Markovian Application to Brand Switching Behaviour: A Survey of Toothpaste

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Abstract

Every industry and economy is idiosyncratic especially in terms of what drives consumer loyalty and so, extrapolating knowledge may not always provide the right basis for competitive advantage. This paper borrows transition matrix as a forecasting instrument for determining the market environment in the future, and sets out to unveil the potential of Markov chains in sequencing family brand choice and in determining intensive transitional probabilities for toothpaste. Data were purposefully drawn from 785 students of universities of Abuja, Lagos, and Port Harcourt. The data generated were cast into a Markov matrix to permit meaningful observation of the households' behaviour toward five brands of toothpaste. Further, the data were analyzed using multiple regressions and Pearson correlation co-efficient; and the findings showed that households exhibit AAAAA, AAAAB, and AAABC not because of trade deals, out-of-stock of favourites, and in-store stimuli; rather because of such product-delivery attributes as flavour and functionality, brand availability and awareness, and brand name and image. While the paper concludes that subjects exhibit brand loyalty based on brand's selling points, the paper advised on creating corporate framework that allows for more strategic and perhaps tactical actions.

Key words: Markov chain, toothpaste, switching behaviour, brand loyalty.

Introduction

Building sustainable competitive advantage (SCA) has long made the phenomenon of consumer brand switching a central issue underlying market dynamics (Dick and Basu, 1994; Parker, 1979). Amidst the prevailing stiff competition and informed consumers, scholars and practitioners recognize that steady throughput lies on grasping the processes that underlie brand switching/loyalty and to cast it into a framework suitable for evaluating market factors and for predicting their influences on sales behaviour (Farley and Kuehn, 1965; Parker, 1979). This is worthwhile because loyal behaviour attracts product-support information and advocacy behaviour (Schoenbachler, 2004; Kuenzel, 2009; McGrath, 2011), less price sensitivity, and willingness to spend more resources to maintain undisrupted behaviour (Paswan *et al.,* 2007). Aside loyal consumers refusing to switch in order to show cohesiveness to the symbols of their social class (Nia and Zaichkowsky, 2000); their positive word-of-mouth represents the mechanism for saving marketing cost (Rundle-Thiele and Mackay, 2001). Boone and Kurtz (2007) observe that generating a new customer costs 5 to 7 times as much as keeping a current one, so firms pay steep prices when customers stray to other brands. Depending on the industry, a 10 percent reduction in value-chain cost structure may yield 40 to 50 percent improvement in pre-tax profit (Eisingerich and Bell, 2007; Alrubaiee and Al-Nazer, 2010; Shaker and Basem, 2010) or as little as a 5 percent improvement in

customer retention can upsurge profitability to about 25 to 85 or 95 percent (in terms of NPV) (Reichheld and Sasser, 1990). Ha *et al.* (2008) found strong correlation between loyalty and the mean number of different stores visited per shopping time.

Consumers make brand choice as a result of many influences; habits, in response to merchandising cues, or with explicit consideration of alternatives. The economic sense of such behaviour is guided by correctly predicted marketing influences leading to it (Parker, 1979; Farley and Kuehn, 1965; Kuehn, 1956). Literally, consumers prefer loyal behaviour to brands perceived to be satisfactory to purchasing untried ones (Kalu and Awa, 2008). The surveys of acceptance rate of a new food product (see Arndt, 1967) and headache remedies (see Cunningham, 1967) found that high-risk perceivers were more likely to be loyal to old brands than low-risk perceivers. Even at the exploratory phase of purchase when consumers make trial behaviour, Shoemaker and Shoaf (1975) opine that they tend to buy smaller quantities than usual in order to minimize risk associated with disrupted behaviour. However, people love familiar stimuli; the unfamiliar is perceived discomforting but with aggressive acquisition of more knowledge, the unfamiliar becomes familiar (Venkatesan, 1973). The behavioural scientists and instrumental conditioning theorists suggest that consumers make two types of purchase- trial and repeat (Schiffman and Kanuk, 2009); trial behaviour permits firsthand experience of novel brands and reinforces repeat behaviour if perceived more satisfactory than familiar behaviours.

Modelling brand loyalty seems an uphill task perhaps because of the intricacies of human behaviour. With the advent of management sciences and mathematical models as well as availability of software, the erstwhile complication in transforming marketing problems into mathematical equations is now primordial as explicit attempts are made to model and test various theories of brand loyalty and/or brand switching. Attempts to understand the dynamics of consumer brand choice necessitated the investigation of frequency of occurrences of various configurations in short purchase sequences. Kuehn (1962) surveyed 2 to 5 purchase sequences for several products while Harary and Lipstein (1960) focused on consumer buying behaviour in terms of two-purchase sequences. These studies examined consumer brand choice as stochastic or probabilistic processes (Farley and Kuehn, 1965). The two-purchase sequence analysis underlies the concept of first-order purchase to purchase Markov brand shifting and the longer purchase sequence of Kuehn (1962) led to brand shifting learning model. The basic concepts of Markov Chain as marshalled out by a Russian mathematician, Andrey Andreyevich Markov, span predicting income distribution, immigration as a geographic structure, brand switching and brand loyalty, occupational mobility, and long-term market share, especially in oligopolistic environment (Frydman, 1984; Geweke *et al.,* 1986; Simper and Spilerman, 1977).

This paper borrows transition matrix as a forecasting instrument for determining the market environment in the future, and sets out to unveil the potential of Markov chains in sequencing family brand choice and in determining intensive transitional probabilities for toothpaste. The research question is: given the last purchase of toothpaste, what is the probability that the consumer purchases same brand (say close-up, X1) or switches to another (say Aqua-fresh, X3) next time? The study fills gap in knowledge at the instance of two points; (1) toothpaste seems a fascinating area of inquiry perhaps because of huge competition and brand extension as well

as its neglect by previous scholars; and (2) where similar studies (Cheng *et al.,* 2012; Parker, 1979; Brown, 1953) exist, they seem somewhat alien to toothpaste and to developing economies such as Nigeria. For instance, Cheng San and Yee (2012) focused on counterfeit clothing and footwear in Malaysia; Parker (1979) on consumer grocery shopping in Dublin; and Brown (1953) on nine product classes in Chicago, one of which was toothpaste. Although Brown took a qualitative approach and sets the pace for similar scholarly inquiries, his findings and those of Cheng San and Yee (2012) and Parker (1979) can rarely be wholly extrapolated to specifically solve problems in today's changing Nigeria; hence, the need for this study.

Theoretical Development

a. *Brand Loyalty and Measurement*

Defining, operationalizing, and measuring brand loyalty vary amongst scholars and practitioners. One of the thorniest ordeals of marketing management is how to obtain objective and general measurement metric(s) of brand loyalty (Kahn *et al.,* 1986) and to correlate such metrics with consumer characteristics in order to segment markets. Studies (Phau *et al.,* 2009) and the theory of reasoned action (TRA) suggest that purchase intention is the surrogate measure of actual purchase (Summers and Belleau, 2006); the best predictor of behaviour is intention to perform (Fishbein and Ajzen, 1980; Young *et al.,* 1998). Brand loyalty may mean high customer lifetime value (Kalu and Awa, 2008); it measures the length of time a customer is predisposed to resist competitive offers (Hasouneh and Ayed Alqeed, 2010) or a deeply held accord to repurchase preferred product versions in future despite the potential influences of perhaps ugly experiences and marketing efforts (Yim *et al.,* 2008; Gommans *et al.,* 2001). The loyal consumer does not only repurchase and cause me-too but also shuns switching even when better offers exist elsewhere (Oliver, 1997; Oh and Fioritio, 2002). Scholars (de Rio-Lanza *et al.,* 2009; Michel *et al.,* 2009) suggest that committed customers assume that ugly experiences may be settled out overtime and turn them even more satisfied. Loyalty may mean a passive improvement of situation; a measure of tolerance amidst voiced out inconvenient situations (Alrubaiee and Al-Nazer, 2010), a function of satisfaction and switching barriers (Fornell, 1992), and a process whose end product affects perceived quality and ultimately behavioural intentions (Bitner, 1990).

The theory of brand loyalty is premised on the fact that the longer a relationship lasts the more profitable it turns and so, the core of relationship marketing is to win and keep customers by creating relational value chain (Peng and Wang, 2006) in a manner that culminates more contacts and deeper accords, frequency marketing and efficient operations, cannibalization/cross selling, making disruptive behaviour costly, and detailed probing into customer complaints and competitive benchmarking (Hasouneh and Ayed Alqeed, 2010). Early scholarly inquiries (Brown, 1953; Cunningham, 1956; Kuehn, 1962; Harary and Liptein, 1962) and recent ones (Dick and Basu, 1994; Taylor *et al.,* 2004; Gil *et al.,* 2007) on customer brand loyalty principally emphasized behavioural and attitudinal loyalty. Further studies (Schiffman and Kanuk, 2009; Asseal, 1992; Wilkie, 1994) emphasized cognition and consistency in attitudinal loyalty and behaviour. Behaviour explains consumer loyalty in terms of purchase habits or evidence of consistency; whereas, attitudinal sees loyalty from favourable predisposition to a brand. Conceptually, Jacobs and Chestnut (1978) provided that brand loyalty is biased (i.e. non-random); a

purchase behaviour expressed overtime by some decision making units with respect to one or more brands out of a set of brands, and shaped by psychological (decision-making, evaluative) processes. Charnatony and McDonald (1992) opined that behavioural measures define loyalty by sequence of purchases and/or by the proportion of purchases; an indication that a satisfied consumer repeats behaviour in a relatively short time. Lyong (1998) served operational definition when he viewed brand loyalty as a function of brands relative frequency of purchase in both time independent and time dependent situations.

Brown's (1953) study represents the earliest inquiry on behavioural measures of brand loyalty. The study compared brands across product classes using The Chicago Tribune Consumer Purchase Panel Data and attempted to model sequences of purchase patterns of 100 families. The findings led Brown to categorized family sequences of brand choice into four- undivided and stable loyalty (AAAAAA), divided but stable loyalty (ABABAB), unstable loyalty (AAABBB), and no loyalty (ABCDEF). Farley and Kuehn (1965) accused Brown (1953) of having ambiguous classification that makes replication of the survey almost difficult. Cunningham (1956) recognized Brown's (1953) ordeals in defining pattern of behaviours and avoided them with a cross-sectional share of purchase statistic a household would make of specific brand(s). He showed various aggregates of this statistic for seven product classes with particular focus on each family's loyalty to its most frequently purchased brands. Though Cunningham's (1956) work permitted stable comparison of behaviour over the various product classes, it lent very little to the understanding of consumer behaviour dynamics and thus extends and/or complemented Brown's. Individuals who exhibit ABABAB sequences were categorized as breaking purchase vicious between two brands in the semi-period of the study. Brown's and Cunningham's classifications were supported by other scholars (e.g., Tucker, 1964; Finn, 1984). Finn proposed that a consumer is considered brand loyal if he makes three successive purchases of same brands of a product (AAABBB); whereas Tucker measured brand loyalty by the proportion of total product purchases a household devotes to a brand most frequently purchased (AAAAABB).

Although, behavioural loyalty is applauded for focusing on customers' value towards a brand (Schultz and Bailey, 2000), the cognitive learning theorists assert that the classifications lack precision since they do not distinguish between true brand faithful and the spurious loyalists, who repeat brands in response to cues/ in-store stimuli and/or out-of-stock of favourites (Schiffman and Kanuk, 2009; Shapiro, 1977; Schoenbachler *et al.,* 2004); thus, there is a sufficient difference between brand loyalty and repeat buying behaviour. Loyalty is measured by attitude rather by purchase consistency (Schiffman and Kanuk, 2009) though scholars (see Sharp *et al.,* 2002) note that attitudinal loyalty is not sufficiently relevant in determining brand loyalty in a short-run. Therefore, Baloglu (2002) and Ha *et al.* (2008) emphasized the need to extend brand loyalty definition by synchronizing attitudinal and behavioural influences. The operant conditioning and cognitive learning theorists provide knowledge that complemented the existing literature to enlarge the understanding of the dynamics of brand loyalty. The first views behaviour consistency as signal of loyalty based on the theories of Thorndike's law of effects, reinforcement, and stimulus response (S-R); and the second signifies that favourable predisposition to a brand may not be reflected by just measuring continuous behaviour rather by following Edward Tolman's proposition of thinking about a problem and developing experiences that could serve to reduce

perceived risk in similar situations in future (left hemisphere). Other theorists (Schiffman and Kanuk, 2009; Hansen, 1981) suggest that brand loyalty is measured by the degree of involvement/hierarchy of effects; the high involvement theorists emphasize on extensive information search leading to attitude change and attitude formation, purchase behaviour, and ultimately brand loyalty; while low involvement involves brand awareness leading to purchase behaviour, attitude change and attitude formation, and then brand habit.

b. Markovian Models

Markov chain is a dynamic quantitative model with Markov property; the probability of moving to state (X) at time (n+1) depends only on current state (immediate past purchase behaviour) and not on the sequence of entire previous states. Thus, it is a system where discrete random variables $\{X1, X2, X3, ..., Xn\}$ form a stochastic process of transition from one state to another in a chain-like manner. Given the chronological times $\{to, t1,........,tn\}$, the family of random variables $\{X1, X2, X3, ...,Xn\}$ is said to be a Markov process if it possesses the following property.

$P \{Xtn =xn/Xtn\text{-}1 =xn\text{-}1,.............,Xto =xo\} = P\{Xtn =xn/Xtn\text{-}1 =xn\text{-}1\}$, where n=0,1,... and the possible values of Xi form finite set S referred to as state space of the chain.

Usually, a Markov chain is characterized by a set of states and transition probabilities (Trivedi and Sahner, 2009) and defines finite set of times (i.e. a discrete-time Markov chain) though same terminology applies to situations where time takes continuous values (Nummelin, 2004; Parthasarathy and Vinoth, 2010). However, Markov chain Monte Carlo methodology covers cases of the two extremes (discrete algorithm steps and continuous state space). The first-order purchase-to-purchase Markov process was the first application of a stochastic model to describe brand switching. The model assumes that each purchase is affected in a stochastic sense only by preceding purchase and is statistically independent of prior purchases (Taha, 2007; Loomba, 1978; Farley and Kuehn, 1965; Law and Kelton, 2000; Damodaran and Gopal, 2009); knowledge of the immediate past behaviour of a system helps to predict its future behaviour. The conditional probabilities

$P \{Xn+1 =Xn+1/Xt =xn\}$; where n= 0, 1, 2,........

of the next state (and in fact all future states) given its current state depends on the system's current state and not additionally on the state of the system's previous steps. Given that the data on market share behaviour of different brands of a product (say toothpaste, Xt) is known, Markov analysis provides insight into how a system (e.g., high frequency, medium frequency, and low frequency purchasers) transits to the next or previous integer or how consumers shift behaviour (rejection operator) from one brand (say close-up, $X1$) to another (purchase operator) (say Aqua fresh, $X3$) in a trial. The assumption is that a system or a customer at a specified time can be in one of the nth state; either buying close-up ($X1$), McCleans ($X2$), Aqua-fresh ($X3$) or some other brands (Xn) in the choice set. The probability of moving from state i in nth time step is given as

(n)

$Pij = P \{Xn =j/X0 = i\}$ and for single-step transition $Pij = Pr \{X1 = j/X0 = i\}$

Since systems change (transition) randomly often in response to managerial cues or something else to a point of inflicting a change in loyalty (say from X1 to X2 or to X3), it is difficult to make exact prediction about their future behaviour though their future statistical properties may be predicted. The probabilities of state-changes termed transition probabilities (Pij) representing the probability of a customer transiting from brand i to brand j

may change with time (dependent or non-stationary Markov chains) or remain constant overtime (time-dependent or stationary Markov chains). Formally for all (n) and probability of transition independent of (n), the equation below holds.

P {Xn+1 =x/X1 =y} = P {Xn = x/Xn-1 =y}, where n =0, 1, 2.....

The probability of transiting from states i to j in nth time steps

(n)
Pij = P {Xk +n = j/Xk = i} and Pij = Pr {Xk +n = j/Xk = i}

Research Plan

This study investigates and models brand loyal behaviour of toothpaste consumers using the Markov Chains. Data were drawn purposefully from 785 students of universities of Abuja, Lagos, and Port Harcourt. These universities are located in choice cities, they cover the six geo-political zones of Nigeria, and they assure federal character in students' enrolment. Questionnaire was developed and the questions therein bordered on five brands of toothpaste {Close-up X1, McCleans X2, Colgate X3, Dabur X4, and Aqua-fresh X5}. The decision to arrive at this five was informed by preliminary inquiries. To qualify for the study, subjects must at present use toothpaste and by implication such households/persons expect replacement in due course either in favour of current brand or another. The questionnaire was made up of three sections and of structural disguised and structural undisguised questions. The first section dealt with demographic matters; and the second relates to the brands that form the foundations of Markov matrix, where the subjects ranked brand currently used and the likely preference(s) in the next purchase. The unwieldiness of the data precipitated casting them in transition matrix. To generate meaning from the data, we

- analyzed sets of summary statistics like the share of total purchases represented by favourite brand ;
- categorized families in loyalty classes using purchase shares or similar measures; and
- traced sources and destination- that is given the last purchase, what brand is likely to be purchased next?

The third borders on marketing variables that informed the choice. Responses to this last section was measured on 5 point scale from strongly agree (1) through strongly disagree (5).

Data and Measures

Brand loyalty measures consumption consistency in a product class. Given the absence of trade deals, out-of-stock of favourites, and in-store stimuli, this paper draws from Finn's (1984) model (AAABBB); and Tucker's (1964) model (AAAAABB) to measure brand loyalty as the most frequently purchased brand(s) within a stated sequence. In the 25 events within 5 states, each household/student was categorized in terms of the number of times it uses a particular brand of toothpaste, and the responses were cast into transitional matrix to generate meaning. Any household that makes consistent behaviour at least three times {AAAAA, AAAAB, AAABC} was considered exhibiting brand loyalty. Further, measures of the independent variables that informed brand loyalty were reported. Flavour was measured by herbal content, mint, menthol, fluoride, strawberry, and fresh; functionality by tooth brightness, decay prevention, and protection of cavity. Brand awareness was measured by brand's diffusion via mass media and epidemic approach (word-of-mouth) (see Fourt and Woodlock, 1960;

Mansfield, 1961; Bass, 1969) whereas brand availability measures ease of search and access. Brand name and image measures affect transfer (see Wright, 1975) and deals measure sales-inducing incentives.

Validity and Reliability

The validity and reliability of the instruments were tested for accuracy of their measurement power. Though validity was confirmed in previous studies (Dick and Basu, 1994; Kahn *et al.,* 1986), we reconfirmed in two-fold. First, the instruments were subjected to face validity involving the scrutiny of colleagues and other informed persons in order to ensure that the statements raised adequately represent the property to measure. Second, a pilot study to pre-test the scale measurement on a purposeful sample of 58 respondents in order correct inconsistencies and/or ambiguities before the actual survey. For reliability and empiricism, Cronbach test was conducted and the result slightly surpassed Nunnally's (1978) benchmark of 0.7.

Switching Behaviour and Transition Probabilities

Probability models in general and transition probability matrices in particular have considerable appeal for organizing sequences of panel data. See the household purchase sequence of toothpaste in a time period summarized below. They were 5 states and 25 state spaces/events; thus,

S = { Close-up X1, McCleans X2, Colgate X3, Dabur X4, Aqua-fresh X5}.

Group A Households	{X1 X4 X4 X4 X3 X3 X3 X2 X2 X5 X3 X3}
Group B Households	{X1 X1 X4 x5 X3 X1 X2 X1 X1 X4 X4 X4}
Group C Households	{X2 X2 X4 X3 X4 X4 X1 X4 X1 X4 X4 X5}
Group D Households	{X2 X2 X2 X2 X5 X5 X5 X1 X4 X4 X4 X4}
Group E Households	{X1 X1 X1 X1 X1 X1 X1 X2 X2 X2 X3 X4}

From learning model theories, these states define the probability vectors representing the probability of a consumer buying each brand on the next trial; whereas events or state spaces provide a single purchase act that modifies consumer's probability vector and alters the state the consumer finds himself. The following data cast in a transition matrix summarizes that data shown above as fractions of purchases of a given brand going to all brands (including itself) at the next stage. Each element in the array is divided by the sum of elements in the row in which it occurs with a resulting matrix, which describes the likelihood of a consumer purchasing any given brand in the next purchase act given information on the immediate preceding purchase.

Table 1: **Probability distribution**

Brand Purchased at Trial t+1

		X1	X2	X3	X4	X5
Brand Purchased at trial t	X1	0.083	0.167	0.417	0.250	0.083
	X2	0.417	0.083	0.083	0.333	0.083
	X3	0.167	0.167	0.083	0.500	0.083
	X4	0.333	0.083	0.083	0.250	0.250
	X5	0.583	0.250	0.083	0.083	0

The matrix shows the states of the process; the existing and the next brand preference of the subjects. This array of data in a probability form (each entry ≥ 0 and each row exhaustively sums to 1) offers insight into the process of brand loyalty and brand switching behaviours. Observe that the probability of subsequent purchases increases as a result of continual purchase of Say X1 or X2, and decreases when X3 or X4 is chosen. If the process (refer to table 1) remains stable in a long-run and if the 785 households represent the entire buying population, brand X1 (Close-up) with a probability of 0.583 is the most likely preferred when compared with other brands. The next most preferred brand is X4 (Dabur) with a probability of 0.5; X1 and X4, each loses customers almost equally to other brands and X1 is most likely to lose to X4 than to X2, X3, and X5. These insights have managerial usefulness, especially in identifying competitive behaviour but this is only critical when there is a long-run stability in transition matrix. Ehrenberg (1965) posits that instability turns up almost all empirical tests; marketing activities, especially deals, disrupt the stability of transition probabilities. Therefore, there is a gap in knowledge in using Markov chain to make long run forecasts amidst instability in transition probabilities.

Simple Markov process rarely provides adequate description that underpins brand switching behaviour. Therefore, the variables that influence existing brand preferences are reported below. Variables such as quality in terms of flavour and functionality (Xa), asking price (Xb), brand availability and awareness (Xc), brand name and image (Xd), deals (Xe), and packaging (Xf) were surveyed to unveil how paramount each is in maintaining the observed customer loyalty. SPSS (version 17) was used to analyze the data. A progressive enter method of variables was used; for each variable, a separate regression coefficient describes its relationship with loyal behaviour while Pearson's Correlation Coefficient measured their interactive relationships.

The regression equation is thus

$Yi = a + b(Xa) + b2(Xb) + b3(Xc) + b4(Xd)$----------------------$+ei$

Table 2: **Summary of Regression Analysis**

Model	R	R^2	Adjusted R	SE
	0.78	0.608	0.512	1.225

The study model summary in table (1) shows a value of R = 0.608, P<0.01; indicating that a large portion of overall variance to explain brand loyalty. In other words, the control variables in the above equation explained about 61 per cent variations of customer loyalty to toothpaste.

Table 3: **Pearson Correlation Coefficients of the Control Variables**

Correlation Coefficients

	Loyalty	Xa	Xb	Xc	Xd	Xe	Xf
Loyalty	1						
Xa	0.35*	1					
Xb	-0.23**	-0.12	1				
Xc	0.32*	0.01	0.14	1			
Xd	0.22*	0.03	0.10**	0.05	1		
Xe	0.03*	-0.14	0.07	0.08	0.17	1	
Xf	-0.12**	-0.06	-0. 04	0.20	-0.05	0.18**	1

Note: Correlation is significant at *0.05 and **0.01 levels (two-tailed test)

Discussion

This paper surveyed purchase sequences in five states (brands of toothpaste) with the probability of choosing one state at a time depending only on immediate past purchase behaviour. The probability distribution shows that close-up and dabur are the most likely preferred brand; thus, as long as no other brands are chosen, the probability of subsequent purchases of close-up or dabur increases. However, on recognition that simple Markov process lacks adequate explanation to such choice; brand availability and awareness, quality in terms of flavour and functionality, packaging, asking price, brand name and image, and deals were investigated to provide insight into such purchase behaviour. All these control variables differ in their relationships with customer loyalty either at p<0.05 or at p<0.01. Quality in terms of flavour and functionality, brand availability and awareness, brand and name image, and deals explained significant positive correlations with such loyal behaviour whereas packaging and asking price explained weak correlations.

Table (2) shows that flavour and functionality (Xa) attracts significant positive correlation coefficient (0.35, p<0.05) and the direction of such relationship explained the most significant weighted average impact (β =0.321) (see also table 4) on the observed loyalty. Previous (Haley, 1968; Fiske, 1982) and recent (Puligadda and Ross, 2010; Datamonitor, 2007; Topping, 2007) studies lend support to this finding. Fiske (1982) inferred evaluation of functionality by brand attribute beliefs and their relative importance as well as some overall attitude towards the parent brand(s). While Puligadda and Ross (2010) revealed that increasing number of flavours increases perceived variety, Haley's (1968) study on segmenting toothpaste markets based on benefit sought, found that children look for flavour and product appearance, teens and young married look for tooth brightness, large families for decay prevention, and men for good price deals. Further support came from Topping (2007), who found that children's flavour preferences are genetically influenced, with preferences for sweet flavours often prevalent; and adult's flavour preferences are predominantly guided by social and cultural norms. A Datamonitor survey in the U.S. and Europe revealed that 80% of men and women agreed that their flavour preferences are guided by three mega-trends- health and wellness, sensory indulgence, and homing/comfort. This explains why herbal favour ranks first in most consumer decisions.

Table 4: **Regression Analysis**

Control Variable	β	Correlation Coefficient	t-test
Xa	0.321	0.526	4.16
Xb	-0.286	-0.240	-3.10
Xc	0.301	0.489	3.91
Xd	0.280	0.312	3.64
Xe	0.212	-0.265	3.11
Xf	-0.171	-0.210	-2.25

Negative correlation coefficients occurred when asking price (-0.23, $p < 0.05$) and packaging (-0.03, $p < 0.05$) entered the equation with resulting inverse weighted average impacts of β = -0.286 for asking price and β = -0.171 for packaging. The result for packaging contrasts the previous studies (e.g., Strecker *et al.,* 1990; Yamoah, 2005), which reported that apart from a well-designed package differentiating and ensuring wholesomeness of its contents, it influences consumer preference (through promotional messages) especially in a competitive scene. For asking price, studies (Choi, 1991, Draganska and Jain, 2005) contradict our finding. The explanation to this stems from the fact that Port Harcourt city is an oil rich zone where even the sellers understand that as long as price differential is not too far-off for low involvement products and the product in question delivers the ideal satisfaction, consumers rarely complain aggressively. When brand availability and awareness (Xc) and brand name and image (Xd) entered the equation, positive correlation coefficients resulted; (0.32, $p < 0.05$) for Xc and (0.22, $p < 0.05$) for Xd. A weighted average impact of β= 0.301 was made by Xc and β= 0.280 by Xd.

This finding is consistent with stimulus generalization of Professor Ivan Pavlov (see Schiffman and Kanuk, 2009; Kotler and Keller, 2009), cognitive consistency (see Heider, 1958; Osgood and Tannenbaum, 1955; Festinger, 1957), affect transfer (see Wright, 1975), categorization theory (see Fiske, 1982), Thorndike's law of effects (see Thorndike, 1947), and technology cluster (Cook, 2009) since all suggest that brand equity expressed in terms of strong reputations and psychological attributes have assurance of awareness, quality, affect, dependability, performance, and service (Aaker and Keller, 1990). Firms maximize the synergy of parent brand's heightened awareness, availability, and good reputation/brand image to launch successful extensions (Randall, 2000) on the grounds that transfer of cognitive and affect processes permit instant communication of salient image as well as higher product acceptance (Salciuviene *et al.,* 2010; Ambler and Styles, 1997; Martin *et al.,* 2005; Kohli and Harich, 2005). Yamoah (2005) studied the availability factor of rice in Ghana and found that brands that experience seasonal shortages suffer customer loyalty.

Finally, deals (Xe) attracted a positive correlation coefficient of 0.03, $p < 0.05$ and a weighted average impact of β= 0.202. This finding may be explained on the grounds that toothpaste is a low involvement product with many versions; thus, deals add distinctive values, retain loyalty, and steer up trial behaviours which are rarely preceded by aggressive search and evaluation efforts. Previous studies (e.g., Haley, 1968; Murphy and Sohi, 1995; Strang, 1976; Shapiro, 1977; Keller, 2001) support this finding. Haley's (1968) study on toothpaste found that men look for good price deals. Going by this stepwise approach, flavour and functionality is the most significant

determinant of the observed customer loyalty, followed by brand availability and awareness, brand name and image, and deals.

Limitations and further studies

Rarely would every product class find the finding(s) of this study wholly useful, after-all toothpaste is just one of low involvement products. That our sample was drawn from users of frontline brands of toothpaste in the low density area of Port Harcourt limits the power of generalization against those areas, other brands, and other product classes not investigated bearing in mind that every locale, brand, and product class/category is, to a large extent, idiosyncratic. Extended data and measures are required to build external validity; future scholars may replicate the survey in other locales and product classes for cross learning and building of guiding laws. Further, caution need be exercised in the measures used since they seem subjective and prone to common method bias even though concrete steps were taken to minimize their effect on results. Finally, factors such as in-store stimuli, store attendant's advice, product's country of origin, situational influences, who makes choice decisions, organization's size (for producers), and others were not measured and thus, scholars are challenged to take them up.

Conclusions and Contributions

Marketing studies are thought discrete from time and place viewpoints, thus finite Markov chains apply. This paper surveyed brand switching and brand loyalty of toothpaste users in the low density areas of Port Harcourt. The data gathered were transformed into a Markov matrix and the switching behaviour amongst the five brands was observed. Because the matrix was a systematic one, the paper concludes that subjects exhibit brand loyalty (AAAAA; BBBBB), and Close-up and Dabur were the most preferred brands. Markov matrix shows strength in predicting long-run brand loyalty but it rarely provides lenses to understand which variables are responsible for such loyalty. Therefore, this paper steps further to unveil such lenses and further concluded that flavour and functionality were the most significant determinants of this observed loyalty, followed by brand availability and awareness, brand name and image, and deals.

The dearth of local studies that have specifically identified the most preferred brands and ''why'' carves a strength for this study. Further, though there is a general assumption that price sensitivity is a common phenomenon amongst people of low income groups, this paper distinguishes itself by reporting that price does not hold top-notch position in consumer decision-making especially when there is a ruling price range and the product itself delivers its functional, psychological, and social promises to the audiences. Finally, familiarity with the various brands of toothpaste makes packaging a mere container with little or no promotional values.

Managerial Implications

Amidst the existing stiff competition, the implication is to key strategic and tactical actions along the strengths of the factors identified by the study in order to build competitive advantage that retains AAAAAA sequence of purchase via clear grasp of consumers' changing expectations. First, packaging must be made more aesthetic and appealing to cause consumers to guess, and/or actually recognize, the salient selling points embedded in its positioning and repositioning message contents. Second, price need be de-emphasized as a major decision determinant in this product category, rather flavour (in terms of herbal content), brand availability and awareness, brand name and image, and deals.

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