affordable Products

In this study, lower-priced luxury fashion products such as shoulder and mini bags, along with footwear products, recorded mean sales prices of US$1,000 or less. However, these products significantly contributed to high estimated sales figures, warranting a brief discussion on the features of these products. Popular Gucci bags have a metallic ornament with the brand logotype "double G Marmont" attached. Likewise, popular Prada bags feature an inverted triangular plate called the "Prada plaque", marking its brand logotype. For footwear products, these four luxury fashion brands feature sneakers in their top 10 sub-categories, which contribute to their estimated sales. Sneakers often feature a logotype that symbolizes the brand. Moreover, prices for these products are not as high as the premium prices for flagship products; such bag ornaments and sneaker logotypes are iconic design signatures that shape luxury fashion brands (Fionda & Moore, 2009; Keller, 2009). These relatively lower-priced, affordable products attract consumers fascinated by the luxury fashion brand even if they might not have the sufficient disposable income to afford the expensive flagship products. This study suggests that lower-priced, affordable luxury fashion products complement expensive flagship products in order to achieve greater sales figures.

Diagonal Brand Extension in order to Prevent Dilution, Damage, and Cannibalization

As previously mentioned, the brand extension of luxury fashion products brings about several challenges. For example, inconsistency between a new product and a core product in horizontal brand extension might dilute the established core brand's image (John et al. 1998; Martinez & Pina, 2003; Park et al., 1991). Furthermore, a negative impression might result from low-priced or low-quality products in vertical brand extension, harming the prestige of the brand's image (Childs et al. 2018; Dall'Olmo Riley et al., 2013). Therefore, luxury fashion brands often create sub-brands to avoid the dilution of their brand image. However, vertical brand extension often results in the cannibalization of the core brand by its sub-brands (Pitta & Katsanis, 1995; Reddy, Holak & Bhat, 1994). For example, Dolce & Gabbana and Marc Jacobs both closed their respective sub-brands D&G and Marc by Marc Jacobs, presumably due to the brand dilution and cannibalization caused by the vertical extension of their core brands.

Estimated sales for Gucci, Prada, Burberry, and Dolce & Gabbana by sub-category suggests the presence of complementary relationships between premium-priced flagship products and affordable products. These complementary products play a significant role in expanding business scale. For Gucci and Prada, footwear products, such as sneakers and sandals, are affordable products when compared to their flagship products and tote bags. For Dolce & Gabbana, footwear products, such as sneakers, pumps, and sandals, are affordable products when compared to their flagship day dresses and cocktail party dresses. We named these complementary relationships diagonal brand extensions because, in these complementary relationships, product categories are horizontally different and price levels are vertically different. It would be rational to understand that diagonal brand extension effectively avoids the dilution of the brand image and the cannibalization between a core brand and its sub-brands. Although diagonal brand extension effectively avoids the pitfalls of downscale brand extension, excessive extension by a huge number of products has the potential to harm brand equity because flagship products reflect the history and heritage of a luxury fashion brand. The risk of marketing strategy for short-term profit must be precisely estimated for luxury fashion brands and online platform services.

Conclusions

This study focused on luxury fashion design, a field regarded as the top of the pyramidal model, which creates cutting-edge fashion trends and spreads them across the entire fashion industry. Diverse tangible and intangible added value fascinates consumers and attracts them to luxury fashion products. Brand extension in luxury fashion brands has been an important marketing strategy as it expands business scale. Although a quantitative consumer-based approach has been used to analyze brand extensions, a producer-based approach has yet to be discussed following the difficulty of data acquisition.

First, this paper discusses horizontal and vertical brand extensions and their problems. Second, we arranged distribution channels for luxury fashion products and shed light on online platform services that aggregate online retailers. The study also discusses the importance of online platform services as a data source. Third, this paper proposes a method of estimating sales figures and analyzes 308,154 unique items provided by 2,513 brands across 200 days.

Estimated sales figures by brand and category confirmed the effectiveness of horizontal brand extension for luxury fashion brands. Because Gucci, Prada, Burberry and Dolce & Gabbana show remarkable sales figures, the study analyzed sales figures by subcategory. The composition of subcategories suggests the presence of complementary relationships between premium-priced flagship products and affordable products, thus reflecting the history and heritage of luxury fashion brands. These diagonal brand extensions are aimed at avoiding the dilution and disgrace of brand image and cannibalization between a core brand and its sub-brands.

Due to the peculiarity of the data source based on luxury online platform services, the study has several limitations. Although online platform services as a data source are advantageous in that various brands can be analyzed, their share of the online market is limited to 12% of the entire luxury product market (Bain & Company, 2020). In this analysis, true luxury fashion brands like Hermès have not been included in as a source. A consumer's extraordinary experience when purchasing a luxury fashion product from a flagship store is an important value-added factor, which is unique to luxury fashion brands. However, online stores, including online platform services, cannot promote the same extraordinary experiences as flagship and department stores do. It is, therefore, possible that consumer behavior might be influenced by the distribution channel. Although casual fashion brands and sport brands were included as a source, there is no clear boundary between luxury and non-luxury fashion brands in the context of emerging street luxury fashion. The fit of a product on a person's individual body is another factor that should be considered. For example, consumers usually pay little attention to the fit of a bag on their body; however, the fit of a garment is a serious factor that affects purchase decisions. The current level of technology is not innovative enough to solve the problem of individual fit, especially for garments. As this problem is inherent to online purchasing, it currently persists. Thus, consumer behavior might be affected by product category. These problems should be investigated and discussed in future studies.

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