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GAMES THEORY: WHAT HAS IT TO DO WITH NIGERIA TELECOM INDUSTRY?

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Abstract

This study examines the application of game theory to the Nigerian telecommunication industry through analytical modeling and deductive reasoning. The study addresses the question: what has game theory to offer the Nigerian telecom sector? Guided by the need to understand strategic decision-making in oligopolistic markets, the analysis employs illustrative parameters to apply Cournot, Bertrand, and Stackelberg models, explaining output competition, price competition, and strategic leadership respectively. The models predict that telecommunication firms in Nigeria operate under conditions of strategic interdependence where each firm's decision influences rival firms. The Cournot framework demonstrates that firms compete through output decisions and tend toward equilibrium. The Bertrand model illustrates that price competition can lead to reduced profits when firms offer similar services, while the Stackelberg model emphasizes that firms who take the lead in introducing new products influence follower firms. The study demonstrates that game theory provides a relevant analytical framework for understanding pricing strategies, market rivalry, innovation, and competitive positioning among firms. It concludes that game theory offers a structured approach to understanding telecom firm behavior in competitive environments. The study suggests that firms should adopt strategic planning, maintain balanced pricing strategies, invest in innovation, and leverage leadership advantages to sustain competitiveness.

Keywords: *Game theory, Cournot model, Bertrand model, Stackelberg model, oligopoly, telecommunications, Nigeria*

INTRODUCTION

Companies operating in today's markets rarely make decisions in isolation. Each price change, each strategy change, each decision about how to use resources is made with one eye on what the competition is doing or will do next. This interdependence has made competition a far more complex phenomenon than traditional decision-making models were ever intended to deal with, especially under conditions of uncertainty where the outcome of any one firm's decision is heavily dependent on the reactions it provokes from others (Inegbedion & Obadiaru, 2018).

One of the more powerful frameworks for understanding this fact has been game theory. It is built on mathematical economics and deals with strategic interactions between rational decision makers (individuals or organisations), in which the gains and losses you make depend not just on your own choices, but also on the choices everyone else is making at the same time (Schuur et al., 2021). This framework has gained a lot of interest since it can represent the types of real-world competitive situations that simpler analytical methods have difficulty capturing. The theory is based on the notion of Nash equilibrium - the idea that strategic stability occurs when no one can perform better by unilaterally changing what they are doing, as proved by John Nash. This notion has been quite robust, and has been used across areas as diverse as economics, engineering and political science to explain competitive outcomes and strategic behaviour (Jiang & Leyton-Brown, 2010; Samuelson, 2016).

The applicability of game theory is really extensive. It has been used in agricultural decision making (Adeoye et al., 2012), cocoa production systems in Nigeria (Oluyole et al., 2013), project

management (Bockova et al., 2015) and cost allocation problems (Lemaire, 2014) - applications that are quite different on the face of it, but all of which have the common feature of having multiple decision makers with interdependent decisions. Especially in the field of business and market rivalry, the framework has become a natural instrument for the analysis of pricing strategies, resource allocation, and competitive dynamics. Selim (2010) states that firms often make pricing decisions depending on what they anticipate competitors to do. Bravo et al. (2010) applied game theory to model how firms change prices to maximise profits, taking into consideration the likely responses of rivals.

This type of analysis is very pertinent in the telecommunications business. It is structurally oligopolistic – a few dominating companies whose every action is felt by the rest – and competition plays out across numerous dimensions simultaneously: pricing, service quality, network growth and promotional activities (Keehan et al., 2022). This is a widely known dynamic, especially in Nigeria. According to Ayaga and Nnabuko (2019), the competitive tactics of Nigerian telecoms companies have a very high impact on consumer satisfaction and strategic interaction in the industry. Anwar et al. (2018) showed the use of game theoretic models for optimal resource allocation in wireless networks under competitive pressure. Khosroshahi et al. (2019) showed that even factors such as corporate social responsibility can be incorporated in game theoretic pricing models. Boz and Koç (2019) used a game theoretic framework to study the customer switching behaviour in the GSM market. The authors concluded that customers respond predictably to competitive actions in pricing and service quality. This has direct implications for how firms in the sector should consider their strategic options.

But even with this collection of work, there is a gap. The traditional game theory models of Cournot, Bertrand and Stackelberg offer three different perspectives on competitive behaviour; they focus on output decisions, price competition and strategic leadership, respectively. The Nigerian telecommunication sector has been an area of interest for some researchers, but their application has not been well investigated, creating a substantial blind spot in our understanding of how enterprises in this sector behave and interact (Aigbokhaevbolo, 2011; Inegbedion & Obadiaru, 2018).

This study attempts to fill that gap. It uses mathematical modelling and game theoretic analysis, deductive reasoning and equilibrium analysis to generate predictions about firm behaviour in defined competitive situations, rather than testing hypotheses against acquired market data. The parameters are hypothetical but based on the facts of the Nigeria telecoms market, and are used to highlight how known theoretical frameworks might deepen our understanding of strategic engagement in this industry. The focus, at its core, is on how firms compete, how they respond to one another, and how those dynamics shape the pursuit of their objectives.

The specific objectives of this study are to:

i. Examine the relevance of game theory in the Nigerian telecommunication industry
ii. Apply key game theory models to explain competitive behaviour
iii. Analyze how firms make strategic decisions in pricing and output
iv. Explore the implications of these strategies for market performance and customer outcomes

LITERATURE REVIEW

Conceptual Review

Game Theory

Basically, game theory is the study of how people make decisions in strategic circumstances – when your outcome depends not only on what you do, but also on what everyone else does. It gives a systematic way of thinking about rivalry, cooperation, and the kind of back-and-forth strategic interplay that characterises actual markets and real organisations. Its usefulness is that it explains how decision-making is made by rational players in contexts where no one person has complete control over what happens (Samuelson, 2016). As Jiang and Leyton-Brown (2010) put it beautifully, game theory allows us formal models for forecasting the behaviour of rational actors exactly because their choices ripple out and influence others, who then respond. John Nash is mainly the intellectual foundation for current game theory . He showed that strategic interaction is not infinitely chaotic , but may be stable and mathematically predictable . But Nash's contribution was more than technical; it was conceptual. Nash showed that competition is not invariably a downward spiral of conflict; that rational agents, even in competitive environments, can reach stable patterns of behaviour.

Equilibrium, Nash

There is solid reason why game theory has the Nash equilibrium at its heart. This is the point where all players in a strategic interaction have selected a strategy which is a best response to the strategies of all the other players, i.e., no one person can perform better by deviating on his own.

A strategy profile s^* is said to be a formal Nash equilibrium if:

$\pi i(s^*) \geq \pi i(si, s^*-i)$ for all players i where πi is the reward for player i.

In layman's words, it is the point of strategic stability. It was characterised by Karsten (2016) as a mathematical rationale for stable results in competitive settings. Jiang and Leyton-Brown (2010) nicely summed up the common-sense reasoning: when equilibrium is established, no sensible participant has an incentive to diverge unilaterally. In real markets this plays out in familiar ways. For example, in Nigeria's telecommunications sector, firms are always changing their prices in response to competitors and these changes tend to reach a kind of equilibrium over time as each firm realises that aggressive moves are likely to result in retaliation that makes everyone worse off (Kukreja, 2018). Schuur et al. (2021) showed that equilibrium results can explain market share patterns in competitive settings. Keehan et al. (2022) shown that equilibrium notions can account for behaviour among both companies and consumers in geographical markets.

Pricing strategies

Pricing strategy is how organisations decide what to charge – and in competitive marketplaces, that decision is rarely made in a vacuum. Pricing is essentially strategic. It depends on what competitors are pricing, what customers will pay, and what reaction a price adjustment is likely to trigger. Game theory is especially appropriate for the analysis of pricing in this setting since it reflects the interdependence that makes pricing decisions so significant (Selim, 2010). In oligopolistic sectors, where a handful of firms dominate and the action of each firm is perceived by the others, price decisions require firms to plan many steps ahead.

The Bertrand model, where enterprises compete on price, one undercutting the other until prices fall to marginal cost, is a more recognisable dynamic, and can swiftly turn devastating for all concerned. But companies don't always scramble to the bottom. As Dong and Zhong (2019) noted, enterprises may engage in tacit collusion, that is, without a formal agreement, but through an implicit understanding that strong pricing competition will be detrimental to all. Pricing considerations are also more critical in Nigeria's telecom business as customers are sensitive and responsive. Ayaga and Nnabuko (2019) observed that competitive pricing has a direct impact on customer satisfaction. Boz and Koç (2019) found that pricing is one of the main variables that lead customers to change their provider. Khosroshahi et al (2019) added another layer, showing that pricing strategy doesn't have to be just about beating competitors to the bottom firms can and do factor in things like corporate social responsibility and customer satisfaction into their pricing decisions, balancing competitiveness with long-term profitability.

2.2 Theoretical Review

Game theory is essentially about what occurs when decisions are not made in isolation, when your decision has an effect on others and their decisions have an effect on you. It gives a mathematical foundation for thinking about conflict, cooperation and competition among rational people. It goes far beyond economics into such diverse domains as politics, biology and engineering (Samuelson, 2016). That range is one reason that it is such a lasting analytical tool: the underlying logic of strategic interdependence appears in a vast array of human and organisational behaviour.

The idea of equilibrium is central to the framework, and in particular Nash equilibrium, which is the point at which no player can improve their position by changing their strategy alone, given what the other players are doing (Jiang & Leyton-Brown, 2010). John Nash's contribution in providing a formal structure to this idea was truly transformational to economic theory. He gave a rigorous mathematical basis to understanding how strategic stability arises in competitive situations. Karsten (2016) extended this further, linking equilibrium concepts to fixed point theorems - mathematical techniques that explain why equilibrium solutions exist in the first place, rather than assuming they do. That theoretical underpinning is important because it means that game theory's predictions regarding competitive behaviour are not only intuitive; they are mathematically justifiable.

Game theory is also warm bedfellows with decision theory and optimisation. At bottom, participants in any strategic engagement are attempting to maximise something—profit, utility, market share—but they are doing so under restrictions that are partly imposed by the choices of other players (Aguiar et al., 2014). This combination of optimisation under interdependence is precisely

why game theory is so applicable to industries like telecommunications, where competition is fierce, there are few major players, and no firm can make strategic decisions without considering how rivals will react.

2.3 Empirical Review

The practical uses of game theory are surprisingly broad, and the amount of empirical work based on it keeps increasing. Adeoye et al. (2012) demonstrated the application of game theory to agricultural production which proved to be quite accurate in capturing the logic of resource allocation and production decisions among competing farmers. Oluyole et al. (2013) applied a similar technique to cocoa production systems in Nigeria and found that farmers adapted their strategies based on what they expected rivals to do a classic game theoretic dynamic playing out in a very practical environment.

More generally, in the Nigerian business context, Aigbokhaevbolo (2011) argued that game theory is especially well suited to firms that operate in underdeveloped economies, where a high degree of strategic uncertainty and an inability to predict the behaviour of competitors is often the difference between remaining competitive and falling behind. Bravo et al. (2010) took the application one step further and combined game theory and vector machines to model pricing strategies. They found that firms change prices based on market conditions and moves made by competitors. This reinforces how interdependent pricing decisions are.

Some of the most directly applicable applications have come from the telecoms sector. Ayaga and Nnabuko (2019) investigated competing tactics and customer happiness in the Nigerian telecom market and discovered that competitive actions, particularly pricing and service quality, had a positive and significant impact on consumer satisfaction and company success. Boz and Koç (2019) studied the same business from the customer side using a game theoretic framework to evaluate switching behaviour in the GSM market. Their discovery was both straightforward and important: clients switch between suppliers on the basis of perceived value, pricing and quality of service. This means that enterprises ignore these signals at their peril. Anwar et al. (2018) studied resource allocation in wireless networks and found that enterprises employ strategic models to optimise the deployment of network resources in the face of competition. This is a more technical application but one that has obvious performance implications.

Khosroshahi et al. (2019) created a game theoretic model outside the telecoms industry, where corporate social responsibility and customer satisfaction are part of the pricing equation, demonstrating that firms need not choose between being competitive and being ethical; the two can be designed to reinforce each other. Schuur et al. (2021) analysed competition in market share and showed that game theoretic models were able to describe and predict equilibrium outcomes in competitive marketplaces with considerable accuracy. In a retail context, Jones (2003) demonstrated that supermarkets strategically change their prices to draw customers while safeguarding profitability. Such a discovery speaks to just how broadly the strategic logic game theory outlines applies across businesses and situations.

Research Gap

Although previous studies have explored game theory in various contexts, there exists a gap in literature on how game theoretic models explain strategic interactions in the Nigerian telecommunication industry. Existing studies have focused on isolated aspects such as pricing or customer behaviour, without combining classical models that analyze firms in competitive environments. This study addresses this gap by using Cournot, Bertrand and Stackelberg models to predict and understand strategic behaviour among firms. Application of these models will contribute to literature theoretically and practically as it will offer explanation on how firms behave in the telecom industry using game theory.

Methodology

Design of Study

This research is not based on the collection and analysis of natural data. The research strategy is theoretical and analytical with the main method of investigation being game theory modelling. This approach is based on a simple reason: the questions being posed here are best answered by mathematical reasoning and deductive analysis, not by polls or market data. We model the expected behaviour of enterprises competing in the Nigerian telecoms industry with hypothetical but

realistically grounded parameters, and draw equilibrium outcomes from those simulations. This aligns with the type of organised analytical framework that Samuelson (2016) identifies as core to the utility of game theory. The three analytical tools are well-established models – Cournot, Bertrand and Stackelberg – each of which illuminates a distinct aspect of competitive behaviour: competing on production, competing on price and the strategic benefits of early movers in sequential decision-making.

Analysis Frameworks

Telecoms companies are seen in this study as rational actors functioning in a common strategic environment, where each move is made with an eye on the competitors and what they are likely to do. The players are represented by:

Players = { $firm_1$, $firm_2$, $firm_3$, … }

Each business chooses an output level, (Qi), for the Cournot case, or a pricing level, (Pi), for the Bertrand case depending on the model being applied. In the Stackelberg setting, there exists a leader company and followers, that is, the decision making is sequential. All three models have the same fundamental goal – each firm is aiming to maximise profit as follows:

$\pi i = P(Q) \cdot Qi - C(Qi)$ Where πi is the profit of the firm i, P(Q) is the price in the market as a function of total output, Qi is the output of the firm itself and C(Qi) is the cost of producing it. This concept reflects the core of strategic interdependence: the profits of any given firm are a function not just of its own decisions, but also of the decisions being made concurrently by its competitors.

Model Specifications Cournot Model

In the Cournot model, the firms are in a position where they simultaneously decide how much output to generate, assuming the other firm's output as given. The market demand function is

$P = a - b (Q1 + Q2)$ Where P is the market price, an is the demand intercept, b is the slope of the demand curve and Q1 and Q2 are the output levels of the two competing firms. Each firm solves the following profit function:

$\pi i = P - MCiQi$ by solving the first order condition:

$\partial pi/\partial Q\_i=0$

This yields a reaction function for each firm, effectively the optimal output response to whatever the competition is generating. The intersection of the two reaction functions is the equilibrium point and this gives a stable conclusion where neither firm has an incentive to change its output.

Bertrand's model

The Cournot model is output based . The Bertrand model is price based . Here firms compete on price rather than quantity . Each firm takes the other firm 's price as given and sets its own price . The profit function is given by:

$\pi i = Qi (Pi - MC)$

In a world of interchangeable, homogeneous products, competitive logic inexorably pulls down prices. The equilibrium outcome is:

$P\ 1 = P\ 2 = MC$

Prices are equal to marginal cost, and all economic profit is competed away. It's a depressing outcome, but it's a true dynamism: when customers can easily transfer from one provider to another with the same product, corporations have minimal price power and the rest is just competition.

Stackelberg Model

The Stackelberg model adds one element that the other two lack: sequence. The leader of the firms goes first and commits to an output level prior to the follower's decision. The response of the follower is described by its reaction function:

$QL = f(QF)$

Given this response, the leader maximises his profit by solving:

$\max \pi\ L = (P(QL, QF) - MC)QL$

Substituting the follower's reaction function into the leader's problem we obtain:

$\pi L = P(QL, f(QL))QL$ In this formulation, the first-mover has a strategic edge. The leader moves first, shaping the competitive environment before the follower has a chance to respond and achieving a more favourable market position. The follower is forced to react rather than be proactive and left with less production and less strategic control of the outcome.

Choosing parameters

The parameters utilised in this study are illustrative and not empirically derived. For a stylised market scenario, we assume a demand intercept of a = 100 and slope of b = 1. To illustrate how alternative cost structures affect the competitive outcome, we use marginal cost values of MC = 20 and MC = 10 in a variety of settings. The numbers are not genuine, but they have been chosen purposefully to reflect the kind of conditions that tend to characterise true oligopolistic marketplaces. The purpose is to extract fundamental principles of strategic behaviour, not to forecast precise results in any particular real-world market.

Type of Analysis

It is worth clarifying what this study is and is not claiming. The analysis is solely theoretical, based on mathematical reasoning, and not on empirical observation. It employs game theoretic models to develop equilibrium conditions and to infer the expected behaviour of rational enterprises given well defined competitive conditions. Numerical examples are utilised throughout to make the ideas tangible and accessible, but these are illustrative tools, not genuine market data. The study's conclusions are should be taken as theoretical propositions: organised, logically grounded insights into the dynamics of competitive strategy rather than descriptions of what any individual organization is doing right now. The importance is in the clarity of the conceptual framework they provide and how they help to comprehend how strategic interaction determines results in competitive markets like Nigerian telephony.

Model Analysis And Theoretical Predictions

Analysis of the Cournot Model Competition in Quantities

The market is represented by a linear inverse demand function, starting with the Cournot model:
P = 100 – (Q1 + Q2) where marginal cost is MC = 20.
Profit function for Firm 1:
π 1 = (P − MC)Q 1
Replacing P:
π1 = (100 - Q1 - Q2 - 20)Q1 π1 = (80 - Q1 - Q2)Q1
With first order condition:
$\partial\pi 1/\partial Q1 = 80 - 2Q1 - Q2 = 0$.
This yields the response function of Firm 1:
Q1 = (80 - Q2)/2
By symmetry, the response function of Firm 2 is:
Q2 = 80-Q1/2
Solving for equilibrium by assuming $Q_1 = Q_2 = Q:$
Q=(80-Q)/2 2Q=80-Q 3Q=80
Q = 80/3 ~= 26.67
The equilibrium price is given by:
P = 100 - (26.67 + 26.67) = 46.66
The lesson here is educational. In Cournot competition, the two firms arrive at equal output levels, the market price is well above marginal cost, and both firms make positive profit. No company has any motivation to shift course unilaterally; they have reached a stable equilibrium. In the case of Nigerian telecommunications, this means how enterprises fight for market share through service capacity (data bundle offerings, network growth, coverage enhancement) rather than direct and perhaps destructive price wars (Varian, 2014).

Analysis of the Bertrand Model: Price Competition

The Bertrand model changes the basis of competition from output to price, and the assumptions alter appropriately. Assume all products are homogeneous – firms are selling basically the same item. Assume all firms have a marginal cost of MC = 10, so no firm has a cost advantage.

The equilibrium is stark when enterprises compete on price:

P1 = P2 = MC = 10

And the profit calculation demonstrates what that implies in practice:

π = (P −MC)Q = (10− 10) Q = 0

If the products are identical , then the competition on price will drive prices down to the marginal cost . There will be no margin . It's a theoretical extreme, but it illuminates a genuine dynamic: When customers may move freely from one provider to another delivering the same service at various costs, the competitive temptation to undercut one another is constant.

In practice, telecoms companies tend to find a method to avoid this trap. As Dong and Zhong (2019) argued, enterprises differentiate their services through brand perception, customer experience, loyalty programs, or distinctive features exactly to escape the logic of plain price competition. Price cuts do happen in Nigeria's telecom business, mostly as tactical manoeuvres to grab market share, but companies seek to stabilise rates before the erosion becomes permanent.

Analysis of Stackelberg Model: Competition of Leader and Follower

The Stackelberg model introduces a dynamic that the other two models lack: one firm moves first. Given the same demand function and marginal cost:

$P = 100 – (QL + QF)$, $MC = 20$

First the follower problem is solved. Maximisation of the follower's profit:

$\pi F = (80 - QL - QF)QF$

Taking the first-order condition

$80 − QL − 2QF = 0$ $QF = 80 − QL\ 2$

Anticipating this response by the follower, the leader replaces the reaction function into its own profit equation:

$\pi L = (80 − Q L − (80 − Q L)/2) \cdot QL$ $\pi L = (80 – QL)/2 \cdot QL$ Maximizing the leader's profit: $\pi L = (80QL − QL^2) / 2\ 40 − QL = 0$ $QL = 40$ (

The follower then produces:

$QF = (80-40)/2 = 20$

And equilibrium price:

$P = 100 – (40+20) = 40$

The leader earns the better market position since he doubles the output of the follower. And moving first isn't just a timing advantage. It's a strategic one. The leader does so by committing to a high output level early, therefore shaping the competitive environment before the follower has an opportunity to act. In this way, the follower is forced into a reactive and less profitable position. This is reflective of how competition actually plays out in the Nigerian telecoms space where the dominant players tend to be the first to offer new technology, pricing strategies and service improvements and the competitors adapt rather than lead (Inegbedion & Obadiaru, 2018).

Contrastive Analysis

Price Strategy Model Outcome Market Level Profit Insight Cournot Quantity Competition Moderate Positive Balanced Competition Price Competition Zero Intense competition Stackelberg Leader–Follower Moderate Leader advantage Strategic superiority

Discussion

Running the three models side-by-side shows something actually useful: the form of competition matters greatly for outcomes. The Cournot model yields a steady state of balanced competition, with positive earnings for both firms and no motive to destabilise the equilibrium. The Bertrand model, by comparison, is an illustration of competition simply on price with perfect substitutes for items. Profits are competed away completely and enterprises are left with nothing to show for their rivalry . The Stackelberg model is somewhere in between the two in terms of the ultimate market outcome, but creates an asymmetry: the firm that moves first and commits early gets a structural advantage that the follower cannot fully close.

Such predictions are compatible with the accepted economic theory regarding oligopolistic markets that firms act strategically always with an eye to what competitors are anticipated to do next (Tirole, 1988; Samuelson, 2016). In the context of Nigeria's telecommunications industry, the three models provide a composite view of how firms manage the conflict between competing aggressively and protecting their profits through managing service capacity, avoiding outright price wars, or leveraging the benefits of strong leadership in technology and innovation.

However, it is worth being explicit about what these findings are and aren't. These are based on theoretical models utilising illustrative parameters, not actual market data. The models offer

meaningful conceptual insights into the dynamics of strategic rivalry, but empirical validation using real data from the Nigerian telecom market would be required before these theoretical predictions can be confirmed as accurate representations of actual firm behaviour**.**

Conclusion And Theoretical Implications

The study sought to understand competitive behaviour in Nigeria's telecoms business using game theory and what the analysis eventually reveals is that the framework is worth its salt. A consistent picture emerges of an industry where firms are far from passive – where every decision regarding output, pricing or market positioning is made with competitors squarely in mind, and where the consequences of those decisions are determined as much by expected rival responses as by the individual firm's own calculations, as we examine the Cournot, Bertrand and Stackelberg models step-by-step.

The Cournot model indicates that competition on output – service capacity, network investment, data offerings – tends towards a stable equilibrium where businesses receive positive returns and face limited incentives to disrupt the status quo. The Bertrand model tells a gloomier tale: where services are hard to distinguish and firms mainly fight on price, the logic of undercutting rivals can wipe out profits until no one wins. The Stackelberg model adds a third dimension, demonstrating that organisations that can and will commit to a course of action before rivals respond can gain a structural advantage that followers find hard to surmount.

These findings do not exist in a vacuum. As Adeoye et al. (2012) and Aigbokhaevbolo (2011) have pointed out, game theory fits well with the behaviour of firms in developing nations because the volatility of the market makes strategic thinking not only valuable but a must. Anwar et al. (2018) highlighted the relevance of the framework for resource allocation problems in wireless networks – a situation that closely resembles telephony whereas Lemaire (2014) demonstrated its relevance for cost allocation and operational decisions more generally. The theoretical assumptions presented in this study are well aligned with this body of work, further bolstering the idea that game theory is not only an academic construct but a genuinely applicable instrument for understanding how real competitive dynamics unfold.

Having said that, there is an important caution to emphasise. The conclusions of this paper are based on theoretical models created with sample parameters. They offer real insight into how competition in Nigerian telecoms might work. However, empirical validation using actual market data would be required before these predictions could be held up as descriptions of how firms are actually behaving on the ground.

Theoretical Implications for the Telecommunication Industry in Nigeria

The report provides a number of practical lessons for organisations in this arena. For starters strategic engagement is not a choice it is the reality of the market these firms are in. Decisions taken without considering the replies of competitors are decisions taken on the basis of incomplete knowledge and in an oligopolistic industry that omission tends to cost enterprises dearly in terms of market position and profitability.

It is important heeding the warning that the Bertrand model gives us regarding pricing competition. The incentive to compete on prices can be a race to the bottom that leaves everyone worse off when enterprises offer basically interchangeable services to clients. Differentiation is the more sustainable way – investing in network quality, increasing the bar on customer service and employing technology innovation to give customers reasons to stay beyond pricing alone.

The Stackelberg model has also an important point to convey regarding leadership. Companies that move first that develop new products, new technology or new service structures before competitors can respond do not merely get a short-term edge. They influence the competitive environment so as to restrict what followers can do, turning decision timing into a source of sustainable advantage. This observation is very meaningful in Nigeria's rapidly moving telecom sector as new technology and changing consumer expectations generate regular opportunities for first-mover advantages.

In the end, the data implies that enduring success in this market is unlikely to come from doubling down on any single competitive lever. A balanced approach is a careful integration of pricing, output management, and strategic positioning and is more likely to last than any plan based on a single component. Ayaga and Nnabuko (2019) make a similar argument in their study on

competitive strategy and customer satisfaction in the Nigerian telecom sector. The theoretical predictions developed here go in the same direction.

Future Research, Application of Theory

The recommendations below are based on the theoretical analysis of this study. Based on game theoretic modelling using illustrative parameters, any of them would need to be empirically validated before being immediately converted into a firm level strategy:

It would be in the firms' best interest to incorporate competitive response into their strategic planning process from the outset. It is usually better to decide what to do with a clear-eyed perspective of how the competitive landscape is going to develop than to respond to what rivals have already done.

On pricing, the analysis supports a need for balance. Aggressive price cuts may attract customers in the short run, but they provoke retribution and eat into the profitability that makes sustainable investment viable. A price strategy that blends real affordability with tangible value (via service quality, reliability and customer experience) is easier to defend over time.

Investment is needed in significant differentiation by innovation. Better networks, more flexible data packages and real improvements in customer service all take the burden off competing purely on price, and they foster the kind of customer loyalty that is difficult for rivals to poach.

There are significant first mover benefits to be purposefully pursued. Companies that establish a culture of early innovation getting new products and services to market before their competitors can respond – create strategic advantages that multiply over time.

Lastly, competitive intelligence should be a continuing process, not a one-off exercise. Markets change, rival strategies change, and the firm that is always reading those signals is better positioned to adapt successfully than one that only glances up when a crisis forces it to.

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