Patterns of fruit and vegetable buying behaviour in the United States and India

Abstract

This paper describes the patterns discovered in fruit and vegetable buying behaviour in the United States and India. Using claimed buying data obtained from online questionnaires we compare the patterns against those found extensively in consumer goods categories across the world. This study analyses consumer loyalty with Double Jeopardy, consumer sharing with Duplication of Purchase and brand user profiles with Mean Absolute Deviations. The results show the buying behaviour patterns of Double Jeopardy, Duplication of Purchase and that brand user profiles exist within the fruit and vegetable categories. The implications of these findings are (1) that the size of fruit and vegetable brands are largely determined by how many people buy them and not how loyal those consumers are, (2) fruit and vegetable brands share consumers with each other, and, (3) fruit and vegetable brands are not purchased by unique segments of the populations. Therefore in order to increase the number of people buying fruit and vegetable brands marketers should focus on increasing their mental and physical availability (i.e. the same strategies used for consumer good category brands).

Key words: Patterns of buying behaviour, Fruit and vegetables, Dirichlet, Segmentation

Introduction

Fruit and vegetable consumption is an important component of a healthy diet. Despite its importance, there is no systematic analysis of how consumers buy these ‘categories’ (fruits and vegetables) or ‘brands’ (bananas, apples, broccoli, peas etc.). In response, this paper determines if there are any patterns in fruit and vegetable buying behaviour similar to those established within the consumer behaviour literature, namely patterns relating to consumer loyalty, consumer sharing and brand user profiles (Ehrenberg 1988; Sharp 2010; Romaniuk & Sharp 2016)

This paper first discusses the context of the research, highlighting the need for an understanding of fruit and vegetable buying behaviour. Next, the analytical approaches and dataset are outlined. This study uses descriptive data and compares the reported buying behavioural data with the theoretical predications from the Dirichlet model. Two size measures (market share and penetration) and four loyalty measures (average purchase frequency, category buying rate, share of category requirements and sole loyalty) are used to analyse consumer loyalty. In addition, analysis of the duplication of buying between brands indicates the degree of consumer sharing and a comparison of commonly used segmentation variables (mean absolute deviations) reveals the brand user profiles of fruits and vegetables.

An initial analysis is undertaken for the fruit and vegetable ‘categories’ and the fruit and vegetable ‘brands’ in the United States. The results are then extended to India. The results for the United States are outlined within the manuscript and the Indian results are provided within the appendices. Clear patterns arise in both countries; the buying behaviours for fruits and vegetables are similar to that of other consumer goods categories. This analysis provides insight for marketing managers and retailers with regards to buying behaviour in the fruit and

vegetable categories. In addition, the results contribute to consumer behaviour literature by extending the applications of the Dirichlet model.

Background

Collectively, the United States and India account for over a fifth of the global population (Worldometers 2015) and a quarter of global Gross Domestic Product (World Bank 2014). However these two countries differ not only in population size and wealth but also in terms of health. While less developed countries experience high rates of malnutrition due to lack of education, security and access to healthy foods such as fruits and vegetables (Roth *et al.* 2004; Swinburn *et al.* 2011), developed countries such as the United States experience high rates of obesity and health disorders due to the overconsumption of energy-dense and nutritionally-poor foods and inadequate consumption of fruit and vegetables, despite their availability.

The inadequate consumption of fruits and vegetables is a key factor in the global health problem of poor nutrition (FAO 2014; WHO 2003). This issue presents similarly in the United States and India with 70 to 90% of adults not consuming the recommended daily intake (Kanungsukkasem *et al.* 2009; National Center for Chronic Disease Prevention and Health Promotion 2013; Pomerleau *et al.* 2003; Moore & Thompson 2015). Fruit and vegetable consumption is similar despite approximately 42% of the Indian population being vegetarian (Delgado *et al.* 2001) compared to only about 10% in the United States (Vegetarian Times 2014); this difference likely due to the prominence of different religious communities in both countries. It is clear that both countries, despite their differences, have low consumption of fruits and vegetables.

This study describes consumers' buying behaviour in the fruit and vegetable categories in order to understand how to influence the buying behaviour for fruit and vegetable brands.

Descriptive research is an important step towards understanding and then influencing consumer behaviour. Descriptive models provide marketers with patterns of consumers' buying behaviour (Ehrenberg 1997), which can aid in marketing decisions (Ehrenberg *et al.* 2001). Such patterns have facilitated the success of consumer goods categories (Kennedy & McColl 2012). Specifically, we use the Dirichlet model to analyse two 'categories' (fruits and vegetables) containing numerous 'brands' (bananas, apples, broccoli, peas etc.) to understand consumer loyalty to, and consumer sharing between fruit and vegetable brands. The Dirichlet model has been used in the past to understand buying behaviour in consumer goods categories and validated with branded grocery products (Goodhardt *et al.* 1984, 2006). Furthermore, this study describes and compares fruit and vegetable brand user profiles to identify whether the consumers of different fruit and vegetable brands are similar or different.

This paper continues by outlining the primary measures of consumer buying behaviour and how they will apply to this empirical investigation.

Consumer loyalty

The approach used for the purpose of this paper to describe consumer loyalty is Double Jeopardy (McPhee 1963), which states that brands with more consumers tend to also have consumers who are slightly more loyal towards them (Ehrenberg *et al.* 1990). In this instance, as market share and penetration increases, so too does the average purchase frequency, share of category requirements and sole loyalty. The opposite pattern is found for category buying rate, due to bigger brands being bought by infrequent category consumers. This is known as the Natural Monopoly law (Romaniuk & Sharp 2016).

The Double Jeopardy pattern has described the relationship between a brands' size and consumer loyalty in various contexts. First, Ehrenberg (1991a) demonstrated how new brand consumer loyalty and size were confined within the category's Double Jeopardy pattern.

Second, Ehrenberg (1991b) found politicians with greater awareness benefited from higher attitudinal loyalty. Third, Dawes (2009) showed iconic sportswear brand consumer loyalty was related to how many people bought them. Next, Singh *et al.* (2012) found that the Double Jeopardy pattern occurred when looking at age-specific buying behaviour. Last, Singh *et al.* (2008) found that consumer loyalty was connected to the size of functionally different variants. Overall, the Double Jeopardy pattern has been found to occur in many circumstances and consumer goods categories (Ehrenberg & Scriven 1997), hence Double Jeopardy is considered a valid tool with which to describe fruit and vegetable buying behaviour and compare against those found extensively in consumer goods categories.

The following measures were used to determine the size and consumer loyalty of fruit and vegetable brands. The following formulas are provided as examples using the fruit 'category' and banana 'brand'.

$$Market\ Share\ (\%) = \frac{total\ banana\ purchases}{total\ fruit\ purchases}$$

$$Penetration\ (\%) = \frac{the\ number\ of\ banana\ buyers}{the\ number\ of\ fruit\ buyers}$$

$$Average\ Purchase\ Frequency = \frac{total\ banana\ purchases}{the\ number\ of\ banana\ buyers}$$

$$Category\ Buying\ Rate = \frac{total\ fruit\ purchases}{the\ number\ of\ banana\ buyers}$$

$$Share\ of\ Category\ Requirements\ (\%) = \frac{total\ banana\ purchases}{total\ fruit\ purchases\ by\ banana\ buyers}$$

$$Sole\ Loyalty\ (\%) = \frac{total\ number\ of\ buyers\ who\ only\ purchased\ bananas}{the\ number\ of\ banana\ buyers}$$

Consumer sharing

We use the Duplication of Purchase pattern to describe consumer sharing between brands within the same category (Ehrenberg 1988). The pattern shows the percentage of each brand's consumers who also bought each of the other brands within the same category. The underlying pattern shows that brands share consumers with their competitors in line with their size (i.e. the number of consumers who bought the brand at least once in the given time period) (Keng *et al.* 1998; Sharp & Wright 1999; Uncles *et al.* 1995). As a result, brands share more consumers with bigger brands, and fewer consumers with smaller brands.

The Duplication of Purchase pattern has been observed in a wide range of circumstances including consumer goods categories (Fader & Schmittlein 1993; Scriven & Bound 2004; Day *et al.* 1979), apparel brands (Dawes 2009), product variants (Singh *et al.* 2008), leisure activities (Scriven *et al.* 2014), modelling brand competition for new brands (Ehrenberg 1991a) and has recently described cross-category consumer sharing (Tanusondjaja *et al.* 2016). Given the range of contexts in which the Duplication of Purchase pattern has been found to apply, it is a valid tool for describing the buying behaviour of fruits and vegetables.

Brand user profiles

We use the Mean Absolute Deviation (MAD) approach to describe the brand user profiles of fruit and vegetables. The approach stems from market segmentation literature (Smith 1956; Hammond *et al.* 1996) and refers to the comparison of demographic, socio-economic, geographic and psychographic variables that define a brand's consumers. Research has shown that consumer goods category brands generally compete in one unsegmented mass market (Ehrenberg & Kennedy 2000; Uncles *et al.* 2012) and consequently, individual brand user profiles reflect the same single category user profile.

Brand user profiles have been found to seldom differ across many situations including sportswear apparel brands (Dawes 2009), leisure activities (Scriven *et al.* 2014), product

variants (Singh *et al.* 2008) and consumer goods categories and services for over two decades (Hammond *et al.* 1996; Lees & Winchester 2014). The MAD analysis is our third valid tool to describe and compare the buying behaviour of fruits and vegetables.

Method

This study utilised household survey data rather than panel data for two key reasons. First, we deliberately chose two markets that are exceptionally different and both very large (i.e. United States and India). The United States is a typical western marketplace, while India is a developing marketplace with high rates of vegetarianism. Second, because India was included in the analysis we needed a data collection method that captured the buying behaviour from the typical Indian shopper who still uses traditional local stores and vendors to buy fruits and vegetables. Such stores are not captured in panel data. While other staple foods are transitioning to supermarkets, the fruit and vegetable market is still exceptionally fragmented and dominated by local outlets (Rajkumar & Jacob 2010; Sen 2016; Euromonitor International 2016). The lack of traditional stores being captured in panels forced us to use a survey based method. While it has limitations associated with recall, surveys offer the most accurate and comparable data available. We have also adopted a narrower time period to account for issues with recall.

Pilot study

A pilot study prompted participants to list which types of fruit and vegetable they had bought. Two actions were taken to reduce the influence of seasonality. First, respondents could include both fresh and frozen fruits and vegetables. Second, respondents were only asked about the preceding two weeks. These two decisions allowed for the buying of fruits and vegetables that were not in season (i.e. had been frozen) and restricted fresh produce to a single season. The results provided a list of which fruits and vegetables were available to

participants and the language they used to describe them. This allowed us to capture any regional common classifications and name variations. For example, in botanical terms, tomatoes are a fruit; however, in the pilot survey, consumers classified them as a vegetable more than twice as often as a fruit (39% vs. 16%). Many government and research bodies also classify tomatoes this way, based on their usage in cooking rather than their botanical classification (U.S. Department of Agriculture & U.S. Department of Health and Human Services 2010; National Health and Medical Research Council 2013). If participants had strong perceptions of an item as a fruit or a vegetable in contrast to the exact botanical classification, we followed the example of these bodies and classified it in line with public perceptions for the sake of clarity. We therefore classified tomatoes as a vegetable. In addition, by asking participants to list the fruits and vegetables we could capture any local name variations and small differences between countries regarding the names of various fruits and vegetables. For example Bell Peppers are also referred to as Capsicums in some countries. In this instance we used the most predominant name or both.

A further outcome of the pilot study was to identify which fruits and vegetables participants identified as meal flavourings. Items such as herbs, chilli and garlic are used in small amounts to flavour meals in most cooking approaches. They are not eaten on their own, and are therefore less relevant when analysing the buying behaviour of fruits and vegetables. As including ‘flavouring’ items would lead to less precise analogies between buying behaviour, we excluded them from the main study.

Main study

In the main study, we asked close-ended questions about the buying rates for the 30 most common fruits and 30 most common vegetables identified in the pilot studies. Participants were asked which fruits and vegetables they had bought and how often, along with

demographic questions. Only the top 15 fruits and vegetables were used for analysis, in line with previous research in this area; however, the expanded data set was sought to allow for further analysis if required (Ehrenberg 1988; Uncles *et al.* 2012). The survey focussed on the buying behaviour of fruits and vegetables rather than consumption, because buying occasions are grouped together into discrete events – shopping trips – in contrast to consumption, which is continuous. Recall was thus expected to be better for buying behaviour.

Sample

In the pilot studies, 232 respondents were surveyed in total (United States; n=113 and India; n=119). The main study obtained a total 939 respondents from the United States and 1,097 in India.

The data was collected using Amazon's Mechanical Turk and was cleaned prior to analysis. The first stage of cleaning involved removing respondents who first indicated they had bought a fruit or vegetable in the previous two weeks in a binary question, then later indicated that they had bought that fruit or vegetable a quantity of zero times, as such inconsistencies suggested that they were not providing accurate data. The second stage of cleaning removed respondents who did not answer quality control questions correctly (Downs *et al.* 2010). The quality control questions were multiple choice questions regarding facts contained in a short story included in the survey instrument. After cleaning, the sample size in the main study was 847 in the United States and 928 in India – totalling 1,775 respondents.

Results

Consumer loyalty

Both categories had a penetration of 100%, meaning every respondent had bought a fruit or vegetable at least once in the previous two weeks. Consumers from the United States bought from the fruit and vegetable category an average of nine times in two weeks, and buy fruit brands on average twice in two weeks (table 1a). On average consumers bought from the vegetable category an average of 14 times in two weeks and buy vegetable brands two times two weeks (table 1b).

The Double Jeopardy pattern asserts that the fruit or vegetable with the biggest market share will have more people buying it (penetration), and have slightly higher consumer loyalty (average purchase frequency, share of category requirements and sole loyalty) (Sharp 2010). In our study, bananas had the largest market share of fruit (24%), the most consumers (76% penetration) and a slightly higher average purchase frequency (approximately three times in the two-week period). The fruit with the smallest market share (2%), blackberries, also had the fewest consumers (8% penetration) and a slightly lower average purchase frequency of approximately twice in the two-week period (see table 1a). Furthermore, the share of category requirements systematically decreases as the market share of the fruits decreases, as does the percentage of sole loyalty. In addition, the category buying rate increases as the market share of fruits decreases. This is expected given fruits with higher market share will have more infrequent fruit category buyers (i.e. Natural Monopoly). Thus, the difference between fruits with the large as opposed to small market shares is not how loyal consumers are (i.e. how frequently fruit and vegetables are bought), but how many consumers buy them within a given period. The same pattern holds for vegetables in the United States (see Table 1b) and for both fruits and vegetables in India (see Table 1c and Table 1d – Appendix).

(Insert Table 1a about here)

(Insert Table 1b about here)

Furthermore, to confirm the Double Jeopardy pattern in the United States, correlations between market share and penetration were 0.9778 for fruits and 0.9666 for vegetables. In India, the correlations were 0.9641 and 0.9597. Furthermore, the correlations between penetration and average purchase frequency in the United States were 0.7319 for fruits and 0.6155 for vegetables. In India, the correlations were 0.6203 and 0.7229. Thus, there is a relationship between the market shares of fruits and vegetables; the number of people who bought them at least once and how frequently they are bought within that two-week period.

We next confirm whether the observed fruit and vegetable buying behaviour fits the Dirichlet Model's theoretical values in order to determine if the buying behaviour is consistent with other consumer goods categories (Kearns 2010). In Tables 1a and 1b, the observed fruit and vegetable buying behaviour is represented in the 'O' columns, while the Dirichlet Model's theoretical values are represented in the 'T' columns. There are strong correlations between theoretical and observed values for fruits and vegetables. We see the same pattern with Indian fruit and vegetable buying behaviour.

Consumer sharing

The Duplication of Purchase pattern describes the percentage of consumers who bought one fruit or vegetable and also bought other fruits or vegetables. Tables 2a and 2b show the rates of duplication for fruits and vegetables. 73% of respondents who bought a banana also bought an apple, while 51% also bought grapes, 41% strawberries and 8% blackberries. This sharing of consumers is in line with the percentage of consumers who bought the fruit at least once. The pattern holds for both fruits and vegetables (see Table 2c and Table 2d – Appendix).

In addition to reporting the Duplication of Purchase pattern in our study, we include here the duplication coefficient (D-value). The D-value is calculated as the average penetration (%) divided by the average duplication of purchase (Ehrenberg 2000). The figure describes how likely a consumer is to buy another brand in the category (Mansfield *et al.* 2003). For example, a D-value of 1.3 would mean the buyer of one brand would be 30% more likely to buy another brand in the category than the average member of the population at large (Corkindale *et al.* 2013; Scriven & Danenberg 2010). The D-value for fruits was 1.3 and for vegetables was 1.2. Once again we see the pattern extends to India with the same D-values of 1.3 for fruits and 1.2 for vegetables.

(Insert Table 2a about here)

(Insert Table 2b about here)

Brand user profiles

We used the Mean Absolute Deviations to analyse whether the consumers who buy fruits and vegetables are similar or different. We considered five variables with which to characterise types of consumer: gender (male/female), household size (one, two, three, four, five or more), number of dependent children (zero, one, two, three, four, five or more), whether the person is the primary shopper (or not), and age group (18-28, 29-34, 35-42 and 43-74 years).

We determined whether similarities or differences between fruit and vegetable consumers existed by observing the Mean Absolute Deviation (MAD) for each consumer type (Table 3a and 3b). Any deviations below 10% from the category average were considered not to be of any practical significance (i.e. not warranting any additional marketing actions: (Kennedy &

Ehrenberg 2000; Uncles *et al.* 2012)). The results show that there are almost no differences between the brand user profiles for fruits and vegetables. We found the MAD of 3.1 for fruits and 2.7 for vegetables in the United States and extended to India with a MAD of 2.0 for fruit and 1.2 for vegetables (see Table 3c and Table 3d – Appendix). There were no differences for vegetables, and only mangoes and plums saw minor differences based on number of dependent children and age, and gender and age, respectively. The lack of any major or consistent deviations across the various fruits and vegetables suggests that there are no exclusive types of consumers for any particular fruit or vegetable. Furthermore, we compared the user profiles of the most and least bought fruit and vegetable, again finding there were no notable differences in the user profiles.

(Insert Table 3a about here)

(Insert Table 3b about here)

Discussion and conclusions

This research suggests that fruits and vegetables are bought in much the same way brands are. Our results on consumer loyalty conform to the Double Jeopardy pattern, where the biggest difference between high market share and low market share fruits and vegetables was the number of people who bought them and not how often they were bought (McPhee 1963). This suggests that consumer behaviour in the fruit and vegetable markets are similar to those for consumer goods brands. Fruits that have low market shares need to focus on increasing the number of people who buy the fruit as opposed to aiming to increase the frequency of that fruit being bought by existing consumers. A focus on increasing the number of people buying

fruits and vegetables is also important for increasing the quantity and/or variety of fruit and vegetables being consumed.

The fact that consumer sharing conforms to the Duplication of Purchase pattern (Ehrenberg 1988) suggests that consumers buy a variety of fruits and vegetables and share their category buying in a predictable fashion. Hence fruit and vegetable brands compete with each other for sales, but it also demonstrates that, despite low rates of fruit and vegetable consumption, consumers are including a variety of fruits and vegetables in their diet.

The finding that fruit and vegetable brand user profiles have low Mean Absolute Deviations means that there are no specific consumer segments within the markets examined, buying or not buying any particular types of fruits or vegetables. Therefore different fruits and vegetables are not being bought by different types of consumers, meaning marketing efforts must be tailored the general population (and not targeted at consumer segments).

Overall, this research has successfully extended the consumer buying behaviour findings to "new" categories (i.e. fruits and vegetables) (Ehrenberg *et al.* 2001). In doing so, we find that in order to increase the buying behaviour of any fruit or vegetable, the penetration levels must be increased. This in turn will slightly increase the consumer loyalty of each fruit and vegetable. This is the key strategy to promoting healthy eating and addressing the low levels of fruit and vegetable consumption.

Future research can build on this study to determine how the physical availability influences the buying behaviour of fruits and vegetables. There is also a need to understand the 'mental availability' of various fruits and vegetables for consumers – that is, how much consumers consider the fruit and vegetable categories and brands in buying situations (Romaniuk 2013; Sharp 2010). Research into consumer goods categories has found that both mental and physical availability guide patterns of brand buying behaviour (Romaniuk & Sharp 2016;

Sharp 2010). It would also be useful to conduct additional brand user profile studies to include information on consumers' socio-economic groups and race/ethnicity/health status, to determine whether these factors influence buying behaviour amongst consumers.

Appendix

Please note that all tables for the appendix appear within the 'IJMR Tables' word document.

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