

Attain and Sustain Competitive Advantage
A System Dynamics Model of Customer-based Brand Equity

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as a partial requirement of M.Sc. in System Dynamics

at

University of Bergen Norway



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Chapter 1

Introduction

1. Introduction

Tangible assets had remained the only contributors of the firm value but it is now increasingly recognized that along with the tangible assets the value of any firm lies in the perceptual maps of prospective customers (Aaker, 1996; Pearson; 1996, and Ind, 1997). Potential buyers/stakeholders integrate their sensory information related to a product or service with their prior product/service interactions to constitute their multifaceted rational imagery about the product/service (Keegan, Moriarty, and Duncan, 1995). In early 1990s the literature of marketing started to put forward the physical and non-physical constructs of a brand leading to the development of the concept of brand equity which gradually developed into a concept of critical significance in branding.

Branding has become a crucial field of research because it can be highly beneficial for marketing strategists who desire to develop their brands and figure out the strategic plans in order to attain and sustain competitive advantage (Low and Lamb, 2000). The thought of brand building seems curtailed without taking in to account the concept of brand equity management (Aaker 1991). Brand equity incorporates the tangible worth of the brand as well as the intangibles such as value of proprietary technologies, patents, and trademarks. Generally, brand equity can be defined as an outcome of various marketing activities with reference to a particular brand. Brand equity refers to the distinct advantage that a brand achieves as a result of its distinguished brand identity. A variety of views exist about brand equity, but majority of them consider it as an “added value” granted to a product or a service as an outcome of marketing efforts for the brand. It has been acknowledged that brand equity is instrumental in building a brand and leveraging the value of a firm (Keller, 1993 & 1998). Keller (1993) conceptualized customer based brand equity as “the differential effect that brand knowledge has on consumer response to the marketing of that brand”.

For the purpose of this thesis I use conceptualization of Aaker (1991) and Keller (1993) to build a System Dynamics (SD) model for cellular industry of Pakistan using Vensim®. I estimate different parameters and calibrate this model to replicate the behavior of different variables of interest found in historical data. The calibrated model is then used to simulate different policy scenarios.

Chapter 2

The context, the problem and hypothesis statement

2.1. The context

The model is developed in the context of cellular phone industry of Pakistan which is one of the rapidly emerging cellular phone services markets in the world attracting many of the players from around the globe. From a humble beginning where the market was initially shared by only two operators, we now observe a fierce competition among five major operators. Mobilink, in association with Egypt-based Orascom Telecom, is the market leader having around 31 million subscribers or 32% market share in terms of subscription base. It lost a sizeable market share in 2008-2009 because of heavy investment in physical infrastructure and aggressive promotional campaigns launched by arch rivals especially Telenor of Norway which now has subscribers' base of around 20 million and 21% market share. Telenor shares the second place with Ufone, a newly privatized domestic firm, with subscribers' base and market share similar to Telenor. The two rivals are closely followed by Warid, a UAE-based telecom operator, with a market share of 19%. Zong, a China-based telecom operator, is relatively new to the Pakistani market and is ranked 5th in terms of market share. Going through the publically available information of these companies, it seems that firms are trying to build customer based brand equity to win over market share through continuous investments in physical infrastructure of cellular services to intensify their network to penetrate into different areas of the country, aggressive advertisement and promotional campaigns.

2.2. The problem and the model purpose

The market share is the key indicator of sustainability for any mobile phone operator. Review of relevant literature especially Aaker (1991) helps provide the theoretical framework to identify the key determinants of customer based brand equity from a marketing perspective, and their two way linkages to determine customer based brand equity and consequent market performance of the firm.

The fundamental purpose of the model is to identify, incorporate and simulate generally observed dynamics of customer based brand equity in cellular phone industry of Pakistan.

Having determined the system structure, the study identifies the policy parameters pursuing which the competing firms have successfully penetrated the market. This study then demonstrates the likely scenario if the firms continue with their current policy frameworks. Such a simulation exercise helps identify alternative leverage points to help build brand equity that should result in superior market performance to lead/sustain such a fierce competition in cellular phone services market in Pakistan.

A recent study in cellular phone services market in Pakistan used customers' survey (Hafeez 2011) to help identify dimensions of customer based brand equity. I used this study to guide this modeling effort. However, there is no study that suggests the policy parameters to attain and sustain competitive advantage from a marketing perspective in this context. This study intends to fill this gap.

2.3. Hypothesis statement

The fierce competition has changed the market dynamics as well as the market share of the competing firms in cellular services market in Pakistan. This suggests failure of the current policy frameworks. My hypothesis is that for a better market performance the firms need to identify a new set of policies.

Chapter 3

Theoretical Framework

and

Model Description

3.1. Introduction

The business literature acknowledges the importance of branding as it leads towards the development of successful marketing strategy (Gladden and Funk, 2002; Keller, 2003). Intense price competition has lead towards lower profits of the products and services over time (Aaker, 1991), forcing the marketers to find new ways of a better market performance. Differentiation is one such method now named branding, making it a significant competitive marketing strategy (Keller, 2003; Tasci et al., 2007). Later on the notion of brand equity was explicated as a set of assets and liabilities linked to a brand (Aaker, 1991) which was further expanded to include the differential effect that brand knowledge has on consumer response to the marketing of that brand (Keller, 2008). A number of perspectives were taken by different authors, but for the purpose of this study I will take customer-based brand equity. Recently researchers noted lack of conceptualization and instruments to quantify brand equity from a customer perspective (DeChernatony and McDonald, 2003). The authors and researchers face challenges as to what constitutes brand equity, how to measure these determinants and how they affect the market performance (Keller, 2006). The following sections review the relevant literature in this regard.

3.2. Brand Equity Dimensions

The review of relevant literature suggests that the authors and researchers have now generally converged to the four dimensions of brand equity; brand awareness, perceived quality, brand associations and brand loyalty. In the following paragraphs I review some of the relevant literature.

3.2.1. Brand Awareness

It is well known that people generally feel comfortable with the familiar, like the familiar and display good attitudes to items that are familiar to them (Aaker and Joachimsthaler 2000). Such awareness creates positioning of the brand in the minds of the customers and prospective customers. Brand awareness is the fundamental element of brand equity as

customer only selects the product about which he knows well (Kwun and Oh, 2004; Webster, 2000). Aaker (1991) defines three levels of brand awareness as brand recall, brand recognition, and top of mind. He explains brand recall as the ability to retrieve the brand from the memory of the customer/potential customer when exposed to the product category, the needs fulfilled by it or a purchase/usage situation as a cue. He defines brand recognition as the ability to confirm prior exposure to the brand when a brand cue is given. He further suggests top of mind as the state when one can easily recognize the brand among a lot of different brands. Keller (2003) argues that assessing the brand awareness is important for researchers and practitioners. I use the explanation of Aker (1991) to model the 'Brand Awareness' sector of the model developed for the purpose of this study.

3.2.2. Perceived Quality

Perceived quality is another core dimension of brand equity and has a direct impact on brand value perceived by customers (Aaker, 1996; Teas and Laczbiak, 2004). Perceived quality is the judgment of customers about the brand's overall performance (Keller 1993). Some of studies find perceived quality as a strong positive indicator of brand loyalty (Cretu and Brodie, 2007; Michell et al., 2001) and suggest that perceived quality builds during the direct interaction with the brand. They judge the quality based on five dimensions: tangibles, people, consistency, receptiveness and outcome (Alexandris et al., 2008). The outcome is the technical quality of the brand experienced by the customers after consuming the service (Zeithaml and Bitner, 2006). It is argued that higher perceived quality generates brand loyalty and hence the market performance (Jiang et al., 2003). Considering the above literature we used the relative coverage (measured by cell sites) of each provider to model perceived quality which further becomes part of brand equity in 'Investment and Brand Equity' sector of the model.

3.2.3. Brand Associations

Brand association is the representation in the customers' memory associated with the brand (Aaker, 1991; Keller, 1993) and is a dimension of brand equity (Aaker, 1991). The customers

make use of associations to stock and process the relevant information to simplify the decision making process (Aaker 1996) and as such brand associations can enhance brand image, awareness and customer loyalty (Rio et al., 2001; Ross, 2006). Aaker (1996) classified brand associations into two dimensions: associations and differentiation and further categorized the measures of associations into three categories: the brand as a value, the brand as a person and the brand as an organization. Some view brand association as the most important dimension of brand equity (Chen, 2001) while others do not consider it part of brand equity (Otto and Bois, 2006). However, it is unclear and controversial dimension of brand equity when it comes to its measurement. While explaining this dimension some consider perceived quality as part of association (Chen, 2001) while others consider brand association as attributes, attitudes and benefits (Keller, 1993) indirectly suggesting the perceived quality. I follow this thread and consider brand association as perceived quality in my model.

3.2.4. Brand Loyalty

Brand loyalty is the attachment a customer has to a brand and is a core dimension of brand equity (Aaker, 1991; Yoo and Donthu, 2001), but some argue that brand loyalty is an outcome and not the dimension of brand equity (Keller, 1993). However, many favor brand loyalty as a dimension of brand equity and suggest that a loyal customer commits to repurchase or patronize a brand consistently in the future despite situational influences and marketing efforts having the potential to cause switching behavior (Oliver, 1997). Having a loyal customer base is quite a difficult task requiring a consistent superior performance but provides a solid pool of a variety of resources to the brand to excel in the market place. I use this notion to model brand loyalty as a relative loyal customers' base in 'Investment and Brand Equity' sector of my model.

3.2.5. Impact of Brand Equity on Firm's Performance

Market performance takes into account the customer perspective and is determined by the indicators such as sales volume and market share (Lassar, 1998). Firm should count on their

competitive brands and their performance to get a picture of their standing in the market in comparison to their competitors (Baldauf, Carvens, and Binder, 2003). The study of interrelationship among brand equity dimensions and market performance lacks empirical research focus. However, theoretical support has been offered by Webster (2000) who argued that a foremost advantage of brand equity is its significantly favorable effect on demand. Increased brand awareness, greater extent of loyalty, higher perceived quality and positive associations are anticipated to boost market performance. These dimensions of brand equity enormously support the firm in attracting the new customers and retaining the existing ones. Brand equity increases consumer loyalty and switching costs and can result in long-term benefits for firms with strong brands (Jones, Mothersbaugh, and Beatty 2000; McWilliams and Gerstner 2006). Various organizational efforts in the long run contribute towards construction of the dimensions of brand equity and those dimensions result in value addition to the firm and to the customer. Value to the customer is at last added back to the value to the firm so one can say that all the management efforts of brands are actually to add the value to the firm (Aaker, 1991). In terms of the outcomes of brand equity, Ross (2006) regarded brand loyalty, profits generation and extension opportunities as catalysts for firm's long term growth and sustainability. Hence, brand equity dimensions can be favorably related with market performance.

3.3. Methodology

Using the theoretical framework provided by Aaker (1991), I develop a System Dynamics based model to portray the feedback relationships identified by him. I also use the results of a customers' survey conducted in five populous cities of Pakistan (Hafeez 2011) to guide my modeling effort. I do not consider the impact of brand equity on firm's financial performance and keep it out of the model boundary due to expected non availability of detailed financial data. However, such a model boundary assumptions is not likely to affect this study in a significant way as we do not link amount of available investment with the financial outcomes of the firms.

3.4. Model Description

I will describe major causal loops and stock and flow diagrams in the following paragraphs.

3.4.1. Causal loop diagram

There are a total number of 203 feedback loops involving 'Brand Equity'. In the causal loop diagram (CLD), Figure 1, I only present seven major feedback loops (six positive feedback loops and one negative feedback loop). This CLD presents an overall feedback system structure interlinking the dimensions of brand equity.

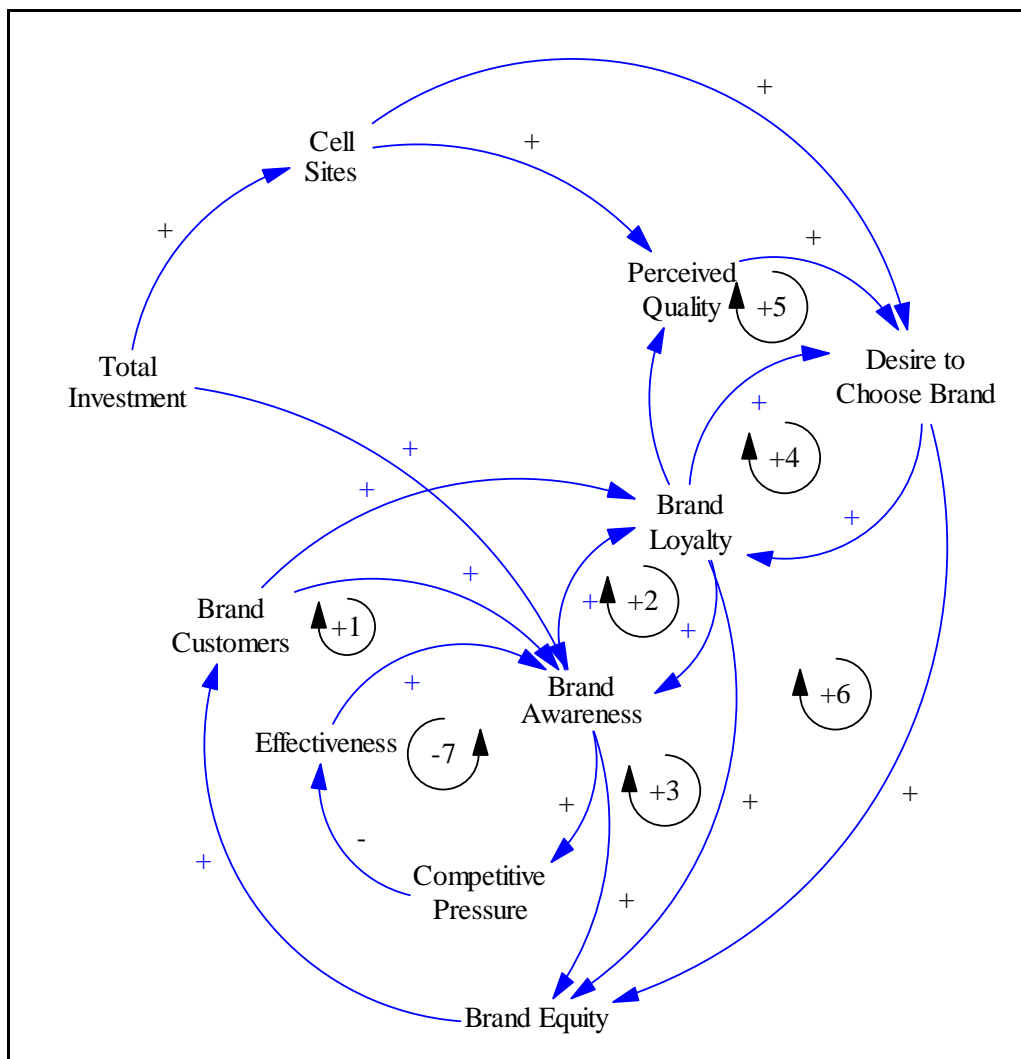


Figure 1: Causal Loop Diagram

3.4.1.1. Positive Feedback Loop 1: Investment in Awareness Pays

The positive feedback loop 1 suggests that investment in marketing helps build brand awareness that strengthens brand equity which in turn builds brand customers and such a build-up reinforces brand awareness through *word-of-mouth* effect.

3.4.1.2. Positive Feedback Loop 2: Awareness – Loyalty Nexus

The positive feedback loop 2 presents a quite intuitive awareness-loyalty nexus which indicates that awareness increases loyalty and loyalty in turn increases awareness.

3.4.1.3. Positive Feedback Loop 3: Loyalty Builds Loyalty

The positive feedback loop 3 advocates that loyalty reinforces brand equity which helps build brand customers and more brand customers means increased brand loyalty. It will be relevant to point out that positive feedback loops 1 to 3 present investments in marketing based short-term perspective of brand equity.

3.4.1.4. Positive Feedback Loop 4, 5 & 6: Investment in Quality Builds Loyalty

The positive feedback loops 4, 5 and 6 show that investment in physical resources (cell sites) helps improve perceived quality in the minds of the customers/potential customers that is reflected as improved network coverage and better communication quality resulting into increased desire to choose the brand which brings in brand loyalty as well as supplements brand equity to increase the base of brand customers. These loops reflect the investments in physical resources based long-term perspective of brand equity.

3.4.1.5. Negative Feedback Loop 7: Competitive Pressure

The negative feedback loop 7 suggests that increased brand awareness attracts competitors' action resulting into increased competitive pressure that reduces the effectiveness of the firm's marketing campaigns having a negative impact on the dimensions of its brand equity. The interaction of positive and negative feedback loops generate the dynamics of market performance of the competing firms.

3.4.2. Stock and flow diagram

I will discuss the stock and flow diagram (SFD) of the model in the following paragraphs.

3.4.2.1. Market sector

Potential market is a group of customers who are willing to buy a product or service, and have resources to buy that product or service. To model this sector I use the portrayal of Aaker 1991 (pp.40) that I present in the following Figure 2.



Figure 2: The Loyalty Pyramid – A Basis for Market Sector

I exogenously estimate the stock of '*Potential Customers*'. For this purpose, I consider '*Population*', its '*Normal Growth Rate*' and '*Normal Death Rate*' as exogenous which is quite logical. Sound estimates for these three are available from a number of reliable sources. I also consider the demographics as exogenous. I acknowledge the role of demographics in customer-based brand equity as the customer behavior of different age groups is different (Hafeez 2011), but such a depiction is beyond the scope of this study as I model for strategic policy design to attain and sustain competitive advantage via elements of customer-based brand equity.

I use historical ‘*Cellular Density Function*’ as exogenous and use the estimates of PTA to estimate potential customers which the competing companies have to compete for. Moreover, I consider the ‘*Time to Outreach*’ as exogenous which is time taken by the companies to make their service available to potential customers by setting up their resources, physical as well as non- physical. I present the stock and flow diagram of Market Sector in Figure 3.

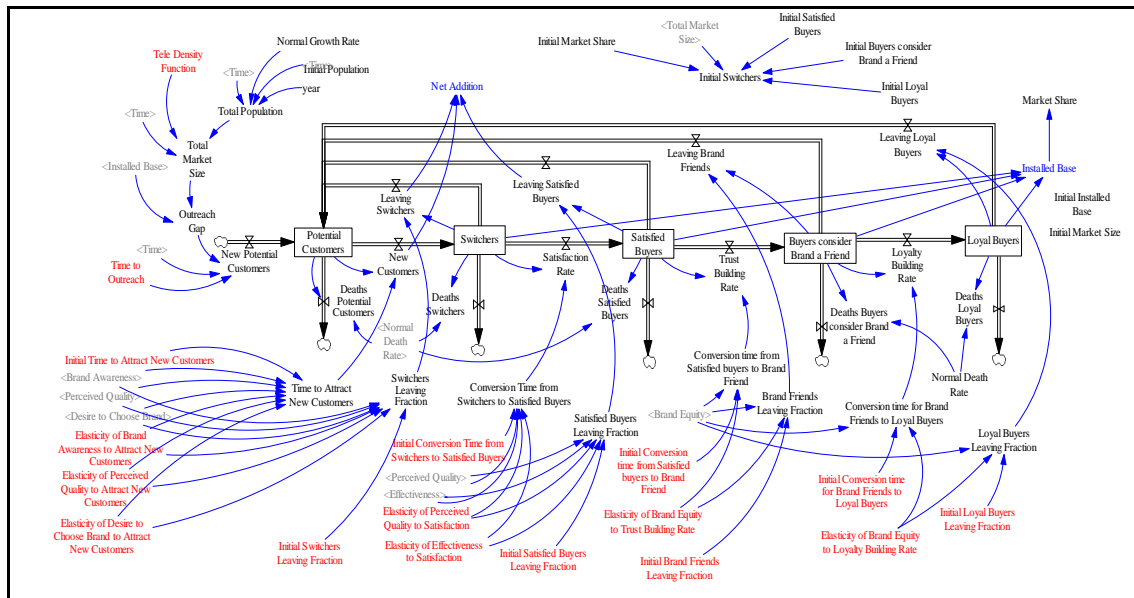


Figure 3: Stock and Flow Diagram of Market Sector

The ‘*Total Population*’ that now has the infrastructure required for cellular services determines ‘*Total Market Size*’ of which some are already customers (‘*Installed Base*’) of the five competitors in this market; Mobilink, Ufone, Telenor, Warid and Zong for which I use subscribers to identify them. As such the difference of ‘*Total Market Size*’ and ‘*Installed Base*’ determines ‘*Outreach Gap*’ which these companies try to outreach in ‘*Time to Outreach*’ via collective/industry-wide effort to determine ‘*New Potential Customers*’ per year which is added to the stock of ‘*Potential Customers*’ that is not yet served by cellular industry. The companies use the elements of their brand equity, ‘*Brand Awareness*’, ‘*Perceived Quality*’ and ‘*Desire to Choose Brand*’, to attract ‘*New Customers*’ who accumulate in the stock of ‘*Switchers*’. They are also called price buyers who may leave via flow of ‘*Leaving Switchers*’ to become potential customers or via ‘*Satisfaction Rate*’ to become ‘*Satisfied Buyers*’ via elements of brand equity, ‘*Perceived Quality*’ and ‘*Effectiveness*’, and leave this stock via

'Leaving Satisfied Buyers' to become *'Potential Customers'*. Elasticity of the brand equity elements determines effect on inflows *'New Customers'* and *'Satisfaction Rate'*, and I modeled the two outflows *'Leaving Switchers'* and *'Leaving Satisfied Buyers'* as inverse of inflow formulations i.e. one minus elasticity. The overall brand equity determines *'Trust Building Rate'* to accumulate *'Buyers consider Brand a Friend'* that are then affected by brand equity via *'Loyalty Building Rate'* to accumulate *'Loyal Buyers'*. Based on Aaker (1991) I may have taken a strong assumption that these customers stay with the company till their death but considering the characteristics of cellular industry in general and Pakistani market in particular I use the outflow formulation (for *'Leaving Brand Friends'* and *'Leaving Loyal Buyers'*) from the two stocks of loyal customers similar to that of earlier three stocks' outflow. All of the stocks have one common outflow due to *'Normal Death Rate'*. I use the *'Installed Base'* to calculate *'Market Share'* of each firm.

3.4.2.2. Brand Awareness Sector

Aaker (1991) refers brand awareness as the ability of a potential buyer to recognize a certain product involving a continuum ranging from an uncertain feeling to a definite conviction. The following Figure 3 shows Aaker's notion of brand awareness.



Figure 4: The Awareness Pyramid – A Basis for Brand Awareness Sector

I present the stock and flow diagram of Brand Awareness Sector in Figure 5 for which I use Aaker (1991) as well as Hafeez (2011) to develop this sector as well as to calibrate it.

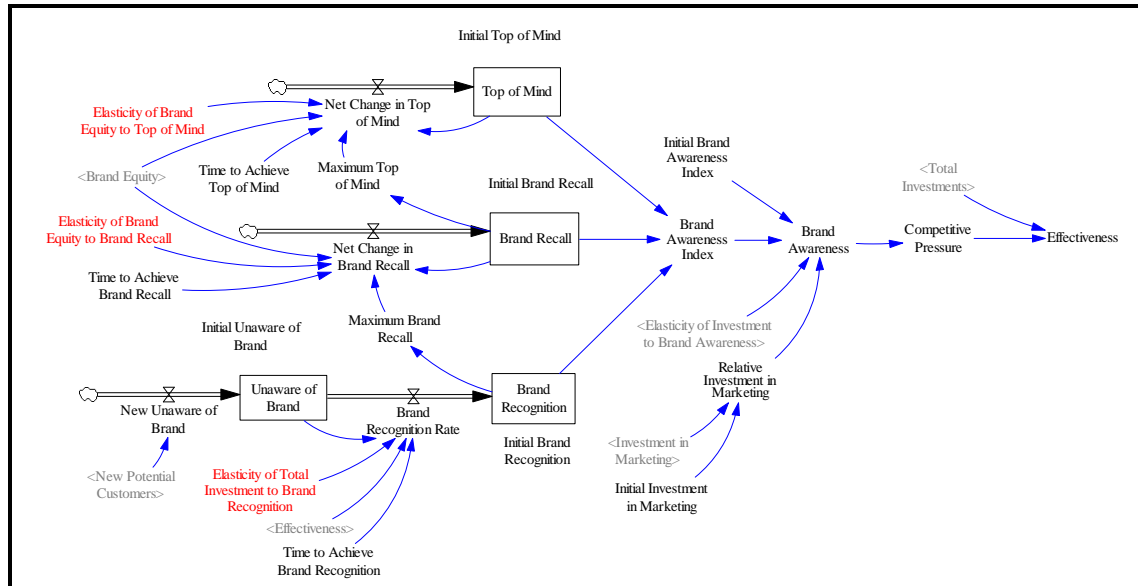


Figure 5: The Stock and Flow Diagram of Brand Awareness Sector

The 'Total Investments' made by the companies create awareness converting 'Unaware of Brand' to 'Brand Recognition' via 'Brand Recognition Rate'. Sum of the stock of 'Brand Recognition' is the 'Maximum Brand Recall' which the companies tap using their brand equity to accumulate them in 'Brand Recall' via 'Net Change in Brand Recall'. Sum of the stock of 'Brand Recall' is 'Maximum Top of Mind' which they tap using their brand equity to accumulate them in 'Top of Mind' via 'Net Change in Top of Mind'. Sum of the three stocks is called 'Brand Awareness Index' and supplemented by their investment activities results into 'Brand Awareness'. More 'Brand Awareness' leads counter action of the competitors and increases 'Competitive Pressure' resulting into reduced 'Effectiveness' of the companies.

3.4.2.3. Investment and Brand Equity Sector

I present the Investment Sector in Figure 6.

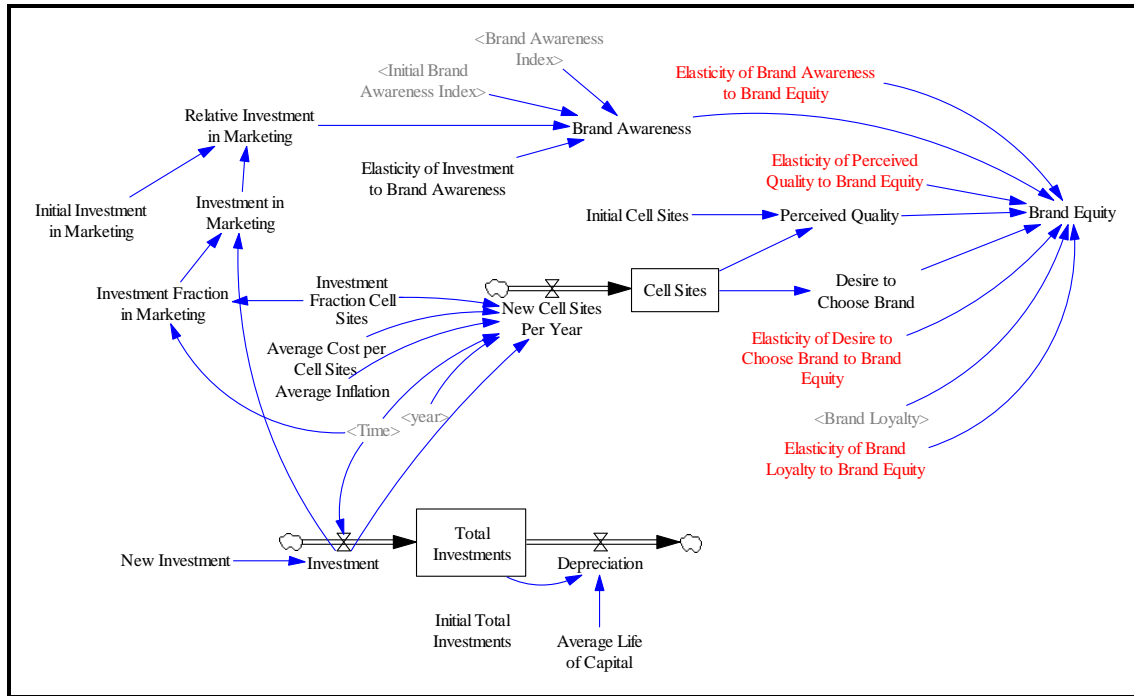


Figure 6: The Stock and Flow Diagram of Investment and Brand Equity Sector

As the documents available on PTA website suggest the competing firms heavily invest in creating and maintaining their physical resources called cellular sites (model name 'Cell Sites') not only to penetrate in the market but also to maintain and improve their coverage and quality of their services. Such an investment helps build and improve 'Perceived Quality' and also creates 'Desire to Choose Brand'. I formulate 'Brand Loyalty' as index of 'Buyers consider Brand a Friend' and 'Loyal Buyers'. I Cobb-Douglas production function to formulate 'Brand Equity' based on 'Brand Awareness', 'Perceived Quality', 'Desire to Choose Brand' and 'Brand Loyalty'. The reviewed literature identifies the difficulty in measuring brand association, an element of brand equity. As I do not get sufficient input to model it, I keep this element out of the model boundary. This is a limitation of this study.

3.4.3. Parameter Estimation

I use the data available on website of Pakistan Telecommunication Authority (PTA), the regulator of telecommunication industry in Pakistan not only for initialization of the model but also for parameter estimation, reference mode and model calibration purposes.

For the purpose of parameter estimation I use two step process recommended by Lyneis and Pugh (1996). As a first step I use the optimization feature of the Vensim® to estimate the parameters used in the model. As the second step I calibrate the model via changing these estimated parameters in such a way that the simulated model output better fits the aggregated data of PTA. I used the PTA data of estimated percentage of total population using telecom services to estimate the potential customers. As the companies have already quickly outreached the densely populated areas, it will be difficult and time consuming to outreach distant and thinly populated areas. Both of these are presented as lookup function in Figure 7 below.

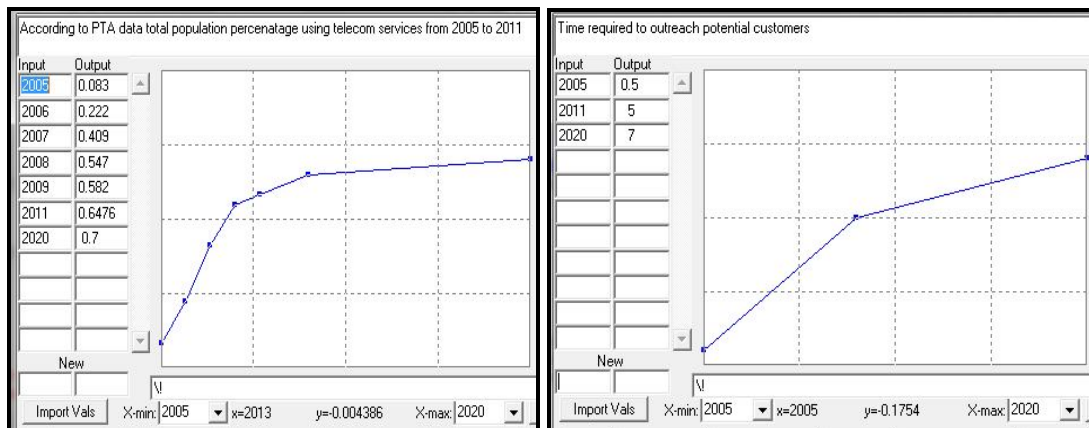


Figure 7: The Tele Density Function and Time to Outreach

In the following Table 1 I present the estimated parameters of all the sectors.

Parameters	Cellular Companies				
	Mobilink	Ufone	Telenor	Warid	Zong
Initial Satisfied Buyers	200,000	100,000	100,000	10,000	10,000
Initial Buyers consider Brand a Friend	5,000,000	1,200,000	500,000	200,000	600,000
Initial Loyal Buyers	1,500,000	1,000,000	400,000	200,000	300,000
Initial Market Share	0.55	0.20	0.062	0.04	0.065
Initial Time to Attract New Customers	0.34	0.45	0.70	0.80	2.50
Elasticity of Brand Awareness to Attract New Customers	0.20	0.10	0.35	0.30	0.50
Elasticity of Perceived Quality to Attract New Customers	0.30	0.30	0.25	0.30	0.40
Elasticity of Desire to Choose Brand to Attract New Customers	0.25	0.10	0.25	0.45	0.45
Initial Switchers Leaving Fraction	0.14	0.40	0.15	0.10	0.20
Initial Conversion Time from Switchers to Satisfied Buyers	2.00	2.00	3.00	4.00	6.00
Elasticity of Perceived Quality to Satisfaction	0.30	0.30	0.30	0.40	0.50
Elasticity of Effectiveness to Satisfaction	0.20	0.30	0.30	0.40	0.50
Initial Satisfied Buyers Leaving Fraction	0.10	0.15	0.10	0.10	0.20
Initial Conversion time from Satisfied buyers to Brand Friend	5.00	3.00	3.00	3.00	3.00
Elasticity of Brand Equity to Trust Building Rate	0.30	0.40	0.40	0.40	0.40
Initial Brand Friends Leaving Fraction	0.05	0.15	0.05	0.10	0.15
Initial Conversion time for Brand Friends to Loyal Buyers	5.00	5.00	5.00	5.00	5.00
Elasticity of Brand Equity to Loyalty Building Rate	0.40	0.40	0.30	0.40	0.40
Initial Loyal Buyers Leaving Fraction	0.05	0.10	0.05	0.10	0.15
Elasticity of Brand Equity to Top of Mind	0.30	0.30	0.30	0.30	0.30
Elasticity of Brand Equity to Brand Recall	0.30	0.30	0.30	0.30	0.30
Elasticity of Total Investment to Brand Recognition	0.30	0.30	0.30	0.30	0.30
Time to Achieve Brand Recall	3.00	3.00	3.00	3.00	3.00
Time to Achieve Brand Recognition	3.00	3.00	3.00	3.00	3.00
Elasticity of Brand Awareness to Brand Equity	0.05	0.26	0.35	0.31	0.69
Elasticity of Perceived Quality to Brand Equity	0.35	0.34	0.52	0.34	0.38
Elasticity of Desire to Choose Brand to Brand Equity	0.16	0.29	0.50	0.48	0.45
Elasticity of Brand Loyalty to Brand Equity	0.76	0.30	0.30	0.30	0.30

Table 1: Estimated Parameters

I only have the number of customers of each of the five competitors but do not have data about the classification of these customers as per Aaker (1991). After using optimization I manually amend these values in such a way that the simulated model output is representing the PTA data reasonably well.

Reading through the website of PTA (PTA 2012) I get estimate of the investments made by these firms over time. But I do not have any data about the type of investments the competing firms are making. However, the descriptions provided there as well as my market information leads me to suggest that there are two major types of the investments made: one, physical investment in developing their own cell sites for which I have the data available from PTA; and two, investment made in marketing and offering different call & SMS/data packages. I assume the following fractions (Table 2) over time for their investment fraction in

development of cell sites and the remaining (that is to say one minus this fraction) will be fraction of investment in marketing activities.

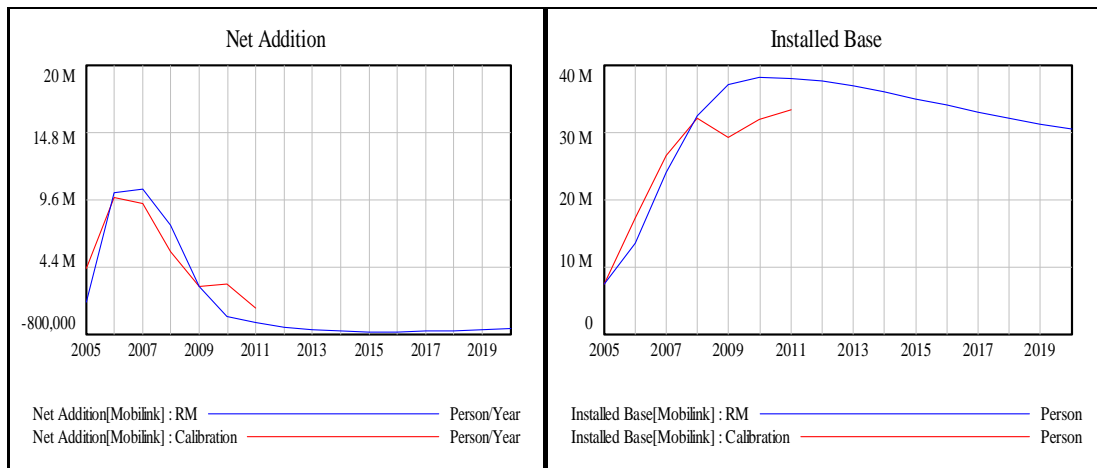
Cellular Companies	Investment Fraction Cell Sites		
	2005	2009	2011
Mobilink	0.70	0.70	0.60
Ufone	0.90	0.85	0.85
Telenor	0.50	0.90	0.85
Warid	0.60	0.70	0.80
Zong	0.85	0.80	0.75

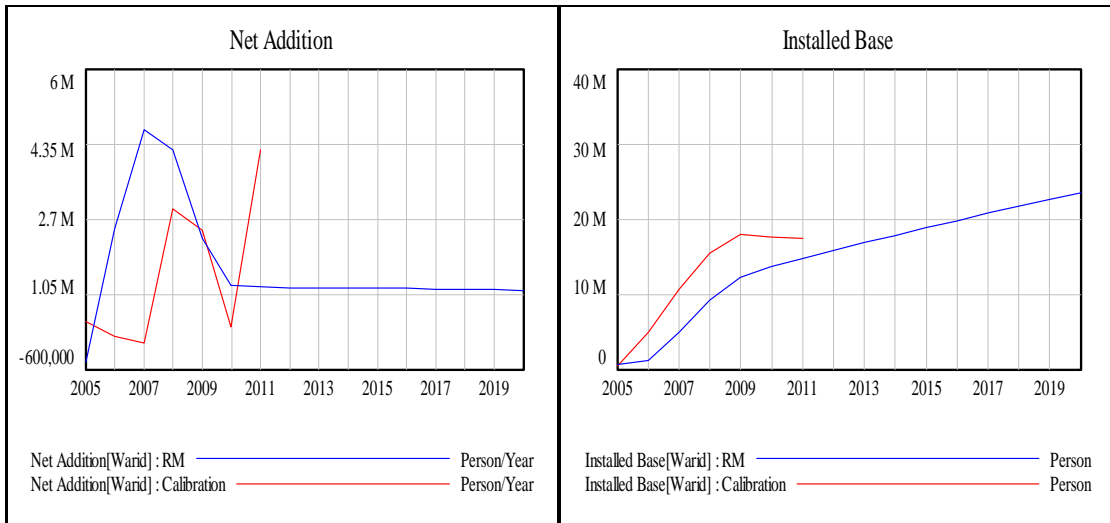
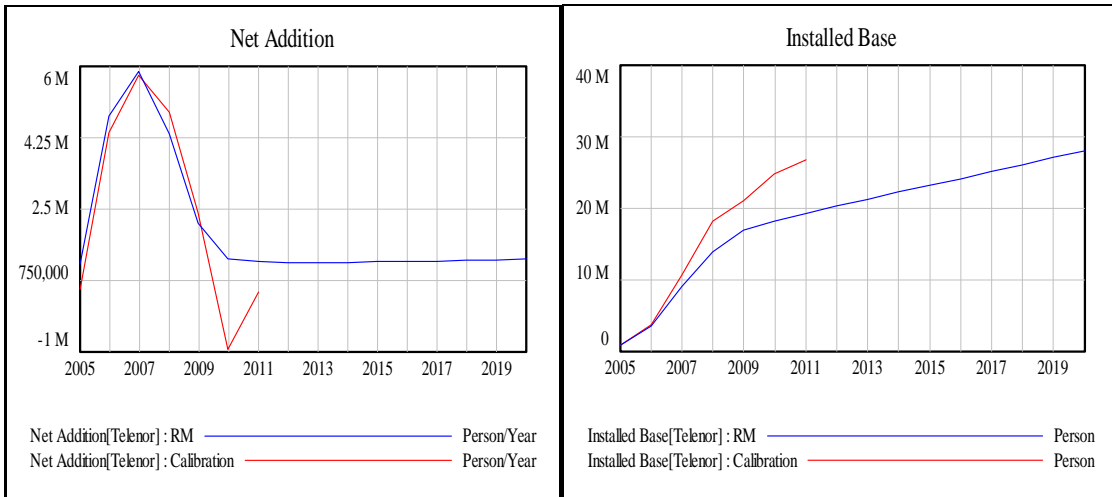
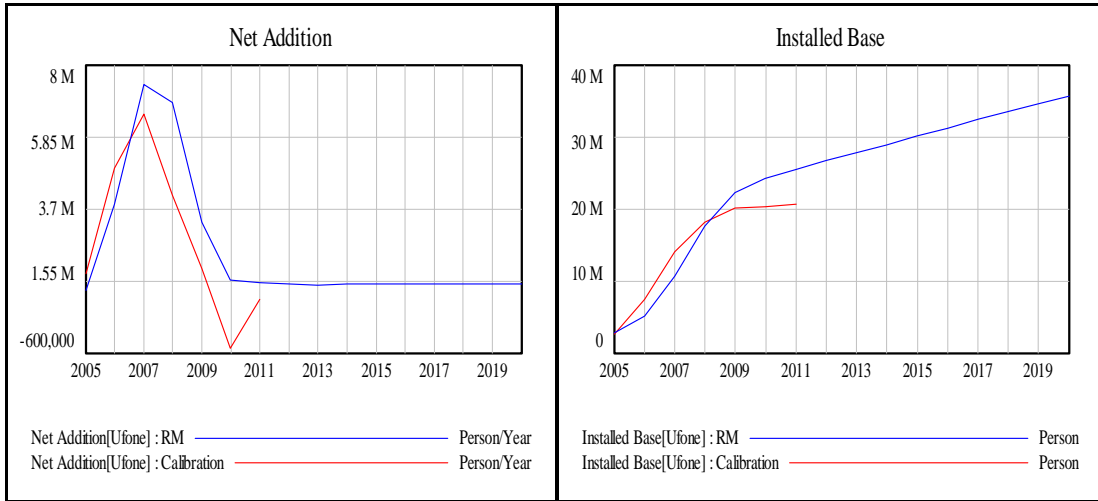
Table 2: Estimated Investment Fraction Cell Sites

Moreover, I assume a constant cost per cell site and constant inflation rate over time. This may be a limitation of this work but I needed to have some estimate of cost per cell site for which I do not have any data and for simplicity a constant inflation rate is assumed.

3.4.4. Model Calibration

Using the above mentioned parameters I simulated the model. The simulation output of the two major market variables i.e. ‘Net Addition’ and ‘Installed Base’ for the five competing firms





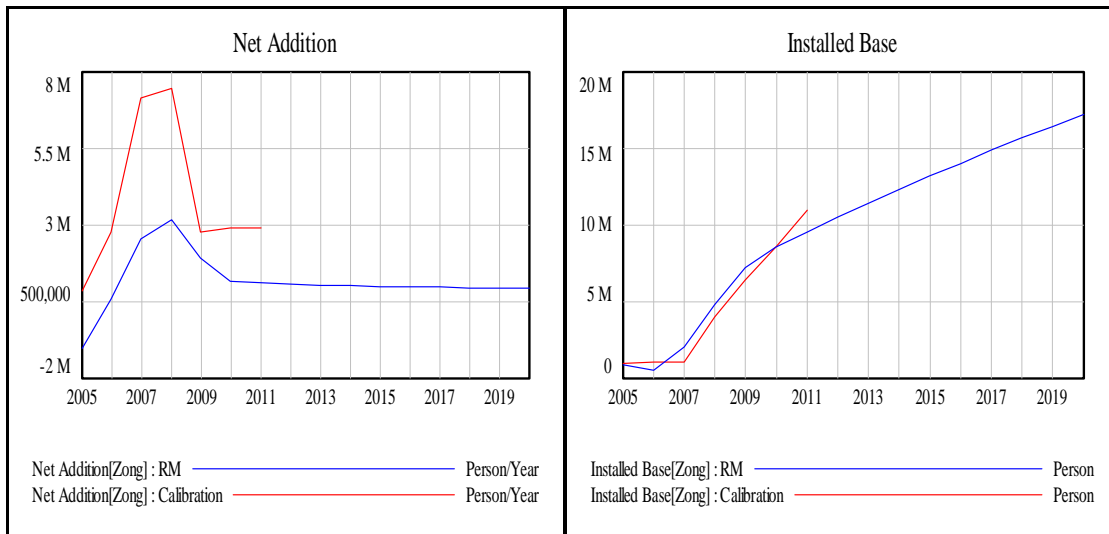


Figure 8: Model Calibration

The Figure 8 clearly indicates that the model captures the underlying behavior of the actual data quite well but this model could not mimic the real data quite well. I try to explain this shortcoming with these probable explanations. Most the users of cellular phones have more than one SIM cards generally of different providers. During last few years there has been many a times different changes (regarding time period) in law which requires the service provider to deactivate the SIM if it was not used for certain time period. Such changes in law resulted into quite a volatile 'Net Addition'. As I do not model these events so the model does not capture these volatilities.

3.4.5. Model Validation

In the following paragraphs I report the results of model validation tests that I have used for the purpose of model validation as prescribed by Barlas (1994) and Sterman (2000). I could not perform all which I admit is the shortcoming of this modeling effort. In the following paragraphs I report the validation tests performed.

3.4.5.1. Direct Structure Test

The direct structure test requires conformity of the model structure and its equations with available knowledge (Barlas 1994). I have developed the theoretical framework of the model around the most popular work in customer-based brand equity of Aaker (1991) and using

this theoretical framework I developed the model. The model description and review of the model equations suggest that model structure and its equations are in line with the available knowledge.

3.4.5.2. Unit Consistency Test

Unit consistency test is also considered as one of the direct structure tests (Barlas 1994). I used the automated units check to check for the units' consistency of the model. The units are all OK.

3.4.5.3. Extreme Condition Test

The model should behave in a realistic fashion if extreme condition is imposed. The stocks should never be negative (Sterman 2000). I used '*Average Life of Capital*' as one (in RM it is 10) and report here that stock of '*Cell Sites*' decreases sizably but is never below zero. All other stocks were also non negative.

3.4.6. Reference Mode

Using the estimated values of the parameters as described in section 4.2.5 along with the structural assumptions taken in model description as well as about different variables, I simulate the model to generate simulated output of different variables of interest which is called 'Reference Mode'.

Below I present the main variable of interest, Market Share, in Figure 9. I will present and discuss rest of the variables of interest

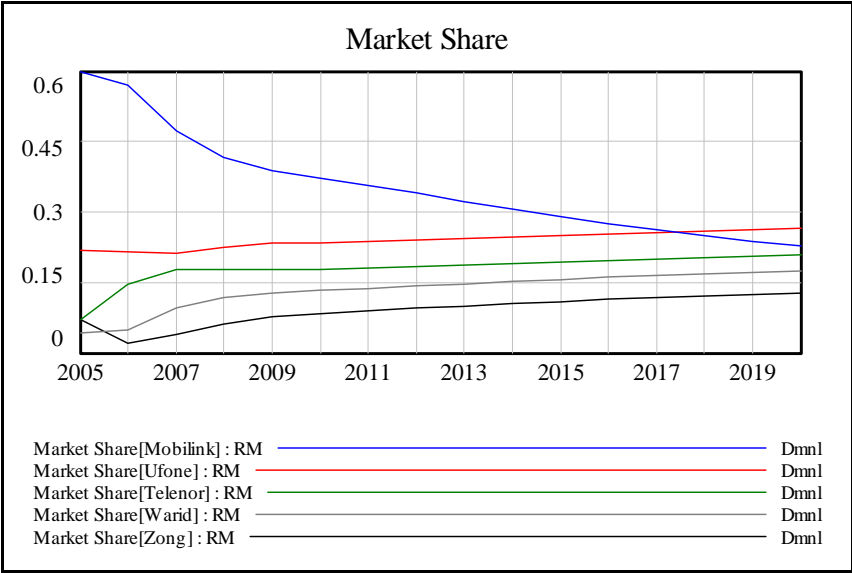


Figure 9: Reference Mode – Market Share

Figure 9 shows a continued declining trend of the market share of Mobilink, the market leader. To understand the possible reasons from a customer based brand equity perspective I will present the simulation outcomes of the elements of brand equity. It is quite astonishing to note that even though Mobilink is market leader but its perceived quality is likely to remain at the lowest. This clearly has policy implications for Mobilink, i.e. Mobilink has to improve its perceived quality by sizeable investment in its cell sites if it is to retain its market leadership.

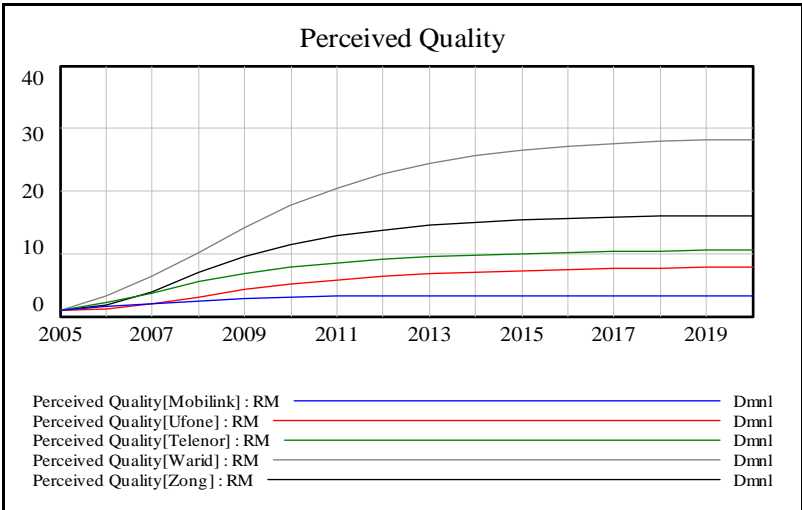


Figure 10: Reference Mode – Perceived Quality

As a consequence of decreasing perceived quality the desire to choose brand of the potential customers is also declining over time for Mobilink. However, it is still highest among the competitors due to better coverage as well as ‘word-of-mouth effect’ and network effect.

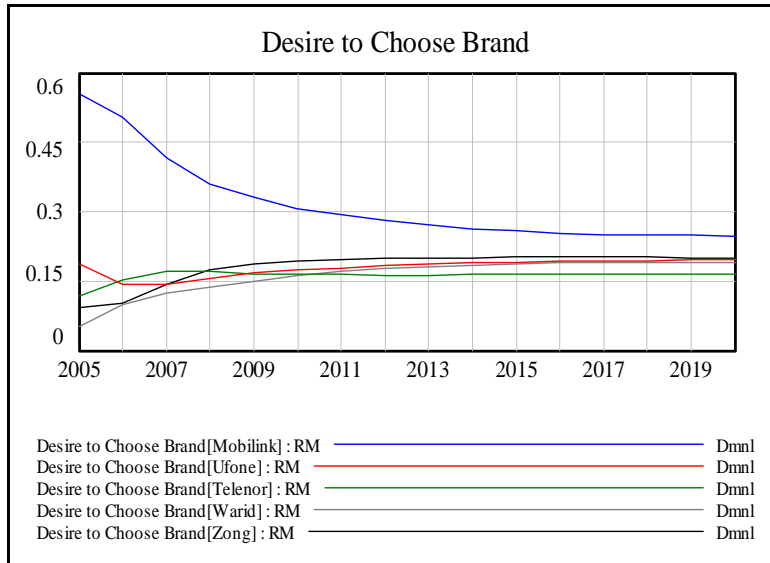


Figure 11: Reference Mode – Desire to Choose Brand

Brand loyalty which is another important element of brand equity initially increased for some time which was outcome of their earlier policies but loyalty started decreasing due to lack of trust and poor perceived quality of Mobilink and high perceived quality of the competitors.

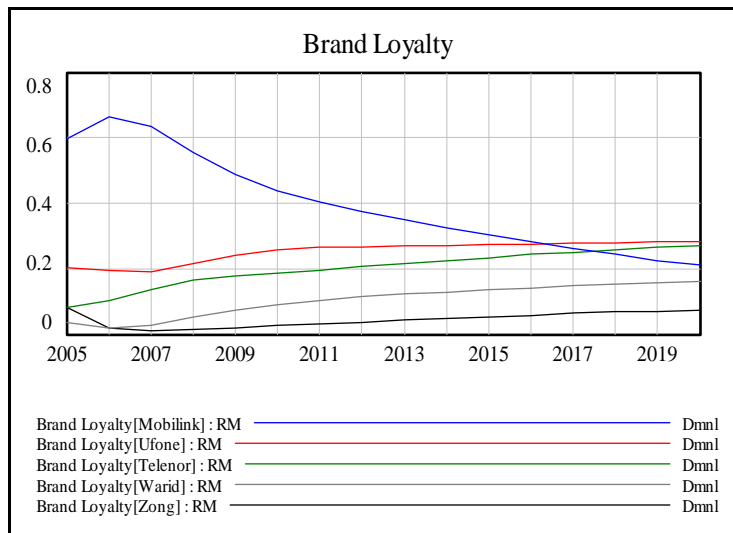


Figure 12: Reference Mode – Brand Loyalty

Chapter 4

Policy Design and Analysis

4.1. Policy Design

I understand from the study of the information available from PTA and the five competing firms that the overall size of the market is dependent upon the firms' efforts to outreach their potential customers by making investment in developing the cell sites. This will make their services available. Once that service is available, the firms will then try to attract the potential customers via their investment in marketing efforts to make them their customers. So there are two fundamental policy questions for the competing firms to outperform others in the market: One, how much to invest? And two, what fraction should be invested in cell site development and in marketing effort?

In other words, the distribution between cell site development and marketing efforts is a question of trade-off between long-term (cell site development) and short-term (marketing efforts) objectives of the firms. This trade-off provides the framework for the policy design resulting into 9 policy scenarios presented in Table 3 below.

Investment	Fraction of Investment in		Policy Scenario
	Cell Sites	Marketing	
Increase	Increase	Decrease	S1
	Same	Same	S2
	Decrease	Increase	S3
Same	Increase	Decrease	S4
	Same	Same	S5
	Decrease	Increase	S6
Decrease	Increase	Decrease	S7
	Same	Same	S8
	Decrease	Increase	S9

Table 3: Policy Scenarios

4.2. Policy Analysis

A declining market share of Mobilink, the market leader, leads me to run the policy scenarios with the objective to reverse the trend of declining market share. I assume that Mobilink's

actions are over and above the competitors' action. To practically implement this in the model simulation I assume that competitors do not respond to the actions by Mobilink.

4.2.1. Policy Scenario 1, 2 and 3

These policy scenarios assume that Mobilink increases its investment from PKR 670 million in 2009 to PKR 10 billion in 2020. All other things remaining the same, along with this increased investment Mobilink:

S1: Increases the fraction of investment in cell sites from 0.60 in 2011 to 0.70 in 2020 and consequently investment fraction in marketing decreases.

S2: Maintains the fraction of investment in cell sites as well as investment fraction in marketing.

S3: Decreases the fraction of investment in cell sites from 0.60 in 2011 to 0.50 in 2020 and consequently investment fraction in marketing increases.

The simulation outputs clearly suggest that a sizeable increase in investment reverses the declining trend of the market share of Mobilink. Further, the simulated outcome of the three policy scenarios; S1, S2, S3; suggest that increased investment fraction in cell sites brings significant increase in the market share. These findings lead to the following policy implications for Mobilink to sustain their market leadership which is otherwise seemingly threatened.

1. Think long-term and invest more in cell sites development. This will not only help improve the perceived quality but will also bring in cellular services coverage to new areas giving them edge of first entrant.
2. Reduction in marketing campaigns (short-term thinking) is seemingly counter-intuitive given current market scenario but the Figure 13 clearly shows that this counter-intuitive policy pays-off well.

It is important to note that the remaining four competitors are already giving high priority to investment in cell sites development. This long-term policy orientation pays-off well to them

and resultantly they are steadily and consistently building their market share threatening the leadership of Mobilink.

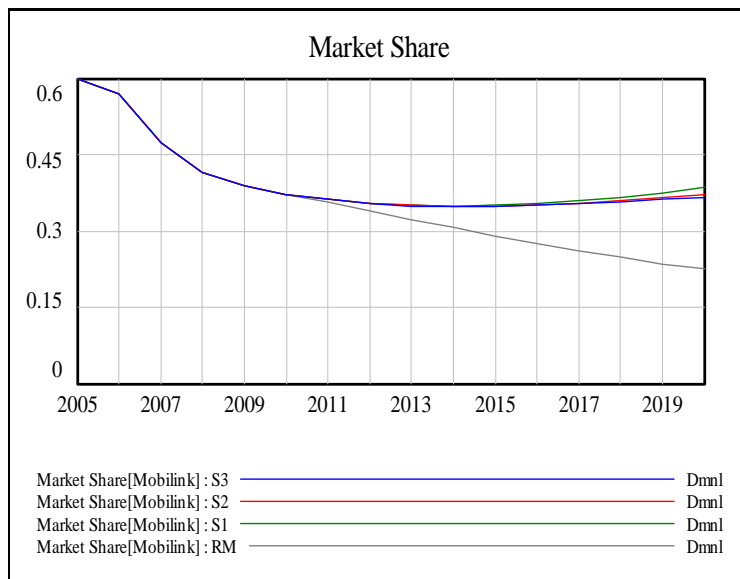


Figure 13. Policy Scenario 1, 2 and 3

4.2.2. Policy Scenario 4, 5 and 6

These policy scenarios assume that Mobilink maintains its investment at PKR 670 million in 2009 through 2020 and assume that Mobilink:

S4: Increases the fraction of investment in cell sites from 0.60 in 2011 to 0.70 in 2020 and consequently investment fraction in marketing decreases.

S5: Maintains the fraction of investment in cell sites as well as investment fraction in marketing. This is RM.

S6: Decreases the fraction of investment in cell sites from 0.60 in 2011 to 0.50 in 2020 and consequently investment fraction in marketing increases.

Figure 9 shows that maintaining the investment at current level will not change its market share even if the company changes the fraction of investment made in cell sites/marketing campaign. The simulation results of S1 to S6 clearly suggest that increased investment along with increased fraction of investment in cell sites would help improve market share of the existing market leader to help sustain its leadership position.

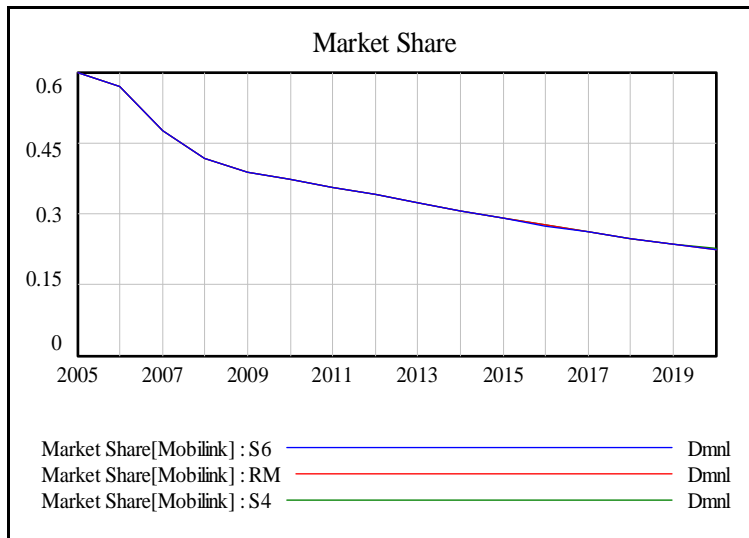


Figure 14. Policy Scenario 4, 5 (RM) and 6

4.2.3. Policy Scenario 7, 8 and 9

These policy scenarios assume that Mobilink reduces its investment from PKR 670 million in 2009 to PKR 67 million in 2020 and assume that Mobilink:

S7: Increases the fraction of investment in cell sites from 0.60 in 2011 to 0.70 in 2020 and consequently investment fraction in marketing decreases.

S8: Maintains the fraction of investment in cell sites as well as investment fraction in marketing.

S9: Decreases the fraction of investment in cell sites from 0.60 in 2011 to 0.50 in 2020 and consequently investment fraction in marketing increases.

Figure 15 shows that declining trend of market share continues with the reduction in the investment from the current level.

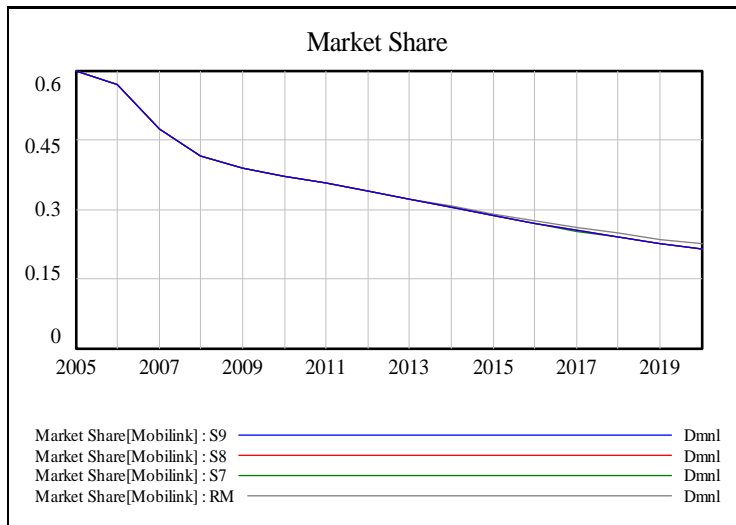


Figure 15. Policy Scenario 7, 8 and 9

Considering the simulation outcomes of the policy scenarios 1 to 9, I am of the view that heavy investment seems to be a strategic tool available with the Mobilink to sustain its market leadership. This led me to another intuitive policy option of acquisition, RM-A. For this policy scenario RM-A I assume that Mobilink makes heavy investment to take over Zong and while doing so it acquires cell sites of Zong and eliminates Zong from the market and essentially eliminates its competitive pressure. Along with these assumptions I further assume that after acquisition Mobilink maintains its current investment per year as well as its existing fraction of investment in cell sites. While doing so I used the same model but eliminated Zong from the subscript, initialized model at 2012 and from the previous version of the model (with all five subscripts) I took the values of all parameters for the year 2012 for the first four subscripts (in 'Market Sector' and used those values as initial values of the parameters in the new version which takes only four competing companies. I present the simulation output of RM-A along with assumptions of S1, S2 and S3 (best options in all five competitors model) as S1-A, S2-A, S3-A in Figure 16. The simulation results suggest that eliminating one of the competitors by making heavy investment in its acquisition is not sufficient to reverse declining trend of the market share. But it has to increase its investment as well as fraction of investment in cell sites to maintain its market leadership (S1-A, S2-A, S3-A). This raises the question about the usefulness of the acquisition. I would argue that instead of acquisition it would be better for Mobilink to sizably increase its investment as well as fraction of investment in cell sites to maintain its market share.

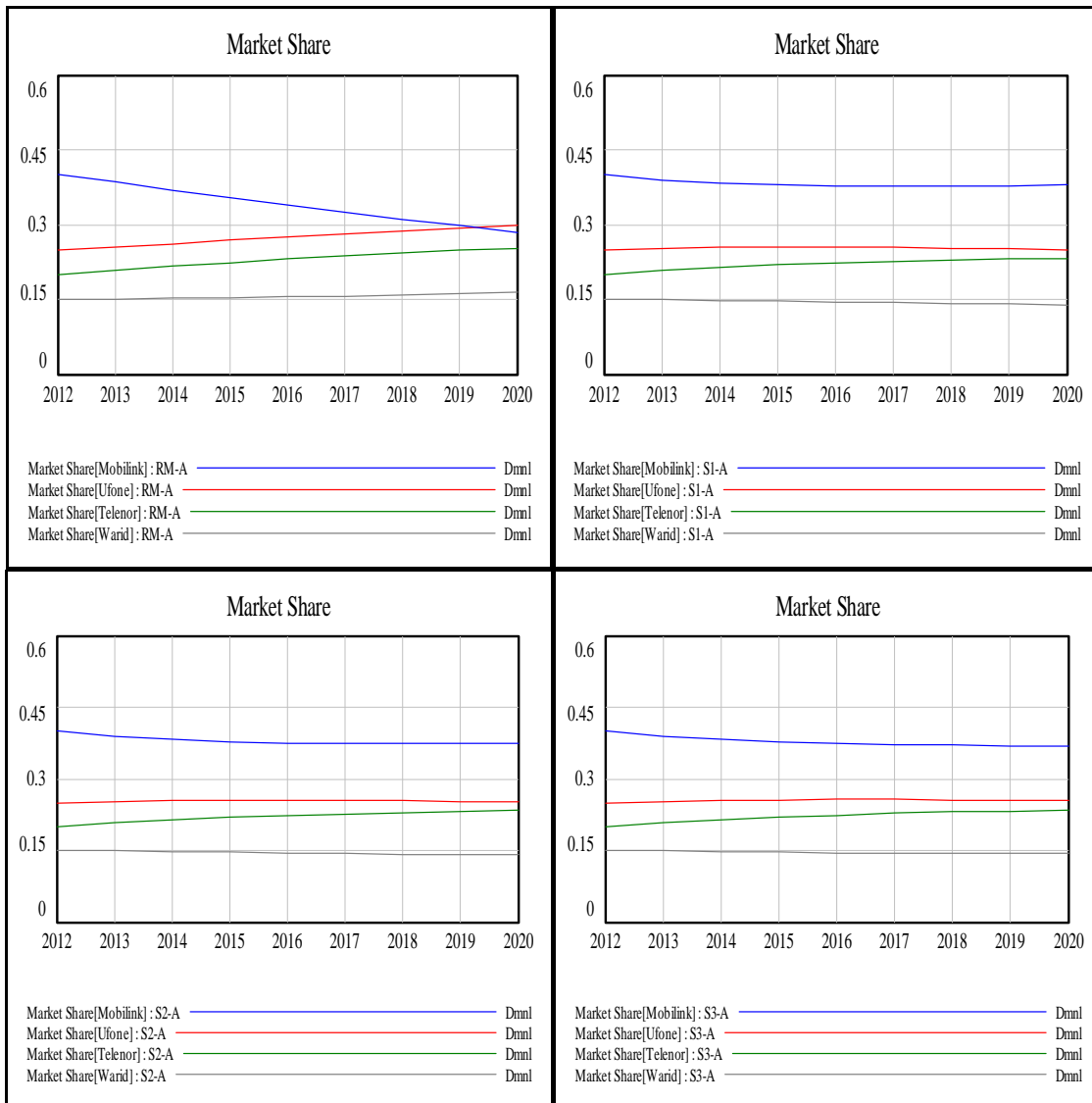


Figure 16: Acquisition Policy Scenario RM-A, S1-A, S2-A, S3-A

Moreover, Figure 17 shows that market share of all competing firms maintain a generally declining trend in policy scenarios 1, 2 & 3 when heavy investment by Mobilink helps increase its market share.

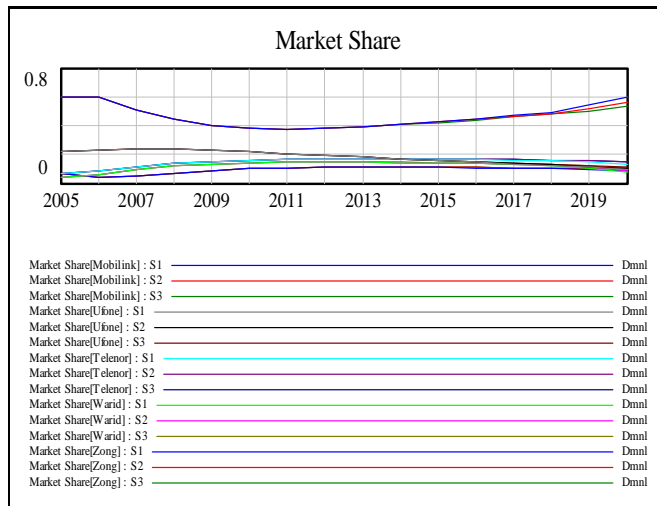


Figure 17: Market Share - Policy Scenario 1, 2 &3

4.3. Conclusion

Using Vensim® I developed a simulation model of customer based brand equity based on the theoretical framework of Aaker (1991) incorporating the two way linkages of the elements of brand equity and market performance of the firm. I have incorporated three of the four elements/dimensions of brand equity and could not include brand association because many do not consider it part of brand equity and for many others it is part of perceived quality and for some others there is difficulty in measurement (please see section 3.2.3). This may be a limitation of this study. Further, I could not perform all model validation tests which is also a limitation of this study.

Model simulations indicate that Mobilink is bound to lose its market share if it continues its current policies. However, heavy investment in its cell sites will help improve its market share and reverse declining trend of the market share.

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Model Equations

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$$\text{Brand Awareness[Firm]} = \left(\frac{\text{Brand Awareness Index[Firm]}}{\text{Initial Brand Awareness Index[Firm]}} \right)^{\text{Relative Investment in Marketing[Firm]}} \times \text{Dmnl}$$

$$\text{Perceived Quality[Firm]} = \left(\frac{\text{Cell Sites[Firm]}}{\text{Initial Cell Sites[Firm]}} \right)^{\text{Dmnl}}$$

$$\text{Cell Sites Decay[Firm]} = \frac{\text{Depreciation[Firm]}}{\text{Average Cost per Cell Sites} \times (1 + \text{Average Inflation})^{\text{year(Time)}}} \times \text{Site/Year}$$

$$\text{Desire to Choose Brand[Firm]} = \left(\frac{\text{Cell Sites[Firm]}}{\text{SUM}(\text{Cell Sites[Firm!]})} \right)^{\text{Dmnl}}$$

$$\text{Cell Sites[Firm]} = \text{INTEG} \left(\max(0, \text{+New Cell Sites Per Year[Firm]} - \text{Cell Sites Decay[Firm]}) \right) \times \text{Initial Cell Sites[Firm]}$$

$$\text{Switchers Leaving Fraction[Firm]} = \left(\frac{\text{Initial Switchers Leaving Fraction[Firm]} \times (\text{Brand Awareness[Firm]}^{-(1-\text{Elasticity of Brand Awareness to Attract New Customers[Firm]})} \times (\text{Perceived Quality[Firm]}^{-(1-\text{Elasticity of Perceived Quality to Attract New Customers[Firm]})} \times (\text{Desire to Choose Brand[Firm]}^{-(1-\text{Elasticity of Desire to Choose Brand to Attract New Customers[Firm]})}) \right)^{\text{Dmnl/Year}}$$

$$\text{Time to Attract New Customers[Firm]} = \left(\frac{\text{Initial Time to Attract New Customers[Firm]} \times (\text{Brand Awareness[Firm]}^{-\text{Elasticity of Brand Awareness to Attract New Customers[Firm]}} \times (\text{Perceived Quality[Firm]}^{-\text{Elasticity of Perceived Quality to Attract New Customers[Firm]}} \times (\text{Desire to Choose Brand[Firm]}^{-\text{Elasticity of Desire to Choose Brand to Attract New Customers[Firm]}}) \right)^{\text{Year}}$$

~ |

Net Addition[Firm]=
 New Customers[Firm]-Leaving Switchers[Firm]-Leaving Satisfied Buyers[Firm]-
 Leaving Brand Friends\
 [Firm]-Leaving Loyal Buyers[Firm]
 ~ Person/Year
 ~ ~ :SUPPLEMENTARY
 |

Leaving Brand Friends[Firm]=
 Buyers consider Brand a Friend[Firm]*Brand Friends Leaving Fraction[Firm]
 ~ Person/Year
 ~ |

Leaving Loyal Buyers[Firm]=
 Loyal Buyers[Firm]*Loyal Buyers Leaving Fraction[Firm]
 ~ Person/Year
 ~ |

Loyal Buyers Leaving Fraction[Firm]=
 Initial Loyal Buyers Leaving Fraction[Firm]*Brand Equity[Firm]^(1-Elasticity of
 Brand Equity to Loyalty Building Rate\
 [Firm])
 ~ Dmnl/Year
 ~ |

Brand Friends Leaving Fraction[Firm]=
 Initial Brand Friends Leaving Fraction[Firm]*Brand Equity[Firm]^(1-Elasticity of
 Brand Equity to Trust Building Rate\
 [Firm])
 ~ Dmnl/Year
 ~ |

Loyal Buyers[Firm]= INTEG (
 Loyalty Building Rate[Firm]-Leaving Loyal Buyers[Firm]-Deaths Loyal
 Buyers[Firm],
 Initial Loyal Buyers[Firm])
 ~ Person
 ~ |

Potential Customers= INTEG (
 New Potential Customers-SUM(New Customers[Firm!])+SUM(Leaving
 Switchers[Firm!])+SUM\
 Leaving Satisfied Buyers[Firm!])+SUM(Leaving Brand
 Friends[Firm!])+SUM(Leaving Loyal Buyers\
 [Firm!])-Deaths Potential Customers,
 Initial Market Size-SUM(Initial Installed Base[Firm!]))
 ~ Person
 ~ New addition in customers who are not using brand previously or using \

different brands.

|
Initial Loyal Buyers Leaving Fraction[Firm]=

0.15, 0.2, 0.05, 0.25, 0.45

~ Dmnl/Year

~ Switching fraction from satisfied buyers to potential customers

|
Initial Brand Friends Leaving Fraction[Firm]=

0.2, 0.25, 0.08, 0.3, 0.5

~ Dmnl/Year

~ Switching fraction from satisfied buyers to potential customers

|
Buyers consider Brand a Friend[Firm]= INTEG (

Trust Building Rate[Firm]-Loyalty Building Rate[Firm]-Leaving Brand

Friends[Firm]-Deaths Buyers consider Brand a Friend\

[Firm],

Initial Buyers consider Brand a Friend[Firm])

~ Person

~ |

New Potential Customers=

Outreach Gap/Time to Outreach(Time)

~ Person/Year

~ Annual addition in potential customers

|
Tele Density Function(

[(2005,0)-

(2020,1)],(2005,0.083),(2006,0.222),(2007,0.409),(2008,0.547),(2009,0.582)\

,(2011,0.6476),(2020,0.7))

~ Dmnl

~ According to PTA data total population percentage using telecom services \ from 2005 to 2011\!\!\!

|
Market Share[Firm]=

Installed Base[Firm]/SUM(Installed Base[Firm!])

~ Dmnl

~ ~ :SUPPLEMENTARY

|
Elasticity of Brand Awareness to Brand Equity[Firm]=

0.05, 0.26, 0.35, 0.31, 0.69

~ Dmnl

~ |

Elasticity of Desire to Choose Brand to Brand Equity[Firm]=

0.16, 0.29, 0.5, 0.48, 0.45

~ Dmnl
~ |

Conversion time from Satisfied buyers to Brand Friend[Firm]=
Initial Conversion time from Satisfied buyers to Brand Friend[Firm]*Brand
Equity[Firm\
]^\Elasticity of Brand Equity to Trust Building Rate[Firm]
~ Year
~ |

Conversion Time from Switchers to Satisfied Buyers[Firm]=
Initial Conversion Time from Switchers to Satisfied Buyers[Firm]*(Perceived
Quality[\
Firm]^\Elasticity of Perceived Quality to
Satisfaction[Firm])*(Effectiveness[Firm]\
^\Elasticity of Effectiveness to Satisfaction[Firm])
~ Year
~ |

Satisfied Buyers Leaving Fraction[Firm]=
Initial Satisfied Buyers Leaving Fraction[Firm]*(Perceived Quality[Firm]^\(1-
Elasticity of Perceived Quality to Satisfaction[\
Firm]))*(Effectiveness[Firm]^\(1-Elasticity of Effectiveness to
Satisfaction[Firm])
))
~ Dmnl/Year
~ |

Brand Equity[Firm]=
(Brand Awareness[Firm]^\Elasticity of Brand Awareness to Brand
Equity[Firm])*(Desire to Choose Brand\
[Firm]^\Elasticity of Desire to Choose Brand to Brand
Equity[Firm])*(Perceived Quality\
[Firm]^\Elasticity of Perceived Quality to Brand Equity[Firm])*(Brand
Loyalty[Firm]\
^\Elasticity of Brand Loyalty to Brand Equity[Firm])
~ Dmnl
~ |

Elasticity of Perceived Quality to Satisfaction[Firm]=
0.3, 0.3, 0.3, 0.4, 0.5
~ Dmnl
~ |

Elasticity of Perceived Quality to Brand Equity[Firm]=
0.35, 0.34, 0.52, 0.34, 0.38
~ Dmnl
~ |

Elasticity of Brand Loyalty to Brand Equity[Firm]=

0.76, 0.3, 0.3, 0.3, 0.3

~ Dmnl

~ |

Elasticity of Brand Awareness to Attract New Customers[Firm]=

0.2, 0.2, 0.1, 0.25, 0.35

~ Dmnl

~ |

Elasticity of Perceived Quality to Attract New Customers[Firm]=

0.3, 0.2, 0.2, 0.25, 0.35

~ Dmnl

~ |

Investment in Marketing[Firm]=

Investment[Firm]*Investment Fraction in Marketing[Firm]

~ PKR/Year

~ |

Relative Investment in Marketing[Firm]=

Investment in Marketing[Firm]/Initial Investment in Marketing[Firm]

~ Dmnl

~ |

Initial Switchers[Firm]=

Initial Market Share[Firm]*Total Market Size-(Initial Satisfied Buyers[Firm]+Initial Buyers consider Brand a Friend\

[Firm]+Initial Loyal Buyers[Firm])

~ Person

~ |

Investment Fraction in Marketing[Firm]=

1-Investment Fraction Cell Sites[Firm](Time)

~ Dmnl

~ |

Elasticity of Effectiveness to Satisfaction[Firm]=

0.2, 0.3, 0.3, 0.4, 0.5

~ Dmnl

~ |

Initial Investment in Marketing[Firm]= INITIAL(

Investment in Marketing[Firm])

~ PKR/Year

~ |

Brand Loyalty[Firm]=

(Buyers consider Brand a Friend[Firm]+Loyal Buyers[Firm])/(SUM(Buyers consider Brand a Friend\

[Firm!])+SUM(Loyal Buyers[Firm!]))
~ Dmnl
~ |

Initial Conversion time from Satisfied buyers to Brand Friend[Firm]=
5, 3, 3, 3, 3
~ Year
~ Time required to explore potential customers\!\!\!
|

Conversion time for Brand Friends to Loyal Buyers[Firm]=
Initial Conversion time for Brand Friends to Loyal Buyers[Firm]*Brand
Equity[Firm]^Elasticity of Brand Equity to Loyalty Building Rate\
[Firm]
~ Year
~ |

Loyalty Building Rate[Firm]=
Buyers consider Brand a Friend[Firm]/Conversion time for Brand Friends to Loyal
Buyers\
[Firm]
~ Person/Year
~ |

Initial Conversion time for Brand Friends to Loyal Buyers[Firm]=
5, 5, 5, 5, 5
~ Year
~ Time required to explore potential customers\!\!\!
|

Elasticity of Brand Equity to Loyalty Building Rate[Firm]=
0.4, 0.4, 0.3, 0.4, 0.4
~ Dmnl
~ |

Elasticity of Brand Equity to Trust Building Rate[Firm]=
0.3, 0.4, 0.4, 0.4, 0.4
~ Dmnl
~ |

Trust Building Rate[Firm]=
Satisfied Buyers[Firm]/Conversion time from Satisfied buyers to Brand Friend[Firm]
~ Person/Year
~ |

Average Cost per Cell Sites=
200000
~ PKR/Site
~ |

Average Inflation=

0.15

~ Dmnl

~ |

Initial Cell Sites[Firm]=

2392, 808, 505, 218, 403

~ Site

~ |

Investment Fraction Cell Sites[Mobilink](

[(2005,0)-(2020,1)],(2005,0.7),(2009,0.7),(2011,0.6)) ~~|

Investment Fraction Cell Sites[Ufone](

[(2005,0.4)-(2020,1)],(2005,0.9),(2009,0.85),(2011,0.85)) ~~|

Investment Fraction Cell Sites[Telenor](

[(2005,0.4)-(2020,1)],(2005,0.5),(2009,0.9),(2011,0.85)) ~~|

Investment Fraction Cell Sites[Warid](

[(2005,0.4)-(2020,1)],(2005,0.6),(2009,0.7),(2011,0.8)) ~~|

Investment Fraction Cell Sites[Zong](

[(2005,0)-(2020,1)],(2005,0.85),(2009,0.8),(2011,0.75))

~ Dmnl

~ |

New Cell Sites Per Year[Firm]=

Investment[Firm]*Investment Fraction Cell Sites[Firm](Time)/(Average Cost per Cell

Sites\

*(1+Average Inflation)^year(Time))

~ Site/Year

~ |

Leaving Switchers[Firm]=

Switchers[Firm]*Switchers Leaving Fraction[Firm]

~ Person/Year

~ Price buyerâ€™s rate monthly shift to others brands

|

Initial Top of Mind[Firm]= INITIAL(

Initial Buyers consider Brand a Friend[Firm]+Initial Loyal Buyers[Firm])

~ Person

~ |

Brand Awareness Index[Firm]=

Brand Recognition[Firm]+Brand Recall[Firm]+Top of Mind[Firm]

~ Person

~ |

Brand Recall[Firm]= INTEG (

+Net Change in Brand Recall[Firm],

Initial Brand Recall[Firm])

~ Person

~ |

Brand Recognition[Firm]= INTEG (
Brand Recognition Rate[Firm],
Initial Brand Recognition[Firm])
~ Person
~ The nonloyal customers who is completely indifferent to the brand. each \
brand is perceived to be adequate and the brand name plays little role in \
purchase decision. these buyers are also called price buyers
|

Brand Recognition Rate[Firm]=
(Unaware of Brand/Time to Achieve Brand
Recognition[Firm])*(Effectiveness[Firm]^Elasticity of Total Investment to Brand
Recognition
[Firm])
~ Person/Year
~ |

Initial Brand Awareness Index[Firm]= INITIAL(
Brand Awareness Index[Firm])
~ Person
~ |

Initial Brand Recall[Firm]= INITIAL(
Initial Satisfied Buyers[Firm])
~ Person
~ |

Competitive Pressure[Firm]=
Brand Awareness[Firm]/SUM(Brand Awareness[Firm!])
~ Dmnl
~ |

Maximum Brand Recall=
SUM(Brand Recognition[Firm!])
~ Person
~ |

Net Change in Brand Recall[Firm]=
(Maximum Brand Recall-SUM(Brand Recall[Firm!]))*(Brand
Equity[Firm]^Elasticity of Brand Equity to Brand Recall\
[Firm])/Time to Achieve Brand Recall[Firm]
~ Person/Year
~ |

Net Change in Top of Mind[Firm]=
(Maximum Top of Mind-SUM(Top of Mind[Firm!]))*(Brand Equity[Firm]^Elasticity
of Brand Equity to Top of Mind\
[Firm])/Time to Achieve Top of Mind[Firm]

~ Person/Year
~ |

Elasticity of Total Investment to Brand Recognition[Firm]=
0.3, 0.3, 0.3, 0.3, 0.3

~ Dmnl
~ |

Leaving Satisfied Buyers[Firm]=
Satisfied Buyers[Firm]*Satisfied Buyers Leaving Fraction[Firm]

~ Person/Year
~ Switching rate of satisfied customers after getting extra compensations of \ switching cost by the competitors
|

Depreciation[Firm]=
Total Investments[Firm]/Average Life of Capital[Firm]

~ PKR/Year
~ |

Effectiveness[Firm]=
(Total Investments[Firm]/SUM(Total Investments[Firm!]))/Competitive

Pressure[Firm]
~ Dmnl
~ |

Initial Brand Recognition[Firm]= INITIAL(
Initial Switchers[Firm])

~ Person
~ |

Time to Achieve Top of Mind[Firm]=
3

~ Year
~ |

Elasticity of Brand Equity to Brand Recall[Firm]=
0.3, 0.3, 0.3, 0.3, 0.3

~ Dmnl
~ |

Elasticity of Brand Equity to Top of Mind[Firm]=
0.3, 0.3, 0.3, 0.3, 0.3

~ Dmnl
~ |

Total Investments[Firm]= INTEG (
max(0,+Investment[Firm]-Depreciation[Firm]),

Initial Total Investments[Firm])
~ PKR

~ |

Time to Achieve Brand Recognition[Firm]=
3
~ Year
~ |

Time to Achieve Brand Recall[Firm]=
3
~ Year
~ |

New Unaware of Brand=
New Potential Customers
~ Person/Year
~ |

Maximum Top of Mind=
SUM(Brand Recall[Firm!])
~ Person
~ |

Top of Mind[Firm]= INTEG (
+Net Change in Top of Mind[Firm],
Initial Top of Mind[Firm])
~ Person
~ |

Unaware of Brand= INTEG (
New Unaware of Brand-SUM(Brand Recognition Rate[Firm!]),
Initial Unaware of Brand)
~ Person
~ New addition in customers who are not using brand previously or using \
different brands.
|

Initial Unaware of Brand= INITIAL(
Outreach Gap)
~ Person
~ |

Satisfaction Rate[Firm]=
Switchers[Firm]/Conversion Time from Switchers to Satisfied Buyers[Firm]
~ Person/Year
~ |

Initial Total Investments[Firm]=
1.2e+008, 5e+007, 2e+007, 1e+007, 1e+006
~ PKR
~ |

Elasticity of Investment to Brand Awareness[Firm]=

0.1, 0.05, 0.1, 0.1, 0.1

~ Dmnl

~ |

New Investment[Mobilink](

[(2005,0)-

(2020,1e+009)],(2005,4.12e+008),(2006,4.9e+008),(2007,5.9e+008),(2008,9.19e+008\
,(2009,6.7e+008)) ~~|

New Investment[Ufone](

[(2000,0)-

(2020,8e+008)],(2005,2.57e+007),(2006,1.035e+008),(2007,3.32e+008),(2008,4.74e+008\
,(2011,5.15e+008)) ~~|

New Investment[Telenor](

[(2005,0)-

(2020,1e+009)],(2005,1.95e+008),(2006,3.6e+008),(2007,5.2e+008),(2008,4.5e+008\
,(2009,4.2e+008)) ~~|

New Investment[Warid](

[(2005,0)-

(2010,6e+008)],(2005,1.38e+008),(2006,2.9e+008),(2007,4.22e+008),(2008,5.8e+008\
,(2009,6.67e+008)) ~~|

New Investment[Zong](

[(2005,0)-

(2010,6e+008)],(2005,7.83e+007),(2006,1.194e+008),(2007,5.7e+008),(2008,5.8e+008\
,(2009,6.4e+008))

~ PKR/Year

~ |

Investment[Firm]=

New Investment[Firm](Time)

~ PKR/Year

~ |

Average Life of Capital[Firm]=

10

~ Year

~ |

New Customers[Firm]=

Potential Customers/Time to Attract New Customers[Firm]

~ Person/Year

~ |

Elasticity of Desire to Choose Brand to Attract New Customers[Firm]=

0.24, 0.25, 0.25, 0.35, 0.4

~ Dmnl

~ |

Initial Time to Attract New Customers[Firm]=

0.25, 0.25, 0.5, 0.85, 1.7

~ Year

~ |

Initial Conversion Time from Switchers to Satisfied Buyers[Firm]=

2, 2, 3, 4, 6

~ Year

~ Time required to explore potential customers\!\!\

|

Deaths Potential Customers=

Potential Customers*Normal Death Rate

~ Person/Year

~ |

Total Population=

Initial Population*(1+Normal Growth Rate)^year(Time)

~ Person

~ over the period of time growth in total population

|

year(

[(2005,0)-(2020,20)],(2005,1),(2020,16))

~ Dmnl

~ |

Total Market Size=

Total Population*Tele Density Function(Time)

~ Person

~ Total person in total population who are taking benefits form cellular \ market

|

Initial Satisfied Buyers Leaving Fraction[Firm]=

0.25, 0.35, 0.1, 0.4, 0.55

~ Dmnl/Year

~ Switching fraction from satisfied buyers to potential customers

|

Initial Switchers Leaving Fraction[Firm]=

0.3, 0.45, 0.15, 0.45, 0.5

~ Dmnl/Year

~ Fraction of price buyerâ€™s shift to other competing brands

|

Deaths Switchers[Firm]=

Switchers[Firm]*Normal Death Rate

~ Person/Year

~ |

Initial Installed Base[Firm]= INITIAL(
Installed Base[Firm])
~ Person
~ |

Outreach Gap=
max(0, Total Market Size - SUM(Installed Base[Firm!]))
~ Person
~ Market gap of persons who can be potential customers
|

Installed Base[Firm]=
Switchers[Firm]+Satisfied Buyers[Firm]+Buyers consider Brand a
Friend[Firm]+Loyal Buyers\
[Firm]
~ Person
~ Sum of total persons who are using cellular services of different \
companies at different satisfaction levels
|

Time to Outreach(
[(2005,0)-(2020,10)],(2005,0.6),(2007,0.65),(2009,0.75),(2011,3),(2020,7))
~ Year
~ Time required to explore potential customers\!\\!
|

Deaths Buyers consider Brand a Friend[Firm]=
Buyers consider Brand a Friend[Firm]*Normal Death Rate
~ Person/Year
~ |

Deaths Loyal Buyers[Firm]=
Loyal Buyers[Firm]*Normal Death Rate
~ Person/Year
~ |

Deaths Satisfied Buyers[Firm]=
Satisfied Buyers[Firm]*Normal Death Rate
~ Person/Year
~ |

Firm:
Mobilink,Ufone,Telenor,Warid,Zong
~
~ |

Initial Buyers consider Brand a Friend[Firm]=
5e+006, 1.2e+006, 500000, 200000, 600000
~ Person
~ |

Initial Loyal Buyers[Firm]=
1.5e+006, 1e+006, 400000, 200000, 300000
~ Person
~ |

Initial Market Share[Firm]=
0.55,0.2,0.065,0.04,0.065
~ Dmnl
~ Mobilink, Ufone, Telenor, Warid, Zong
|

Initial Market Size= INITIAL(
Total Market Size)
~ Person
~ |

Initial Population=
1.59e+008
~ Person
~ Total population of Pakistan in 2005
|

Initial Satisfied Buyers[Firm]=
200000, 100000, 100000, 10000, 10000
~ Person
~ |

Normal Death Rate=
0.01
~ Dmnl/Year
~ |

Normal Growth Rate=
0.025
~ Dmnl
~ Net annual average growth rate in population
|

Satisfied Buyers[Firm]= INTEG (
Satisfaction Rate[Firm]-Leaving Satisfied Buyers[Firm]-Trust Building Rate[Firm]-
Deaths Satisfied Buyers\
[Firm],
Initial Satisfied Buyers[Firm])
~ Person
~ Satisfied (Switching Cost Loyal/ Habitual buyers) with no reasons to change
brand

Or

Satisfied / Habitual buyers with switching cost (Costs in time, money, or \ performance risk associated switching).

Switchers[Firm]= INTEG (
New Customers[Firm]-Leaving Switchers[Firm]-Deaths Switchers[Firm]-Satisfaction
Rate\
[Firm],
Initial Switchers[Firm])
~ Person
~ The nonloyal customers who is completely indifferent to the brand. each \
brand is perceived to be adequate and the brand name plays little role in \
purchase decision. these buyers are also called price buyers

.Control

*****~

Simulation Control Parameters

FINAL TIME = 2020
~ Year
~ The final time for the simulation.

INITIAL TIME = 2005
~ Year
~ The initial time for the simulation.

SAVEPER = 1
~ Year [0,?]
~ The frequency with which output is stored.

TIME STEP = 0.0625
~ Year [0,?]
~ The time step for the simulation.

\\|---| Sketch information - do not modify anything except names

V300 Do not put anything below this section - it will be ignored

*1. Market

\$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,70

10,1,Total Market Size,293,205,33,29,8,131,0,0,0,0,0

10,2,Initial Market Share,880,45,64,12,8,3,0,0,0,0,0

10,3,Initial Market Size,1666,305,57,11,8,3,0,0,0,0,0

10,4,Initial Installed Base,1662,266,46,19,8,3,0,0,0,0,0

10,5,Initial Satisfied Buyers,1237,21,46,19,8,3,0,0,0,0,0

10,6,Initial Buyers consider Brand a Friend,1362,61,70,19,8,3,0,0,0,0,0,0
 10,7,Initial Loyal Buyers,1387,115,37,19,8,3,0,0,0,0,0,0
 10,8,Initial Switchers,1118,94,50,11,8,3,0,0,0,0,0,0
 10,9,Initial Population,508,83,52,11,8,3,0,0,0,0,0,0
 10,10,Total Population,375,141,52,11,8,3,0,0,0,0,0,0
 10,11,Normal Growth Rate,480,45,78,13,8,3,0,0,0,0,0,0
 1,12,9,10,1,0,0,0,0,64,0,-1--1--1,,1|(410,95)|
 1,13,11,10,1,0,0,0,0,64,0,-1--1--1,,1|(383,102)|
 10,14,Tele Density Function,263,71,40,19,8,3,0,2,0,0,0,0,0-0-0-0-0,|12||255-0-0
 1,15,10,1,1,0,0,0,0,64,0,-1--1--1,,1|(327,162)|
 1,16,14,1,1,0,0,0,0,64,0,-1--1--1,,1|(247,147)|
 10,17,Switchers,730,315,40,20,3,3,0,0,0,0,0,0
 1,18,19,17,4,0,0,22,0,0,0,-1--1--1,,1|(650,320)|
 11,19,1692,604,320,6,8,34,3,0,0,1,0,0,0
 10,20,New Customers,604,347,40,19,40,131,0,0,-1,0,0,0
 1,21,23,26,4,0,0,22,0,0,0,-1--1--1,,1|(488,240)|
 1,22,23,17,100,0,0,22,0,0,0,-1--1--1,,1|(730,240)|
 11,23,668,600,240,6,8,34,3,0,0,1,0,0,0
 10,24,Leaving Switchers,600,266,41,18,40,131,0,0,-1,0,0,0
 1,25,17,24,1,0,0,0,0,64,0,-1--1--1,,1|(672,293)|
 10,26,Potential Customers,488,318,45,20,3,3,0,0,0,0,0,0
 1,27,19,26,100,0,0,22,0,0,0,-1--1--1,,1|(565,320)|
 1,28,26,20,1,0,0,0,0,64,0,-1--1--1,,1|(528,352)|
 10,29,Satisfied Buyers,991,320,40,20,3,3,0,0,0,0,0,0
 1,30,32,29,4,0,0,22,0,0,0,-1--1--1,,1|(910,319)|
 1,31,32,17,100,0,0,22,0,0,0,-1--1--1,,1|(813,319)|
 11,32,1596,863,319,6,8,34,3,0,0,1,0,0,0
 10,33,Satisfaction Rate,863,348,37,21,40,131,0,0,-1,0,0,0
 10,34,Buyers consider Brand a Friend,1257,326,56,21,3,3,0,0,0,0,0,0
 1,35,37,34,4,0,0,22,0,0,0,-1--1--1,,1|(1161,324)|
 1,36,37,29,100,0,0,22,0,0,0,-1--1--1,,1|(1070,324)|
 11,37,780,1116,324,6,8,34,3,0,0,1,0,0,0
 10,38,Trust Building Rate,1116,361,38,29,40,131,0,0,-1,0,0,0
 10,39,Loyal Buyers,1525,316,44,21,3,3,0,0,0,0,0,0
 1,40,42,39,4,0,0,22,0,0,0,-1--1--1,,1|(1439,314)|
 1,41,42,34,100,0,0,22,0,0,0,-1--1--1,,1|(1349,314)|
 11,42,812,1391,314,6,8,34,3,0,0,1,0,0,0
 10,43,Loyalty Building Rate,1391,350,34,28,40,131,0,0,-1,0,0,0
 1,44,46,26,4,0,0,22,0,0,0,-1--1--1,,1|(488,209)|
 1,45,46,29,100,0,0,22,0,0,0,-1--1--1,,1|(991,209)|
 11,46,924,832,209,6,8,34,3,0,0,1,0,0,0
 10,47,Leaving Satisfied Buyers,832,248,54,19,40,131,0,0,-1,0,0,0
 12,48,48,330,317,10,8,0,3,0,0,-1,0,0,0
 1,49,51,26,4,0,0,22,0,0,0,-1--1--1,,1|(411,317)|
 1,50,51,48,100,0,0,22,0,0,0,-1--1--1,,1|(353,317)|
 11,51,48,373,317,6,8,34,3,0,0,1,0,0,0
 10,52,New Potential Customers,373,344,46,19,40,3,0,0,-1,0,0,0
 12,53,48,1533,477,10,8,0,3,0,0,-1,0,0,0
 1,54,56,53,4,0,0,22,0,0,0,-1--1--1,,1|(1533,440)|
 1,55,56,39,100,0,0,22,0,0,0,-1--1--1,,1|(1533,370)|

11,56,48,1533,408,8,4,33,3,0,0,2,0,0,0
 10,57,Deaths Loyal Buyers,1487,408,38,26,40,3,0,0,-1,0,0,0
 12,58,48,1260,479,10,8,0,3,0,0,-1,0,0,0
 1,59,61,58,4,0,0,22,0,0,0,-1--1--1,,1|(1259,454)|
 1,60,61,34,100,0,0,22,0,0,0,-1--1--1,,1|(1259,386)|
 11,61,48,1259,432,8,6,33,3,0,0,4,0,0,0
 10,62,Deaths Buyers consider Brand a Friend,1317,432,50,35,40,131,0,0,-1,0,0,0
 1,63,34,62,0,0,0,0,64,0,-1--1--1,,1|(1278,365)|
 10,64,Normal Death Rate,1472,512,46,19,8,3,0,0,0,0,0,0
 1,65,64,57,0,0,0,0,64,0,-1--1--1,,1|(1477,470)|
 12,66,48,992,480,10,8,0,3,0,0,-1,0,0,0
 1,67,69,66,4,0,0,22,0,0,0,-1--1--1,,1|(990,439)|
 1,68,69,29,100,0,0,22,0,0,0,-1--1--1,,1|(990,367)|
 11,69,48,990,400,8,6,33,3,0,0,2,0,0,0
 10,70,Deaths Satisfied Buyers,939,400,43,28,40,3,0,0,-1,0,0,0
 12,71,48,727,464,10,8,0,3,0,0,-1,0,0,0
 1,72,74,71,4,0,0,22,0,0,0,-1--1--1,,1|(728,432)|
 1,73,74,17,100,0,0,22,0,0,0,-1--1--1,,1|(728,365)|
 11,74,48,728,402,8,6,33,3,0,0,2,0,0,0
 10,75,Deaths Switchers,677,402,43,24,40,131,0,0,-1,0,0,0
 1,76,17,75,1,0,0,0,64,0,-1--1--1,,1|(696,357)|
 1,77,29,70,1,0,0,0,64,0,-1--1--1,,1|(975,350)|
 1,78,39,57,0,0,0,0,64,0,-1--1--1,,1|(1509,353)|
 10,79,Installed Base,1611,224,44,11,8,3,0,2,0,0,0,0-0-0-0-0-0-0,|12||0-0-255
 10,80,Outreach Gap,292,289,37,19,8,3,0,0,0,0,0,0
 1,81,1,80,1,0,0,0,64,0,-1--1--1,,1|(282,245)|
 1,82,80,52,1,0,0,0,64,0,-1--1--1,,1|(298,320)|
 10,83,Time to Outreach,182,359,38,27,8,131,0,2,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,84,83,52,1,0,0,0,64,0,-1--1--1,,1|(308,379)|
 1,85,34,79,0,0,0,0,64,0,-1--1--1,,1|(1435,274)|
 1,86,39,79,0,0,0,0,64,0,-1--1--1,,1|(1567,270)|
 1,87,29,79,0,0,0,0,64,0,-1--1--1,,1|(1292,273)|
 1,88,17,79,0,0,0,0,64,0,-1--1--1,,1|(1161,270)|
 10,89,Initial Switchers Leaving Fraction,467,741,54,19,8,3,0,2,-1,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,90,29,47,1,0,0,0,64,0,-1--1--1,,1|(918,287)|
 1,91,17,33,1,0,0,0,64,0,-1--1--1,,1|(780,349)|
 1,92,29,38,1,0,0,0,64,0,-1--1--1,,1|(1034,355)|
 1,93,34,43,1,0,0,0,64,0,-1--1--1,,1|(1318,360)|
 10,94,Initial Satisfied Buyers Leaving Fraction,833,751,70,19,8,3,0,2,-1,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,95,year,469,108,15,11,8,3,0,0,0,0,0,0
 1,96,95,10,1,0,0,0,64,0,-1--1--1,,1|(430,109)|
 12,97,48,488,456,10,8,0,3,0,0,-1,0,0,0
 1,98,100,97,4,0,0,22,0,0,0,-1--1--1,,1|(488,426)|
 1,99,100,26,100,0,0,22,0,0,0,-1--1--1,,1|(488,365)|
 11,100,48,488,398,8,6,33,3,0,0,4,0,0,0
 10,101,Deaths Potential Customers,535,398,39,26,40,3,0,0,-1,0,0,0
 1,102,26,100,1,0,0,0,64,0,-1--1--1,,1|(470,357)|

10,103,Initial Conversion Time from Switchers to Satisfied Buyers,681,601,104,20,8,131,0,2,0,0,0,0,0-0-0,|12||255-0-0
 10,104,Initial Time to Attract New Customers,202,473,133,13,8,3,0,2,0,0,0,0-0-0-0-0-0,|12||255-0-0
 10,105,Time to Attract New Customers,485,526,56,21,8,3,0,0,0,0,0,0
 1,106,104,105,1,0,0,0,0,64,0,-1--1--1,,1|(347,460)|
 10,107,Elasticity of Desire to Choose Brand to Attract New Customers,145,718,79,28,8,3,0,2,0,0,0,0-0-0,|12||255-0-0
 1,108,105,20,1,0,0,0,0,64,0,-1--1--1,,1|(556,455)|
 10,109,Conversion Time from Switchers to Satisfied Buyers,783,525,97,19,8,3,0,0,0,0,0,0
 1,110,109,33,1,0,0,0,0,64,0,-1--1--1,,1|(839,453)|
 1,111,103,109,1,0,0,0,0,64,0,-1--1--1,,1|(777,570)|
 10,112,Normal Death Rate,599,453,37,34,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,113,112,101,1,0,0,0,0,64,0,-1--1--1,,1|(537,433)|
 1,114,112,75,1,0,0,0,0,64,0,-1--1--1,,1|(653,443)|
 1,115,64,62,1,0,0,0,0,64,0,-1--1--1,,1|(1411,439)|
 10,116,Installed Base,197,215,53,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,117,116,80,1,0,0,0,0,64,0,-1--1--1,,1|(229,280)|
 1,118,2,8,0,0,0,0,0,0,0,-1--1--1,,1|(996,68)|
 10,119,Satisfied Buyers Leaving Fraction,925,567,54,19,8,3,0,0,0,0,0,0
 1,120,94,119,1,0,0,0,0,64,0,-1--1--1,,1|(895,671)|
 1,121,119,47,1,0,0,0,0,64,0,-1--1--1,,1|(920,368)|
 10,122,Switchers Leaving Fraction,623,519,49,25,8,3,0,0,0,0,0,0
 1,123,107,122,1,0,0,0,0,64,0,-1--1--1,,1|(405,650)|
 1,124,122,24,1,0,0,0,0,64,0,-1--1--1,,1|(650,383)|
 10,125,Net Addition,695,106,42,11,8,3,0,2,0,0,0,0-0-0-0,|12||0-0-255
 1,126,24,125,1,0,0,0,0,64,0,-1--1--1,,1|(658,195)|
 1,127,47,125,1,0,0,0,0,64,0,-1--1--1,,1|(750,195)|
 1,128,20,125,1,0,0,0,0,64,0,-1--1--1,,1|(676,227)|
 10,129,Desire to Choose Brand,171,555,98,12,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,130,129,122,1,0,0,0,0,64,0,-1--1--1,,1|(378,585)|
 10,131,Conversion time from Satisfied buyers to Brand Friend,1127,490,80,28,8,3,0,0,0,0,0,0
 1,132,131,38,1,0,0,0,0,64,0,-1--1--1,,1|(1145,423)|
 10,133,Elasticity of Brand Equity to Trust Building Rate,998,698,80,19,8,3,0,2,0,0,0,0-0-0-0,|12||255-0-0
 1,134,133,131,1,0,0,0,0,64,0,-1--1--1,,1|(1097,626)|
 10,135,Initial Conversion time from Satisfied buyers to Brand Friend,999,630,67,36,8,131,0,2,0,0,0,0-0-0,|12||255-0-0
 1,136,135,131,1,0,0,0,0,64,0,-1--1--1,,1|(1113,572)|
 10,137,Time,1391,397,26,11,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,138,Initial Conversion time for Brand Friends to Loyal Buyers,1321,657,76,26,8,131,0,2,0,0,0,0-0-0,|12||255-0-0
 10,139,Conversion time for Brand Friends to Loyal Buyers,1375,550,84,19,8,3,0,0,0,0,0,0
 10,140,Elasticity of Brand Equity to Loyalty Building Rate,1334,726,80,19,8,3,0,2,0,0,0,0-0-0-0,|12||255-0-0
 1,141,138,139,1,0,0,0,0,64,0,-1--1--1,,1|(1364,606)|
 1,142,178,139,1,0,0,0,0,64,0,-1--1--1,,1|(1267,575)|
 1,143,140,139,1,0,0,0,0,64,0,-1--1--1,,1|(1415,646)|

1,144,139,43,1,0,0,0,0,64,0,-1--1--1,,1|(1406,458)|
 1,145,6,8,0,0,0,0,0,64,0,-1--1--1,,1|(1236,77)|
 1,146,5,8,0,0,0,0,0,64,0,-1--1--1,,1|(1177,57)|
 1,147,7,8,0,0,0,0,0,64,0,-1--1--1,,1|(1265,105)|
 10,148,Elasticity of Effectiveness to Satisfaction,659,738,86,18,8,3,0,2,0,0,0,0,0-0-0-0-0-0,|12||255-0-0
 1,149,148,109,1,0,0,0,0,64,0,-1--1--1,,1|(800,653)|
 10,150,Total Market Size,1055,32,47,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,151,150,8,0,0,0,0,0,64,0,-1--1--1,,1|(1085,62)|
 10,152,Brand Awareness,144,502,69,13,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,153,Perceived Quality,142,528,73,13,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,154,Elasticity of Brand Awareness to Attract New
 Customers,159,599,86,28,8,3,0,2,0,0,0,0,0-0-0-0-0-0,|12||255-0-0
 10,155,Elasticity of Perceived Quality to Attract New
 Customers,151,654,73,28,8,3,0,2,0,0,0,0,0-0-0-0-0-0,|12||255-0-0
 1,156,154,105,1,0,0,0,0,64,0,-1--1--1,,1|(317,541)|
 1,157,152,105,1,0,0,0,0,64,0,-1--1--1,,1|(344,494)|
 1,158,153,105,1,0,0,0,0,64,0,-1--1--1,,1|(316,505)|
 1,159,155,105,1,0,0,0,0,64,0,-1--1--1,,1|(313,560)|
 1,160,129,105,1,0,0,0,0,64,0,-1--1--1,,1|(319,522)|
 1,161,107,105,1,0,0,0,0,64,0,-1--1--1,,1|(296,593)|
 1,162,152,122,1,0,0,0,0,64,0,-1--1--1,,1|(380,564)|
 1,163,153,122,1,0,0,0,0,64,0,-1--1--1,,1|(381,574)|
 1,164,155,122,1,0,0,0,0,64,0,-1--1--1,,1|(396,619)|
 1,165,89,122,1,0,0,0,0,64,0,-1--1--1,,1|(559,655)|
 1,166,154,122,1,0,0,0,0,64,0,-1--1--1,,1|(413,594)|
 10,167,Perceived Quality,647,638,69,13,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,168,Effectiveness,629,661,50,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,169,Elasticity of Perceived Quality to Satisfaction,647,694,70,19,8,3,0,2,0,0,0,0,0-0-0-0-0-0,|12||255-0-0
 1,170,167,109,1,0,0,0,0,64,0,-1--1--1,,1|(769,610)|
 1,171,168,109,1,0,0,0,0,64,0,-1--1--1,,1|(765,632)|
 1,172,169,109,1,0,0,0,0,64,0,-1--1--1,,1|(781,638)|
 1,173,167,119,1,0,0,0,0,64,0,-1--1--1,,1|(772,629)|
 1,174,168,119,1,0,0,0,0,64,0,-1--1--1,,1|(757,657)|
 1,175,169,119,1,0,0,0,0,64,0,-1--1--1,,1|(802,670)|
 1,176,148,119,1,0,0,0,0,64,0,-1--1--1,,1|(826,696)|
 1,177,112,70,1,0,0,0,0,64,0,-1--1--1,,1|(758,480)|
 10,178,Brand Equity,1039,552,51,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,179,178,131,1,0,0,0,0,64,0,-1--1--1,,1|(1087,536)|
 10,180,Market Share,1612,125,44,11,8,3,0,0,0,0,0,0
 1,181,79,180,0,0,0,0,0,64,0,-1--1--1,,1|(1611,181)|
 10,182,Time,480,77,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,183,185,26,4,0,0,22,0,0,0,-1--1--1,,1|(488,179)|
 1,184,185,34,100,0,0,22,0,0,0,-1--1--1,,1|(1257,179)|
 11,185,108,1064,179,6,8,34,3,0,0,1,0,0,0
 10,186,Leaving Brand Friends,1064,206,47,19,40,3,0,0,-1,0,0,0
 1,187,189,26,4,0,0,22,0,0,0,-1--1--1,,1|(488,158)|
 1,188,189,39,100,0,0,22,0,0,0,-1--1--1,,1|(1525,158)|
 11,189,716,1392,158,6,8,34,3,0,0,1,0,0,0

10,190,Leaving Loyal Buyers,1392,185,45,19,40,3,0,0,-1,0,0,0
 10,191,Brand Friends Leaving Fraction,1210,537,54,19,8,3,0,0,0,0,0
 1,192,178,191,0,0,0,0,0,64,0,-1--1--1,,1|(1116,545)|
 10,193,Initial Brand Friends Leaving Fraction,1039,762,65,19,8,3,0,2,-1,0,0,0,0-0-0,0-0-0,|12||255-0-0
 10,194,Initial Loyal Buyers Leaving Fraction,1500,695,61,19,8,3,0,2,-1,0,0,0,0-0-0,0-0-0,|12||255-0-0
 1,195,193,191,1,0,0,0,0,64,0,-1--1--1,,1|(1157,672)|
 1,196,133,191,1,0,0,0,0,64,0,-1--1--1,,1|(1124,646)|
 1,197,191,186,1,0,0,0,0,64,0,-1--1--1,,1|(1183,369)|
 1,198,34,186,1,0,0,0,0,64,0,-1--1--1,,1|(1178,255)|
 10,199,Loyal Buyers Leaving Fraction,1541,587,54,19,8,3,0,0,0,0,0,0
 1,200,178,199,1,0,0,0,0,64,0,-1--1--1,,1|(1258,606)|
 1,201,194,199,1,0,0,0,0,64,0,-1--1--1,,1|(1531,651)|
 1,202,199,190,1,0,0,0,0,64,0,-1--1--1,,1|(1612,392)|
 1,203,39,190,1,0,0,0,0,64,0,-1--1--1,,1|(1495,242)|
 1,204,140,199,1,0,0,0,0,64,0,-1--1--1,,1|(1444,669)|
 1,205,186,125,0,0,0,0,0,64,0,-1--1--1,,1|(882,157)|
 1,206,190,125,0,0,0,0,0,64,0,-1--1--1,,1|(1048,145)|
 10,207,Time,293,253,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,208,207,1,0,0,0,0,0,0,0,-1--1--1,,1|(293,245)|
 10,209,Time,375,171,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,210,209,10,0,0,0,0,0,0,0,-1--1--1,,1|(375,163)|
 10,211,Time,373,382,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,212,211,52,0,0,0,0,0,0,0,-1--1--1,,1|(373,374)|
 10,213,New Investment,880,929,40,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,214,Cell Sites,154,100,40,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,215,1,3,0,0,0,0,0,0,1,-1--1--1,,1|(960,252)|
 1,216,79,4,0,0,0,0,0,0,1,-1--1--1,,1|(1625,236)|
 1,217,8,17,0,0,0,0,0,0,1,-1--1--1,,1|(938,196)|
 1,218,4,26,0,0,0,0,0,0,1,-1--1--1,,1|(1081,291)|
 1,219,3,26,0,0,0,0,0,0,1,-1--1--1,,1|(1077,310)|
 1,220,5,29,0,0,0,0,0,0,1,-1--1--1,,1|(1118,164)|
 1,221,6,34,0,0,0,0,0,0,1,-1--1--1,,1|(1312,186)|
 1,222,7,39,0,0,0,0,0,0,1,-1--1--1,,1|(1451,208)|
 \\---// Sketch information - do not modify anything except names
 V300 Do not put anything below this section - it will be ignored
 *2. Brand Awareness
 \$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,70
 10,1,Brand Recognition,365,505,46,28,3,3,0,0,0,0,0,0
 1,2,3,1,4,0,0,22,0,0,0,-1--1--1,,1|(279,502)|
 11,3,1724,233,502,6,8,34,3,0,0,1,0,0,0
 10,4,Brand Recognition Rate,233,529,55,19,40,131,0,0,-1,0,0,0
 10,5,Unaware of Brand,91,504,48,25,3,3,0,0,0,0,0,0
 1,6,3,5,100,0,0,22,0,0,0,-1--1--1,,1|(183,502)|
 1,7,5,4,1,0,0,0,0,64,0,-1--1--1,,1|(140,544)|
 10,8,Time to Achieve Brand Recognition,140,683,59,19,8,3,0,2,0,0,0,0,0-0-0,0-0-0,|12||255-0-0
 1,9,8,4,1,0,0,0,0,64,0,-1--1--1,,1|(205,627)|
 10,10,Initial Brand Recognition,369,562,39,19,8,3,0,0,-1,0,0,0

10,11,Initial Switchers,354,379,59,11,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,12,Initial Unaware of Brand,55,437,57,19,8,3,0,0,-1,0,0,0
 10,13,Outreach Gap,90,456,54,11,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 12,14,48,-123,500,10,8,0,3,0,0,-1,0,0,0
 1,15,16,14,100,0,0,22,0,0,0,-1--1--1,,1|(-77,500)|
 11,16,48,-35,500,6,8,34,3,0,0,1,0,0,0
 10,17,New Unaware of Brand,-35,528,56,19,40,3,0,0,-1,0,0,0
 10,18,New Potential Customers,-77,599,50,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,19,18,17,1,0,0,0,0,64,0,-1--1--1,,1|(-46,574)|
 1,20,16,5,4,0,0,22,0,0,0,-1--1--1,,1|(7,500)|
 10,21,Elasticity of Total Investment to Brand Recognition,65,606,65,28,8,3,0,2,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,22,21,4,1,0,0,0,0,64,0,-1--1--1,,1|(164,581)|
 10,23,Maximum Brand Recall,213,428,54,19,8,3,0,0,0,0,0,0
 1,24,1,23,1,0,0,0,0,64,0,-1--1--1,,1|(271,477)|
 10,25,Effectiveness,120,648,50,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,26,25,4,1,0,0,0,0,64,0,-1--1--1,,1|(184,608)|
 10,27,Competitive Pressure,808,329,39,19,8,3,0,0,0,0,0,0
 10,28,Initial Brand Recall,372,270,59,11,8,3,0,0,0,0,0,0
 10,29,Brand Awareness Index,544,331,41,27,8,3,0,0,0,0,0,0
 10,30,Brand Equity,-86,262,51,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,31,Elasticity of Brand Equity to Brand Recall,-101,320,72,19,8,3,0,2,-1,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,32,Initial Brand Awareness Index,544,241,44,26,8,3,0,0,0,0,0,0
 10,33,Brand Awareness,677,331,41,19,8,3,0,0,0,0,0,0
 1,34,29,33,0,0,0,0,0,64,0,-1--1--1,,1|(603,331)|
 1,35,32,33,0,0,0,0,0,64,0,-1--1--1,,1|(609,284)|
 10,36,Brand Recall,366,330,49,29,3,3,0,0,0,0,0,0
 12,37,48,52,321,10,8,0,3,0,0,-1,0,0,0
 1,38,40,36,4,0,0,22,0,0,0,-1--1--1,,1|(256,321)|
 1,39,40,37,100,0,0,22,0,0,0,-1--1--1,,1|(122,321)|
 11,40,48,189,321,6,8,34,3,0,0,1,0,0,0
 10,41,Net Change in Brand Recall,189,350,46,19,40,3,0,0,-1,0,0,0
 1,42,31,41,1,0,0,0,0,64,0,-1--1--1,,1|(42,359)|
 1,43,30,41,1,0,0,0,0,64,0,-1--1--1,,1|(48,335)|
 10,44,Time to Achieve Brand Recall,-73,381,53,19,8,3,0,2,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,45,44,41,1,0,0,0,0,64,0,-1--1--1,,1|(58,384)|
 1,46,36,41,1,0,0,0,0,64,0,-1--1--1,,1|(279,364)|
 10,47,Maximum Top of Mind,172,261,50,21,8,3,0,0,0,0,0,0
 1,48,36,47,1,0,0,0,0,64,0,-1--1--1,,1|(256,304)|
 10,49,Time to Achieve Top of Mind,48,264,53,19,8,3,0,2,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,50,23,41,1,0,0,0,0,0,0,-1--1--1,,1|(193,389)|
 10,51,Initial Top of Mind,339,108,59,11,8,3,0,0,0,0,0,0
 10,52,Elasticity of Brand Equity to Top of Mind,-63,201,71,19,8,3,0,2,-1,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,53,Top of Mind,347,169,48,27,3,3,0,0,0,0,0,0
 12,54,48,84,163,10,8,0,3,0,0,-1,0,0,0
 1,55,57,53,4,0,0,22,0,0,0,-1--1--1,,1|(249,163)|
 1,56,57,54,100,0,0,22,0,0,0,-1--1--1,,1|(141,163)|

11,57,48,194,163,6,8,34,3,0,0,1,0,0,0
 10,58,Net Change in Top of Mind,194,192,61,19,40,3,0,0,-1,0,0,0
 1,59,52,58,1,0,0,0,0,64,0,-1--1--1,,1|(36,181)|
 1,60,53,58,1,0,0,0,0,64,0,-1--1--1,,1|(294,207)|
 1,61,30,58,1,0,0,0,0,0,0,-1--1--1,,1|(1,223)|
 1,62,47,58,1,0,0,0,0,0,0,-1--1--1,,1|(155,232)|
 1,63,49,58,1,0,0,0,0,0,0,-1--1--1,,1|(90,229)|
 1,64,53,29,0,0,0,0,0,64,0,-1--1--1,,1|(439,245)|
 1,65,36,29,0,0,0,0,0,64,0,-1--1--1,,1|(452,330)|
 1,66,1,29,0,0,0,0,0,64,0,-1--1--1,,1|(449,422)|
 1,67,33,27,1,0,0,0,0,64,0,-1--1--1,,1|(737,336)|
 10,68,Initial Satisfied Buyers,372,300,51,19,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,69,Initial Buyers consider Brand a Friend,363,146,75,19,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,70,Initial Loyal Buyers,363,146,42,19,8,2,1,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,71,Elasticity of Investment to Brand Awareness,552,434,78,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,72,71,33,1,0,0,0,0,0,0,-1--1--1,,1|(625,398)|
 10,73,Effectiveness,966,329,41,11,8,3,0,0,-1,0,0,0
 1,74,27,73,0,0,0,0,0,0,0,-1--1--1,,1|(879,329)|
 10,75,Total Investments,808,263,43,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,76,75,73,1,0,0,0,0,0,0,-1--1--1,,1|(877,304)|
 10,77,Relative Investment in Marketing,591,485,51,24,8,3,0,0,0,0,0,0
 10,78,Initial Investment in Marketing,505,613,59,22,8,3,0,0,0,0,0,0
 1,79,78,77,1,0,0,0,0,64,0,-1--1--1,,1|(565,568)|
 1,80,77,33,1,0,0,0,0,64,0,-1--1--1,,1|(663,418)|
 10,81,Investment in Marketing,490,562,47,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,82,81,77,1,0,0,0,0,0,0,-1--1--1,,1|(544,543)|
 1,83,10,1,0,0,0,0,0,0,1,-1--1--1,,1|(368,544)|
 1,84,12,5,0,0,0,0,0,0,1,-1--1--1,,1|(67,461)|
 1,85,11,10,0,0,0,0,0,0,1,-1--1--1,,1|(359,459)|
 1,86,13,12,0,0,0,0,0,0,1,-1--1--1,,1|(86,453)|
 1,87,68,28,0,0,0,0,0,0,1,-1--1--1,,1|(372,281)|
 1,88,29,32,0,0,0,0,0,0,1,-1--1--1,,1|(544,292)|
 1,89,28,36,0,0,0,0,0,0,1,-1--1--1,,1|(370,284)|
 1,90,69,51,0,0,0,0,0,0,1,-1--1--1,,1|(352,128)|
 1,91,70,51,0,0,0,0,0,0,1,-1--1--1,,1|(352,128)|
 1,92,51,53,0,0,0,0,0,0,1,-1--1--1,,1|(340,123)|
 1,93,81,78,0,0,0,0,0,0,1,-1--1--1,,1|(494,579)|
 \\|---| Sketch information - do not modify anything except names
 V300 Do not put anything below this section - it will be ignored
 *3. Investment and Brand Equity
 \$192-192-192,0,Times New Roman|12||0-0-0|0-0-0|0-0-255|-1--1--1|-1--1--1|96,96,70
 10,1,Total Investments,467,574,50,31,3,3,0,0,0,0,0,0
 12,2,48,303,573,10,8,0,3,0,0,-1,0,0,0
 1,3,5,1,4,0,0,22,0,0,0,-1--1--1,,1|(387,573)|
 1,4,5,2,100,0,0,22,0,0,0,-1--1--1,,1|(329,573)|

11,5,48,351,573,6,8,34,3,0,0,1,0,0,0
 10,6,Investment,351,592,35,11,40,3,0,0,-1,0,0,0
 12,7,48,666,574,10,8,0,3,0,0,-1,0,0,0
 1,8,10,7,4,0,0,22,0,0,0,-1--1--1,,1|(623,573)|
 1,9,10,1,100,0,0,22,0,0,0,-1--1--1,,1|(547,573)|
 11,10,48,584,573,6,8,34,3,0,0,1,0,0,0
 10,11,Depreciation,584,592,41,11,40,3,0,0,-1,0,0,0
 1,12,1,11,1,0,0,0,0,64,0,-1--1--1,,1|(513,611)|
 10,13,Average Life of Capital,583,672,48,22,8,3,0,0,0,0,0,0
 1,14,13,11,0,0,0,0,64,0,-1--1--1,,1|(583,633)|
 10,15,Initial Total Investments,467,653,50,25,8,3,0,0,0,0,0,0
 10,16,New Investment,199,590,52,11,8,3,0,0,0,0,0,0
 1,17,16,6,0,0,0,0,64,0,-1--1--1,,1|(276,590)|
 10,18,Elasticity of Investment to Brand Awareness,363,237,69,22,8,3,0,0,-1,0,0,0
 10,19,Investment Fraction in Marketing,187,356,63,19,8,3,0,0,0,0,0,0
 10,20,Brand Equity,1012,274,42,11,8,3,0,0,-1,0,0,0
 10,21,Brand Awareness,612,197,56,11,8,3,0,0,-1,0,0,0
 10,22,Cell Sites,652,345,40,20,3,3,0,0,0,0,0,0
 10,23,Initial Cell Sites,610,248,49,11,8,3,0,0,0,0,0,0
 12,24,48,490,343,10,8,0,3,0,0,-1,0,0,0
 1,25,27,22,4,0,0,22,0,0,0,-1--1--1,,1|(579,343)|
 1,26,27,24,100,0,0,22,0,0,0,-1--1--1,,1|(517,343)|
 11,27,48,540,343,6,8,34,3,0,0,1,0,0,0
 10,28,New Cell Sites Per Year,540,370,48,19,40,3,0,0,-1,0,0,0
 10,29,Investment Fraction Cell Sites,359,354,46,26,8,3,0,0,0,0,0,0
 1,30,29,28,1,0,0,0,0,64,0,-1--1--1,,1|(438,352)|
 1,31,6,28,1,0,0,0,0,64,0,-1--1--1,,1|(459,447)|
 10,32,Average Cost per Cell Sites,335,406,57,19,8,3,0,0,-1,0,0,0
 1,33,32,28,1,0,0,0,0,64,0,-1--1--1,,1|(417,371)|
 10,34,Average Inflation,341,436,54,11,8,3,0,0,0,0,0,0
 1,35,34,28,1,0,0,0,0,64,0,-1--1--1,,1|(419,391)|
 10,36,year,425,459,24,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,37,36,28,1,0,0,0,0,64,0,-1--1--1,,1|(461,408)|
 10,38,Desire to Choose Brand,825,345,51,25,8,3,0,0,0,0,0,0
 1,39,22,38,0,0,0,0,64,0,-1--1--1,,1|(726,345)|
 10,40,Brand Loyalty,821,507,45,11,8,3,0,0,-1,0,0,0
 1,41,40,20,1,0,0,0,0,64,0,-1--1--1,,1|(966,440)|
 1,42,29,19,0,0,0,0,64,0,-1--1--1,,1|(288,354)|
 10,43,Brand Awareness Index,529,125,62,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,44,43,21,0,0,0,0,0,64,0,-1--1--1,,1|(569,160)|
 10,45,Initial Brand Awareness Index,423,154,60,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,46,45,21,0,0,0,0,0,64,0,-1--1--1,,1|(516,174)|
 1,47,18,21,1,0,0,0,0,64,0,-1--1--1,,1|(455,214)|
 10,48,Relative Investment in Marketing,266,195,62,19,8,3,0,0,-1,0,0,0
 1,49,48,21,0,0,0,0,0,64,0,-1--1--1,,1|(435,195)|
 10,50,Initial Investment in Marketing,122,281,58,21,8,3,0,0,-1,0,0,0
 1,51,50,48,0,0,0,0,0,64,0,-1--1--1,,1|(189,240)|
 10,52,Investment in Marketing,257,274,42,19,8,3,0,0,0,0,0,0

1,53,6,52,1,0,0,0,0,64,0,-1--1--1,,1|(275,449)|
 1,54,19,52,0,0,0,0,0,64,0,-1--1--1,,1|(216,320)|
 1,55,52,48,0,0,0,0,0,64,0,-1--1--1,,1|(260,241)|
 10,56,Perceived Quality,801,277,56,11,8,3,0,0,0,0,0,0
 1,57,23,56,0,0,0,0,0,64,0,-1--1--1,,1|(695,260)|
 1,58,22,56,0,0,0,0,0,64,0,-1--1--1,,1|(727,310)|
 1,59,38,20,0,0,0,0,0,64,0,-1--1--1,,1|(922,307)|
 1,60,56,20,1,0,0,0,0,64,0,-1--1--1,,1|(906,275)|
 1,61,21,20,1,0,0,0,0,64,0,-1--1--1,,1|(839,197)|
 10,62,Elasticity of Brand Awareness to Brand Equity,743,156,98,23,8,3,0,2,0,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,63,Elasticity of Perceived Quality to Brand Equity,805,236,75,19,8,3,0,2,0,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,64,Elasticity of Desire to Choose Brand to Brand Equity,785,406,77,28,8,3,0,2,0,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 10,65,Elasticity of Brand Loyalty to Brand Equity,794,457,76,19,8,3,0,2,0,0,0,0,0-0-0-0-0-0-0,|12||255-0-0
 1,66,62,20,1,0,0,0,0,64,0,-1--1--1,,1|(926,188)|
 1,67,63,20,0,0,0,0,0,64,0,-1--1--1,,1|(918,256)|
 1,68,64,20,1,0,0,0,0,64,0,-1--1--1,,1|(919,359)|
 1,69,65,20,1,0,0,0,0,64,0,-1--1--1,,1|(962,400)|
 10,70,Net Addition,1069,557,51,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,71,Installed Base,1075,590,53,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,72,Market Share,1336,317,53,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 10,73,Buyers consider Brand a Friend,737,577,56,19,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,74,73,40,1,0,0,0,0,0,0,-1--1--1,,1|(795,550)|
 10,75,Loyal Buyers,752,636,51,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,76,75,40,1,0,0,0,0,0,0,-1--1--1,,1|(826,594)|
 12,77,48,654,497,10,8,0,3,0,0,-1,0,0,0
 1,78,80,77,4,0,0,22,0,0,0,-1--1--1,,1|(654,461)|
 1,79,80,22,100,0,0,22,0,0,0,-1--1--1,,1|(654,393)|
 11,80,48,654,427,8,6,33,3,0,0,2,0,0,0
 10,81,Cell Sites Decay,614,427,32,22,40,3,0,0,-1,0,0,0
 1,82,11,81,0,0,0,0,0,64,0,-1--1--1,,1|(596,521)|
 1,83,32,81,0,0,0,0,0,0,0,-1--1--1,,1|(480,416)|
 1,84,34,81,0,0,0,0,0,0,0,-1--1--1,,1|(481,431)|
 10,85,year,614,468,24,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,86,85,81,0,0,0,0,0,0,0,-1--1--1,,1|(614,460)|
 10,87,Time,351,622,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,88,87,6,0,0,0,0,0,0,0,-1--1--1,,1|(351,614)|
 10,89,Time,187,394,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,90,89,19,0,0,0,0,0,0,0,-1--1--1,,1|(187,386)|
 10,91,Time,540,408,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,92,91,28,0,0,0,0,0,0,0,-1--1--1,,1|(540,400)|
 10,93,Time,614,468,26,11,8,2,0,3,-1,0,0,0,128-128-128,0-0-0,|12||128-128-128
 1,94,93,81,0,0,0,0,0,0,0,-1--1--1,,1|(614,460)|
 1,95,15,1,0,0,0,0,0,0,1,-1--1--1,,1|(467,623)|
 1,96,23,22,0,0,0,0,0,0,1,-1--1--1,,1|(625,285)|
 1,97,52,50,0,0,0,0,0,0,1,-1--1--1,,1|(204,276)|