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# **Marketing of vending channels: A case of French university campuses**

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## **Abstract**

**Purpose:** This study identifies the conventional elements of the vending marketing mix and how they vary across academic segments in the context of a typical French university.

**Design/methodology/approach:** To determine the elements of the vending marketing mix, we conducted interviews with international industry experts and undertook 170 direct observations at various universities to verify the differences in the marketing mix proposals of dissimilar target markets.

**Findings:** The results reveal significant variances across all the elements of the marketing mix, with distribution characteristics being the most frequently adapted element across various markets, followed by promotion- and product-related parameters, while pricing characteristics are the most commonly standardised.

**Research limitations/implications:** Vending operators should pay particular attention to marketing decisions related to the product variety, product assortment length, selection of appropriate locations, availability of smart payment options, and feedback communication channels. The results reveal significant variances across all the elements of the marketing mix, indicating that vending operators adopt specific strategies to reach different market segments. However, there is a high degree of standardisation within vending channels.

**Originality:** Although vending channels are an important retail format, prior studies do not investigate their marketing mixes. This is the first attempt to empirically establish the conventional elements of the vending marketing mix and measure its variation across customer segments.

**Keywords:** retail marketing; vending machines; vending channels; marketing mix

**Article classification:** Research Paper

## 1. Introduction

Vending machines are a well-established retail format for selling convenience products such as snacks, beverages, and cigarettes in public and private locations. Understanding this industry's marketing mix may be useful to new entrants and less experienced vendors in deciding how to successfully establish their businesses; however, no empirical studies have thus far analysed this marketing mix. The literature is limited to entrepreneurial guidelines on how to start a vending business (Entrepreneur Press, 2012), public policy measures targeting the excessive consumption of unhealthy items purchased from vending machines (Carrillo-Álvarez *et al.*, 2020; Rauzon *et al.*, 2020), and technical papers in computer sciences (Lin *et al.*, 2012) that do not address retail marketing aspects. The lack of empirical studies with a marketing focus is largely due to the prevailing understanding that vending machines are standardised retail solutions (Goeldner, 1962). However, with the emergence of Internet of Things technologies, vending machines can also deliver adaptive marketing solutions across target markets (Johnston, 2015). Moreover, Venkatesan *et al.* (2015) found differences in the marketing mix strategies of self-service and full-service retail channels, demonstrating the necessity to establish a separate marketing mix for vending channels.

Vending machines are important marketing channels for delivering refreshments to consumers in captive and semi-captive environments (e.g. universities, airports, and train stations). The daily consumption of food and beverages from vending machines is approximately 95.5 million units, with a vending distribution coverage of about 180 people per vending machine (European Vending & Coffee Service Association, 2019). However, despite the importance and omnipresence of vending machines in today's society, global sales of vending products have declined consistently in recent years; the retail value of the global vending industry, excluding sales taxes, was €42,261 billion in

2014, but only €40,171 billion in 2018, representing an average annual decrease of 5% over this period (Euromonitor International, 2019a). Hence, there is a need for marketing scholars to provide the industry (i.e. manufacturers, retailers, and suppliers) with relevant, accurate, and timely information from leading vending markets that have not yet faced an economic slowdown or found ways to retain strong sales growth.

France is an example of a mature vending market that is still experiencing stable growth. It is the seventh-largest vending market worldwide, with annual sales of €697 million in 2018 and a growth of 2.4% from 2013 to 2018 (Euromonitor International, 2019b). However, little attention is paid to the marketing tools used by vending retailers in France. According to the only publicly available market study, French consumers use vending machines to buy a daily average of 14 million hot beverages, 1 million packaged cold drinks, and 1 million food products (Chambre Syndicale Nationale de Vente et Services Automatiques, 2010). Chambre Syndicale Nationale de Vente et Services Automatiques (the French Vending Association) publishes industrial reports annually; however, the data are limited in scope and freely available only to the association's members—a small percentage of all vending operators registered to sell products in France. The market is highly fragmented, consisting mainly of small enterprises that—because of financial constraints—avoid conducting extensive marketing studies (Euromonitor International, 2019b). Therefore, most market players have limited access to relevant and up-to-date information about the industrial landscape, which impedes their ability to be competitive and improve their market position.

Vending machines are prohibited at French primary and secondary schools; however, the vending industry can freely operate in universities. With a consistently growing student population (Statista, 2020), universities represent a significant market

and an important opportunity for the vending industry (GIRA Foodservice, 2013). However, apart from the prevailing health nutrition literature, studies of the marketing tools applied at universities and how they could be improved are lacking. Therefore, this study identifies the conventional elements of the vending marketing mix and how they vary across segments in this context. To the best of our knowledge, this study is the first to examine the vending industry outside the health context and investigate the marketing mix of vending channels empirically. This research is important because France is one of the world's leading markets. Therefore, insight into marketing instruments may serve as a benchmark for less developed markets to exploit the full potential of their vending channels.

## **2. Literature review**

### *2.1. Vending channels in retailing*

A vending channel is a non-store automatic retailing format that relies on vending machines to distribute products and services to a target market. The first recorded application of vending machines dates to 215 BC when honour boxes were used to dispense holy water at temples in Ancient Greece (Segrave, 2015). According to the Oxford online dictionary, the term “vend” originates from the Latin verb “vendere”, which means “to sell” or “to give something for sale” (Lexico, 2019). Prior studies use different terminology to describe the vending phenomenon, including v-commerce (Kasavana, 2010), automatic merchandising (American Marketing Association, 2018; National Automatic Merchandising Association, 2018), automatic distribution (Chambre Syndicale Nationale de Vente et Services Automatiques, 2010), automatic retailing (Berman and Evans, 2004), and automatic selling (Filser *et al.*, 2020).

Companies traditionally use vending channels to distribute small fast-moving consumer goods purchased relatively frequently through cash payments for immediate consumption. They are a cost-efficient business concept for both retailers and manufacturers (Zentes *et al.*, 2012) and a novel strategy for automated delivery (Bolton, 2019) that aims to provide customer convenience (Hehle and Schnedlitz, 2012). For example, consumers are more inclined to use vending channels when they urgently need to buy a product and perceive that the price is fair (Dixit *et al.*, 2014). In contrast to conventional retailing, vending machines represent a reverse business concept that conveys stores to shoppers (Davies, 1995) while easily delivering consumer solutions anytime and anywhere (Wolpert and Roth, 2020).

However, the nature of vending machine retailing is complex and multifaceted. Apart from being a non-store retail format, vending machines are a responsive and interactive medium (Peterson *et al.*, 1997) with the potential to please consumers to an extent that they will be ready to leave a tip (Maras, 2011). Vending channels are categorised as self-service technologies (SSTs)—flexible technological solutions that allow consumers to receive quick and standardised access to a wide range of services without direct employee involvement (Meuter *et al.*, 2000). Vending channels are retail innovations “where shoppers perform a greater portion of the work” (Inman and Nikolova, 2017, p.8), acting as prosumers in the value co-creation process (Wolpert and Roth, 2020). Michael Kasavana, recognised by the National Automatic Merchandising Association for significant contributions in vending retailing, classified SSTs into three broad categories (vending, kiosk, and web-based), and established common criteria to distinguish each category (Kasavana, 2010). For example, vending machines traditionally dispense a limited number of physical products, that are relatively cheap and therefore accept cash payments, kiosks are service-oriented and rely on electronic

payments, and web-based applications use cashless payments and can offer unlimited product options. Kiosks are computer workstations installed in public settings (Rowley and Slack, 2003) or interactive in-store providers of services (e.g., informational, educational, entertainment and transactional), while vending machines are associated with the sale of fast-moving consumer goods such as snacks, drinks, and cigarettes (Musso and Adam, 2020). However, Kasavana (2010) noted the emerging trend of SST convergence; for example, in automatic retailing one and the same selling device can often be recognized as a vending machine (by national vending associations) but as a kiosk (by kiosk manufacturing associations) which blurs the distinction between the different SSTs. This trend emerged because some innovative vending operators started adopting kiosk and web-based features, extending the conventional marketing scope of their vending machines with the sale of more expensive (luxury) products, services, and the adoption of cashless and contactless payments. For example, Coca Cola was the first to introduce dynamic pricing in vending machines – “a scheme that proposes to increase prices as a function of the level of capacity utilisation” (Courty and Pagliero, 2008, p. 235) and therefore charged consumers differently in hot and cold days. This new generation of vending machines (to which we refer here as smart or intelligent vending machines) is linked to the Internet, uses touch screens, customer telemetry and sometimes even alternative energy sources (Musso and Adam, 2020) trying to minimise the cost of ownership for vending retailers and improving the consumer’s buying experience (Solano *et al.*, 2017). Therefore, we define vending channels as non-store retail formats based on the partial or complete convergence of the three SSTs (see Figure 1).

[Figure 1 about here]

While vending channels have a long history of providing products to customers in



public and private locations (Segrave, 2015), most studies associate them with the excessive consumption of unhealthy items (Rauzon *et al.*, 2020) and discuss the ability of important vending locations such as schools, universities, and workplaces to implement effective health promotion programmes (Carrillo-Álvarez *et al.*, 2020). A systematic review of empirical vending-related studies published between 1981 and 2013 indicated that 87% of the articles focused on the healthfulness of vending machine-sold products (Matthews and Horacek, 2015). However, research on the retail marketing strategies of vending channels is still limited (Hehle and Schnedlitz, 2012). To the best of our knowledge, this study is the first to investigate the marketing mix of vending channels.

## *2.2. Marketing mix of vending channels*

Borden (1964) introduced the marketing mix, a concept describing controllable marketing variables that can positively influence a target market when used in the right combination (Kotler *et al.*, 2018). The most well-established marketing mix framework assumes that the main elements of a marketing strategy are product, price, place, and promotion, or the 4Ps (McCarthy, 1964). While the simplicity of this model makes it popular among researchers and business managers, some criticise it for its lack of customer orientation (Möller, 2006) and being less relevant for services (Kushwaha and Agrawal, 2015), industrial products (Ettenson *et al.*, 2013), and marketing activities in the digital world (Tapp and Spotswood, 2013).

To overcome some of these limitations, researchers have proposed amendments to the 4Ps framework; however, they take either a theoretical or a qualitative perspective (Hashim and Hamzah, 2014; Vignali and Davies, 2004) and discuss which of the elements are applicable across industries and companies of different sizes (Festa *et al.*, 2016; Martin, 2009), rather than taking an empirical perspective (Blut *et al.*,

2018). Despite these constraints, this study uses the general framework of the 4Ps model because it is the dominant philosophy in business management (Zineldin and Philipson, 2007) and a preferred marketing approach in a number of recent studies (e.g. Chen, 2018; Chou *et al.*, 2020). According to Håkansson and Waluszewski (2005), the 4Ps concept is not perfect; however, it is useful as a stepping stone in research, provided it has suitable framing and conceptualisation. Hence, we define the vending marketing mix as the set of conventional 4Ps marketing tools vending operators use to serve their target markets. Each of these elements represents a separate subset of marketing mix decisions to which we refer as the characteristics of vending channels.

#### *2.2.1. Product mix of vending channels*

The marketing literature uses the terms “product mix”, “product portfolio”, and “product assortment” interchangeably to refer to the totality of products sold by a company to a given target market (Kotler *et al.*, 2008). The product mix is associated with decisions on product variety, durability, design, features, branding, packaging, and after-sales service (McCarthy, 1964; Van Waterschoot and Van den Bulte, 1992). According to Kotler *et al.* (2018), the main attributes of the product mix are width (the number of product lines that a firm offers to a market), length (the number of individual products in a product line), depth (the number of variations within a product line), and consistency (the level of relatedness of the product lines regarding their production, distribution, and final consumption). However, apart from the criteria of product availability, portion size, and healthfulness, other product characteristics of vending channels have not been empirically established (Matthews and Horacek, 2015).

#### *2.2.2. Price mix of vending channels*

The price mix includes a set of instruments that help marketers determine price levels,

types of discounts, and payment options (McCarthy, 1964; Van Waterschoot and Van den Bulte, 1992). Matthews and Horacek (2015) found that fewer than half of vending-related models integrate pricing variables, which indicates a need for further research. Moreover, the assessed pricing aspects largely relate to the price levels of food and drinks of minimum nutritional value and the implementation of attractive price discounts to incentivise socially responsible consumer behaviour (Grech and Allman-Farinelli, 2015; Matthews and Horacek, 2015). However, payment options are an understudied research area.

Although the industry has predominantly used cash payments (e.g. coins, banknotes, and tokens) (Segrave, 2015), these payment modes have significant limitations. The use of cash payments assumes that at the time of purchase, consumers carry cash (which, because of security concerns, might not always be the case) or have the exact amount needed for the transaction (if vending operators have not installed change devices). Moreover, vending channels that operate in public areas and accept cash payments are susceptible to theft and vandalism, a constraint that the new generation of cashless and contactless payment options can overcome (Stoyanov, 2014). For example, adding cashless payments to vending machines leads to a 23% increase in sales because consumers tend to spend more when they do not have to pay by cash (Lyons, 2015). Moreover, contactless and cashless payments facilitate transactions when human contact should be limited (e.g. the COVID-19 crisis) and allow the machine to collect consumer data that companies can use for segmentation, loyalty programmes, and sales forecasting. Cashless payment methods also enable companies to offer non-traditional, higher-priced products because the consumer is less limited by the amount of money available to him/her. For example, a recent study showed that although mobile payments are considered by consumers as more convenient than cash

options and therefore lead to higher purchase intention, greater adoption across countries is still needed (Boden *et al.*, 2020). Therefore, it is important to investigate the extent to which vending channels adopt these new payment methods and if they introduce them overall or to target specific customer segments. Currently, the empirical evidence on the pricing characteristics of vending channels is limited, and studies examine the elements of the vending price mix only partially.

### *2.2.3. Place mix of vending channels*

The place mix, often referred to as the distribution mix, represents the “instruments that mainly determine the intensity and manner of how the goods or services will be made available” (Van Waterschoot and Van den Bulte, 1992, p.90). Although the distribution mix has been conceptualised, there is a lack of empirical literature on the elements of the distribution mix in specific industries and the factors that influence their composition (Pearce and Tan, 2006). The distribution characteristics of vending channels involve decisions on the selection of consumer-convenient locations (i.e. high-traffic areas, unrestricted areas, and captive environments) and the adoption of appropriate cross-selling techniques (Stoyanov, 2014). Moreover, the traditional belief is that the success of any vending channel is determined primarily by location, with little supporting scientific evidence. For example, Matthews and Horacek’s (2015) systematic review revealed that only 39% of empirical studies measured the accessibility of vending machines (either through different location types or operating hours), while 91% measured product, 52% measured promotion, and 48% measured price. These results highlight the importance of our study, as we measure the distribution mix of vending channels while simultaneously investigating the overall marketing mix.

#### *2.2.4. Promotion mix of vending channels*

The terms “promotion mix” and “marketing communication mix” refer to the combination of promotion tools (i.e. advertising, sales promotions, personal selling, direct marketing, and public relations) a company uses to communicate its value proposition and establish strong relationships with customers (Kotler *et al.*, 2018). The elements of the mix a company should use depends on its objectives, disposable resources, target audiences, and product features (Pride *et al.*, 2013).

However, vending research concentrates on the promotion of health and nutrition programmes in schools, universities, and workplaces and focuses on consumer behaviour and public policy measures (Grech and Allman-Farinelli, 2015; Matthews and Horacek, 2015). No empirical studies have adopted a business, rather than social, viewpoint of the promotion mix of vending channels or investigated the variability of its elements across customer segments.

#### *2.3. Research hypotheses*

While studies have examined the elements of the marketing mix theoretically, there is limited evidence of their application in different industries. For example, the marketing mix of the vending industry is understudied because traditionally, it represents a small part of global retail sales and is dominated by several small companies offering relatively simple products with a standardised level of customer service (Euromonitor International, 2019a). The traditional marketing automation literature also considers vending as an automated retail format for standardised items (Goeldner, 1962), in which the consumer interaction is characterised by a low level of time spending and task complexity, media simplicity, and unidirectional information exchange (Wolpert and Roth, 2020). However, as part of the recent diffusion of digitalisation in retailing

(Pantano and Vannucci, 2019), vending channels have also become potential providers of adaptive marketing solutions across target markets (Johnston, 2015). Therefore, whether the marketing mixes established in the vending industry are homogeneous across customer segments is unclear. To bridge these gaps in the literature, we formulate the following hypotheses:

H1: The product mix of vending channels differs across target markets.

H2: The price mix of vending channels differs across target markets.

H3: The distribution mix of vending channels differs across target markets.

H4: The promotion mix of vending channels differs across target markets.

### **3. Methodology**

#### *3.1. Pre-study*

We conducted three semi-structured interviews with international industry experts during the largest vending forum in France, Vending Paris, to identify the conventional elements of the vending marketing mix and traditional market segments targeted at universities. Based on the reviewed literature, we organised the responses according to the 4Ps. We identified three types of target markets as the industry standard in the academic vending market: Segment 1 (students), Segment 2 (staff), and Segment 3 (a mixed segment that includes Segments 1 and 2). We used the data collected from the interviews (synthesised in Appendix A) to establish the conceptual framework and design the observation form for the main study—a balanced scorecard in which we measured each element of the mix through a set of five checklists (see Figure 2).

#### *3.2. Main study*

In our census quantitative study, we collected 170 direct observations in all the buildings of the different campuses of the University of Strasbourg to measure the

variability of the marketing mixes of vending channels across the target segments. Here, we focused on hot drinks vending machines (see Appendix B) because 70% of vending machines in France (Chambre Syndicale Nationale de Vente et Services Automatiques, 2012) and 79% of the vending machines in Europe (European Vending & Coffee Service Association, 2019) sell hot beverages. We therefore present a typical example of the industry. Hot drinks are also the fastest-growing vending category in France, having increased by 50% over the last six years (Euromonitor International, 2019b) and the largest one sold through vending channels in Europe (European Vending & Coffee Service Association, 2019). To improve the external validity of the study, we selected the University of Strasbourg as a typical French academic institution in terms of student population, faculty members, and administrative staff (Institut National de la Statistique et des Études Économiques, 2014). Figure 2 presents the research hypotheses and framework.

[Figure 2 about here]

## **4. Results**

### *4.1. Descriptive statistics*

More than half (58%) of all university buildings contain hot-beverage vending machines. The vending operators appear slow to adopt smart vending solutions at university campuses: only 10.4% of the automated distributors have touch screens and only 21.9% have dynamic pricing capabilities. Apart from the possibility of adjusting the sugar level, consumers do not have access to customisation features (e.g. mixing flavours). Coins are the prevailing payment method (99%), with fewer than half of the vending machines offering key (46.9%) and smart-card payment options (37.5%). None of the vending machines send advertising messages in audio or video form through full-

colour displays; all use informational monochrome screens that are small relative to the size of the vending machines (e.g. the largest informational screen is 20×28 cm and is present only on two of the vending machines).

#### 4.2. Preliminary analysis

Here, we present the results of the chi-square test of homogeneity to determine if the product, price, distribution, and promotion characteristics of the vending channels differ significantly across the market segments. The preliminary analysis indicates partial support for the research hypotheses, as each of the 4Ps has at least some characteristics that are significantly different across these segments (see Table I).

[Table I about here]

Three product characteristics, namely, product variety ( $\chi^2_{(14)} = 22.343$ ,  $p = 0.072$ ), width ( $\chi^2_{(4)} = 11.269$ ,  $p = 0.024$ ), and length of the assortment ( $\chi^2_{(4)} = 13.759$ ,  $p = 0.008$ ), vary across the customer segments. Two pricing characteristics differ for the university segments: the availability of payment options ( $\chi^2_{(12)} = 29.604$ ,  $p = 0.003$ ) and price range ( $\chi^2_{(6)} = 11.685$ ,  $p = 0.069$ ). Four distribution characteristics vary significantly across the segments: external location ( $\chi^2_{(2)} = 30.903$ ,  $p < 0.001$ ), point of sale (POS) location ( $\chi^2_{(6)} = 53.302$ ,  $p < 0.001$ ), internal location ( $\chi^2_{(6)} = 16.059$ ,  $p = 0.013$ ), and cross-selling ( $\chi^2_{(6)} = 15.868$ ,  $p = 0.014$ ). In terms of the promotion mix, only the availability of advertising displays of different sizes was the same across segments ( $\chi^2_{(6)} = 4.960$ ,  $p = 0.549$ ); all the other types of promotions in the vending channels differed, including the allergy labels ( $\chi^2_{(2)} = 6.580$ ,  $p = 0.037$ ), usage instructions ( $\chi^2_{(4)} = 7.857$ ,  $p = 0.097$ ), feedback channels ( $\chi^2_{(12)} = 30.834$ ,  $p = 0.002$ ), and slogans ( $\chi^2_{(2)} = 5.638$ ,  $p = 0.060$ ). However, as the results do not reveal where the differences in the



marketing characteristics between the various target markets exist, we conducted a post-hoc test.

#### *4.3. Post-hoc analysis*

To control for family-wise error, the post-hoc analysis involved pairwise comparisons using multiple z-tests of two-column proportions with a Bonferroni correction (see Table II). We discuss the differences between the three customer segments (i.e. students, staff, and combined) below.

[Table II about here]

##### *Milk available in the portfolio*

This product option is offered less frequently to Segment 1 (19.2%) than to Segment 3 (49.1%); however, neither segment is statistically different from Segment 2 (47.4%). Statistical significance is accepted at  $z = 2.616$ ,  $p < 0.0083$ .

##### *Length of the assortment*

Only the vending channels with an assortment greater than 20 product items differ significantly across the market segments. For example, the vending channels are more likely to offer a larger portfolio of products to Segment 3 (24.5%) than to Segments 1 (0%) and 2 (5.3%). Statistical significance is confirmed at  $z = 3.709$ ,  $p < 0.0056$ .

##### *Smart-card payment system*

None of the vending channels serving faculty members accept university cards as a payment method, while the other two segments do not differ significantly in this regard, with 50% for Segment 1 and 43.3% for Segment 3. Statistical significance is established at  $z = 3.743$ ,  $p < 0.0083$ .

### *External location*

Segment 1 is more likely to be reached through vending channels in university buildings than in educational and research centres (i.e. administrative areas, sports centres, and libraries). The other two segments do not differ significantly in terms of the type of university building in which vending machines sell hot drinks; moreover, they have a higher probability of being exposed to vending machines in educational and research centres. The statistical significance is supported at  $z = 5.559$ ,  $p < 0.0083$ .

### *POS location*

The vending channels serving Segment 1 are situated either in student clubs (42.3%) or in independent locations (57.7%), with none located in university or staff clubs, where vending operators target Segments 2 and 3 to the same extent. Statistical significance is accepted at  $z = 7.301$ ,  $p < 0.0042$ .

### *Internal location*

None of the vending channels covering the underground, ground, or first level of the university buildings differ across segments. However, the vending channels operating on the second floor or above appear to target mainly Segment 2. Statistical significance is confirmed at  $z = 4.007$ ,  $p < 0.0042$ .

### *Cross-selling of packaged drinks*

There is a statistically significant difference in the proportions between Segments 2 and 3 (21.1% versus 54.7%) but not between Segments 1 and 2 (50% versus 21.1%) or Segments 1 and 3 (50% versus 54.7%). Statistical significance is established at  $z = 2.549$ ,  $p < 0.0083$ .

### *E-mail and postal addresses*

Segment 2 has a higher probability than Segment 3 of having contact details collected by vending operators at the point of sale, but not compared with Segment 1. Statistical significance is determined respectively at  $z = 2.708$ ,  $p < 0.0083$  and  $z = 2.432$ ,  $p < 0.0083$ .

### *Facebook QR code*

There is no difference between the vending channels serving Segments 1 and 2, as almost 20% of each use Facebook to collect customer feedback. However, none of the vending channels serving the mixed segment rely on that form of communication. Statistical significance is accepted at  $z = 4.116$ ,  $p < 0.0083$ .

The post-hoc analysis indicates that two product characteristics (availability of a milk option and larger portfolio), one pricing characteristic (smart payment option), four distribution characteristics (type of external, internal, and POS locations and cross-selling of packaged foods), and three promotion characteristics (e-mail, Facebook, and postal address) vary among the marketing characteristics of the vending channels that vary by customer segments. According to the coherent principle in the multiple-hypotheses testing theory, a joint hypothesis can be accepted if at least one component hypothesis in the dataset is confirmed (Gabriel, 1969). Therefore, the results provide partial support for all four hypotheses because each of the 4Ps has at least some attributes that differ significantly across the market segments. However, the marketing differentiation by target market varies, with some elements of the marketing mix being more frequently adopted than others.

## 5. Discussion

This study shows that the elements of the vending marketing mix partially vary across target markets. These findings contradict both the conventional marketing automation literature, which considers vending as a standardised automated retail format (Goeldner, 1962), and the contemporary understanding of vending channels as examples of adaptive marketing (Johnston, 2015). However, similar to our findings, in an international non-vending context, Codita (2011) found that instead of privileging marketing mix standardisation or adaptation, researchers should consider these approaches as the two extremes of the same strategic continuum; that is, marketing mix differentiation always exists to some extent within different target markets, explaining why the hypotheses are only partially supported.

We found that vending operators are slow to adopt intelligent vending solutions (e.g. interactive screens, keys and smart payment options, and advertising displays), probably because most market players do not generate sufficiently high profit margins to immediately embrace technological change (Solano *et al.*, 2017). This slow adoption of smart technologies, which we refer to as partial SST convergence, may also explain the partial marketing mix differences identified across target markets. For example, a recent white paper on the differences between traditional vending machines and “micro-markets” (i.e. SST-based convenience stores in offices) highlights the increasing potential for the marketing differentiation of the latter (Wilson, 2020). Therefore, future studies should investigate whether the marketing mix of traditional vending machines is more standardised than the new generation of vending channels that adopt intelligent features (e.g. kiosk or online features).

In contrast to previous vending-related studies that have relied on self-administered questionnaires (e.g. Hehle and Schnedlitz, 2012; Rauzon *et al.*, 2020), we took direct observations to measure vending operators’ marketing mixes more

objectively. Therefore, we may obtain partially different marketing mixes because we measure the objective rather than perceived differences in the marketing characteristics of the vending channels. However, we did not consider the impact of important subjective categories in consumer behaviour such as perceived usefulness and ease of use of SSTs (Mukerjee, 2020), attractiveness (Bhatt *et al.*, 2020), or other environmental characteristics (Barros *et al.*, 2019), which may also influence retail marketing strategies.

Many of the marketing differences identified across the target markets were related to the vending distribution mix, specifically the different types of locations (POS and external) and cross-selling of packaged drinks. Similarly, Yao *et al.* (2020) concluded that locations and surrounding environments are essential for improving the business performance of unmanned convenience stores. The industry experts interviewed in our pre-study also noted that three of the elements of the distribution mix are related to the locational factor, suggesting that location is the most important distribution characteristic in vending channels. Our study thus provides an important contribution, as distribution characteristics are the least frequently studied in the marketing literature (Matthews and Horacek, 2015). Through empirical evidence, we highlight the importance of distribution characteristics and need for further studies. For example, similarly to studies in other retail industries, researchers can use the power of spatial modelling (e.g. Newing *et al.*, 2018) to determine the optimal set of vending locations for every target market and knowledge of proximity marketing to design the most relevant location-based promotions (e.g. Willems *et al.*, 2017).

As this study partially dispelled the conventional myth of the standardized marketing nature of the vending channels, it highlighted the importance to new and unexperienced markets players on adapting their marketing offers according to the

target markets, and moreover to do it to a different extent for each of the 4Ps. A major concern to the industry is currently the limited financial resources of the companies (most of which are small and medium-sized enterprises and family businesses) (Euromonitor International, 2019b) and therefore this study provides vending operators with insights on how to manage their business priorities and allocate their marketing budgets. For example, as location-related decisions were found to be crucial, vending operators should spend on them more financial, human, intellectual and physical resources in the strategic planning. Moreover, industrial vending associations should organize seminars and trainings on location management and develop appropriate tools (e.g., GIS software solutions specifically adopted to the needs of the vending industry) to facilitate the location decision making process for new and existing market players.

## **6. Conclusions**

This study identifies the conventional elements of the vending marketing mix and concludes that they vary partially across target markets, with distribution characteristics being the most frequently adapted elements, followed by the promotion- and product-related parameters, while pricing characteristics are the most commonly standardised. Our findings provide insights for the French vending industry, which, like the rest of the European market, is characterised by small and medium-sized enterprises and family businesses that cannot afford to conduct marketing studies (Euromonitor International, 2019b). Moreover, as we used the opinions of international experts to establish our marketing mix framework, it can serve the needs of other geographical areas. For example, the French Vending Association and European Vending & Coffee Service Association can use the marketing mix developed herein as a classification framework when establishing industrial standards and guidelines for vending operators. Moreover, digital marketing tools could be developed using these indicators to help vending

operators compare their marketing strategies across segments and business locations in real time. Finally, vending operators and other unattended retail formats (e.g. automated convenience stores) can also benefit from our findings by paying particular attention to the marketing decisions on product assortment length, the selection of appropriate locations, the availability of smart payment options, and feedback communication channels (e.g. e-mail, official postal address, and Facebook QR code). Moreover, as vending channels are not only a non-store retail format but also an in-store technological totem used in brick and mortar settings (Wolpert and Roth, 2020), traditional retailers can integrate the concept of the vending marketing mix in their overall omnichannel strategies to properly serve their target markets across different locations and customer touchpoints.

This study has certain limitations. First, regardless of our attempts to empirically establish the differences between the various types of marketing mixes, some marketing mix decisions are interrelated, which leads to more complex marketing mix models (e.g. product-promotion mix, price-promotion mix, and promotion-distribution mix) and confounds the elements within the 4Ps (McCarthy, 1964; Van Waterschoot and Van den Bulte, 1992). Second, based on the principle of coherence in multiple comparison testing and our partially confirmed hypotheses, future work should compare the marketing mixes vending operators design to influence customer segments. Third, we adopt the vendor's perspective and do not consider consumers' attitudes, perceptions, and levels of satisfaction with machines' design, product variety, and payment options. Fourth, the quantitative study has a narrow scope as it covers one educational institution (although the largest one in the region), one product category (the largest and fastest-growing one), and during a specific time period. Hence, it has a clear focus, but our conclusions might have slightly varied if the study was conducted in other geographical

areas, business locations, and time periods. Finally, some retailers now use intelligent vending solutions; therefore, it would be useful to study whether the marketing mix of traditional vending machines is more standardised than these intelligent vending channels and the extent to which smart technology adoption influences marketing mix differentiation. Moreover, with the increasing focus on automated marketing (Tonkova, 2016) and augmented reality (Caboni and Hagberg, 2019), the adoption of new technologies in the vending industry will soon become critical; thus, future research may investigate the need for models that better reflect this industry by applying a different marketing mix.



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Table I. Chi-square test of the marketing mix variations across the target markets

Marketing mix	Target market		
	$\chi^2$	df	p-value
<i>Product mix</i>			
Interface	2.103	2	0.349
Product variety	22.343	14	0.072*
Width of the product assortment	11.269	4	0.024**
Length of the assortment	13.759	4	0.008**
Product quality	3.229	2	0.199
<i>Price mix</i>			
Payment options	29.604	12	0.003**
Change return option	1.769	2	0.413
Average price	11.685	6	0.069*
Price discount (euro)	0.060	2	0.971
Price discount (%)	0.866	4	0.929
<i>Place mix</i>			
External location	30.903	2	0.000***
Internal location	16.059	6	0.013**
POS location	53.302	6	0.000***
Channel width	2.419	2	0.298
Cross-selling	15.868	6	0.014**
<i>Promotion mix</i>			
Allergy labels	6.580	2	0.037**
Usage instructions	7.857	4	0.097*
Feedback channels	30.834	12	0.002**
Slogans	5.638	2	0.060*
Advertising displays	4.960	6	0.549

Note: \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.001

Table II. Post-hoc analysis of the marketing differences across the target markets

Marketing characteristics	Target market (Frequencies)			Z
	Students	Staff	Both	
	(n = 26)	(n = 19)	(n = 53)	
<i>Product variety</i>				
Instant coffee	21a	16a	49a	1.573
Premium coffee	20a	16a	30a	2.515
Tea	21a	18a	46a	1.431
Hot chocolate	26a	19a	49a	2.251
Milk	5a	9a,b	26b	2.616*
Soup	9a	6a	21a	0.676
Savoury flavours	25a	19a	52a	1.062
<i>Width of the assortment</i>				3.357
Up to three product lines	2a	4a	15a	
Four to five product lines	19a	15a	30a	
More than five product lines	5a	0a	8a	
<i>Length of the assortment</i>				3.709**
Up to 14 products	9a	5a	12a	
From 15 to 20 products	17a	13a	28a	
More than 20 products	0a	1a,b	13b	
<i>Payment options available</i>				
Coin payments	26a	18a	53a	1.823
Banknote payments	1a	1a	3a	0.355
Bank card payments	3a	0a	5a	1.923
Smart card	13a	0b	23a	3.743*
Key	10a	13a	22a	2.207
<i>Regular price</i>				3.418
Up to €0.40	8a	10a	21a	
From €0.41 to €0.60	17a	7a	22a	
Over €0.60	1a	1a	10a	
Free	0a	1a	0a	
<i>External location</i>				5.559*
Educational & research	14a	19b	52b	
Other	12a	0b	1b	
<i>POS location</i>				7.301***
Independent location	15a	8a	35a	
Student club	11a	1b	9b	
University club	0a	0a	9a	
Staff club	0a	10b	0a	

<i>Internal location</i>				4.007***
Underground floor	1a	0a	5a	
Ground floor	20a	9a	38a	
First floor	5a	6a	5a	
Second floor and higher	0a	4b	5a,b	
<i>Cross-selling</i>				
Packaged drinks	13a,b	4b	29a	2.549*
Packaged foods	1a	2a	9a	1.820
Combo	20a	12a	30a	1.669
<i>Allergy label</i>	22a	10a	31a	2.565
<i>Usage instructions</i>				
Text instructions	22a	14a	47a	1.711
Picture instructions	22a	15a	49a	1.942
<i>Feedback channels</i>				
Phone number	25a	19a	50a	1.375
Free phone number	3a	5a	15a	1.684
Website	14a	12a	31a	0.629
E-mail	6a,b	5b	3a	2.708*
Facebook	6a	4a	0b	4.116*
Postal address	7a. b	8b	8a	2.432*
<i>Slogan</i>	25a	16a	40a	2.374

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Note: The subscript letters in the columns show the frequency with which the marketing characteristics of the vending channels differ (e.g. 5a and 26b) or do not differ (9a,b) between the target markets. The same subscript letters in the other columns (e.g. 2a, 4a, 15a) indicate the absence of significant differences across the target markets.  $p < 0.0083^*$ ;  $p < 0.0056^{**}$ ;  $p < 0.0042^{***}$ . Bonferroni-adjusted critical values are estimated as the significance level of 0.05 divided by the number of pairwise comparisons.

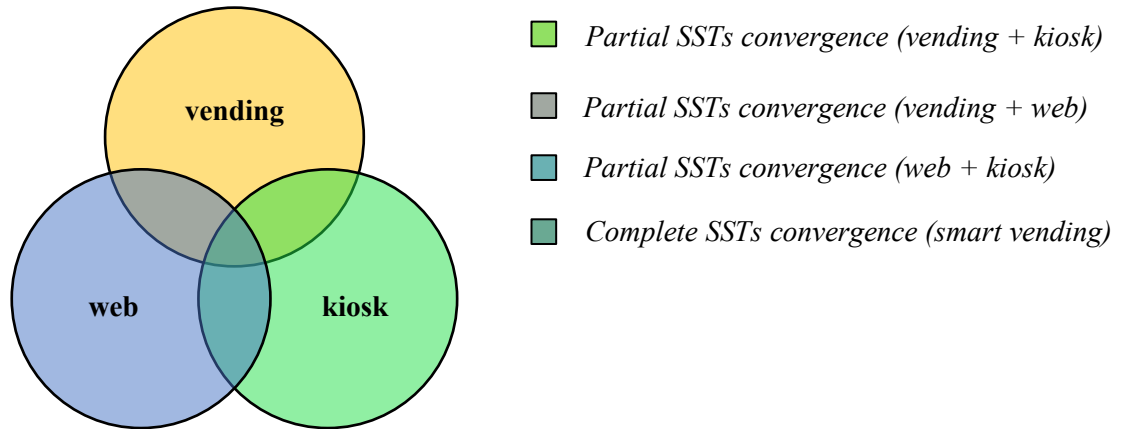


Figure 1. Vending channels due to the convergence of self-service technologies (SSTs)

*Source:* Author

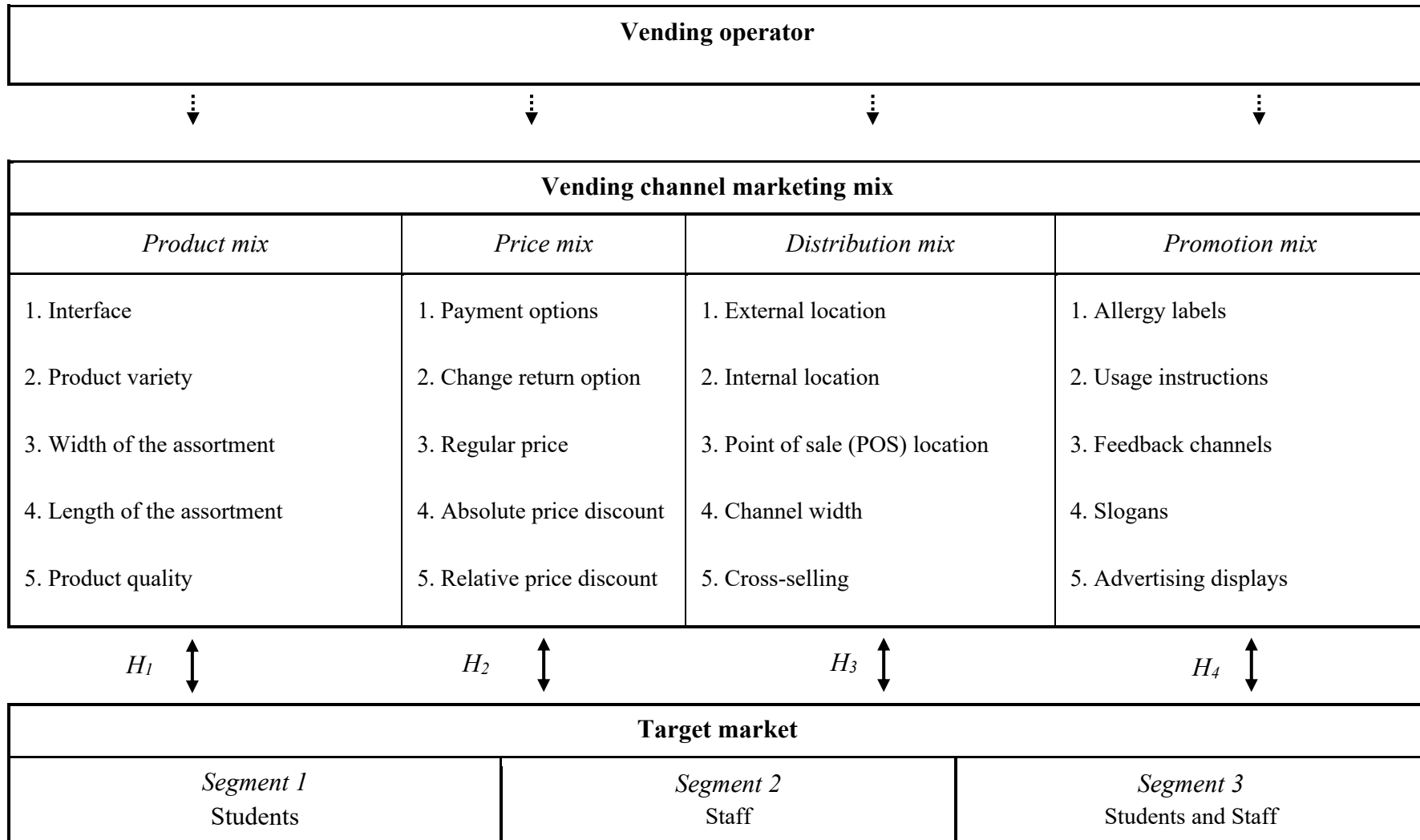


Figure 2. Conceptual framework of the vending marketing mix across the target markets

**Appendix A:** Summary of the interviews with international industry experts

Concept	Elements
Product mix	<p>Interface: type of ordering system used by the vending channel (e.g. touch screens, buttons).</p> <p>Product variety: types of products sold.</p> <p>Assortment length: number of different products sold.</p> <p>Assortment width: number of different product lines sold.</p> <p>Product quality: objective indicators justifying the efforts to deliver a quality product (e.g. water purification systems).</p>
Price mix	<p>Payment options: forms of payment provided to consumers.</p> <p>Change options: decision to install coinoppers to deliver consumer convenience in the transaction stage.</p> <p>Price: average price of the products offered.</p> <p>Absolute discount: absolute price reductions offered to boost sales.</p> <p>Relative discount: percentage discounts offered to boost sales.</p>
Distribution mix	<p>External location: appropriate type of building for the vending channel.</p> <p>Internal location: floor level at which the vending channel operates.</p> <p>POS location: exact place within the building at which the channel operates.</p>

	<p>Width of the vending channel: number of the same vending machines within the vending channel at the POS location.</p> <p>Cross-selling: availability of other vending channels of the same company in the same POS location.</p>
Promotion mix	<p>Allergy labels: indication of the ingredients that might cause allergies.</p> <p>Usage instructions: provision of instructions on the usage of the vending channel.</p> <p>Contact details: types of feedback channels provided to consumers.</p> <p>Slogan: decision to use an advertising message.</p> <p>Advertising display: type and size of advertising displays used in the vending channel.</p>
Academic target markets	<p>Segment 1: students; Segment 2: university staff; Segment 3: mixed segment.</p> <p>Owing to objective constraints related to the accessibility and specificities of the populations at the various university campuses, companies target students and staff both separately and simultaneously, which still represent three distinct segments.</p>



## Appendix B. Scope of the main study

