

Assessing the Predictive Power of Technology Adoption Life Cycle Model in Nigerian Telecom Market

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Abstract— Technology Adoption Life Cycle Model (TALCM) has proved to be a useful marketing tool for technology products. However the model was developed and mostly tested in developed markets. Against the backdrop, this research examines the viability of the model in new environments. Hence, the Nigerian GSM market present a fertile ground given its contrasting features from where the model was developed and frequently tested. The research relied on secondary data largely drawn from regulatory/operators' disclosure. The paper compares GSM operators marketing effort vis-a-vis TALCM prescriptions in relation with their market share for early and middle stages. Result indicates perfect correlation between compliance with the models' prescription and operators' market share. In essence, analysis of operators marketing effort and market share suggest the robustness of the model especially in the early stage where operators marketing effort were more divergent.

Index Terms— GSM, Marketing, Nigeria, TALC Model.

I. INTRODUCTION

The last few decades witnessed an unprecedented wave of technological products. Telecommunication industry is at the forefront of these innovations. However, increased competition, marketplace and customer complexities meant spectacular losses, failures and bankruptcies to high-tech firms despite avalanche of innovations [1, 2]. Bringing to limelight the need for effective marketing, at a time when the traditional marketing tools were offering less than satisfactory results [3]. Hence the need for unique marketing model for technology products [3-5] or at least fine turning the traditional ones [6].

The situation is further aggravated given the rapid changes taking place in telecommunications industry. Thus, making it difficult for operators to acquire and maintain clients [7] and the high level of customer confusion in mobile phone market [8]. More so, survey on US consumers' perceptions of mobile service show that the level of satisfaction is much lower for mobile service carriers compared to other service sectors. In fact, 35 percent of US mobile subscribers in 2004 reported that they were considering switching mobile service carriers [9]. Similarly, it was observed that telecommunications firms are losing 2-4% of their customers' monthly leading to loss of millions in revenue [10]. In Nigeria for example, already one GSM license was rebuked, another is virtually bankrupt and another one has change ownership five times with less than a

decade history. The situation is not different in Malaysia where of the seven licensed in 1994, only three are operational [11, 12]. Accordingly, the birth of Technology Adoption Life Cycle Model (TALCM) was nothing short of delight as high-tech marketers were in desperate need of help given the poor results from the deployment of the Procter & Gamble approach [3].

The goal of this paper is to examine the viability of the TALC model in new environment. Specifically the research aim to empirically push the applicability of the model in four different environment/circumstances: different socio-political set-up (under developed economy); different market structure (Oligopolistic as opposed to perfect competitive market); highly regulated sector as oppose to open industry; and intangible as against tangible technology product.

Telecommunication is playing an increasingly important role in today's globalize world. This suggests that no economy can achieve an appreciable level of development without a vibrant telecom sector [13]. Global telecom spending was projected to have reached \$2.0 trillion by 2007 [14]. Similarly survey revealed that mobile revenues alone accounted for 2.2% of GDP of Africa in 2004 [15]. The survey also revealed positive relationship between GSM access and productivity, government revenue, employment as well as bridging digital-divide. In Nigeria for example GSM service has positively impacted the economy in the areas of teledensity; stimulation of associated industries (especially print media, advertisement, engineering, banks and finance); corporate social investments; technological development; manpower development and general growth of the productive capacity of the economy [16]. In terms of employment GSM operators in Nigeria generated 3,500 direct employment and an estimated 10,000 to 200,000 indirect employment opportunities [17], however latest statistics revealed direct employment by GSM operators had risen to 10,000 and estimated 1 million indirect employment [18]. Mobile phone is the most effervescent and high growth area of telecommunication, with over 1.7 billion global customers and about 80% of the world's population covered by mobile networks [15]. Mobile phone is becoming so popular that people are abandoning fixed line telephony to rely exclusively on mobile phones, primarily because of mobility, safety (emergency), price, variety and privacy [19].

Initially telecommunication infrastructures and policy in Nigeria was dictated by purely administrative reasons, hence at independence in 1960, there were less than 20,000 telephone lines. The country witness a rather slow and stagnant growth by 1999 there were still less than 500,000 lines nationwide. However, series of telecom reforms culminating with *National Telecom Policy, the Wireless*

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Telegraphy Act and the Nigerian Communication Act 2003, achieve full liberalization of the telecom industry by encouraging private and foreign investment as well as proactive regulatory regime. Similarly, a competitive digital mobile license auction in January 2001 marked the birth of GSM in Nigeria. Four firms: Econet Wireless Nigeria (later Vee Mobile, Celtel, Zain and now Airtel); Mobile Telecommunication (Mtel); Mobile Telephone Networks (MTN) and Communications Investments Limited (CIL) were given license. However, CIL license was rebuked due to firms' inability to pay the complete license fee within the stipulated deadline. In 2002, Glo Mobile became the fourth GSM operator in the country. Except Glo Mobile all the three licensed GSM operators roll-out their services in 2001. Glo Mobile, however, released their services in 2003. The oligopoly status granted the four GSM operators expired in early 2006, immediately after the number of licensed mobile operators rose to ten by virtue of unified license regime, although only one more operator released its GSM services i.e. EMTS Limited making a total of five active operators in the market.

II. LITERATURE

A. The Model

TALCM is a model for marketing discontinues technology product with roots in Individual Innovativeness Theory (IIT), marketing mix model and product life cycle model. Moore [20, 21] building on IIT a key element of meta-theory of diffusion [22] proposed the TALCM. Technology life cycle is the predictable pattern followed by a technological innovation starting from its inception and development to market saturation and replacement [23]. He postulated that technology adoption goes from left to right; enthusiasts discover the offering and tell the visionaries. The visionaries then will pass the good word on to the pragmatists, then to the conservatives and finally laggards [3]. It is argued that the point of greatest peril in managing technology life cycle lies in making the transition from an early market to a mainstream market [20, 21]. He called the gap between these two markets a chasm and concludes that crossing the *chasm* should be the primary aim of any long-term technology marketing strategy.

Meanwhile the traditional marketing strategies (largely build on the marketing mix variable) were offering less than satisfactory results. In the same vein the popular version of the marketing mix concept (4Ps) has increasingly come under attack, given its inability to fully address different marketing contexts [24, 25]. As a result there are numerous modifications on the popular 4Ps framework to include variables such as packaging, power, public relations, people, process, customer service, and personalization among others in order to suit different context and circumstances (see for example [26, 4, 5]). Perhaps one of the most concerted criticisms comes from services marketing literature, particularly the works of [27] that extends the 4Ps framework to include process, physical evidence and participants, intangible product. Little wonder therefore survey of European marketing academic indicates high degree of dissatisfaction with the 4Ps framework and that the Booms

and Bitner's 7Ps framework has already achieved a high degree of acceptance as a generic marketing mix, even though there is no uniform support for the new three variables [25]. In synopsis there are no hard and fast rules regarding the total number of marketing mix required in all situations. Circumstances, industry, product characteristics and marketing context ultimately determine the number and variety of overall marketing mix necessary to achieve competitive advantage. For example [28] and [29] while studying real estate agency and medical services respectively found the 7ps of service marketing appropriate. On the other hand it was found necessary to include support services for industrial good because of the continuous nature of relationship as well as the technical nature of the offering Grönroos [4, 5]. In conclusion it was observed that while marketing high-tech requires fine turning of the traditional marketing literature, it does not require a completely new set of marketing thinking and philosophy [6].

The work of Norman [23] concentrates on the appropriate marketing mix strategies suitable to different categories of the adopters. Based on a detailed study of the US PC marketing he concludes that, success relies on matching technology life cycle with appropriate marketing strategies. He cited the example of Apple Computer, a firm that tried hard to make products that were easy to use, understandable, with sophisticated aesthetics driving both graphical design on the screen and industrial design of the products, and controlling only 4% of the market share. For example he observed while early adopters may overlook instability, inelegance and high price; late adopters on the other hand emphasize ease of use, convenience, good design and value for money. Key deduction from the model include: existence of different categories of consumers and unique managerial, marketing and technical strategies for dealing with various consumers group. Hence, unless organizations match customers with appropriate strategies market share and sustainable profitability will be compromise; and commoditization, i.e. crashing down of the initial price of technological innovations with time mainly due to standardization, improvement, economics of scale, new entrants etc [30, 31].

B. The Environment

Nigeria shares virtually all the features of developing economy. For example, research [32] revealed apart from the normal initial start-up capital expenditure for telecom firms (e.g. tax; customs/excise duties; site acquisition costs; equipment importation). GSM operators in Nigeria have to deal with additional capital outlay due to the state of the economy on building/maintaining roads to base stations; buying/maintaining generators to power the network/base stations; investments in backbone telecommunication transmission equipment; high interest rate and low value of local currency in international market. In addition to economic realities there are also cultural differences between develop and developing nations.

Culturally, a linkage was observed between GSM usage, culture and clients satisfaction in Nigeria [17]. However, there is a growing recognition that media convergence is drastically pushing for global cultural convergence, mainly

as a result of proliferation of channels and the increasingly ubiquitous nature of computing and communications [33]. The following are considered the major causes and outcomes of media convergence [33]: *Technological Convergence*; being driven by transforming words, images and sounds into digital information the society expand the potential relationships between them and enable them to flow across platforms. *Economic Convergence*; horizontal integration making a single firm to invest in film, television, books, games, the Web, and music for example, which ultimately lead to cultural production, leading to products with global appeal such Harry Potter and Star Wars. *Social Convergence*; making the society to device ways of navigating via this media avalanche, for example one find a teenager “watching baseball on a big-screen television, listening to techno on the stereo, word-processing a paper and writing e-mail to his friends”[33]. *Cultural Convergence*; media convergence cultivate a new participatory information culture by giving average people the tools to archive, interpret, multiple production and distribution of content. *Global Convergence*; internationalization of media content circulation in music, news, entertainment, cinema all lead to fusion of culture reflecting a citizen of the global village. Today, media convergence is sparking a range of social, political, economic and legal disputes because of the conflicting goals of consumers, producers and gatekeepers. It was concluded that while the digital convergence may bring mix outcomes, but it marks the emergence of a new cultural order [33]. Despite the strong global cultural convergence argument, a number of literatures suggest that culture affects people’s perception of long and short time (see [34] for example), this is imperative in GSM context since speed of delivery affects clients satisfaction judgments [35]. Recently, drawing on a sample across four continents-US and Finnish as well as Egyptian and Peruvian representing monochronic and polychronic cultures respectively [36] investigate the role of culture on customer reactions to download delay in online environment. They view monochronic people to be more organized and strict with their time compared to polychronic. The research not only found culture as a significant factor in perceptions of download delay but also found minimal within culture differences. Other research observed the role of exposure in engendering cross-cultural diffusion even though they found other factors to be more critical [37]. Hence, can cultural differences nullify the versatility of the model? Apart from the state of the economy/culture, the GSM market is unique from other ‘open industry’ due to strict regulation.

A key feature of GSM market in particular and the telecom industry in general is strict regulation. It is argued that good regulations prevent uncompetitive behaviors and harmonize the profit maximization goal of operators with home country’s developmental aspirations [38]. However, survey shows that GSM regulation policies such as license fees and renewal time, spectrum allocation, interconnectivity arrangements, universal service obligation (USO) funding and determining number of operators, significantly impact operator’s business plan and hence plays a fundamental role on operator’s profitability [15]. Additionally, the survey revealed that an optimal regulatory regime would lead to considerably higher levels of investment by 25% amounting to US\$4.6bn in sub-Saharan Africa alone. Similarly, it was argued that regulatory clarity significantly affects GSM firms,

as operators were scared in making large-scale infrastructure investments and irreversible marketing expenditures in the absent of a clear cut guidelines [39].

Building on Malaysian Communications and Multimedia Act 1998 [40] categorize telecommunication regulation into four (4) key areas: *Economic Regulation*; aim to ensure that the industry is efficient with incentives to invest, innovate and interconnect, implemented via licensing, competition policy and service access. *Technical Regulation*; aim to ensure networks and services are interoperable, safe, secure and reliable, implemented via spectrum assignment, numbering and electronic addressing and technical standard. *Social Regulation*; aim at promoting national culture, identity and values. *Consumer Protection*; aim to ensure that consumers have right to access high quality services that are reliable, easily accessible and affordable for their provider of choice, implemented via service quality, consumer disputes settlements, rate regulation and universal service obligation. More recently propose mobile regulatory framework include: minors’ protection; privacy; contractual relationships; intellectual property protection; market and resources access [41]. In essence, [40] and [41] suggest regulation in the sector affect the performance of operators.

Theoretically, although high-tech diffusion research has been popular in marketing literature, there are limited studies conducted in developing nations [42]. Most studies focused on a single market (most often US markets) and single tangible product such as television set [43]. As a result there are calls for research to gather empirical evidence on managing innovation in developing worlds [44]. Especially since developing countries present a unique operating environment with poor technology base, customers with low disposal income and high cost and scarcity of capital [45]. Hence “it is not evident that we can derive reliable generalizations for developing countries by analyzing the diffusion process across wealthy, very often saturated markets” [43]. Similarly, “while there is no denying that the world market has become more integrated than ever before, national competitiveness remains a valid research topic inasmuch as borders exist and political, economic, and cultural institutions differ between nation states” [46]. On this point it was observed that “if diffusion studies are criticized because they are conducted within a single country (only USA), the cross-cultural diffusion studies can be criticized as being predominantly European” [43].

From the foregoing the need for assessing the robustness of the model in new environment is obvious: first, most studies are conducted in perfect competitive market with tangible technology in developed economies; second, there is evidence that state of the socio-economy environment express in political stability, per capita income affect, culture etc affects the diffusion of telecommunications services; third, operating in developing economy entails additional cost of operation; and the quality of regulation affect diffusion of telecommunications services.

III. METHODOLOGY

The paper relied exclusively on secondary data. Data presented on the upper part of the table covers operators’ marketing mix strategy vis-à-vis market share that covers the

first stage of the life-cycle. The dataset was originally captured from operators/regulatory disclosure (see [47]). The lower portion of the table also borders on marketing mix effort vis-à-vis operators' share of the market in the second

stage of the market captures from the same sources. A simple ranking with High, Moderate or Low indicating the level of compliance with the model was used for the exploratory review.

TABLE I. MARKETING MIX AND MARKET SHARE OF GSM OPERATORS IN NIGERIA

Early Stage (Inception to 2006)						
Decision Line	MTN	Glo	Airtel	MTel	EMTS	CDMA
Core Service	Low	High	High	Moderate		
Value-Added Service	Low	High	High	Low		
Distribution	High	Moderate	Low	Low		
Price	High	Moderate	Moderate	Low		
Customer Service	Low	High	High	High		
Market Share Source: MobileAfrica (2006)	41%	29%	24%	04%		02%
Middle Stage? (2007-2010)						
Core Service	High	High	High	Moderate	High	
Value-Added Service	High	High	High	Low	High	
Distribution	High	High	Moderate	Low	Low	
Price	Moderate	Moderate	Moderate	Moderate	Moderate	
Customer Service	High	High	High	Low	High	
Market Share Source: NCC (2010)	41%	23%	21%	0.4%	2.6%	11%

The Five factors i.e. Core Service, Value-Added Service, Distribution, Price and Customer Service form the basis for measuring operators marketing effort as decomposed below:

- **Core Service** measures the offering of voice and messaging services. Variables include call clarity, SMS delivery, static/drop calls, quality MMS;
- **Value Added Services (VAS)** measures wide variety of informational, transactional and entertainment services. Variables include availability of commercial information, sport results/headlines, entertainment news, information about location area identity, Internet services, downloads (music/ring tone, movie, games, photographic, logo), stock monitoring/trading, travel services, participation TV shows, voting in SMS based contests, competitions and quizzes;
- **Distribution** measures the level of geographic coverage, service availability and accessibility. Variables include: service coverage of urban/rural areas and major road networks, service/network failure, network/service availability under extreme weather, signal strength, festivities and service availability;
- **Price** measures the amount operators charge for patronizing core and/or VAS. Variables include: Tariff/bills for calls, SMS charges, pricing Multi-Media Services (MMS), access/validity time, tariff for international roaming, charges for informational services, price/bonus value-added services;
- **Customer Support** measures the range and quality of support services that accompany the offering of Core and VAS. Variables include number of languages available for support, speed of response to request, number and spread of customer support centers, Internet based support services, range of avenue for registering complain, virus protection, warning about fraudulent schemes, notification/apology for service failures.

The constructs are consistent with what is obtainable in the industry for example *J.D. Power and Associates* uses billing, promotions and offering, image, call quality/coverage,

customer service, and handset. And by regulatory agencies such as the Telecom Regulatory Authority of India (Trai) applies the following dimensions as the customer satisfaction benchmarks; network availability, billing and customer care. In addition to content validity, the constructs also display high empirical validity such as unidimensionality, discriminant, convergent, nomological validity as well as reliability from the study area [48, 49].

IV. OPERATORS MARKETING SHARE

In the early market (Inception to September 2006) MTN was the best compliant firm in the country; the company charged highest price. MTN charges for both local and international calls exceeds that of the other players, the firms' offering also had the lowest value added services for the period under review. MTN SIM's also has low capacity for saving SMS and phone book address, for example while Econet's (now Airtel) SIM has capacity to accommodate 25 SMS and 250 phone book address, MTN SIM only accommodate 15 and 200 SMS and phone book address respectively. MTN also had the highest coverage and offers little customer support services. In Bauchi State for example Glo mobile and M-Tel have a fairly large offices, while Econet had a liaison office in the floor of First bank of Nigeria Bauchi branch, but MTN had neither office nor liaison office. It is clear from Table I that while MTN lead the pack for compliance, Glo mobile was obviously the follower for example it ranked moderate in Distribution. Econet (now Airtel) rank third overall, with low score in customer support service. With low compliance score ranking in two areas (Price and Distribution) and high score in customer support services, MTel rank last in overall compliance with the early stage TALCM prescript. Going by the model, MTN the best compliant firm in the market was the leader, followed by Glo, Airtel and MTel in that order. With high customer service, product quality and variety as well as low price Airtel &

MTel implemented the model's recommended marketing mix for the middle stage, when clients/adopters will be price sensitive, requires extensive customer support services and wide variety of value added services. In the early market the review suggests a positive relationship between compliance with the model and market share of GSM operators. Similarly, MTel was unable to make the much needed transition from the early market to mainstream market.

In the emerging middle stage (2007-2010) operators marketing mix are less divergent, for example MTN's and Glo marketing mix virtually converged. And very similar to Airtel for many of the constructs except Distribution, EMTS the latest entrant to the market also mirror that of MTN and Glo except in Distribution. MTel rank lowest in compliance in the middle stage as well. The market share shows little change except for the huge inroads made by CDMA operators and EMTS outperforming MTel. In the middle stage it is difficult to attribute share to marketing effort especially for MTN and Glo. However, the model also proved effective in the middle stage when the two extreme performers are compared i.e. MTN and MTel. Similarly, MTel was unable to make the much needed transition from the early market to mainstream market

V. CONCLUSION AND LIMITATIONS

The paper suggests despite unique operating environment characterized by strict regulation, oligopolistic market, developing economy, intangible offering compliance with the prescript of the model is directly related to the market share of GSM operators in Nigeria. To this end the research supports global cultural convergence view. The finding also gives credence to the conclusion of research that despite strict regulation and marketing policy convergence "in most industries, some firms are more profitable than others... the superior performers conceivably possess something special and hard to imitate that allows them to outperform their rivals" [50]. Perhaps the seemingly oligopolistic market advantage to the operators is wiped away by the cost of operation in developing economy as well as high customer confusion and switching behavior in the industry. Especially since regulation is in theory generic to all operators and can aid or impede their marketing effort. However, conclusion of this paper should be interpreted with great caution. First the traditional weakness of the model's oversimplification; the ranking process is difficult especially since different operators disclose not exactly same category of information; deliberate non inclusion of promotion as one of the marketing factors (due to measurement issues) despite the fact that it is a key feature of GSM marketing strategy. Nevertheless the research provides exploratory support for the viability of TALCM in new market.

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