# Business Model Innovation and its Drivers in the Cell Tower Industry in Sub-Saharan Africa

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ABSTRACT

*This paper analyzes the business models at work the cell tower market in Sub Saharan-Africa (SSA), using illustrative cases of seven tower companies (TowerCos) operating in the Ghanaian and Nigerian markets. The framework adopted in this study enabled the investigation of three main components of the tower companies' business model: resources & competencies, organization, and value proposition. The analysis highlights three common types of innovation among SSA TowerCos: (1) value proposition extension or bundling; (2) value chain reorganization; and (3) process optimization. The paper provides one of the first academic studies to identify and investigate the underlying business models for delivering telecom tower infrastructure in SSA. The analysis reveals that while the regulatory regimes in the telecom industries in SSA continues to mature, there are significant opportunities for infrastructure innovation to cater for rising data traffic. The analysis also reveals that site ownerships are usually not the most important determinant factor of TowerCo overall performance.*

**Keywords**

Business models; Cell Tower; Sub-Saharan Africa; TowerCo; Mobile Telecommunications Industry

EXECUTIVE SUMMARY

Outsourcing of telecom infrastructure has been a growing trend among mobile operators as a way to reduce the costs of deploying telecom networks. Yet, despite the emergence of infrastructure sharing policy and the extensive use of the term “business model” in practitioner-oriented articles, there has been little corresponding academic research on the topic, and even less applying the business model (BM) concept to address the topic of innovation and change in the dynamic cell tower market. Adopting a BM approach is consistent with the concerns of scholars, practitioners, and policy makers; as such, it can aid mutual understanding among a wide range of audience.

The aim of this paper is to analyze the BMs in the tower market in Sub Saharan-Africa (SSA), using illustrative cases of seven tower companies (TowerCos) operating in the Ghanaian and Nigerian markets. The framework adopted enabled the investigation of three main components of the BM: resources & competencies, organization, and value proposition. Given that the telecom industry consists of highly turbulent and dynamic business environments, it is especially important to understand the important aspects of how the contextual environment influence innovation.

The analysis highlights three types of innovation among SSA TowerCos: (1) value proposition extension or bundling; (2) value chain reorganization; and (3) process optimization. These three required resources & competencies, which may come from external markets or be developed internally. In terms of external drivers, factors determining innovations in the SSA cell tower relates mostly to regulation and institutional factors, competition, and pressures from operators.

The study indicates that the regulatory and licensing regimes in the telecom industries in SSA have yet to mature. However, with fast exploding data traffic and the somewhat restrictive nature of regulations regarding tower specifications, there are significant opportunities for innovation. The analysis also reveals that site ownerships are usually not the most important determinant of TowerCo overall performance. Often, firms that focus on operational excellence through, for example, process optimization, can turn up consistently high-performance figures.

# 1. INTRODUCTION

The ability to communicate seamlessly without restriction offers tremendous levels of convenience and flexibility that has greatly improved our way of lives. Nevertheless, behind the simple act of picking up a phone for communication and other purposes, there exists a complex infrastructure and technology that enable proper connectivity. Extensive infrastructure is necessary to build telecom networks; this requires significant amounts of financial investments. According to the GSMA, mobile network operators (MNOs) have invested more than $1.3 trillion to deploy new wireless networks since 2010. Telecom cell towers make up a substantial portion of these investments.

In order to reduce the significant costs of deploying telecom networks, outsourcing of wireless infrastructure to third-party companies (TowerCos) is a growing trend that delivers a number of benefits to MNOs, playing a key role in the continued expansion of mobile network coverage. Furthermore, regulatory efforts to promote universal service access and reduce tower duplication have brought about a trend in which passive infrastructure sharing is not only permissible, but also becomes an attractive and cost-effective approach to network expansion (Meddour et al, 2011).

The emergence of infrastructure sharing and TowerCo models has continued to generate the attention of policy makers and practitioners alike. A number of academic articles have contributed to the conversation on infrastructure sharing; however, these have mostly been from a deployment and technical viewpoint (Frisanco et al., 2008; Cano et al., 2017). Another stream of literature focus on the benefits of infrastructure sharing (Meddour et al., 2011; Mölleryd & Markendahl, 2013).

As infrastructure sharing become more popular and operators transfer ownership and management of their towers to TowerCos, only little academic research has examined BM innovation in telecom infrastructure provision, or applied the BM concept to the relationship between operators and their infrastructure partners (However, see Bhardwaj, 2013). As a result, fundamental issues about configuration of value are not currently being systematically addressed. Yet, evaluation of the nature of interdependencies between MNOs and TowerCos is important in order to understand how these impact on innovation and value creation. Moreover, there exists a gap regarding the complex interplay

between TowerCo BMs and external environmental influences such as regulation and competition. This research gap is addressed here in light of the following research question:

*How do SSA's tower companies innovate their business models and what external factors drive business model changes in SSA's cell tower market*?

In the next section, extant literature on BM is reviewed and a conceptual framework to analyse the TowerCo BMs is presented. Thereafter, the evolution of the mobile telecoms industry in Sub-Saharan Africa is briefly discussed. Section 3 outlines the methodology used, and the findings are presented in section 4. This is followed by discussion of findings and conclusion of the study.

## 2. LITERATURE AND THEORETICAL UNDERPINNING

### 2.1. **Conceptualization of the Business Model**

The BM as a management concept has long been a subject of attention among practitioners and scholars alike. Since it gained popularity following the advent of the internet-based BMs, researchers from various disciplines have investigated BMs, leading to a wide variety of definitions and applications. Despite a lack of consensus as to the definitions of BM, the concept has generally been used to describe the way an organization creates and captures value (Teece, 2010; Magretta, 2002).

One of the core areas of conceptual differences in the literature relates to the BM components. Some authors describe BM by specifying ex ante the normative components (Osterwalder & Pigneur, 2010; Teece, 2010) while others adopt a more inductive approach for the type of organization being studied (Amit & Zott, 2001; Bouwman et al., 2008). Still others (Demil & Lecocq, 2010; Casadesus-Masanell & Ricart, 2010) aggregate the BM components on a higher level, specifying only a few general components that encompasses subsidiary elements that can be applied to all kinds of organizations.

Changes that occur to one or more of these BM components are known as business model innovation (Foss & Saebi, 2017; Amit & Zott, 2001). BMI poses additional questions about novelty in value proposition and about structural reconfigurations of firms (Spieth et al, 2014), and incorporates

additional considerations such as drivers and antecedents of innovation (Foss & Saebi, 2017; Demil & Lecocq, 2010). This article reconciles the two approaches of business model and business model innovation to address the question of how a BM evolves, looking especially at the dynamics created by the interplay between the BM components and the antecedent factors to BM changes.

### 2.2. **Drivers and Antecedents of Business Model Change**

BMI is characterized as a continuous reaction to environmental changes (Demil & Lecocq, 2010). BMI drivers vary greatly but may be placed at multiple levels (organizational, industry, and institutional level) (Foss & Saebi, 2017). Overall, scholars narrow down BMI drivers to external and internal factors (Demil & Lecocq, 2010; Mahadevan, 2004). Internal drivers identified in the literature include shift in company's strategy (Foss & Saebi, 2017), consequences of changes in BM components (Demil & Lecocq, 2010), and strategic awareness (Haggege et al., 2017).

In terms of external environment, major determinants include changing demands of stakeholders and customers (Wanjiru et al., 2019), changes in economic/regulatory conditions (Demil & Lecocq, 2010), changes in the competitive environment (Sosna et al., 2010), and opportunities brought about by new technologies (Chesbrough, 2007). Previous studies have shown mixed results about the impact of environmental drivers on BMI. For example, in their cross-industry study, de Reuver et al (2009) analyze the impact of three external drivers (market, regulation, and technology) on BMI and consider different phases of service development. They found that regulatory drivers play only a minor role in BM innovation and that the major drivers are technological and market related forces.

The existence of environmental drivers brings to the fore the importance of continuous environmental scanning, which involves checking for changes that may help the firm in adapting the BM effectively (Osterwalder & Pigneur, 2010). Thus, the BM must evolve to match changing external conditions (Sosna et al, 2010; Demil & Lecocq, 2010). This underscores the importance of analyzing both the static determinants (efficiency and effectiveness of BM components) and the dynamic drivers that influence BMI and value creation (Haggege et al., 2017).

## 2.3. Mobile Telecommunications and Cell Tower Market in Sub-Saharan African

When telecom industries across the world began to be liberalized in the 1990s; the most evident sign of change was the lowering of entry barriers (Fransman, 2007). A similar trend has occurred in SSA – a shift that has brought about a more mature wireless market and trends such as vertical dis-integration and greater degree of outsourcing (Cricelli et al., 2011). This trend is aided by the infrastructure sharing policy in many countries (Osei-Owusu & Henten, 2017).

Other environmental determinants of BMI in the telecoms industry include technological trends and market pressures (Dodourova, 2003; Bouwman et al., 2008). Given recent technological advances, one of the apparent changes is a shift from an industry that was all about voice to one centered around data (Dodourova, 2003). Hence, customers' need increasingly move away from basic services to sophisticated data-based services (Bouwman et al, 2008).

As the SSA telecom industry evolves, the advent of 3G and 4G technologies have led to the transitioning from basic voice and data telephony to an era of mobile services, supported by smartphones (Cricelli et al., 2011). As a result, mobile operators have shifted focus from internal management of infrastructure elements to satisfying the customers.

Table 1: Overview of Selected MNOs in Sub-Saharan Africa

| MNO | Country of Operation in SSA | Subscribers (millions) |
|---|---|---|
| MTN | 14 | 165 |
| Airtel | 15 | 78 |
| Vodafone/Vodacom/ Safaricom | 9 | 64 |
| Orange | 15 | 50+ |
| Glo | 4 | 34 |
| Tigo | 5 | 21 |

Source: Multiple sources including MNO websites (correct as of June 2019)

Today, SSA's mobile industry has many operators all offering services on a full scale. The heightened competition has had an impact on penetration of mobile across the continent. At the same time, networks continue to expand as MNOs outsource their infrastructure to third party companies. With the increasing mobile penetration and rising data traffic across many countries in Africa, the question about whether mobile infrastructure will keep up with increasing demand (Al-debei et al, 2015; GSMA,

2018) is especially relevant to SSA contexts. Nevertheless, the opportunity for infrastructure innovation is high, as seen by the emergence of the independent TowerCo business model.

Table 2: Overview of Selected Towercos in Sub-Saharan Africa

| Towercos | No of Towers | Country |
|---|---|---|
| American Towers | 9600+ | Nigeria, Ghana, SA, Uganda |
| Helios Towers | 6500+ | Ghana, Tanzania, DR Congo, Congo |
| IHS Towers | 24000+ | Nigeria, Cameroon, Rwanda, Zambia, Ivory Coast |
| Eaton Towers | 5000+ | Ghana, Uganda, Kenya, Niger, Burkina Faso |
| Pan-African Towers | 1300+ | Ghana, Nigeria |

Source: Towerco Websites (August 2019) and TowerXchange (2017)

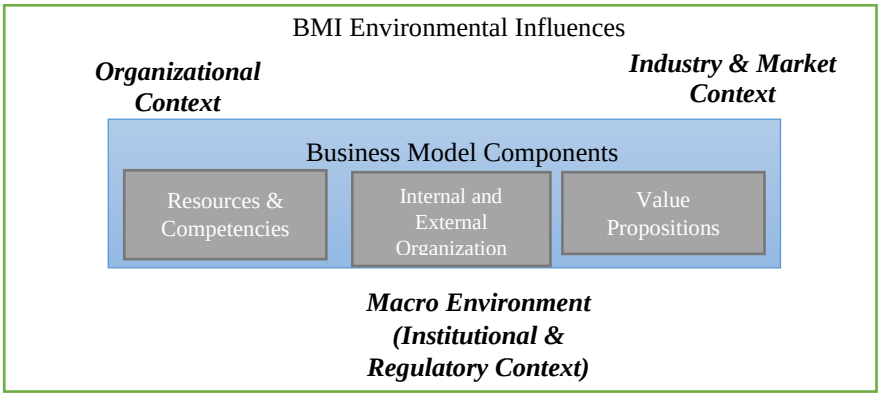
## 2.4 Conceptual Framework: The RCOV Model

This study takes the view that a firm's BM can be described in terms of three components - RCOV, i.e. resources and competences (RC); the organization(O) of the business within the value chain or within the firm boundaries; and the value propositions(V) offered by the firm (Demil & Lecocq, 2010). These components are adopted because they avoid the disadvantages of the normative definitions of BM, while still allowing general comparisons across firms.

The RCOV framework is consistent with the Penrosian view, which espouses a resource-based perspective of the firm (Blundel, 2003). According to Penrose (1959, cited in Blundel, 2003), resources are not important per se, but their importance lies in the 'services of resources'. In other words, 'the services yielded by resources are a function of the way in which they are used" (Demil & Lecocq, 2010: 230). This is significant in the context of TowerCos, since resources, activities, and relationships constitute the core of TowerCo business models (TowerXchange, 2017). The framework conceives of value propositions as the sources of revenues; while value activities and resource acquisitions, development and integration are costs drivers (Demil & Lecocq, 2010).

From an analytical point of view, the environment influences a firm's BM choices, determining the changes that occur along the BM components (Foss & Saebi, 2017). As shown in figure 1, these environmental factors may have macro environmental or institutional origins, but may also derive from the organization or the behaviour of customers and competitors (micro environment).

Figure 1: Research Framework




Source: developed by the author based on Demil & Lecocq (2010)

## 3. METHODOLOGY

Given the exploratory nature of this study and the paucity of academic research on the subject of BM innovation in telecom infrastructure, a multiple case study approach was considered appropriate for a better comprehension of this contemporary phenomenon within complex and uncertain contexts (Yin, 2014). The study focused on the main actors in the cell tower market in Nigeria and Ghana. Both countries were chosen as two standard reference points on infrastructure innovation in challenging environments, given the numerous infrastructural and operational challenges to operate mobile networks in a cost-effective manner. Furthermore, both countries are examples of the rise of the independent TowerCo business model in emerging markets.

### 3.1.Case study selection and data collection

Seven cases were selected as illustrative cases only, designed to flesh out patterns in the cell tower industry in SSA, "rather than to be 'mined' to extract theoretical concepts" (Demil & Lecocq, 2010: 229). The organizations have rich diversity and potential to shed light on BMs for telecom cell towers (Stake, 1995). These cases are: two multinationals with well-established footprints across SSA (Eaton and Helios), emerging market's largest provider of mobile telecoms infrastructure (IHS), two subsidiaries of an American multinational competing in the telecom industry in five continents (ATC Ghana and ATC Nigeria), an home-grown infrastructure company based in Ghana (African Towers), and a niche tower infrastructure firm offering telecom infrastructure services in Nigeria (BCTEK).

Table 3: Profile of Participating organizations

| Company | Org Type (Ownership in study context) | Emerging Market Presence | Study Context | Towers in study context |
|---|---|---|---|---|
| ATC Ghana | MNE subsidiary | Africa, Asia, LA | Ghana | 2390+ |
| ATC Nigeria | MNE subsidiary (JV) | Africa, Asia, LA | Nigeria | 4700+ |
| Eaton Towers | MNE subsidiary | Africa | Ghana | 1283+ |
| African Towers | Privately-owned | Africa | Ghana | 100+ |
| BCTEK | Privately-owned | Africa | Nigeria | 700+ |
| Helios Towers | MNE subsidiary | Africa | Ghana | 933 |
| IHS | MNE subsidiary | Africa and ME | Nigeria | 16390 |

Source: TowerCo websites and field research (info correct as of August 2019)

A variety of data sources informed the analysis: public reports and press releases on companies' website and dozens of articles from specialized media. Most importantly, a total of 14 semi-structured interviews were carried out, including 10 with managers directly involved in the development or management of innovations at the tower companies, and 4 with top decision-makers at regulatory agencies who provided information about external dynamics impacting on innovation.

Table 4: List of Interviewees

| Case | Unique interviewees | Department / Designation of Interviewees |
|---|---|---|
| ATC Nigeria | 2 | Interviewee 1 - Operations<br>Interviewee 2 – Utility |
| Eaton Towers | 2 | Interviewee 3 – Operations<br>Interviewee 4 - Sales & Marketing |
| African Towers | 2 | Interviewee 5 – Senior Executive<br>Interviewee 6 - Business Development |
| ATC Ghana | 1 | Interviewee 7 - Sales & Marketing |
| BCTEK | 1 | Interviewee 8 – Operations |
| Helios Towers | 1 | Interviewee 9 - Accounts and Sales |
| IHS | 1 | Interviewee 10 – Senior Executive |

## 4. FINDINGS

This section presents the findings organised as headings representing the three components of the business model: value proposition, organization, and resources & competencies.

### 4.1. Value Proposition of TowerCo Business Models

The main value proposition of TowerCos is their ability to reduce costs for operators, enable wider reach to more subscribers and also, reduce the impacts of duplicating towers. However, TowerCos individually look to different ways to differentiate their offerings in the market. High flexibility, customer responsiveness, enhanced security, power availability, and overall site performance were some of the unique propositions highlighted by respondents in this study.

Independent TowerCo BMs fall under two broad categories: the pure-play model and value-added model. The traditional TowerCo BM is built on a cost-sharing proposition, in which operators take out their tower infrastructure to third party companies. This model is driven by operators' need to achieve operational efficiency and focus on their core competencies. This type of BM can be referred to as '*pure play infrastructure model'*, and is operated by TowerCos who focus only on building or managing a portfolio of sites and leasing space on the sites to operators.

The '*value-added' business model* offers a cost-cutting sharing proposition, but in addition, functions as a specialist provider of telecom network services, including energy management, operations, and site planning. To varying degrees, Nigerian and Ghanaian TowerCos operated this model, offering energy-as-a-service, site maintenance, and inbuilding solutions, and generally diversifying into new service areas. However, the TowerCos adopted a variety of strategies to acquire customers; including build-to-suit, site acquisition, and managed services.

### *4.1.1. Customer Acquisition Strategies of TowerCos in Ghana and Nigeria*

*Build-to-suit models* - a market-pull strategy in which an operator invites TowerCos to build towers based on the operator's needs and radio frequency (RF) plans - is especially important for network rollouts in Ghana and Nigeria. In these models, the TowerCos own the infrastructure and the customer for which the tower was built becomes the anchor tenants. The build-to-suit model was not a preferred entry route into the tower markets for many firms. However, TowerCos such as Eaton, Helios, and ATC have continued to build towers in a bid to expand their portfolio and accelerate rollout. The 'push-based model' is a variant of the build-to-suit that was also adopted by the TowerCos to acquire customers. Under this arrangement, a TowerCo conducts its own research on an operator's RF plan, and then markets the location to the operator.

*Tower Acquisition* was the most common entry strategy for MNEs. Under this model, transactions are completed in a buy and leaseback arrangement (BLB), in which the seller becomes a customer by default (anchor tenant) on the acquired towers. The buyer can then acquire more customers by leasing back space to other operators. A number of acquisitions by MNEs occurred in Nigeria and

Ghana between 2010 and 2015, including Helios' acquisition of 750 towers from Tigo, IHS' purchase of 9200 towers from MTN in 2014, and Airtel's sale of its 4700 Nigerian towers to ATC.

*The Outsourcing Model* allow TowerCos to provide 'managed services', helping operators to reduce OPEX and complexities whilst retaining ownership of the towers. Eaton's entry into Ghana was structured on the basis of the outsourcing model, under a Managed-with-License to Lease (MLL) agreement with Vodafone. In Nigeria, BCTEK operates a unique MLL model that allows it to lease a portfolio of 700 towers built by the Government for the Police Network. Under the MLL arrangement, the police are not paying tenants; government rides on the infrastructure for free and shares profits with BCTEK in order to recoup capital investments spent to build the towers. However, BCTEK ensures sustainability by offering colocation and managed services on the same towers. In general, although MLL agreements were mostly between TowerCos and MNOs, agreements could also be between TowerCos, as was the case when IHS took operational control of SWAP's towers in Nigeria.

A fourth approach to customer acquisition comes by offering related services such as Distributed Antennae Systems (DAS) and other in-building solutions. This was an effective market entry strategy for African Towers in Ghana, as the TowerCo was unable to compete with the bigger players for the towers that were being monetized.

### *4.1.2. TowerCo Diversification Path*

The TowerCo value proposition is significantly enhanced through diversification into other service areas. Nigerian and Ghanaian TowerCos successfully evolved into full-service providers, driving operational excellence reducing OPEX. Some MNEs deployed innovative site monitoring telemetrics, and offered customers right to view the network as an additional proposition. An important area where TowerCos offered new value propositions was power supply. Whereas tenants were responsible for providing energy at tower sites, a variant of the TowerCo business model was observed, in which tower companies, in addition to selling infrastructure, provide energy-as-a-service to customers. Most of the TowerCos owns, operates, and bears all operating costs for the tower's energy assets. Such investments

in energy efficiency and management are part of strategies that tower companies adopt to drive site-level profitability, thereby enabling recovery of revenues (value capture).

## 4.2. Value Creation and Value Capture in the SSA Cell Tower Market

Two components of the BM (resources & competences and organization) combine to determine the firms' value creation logic as well as structure and volume of costs and revenues.

### *4.2.1. Resources & Competencies*

Towercos' value propositions are built on delivering the highest levels of performance and services. Key influences on innovation comprised a combination of resources, competencies, and innovation capabilities that are necessary to achieve success in the cell tower market. The high levels of capital costs (CAPEX) required for site building and equipment purchases represented inexorable constraints to expansion, especially for smaller players that had lesser access to finance. The MNEs, on the other hand, had well developed abilities to raise funds within international markets. MNEs also had advantages in terms of industry experience, links to international innovation networks and partnerships necessary for the development of new technologies. Local TowerCos had relatively better familiarity with the ways to navigate institutional deficits and the influence of social norms.

### *4.2.2. The Organizational Structure of TowerCo Business Models*

Two major organizational inputs contributed to TowerCo's value creation and performance – 1) operational excellence, and 2) relationship with customers, partners, and other stakeholders.

#### 4.2.2.1.Operational Excellence

TowerCos create value by unlocking efficiencies of shared infrastructure and accelerating network rollouts. Innovations were aimed primarily at delivering operational efficiencies through economies of scale, new technologies, and the use of established processes to extract economic value. In SSA, energy is the most crucial part of running and managing networks, impacting profitability, and also affecting availability of services. Most of the TowerCos optimized their operations by adding batteries and solar

technology to complement generators in off-grid areas, thereby making savings on diesel. Larger sized TowerCos used a centralized Network Operating Centre (NOC), which not only improved network monitoring and control, but also contributed to OPEX reductions and customer satisfaction.

Table 5: Drivers and Effects of Operational Excellence in SSA Cell Tower Market

| | Constraining factors | Driving factors | Business Impact of failure |
|---|---|---|---|
| **Operational efficiency** | • Operational inefficiencies<br>• Input costs | • Proactive monitoring and performance control<br>• Right technologies<br>• Supply chain coordination | • Declining profitability<br>• Cost of services |
| **Network availability** | • Failure in energy provision<br>• Equipment vandalization<br>• Equipment failure<br>• Natural spikes | • Proactive monitoring through NOCs<br>• New systems/processes to drive uptime and suppress spikes<br>• Site security | • Service disruption<br>• Brand is affected negatively<br>• Loss of revenues |

Internal reorganization and supply chain coordination were other strategies to enhance process efficiencies and network availability. For example, Helios, which previously had five contractors managing sites across five regions, shifted maintenance of all sites to one company. The findings reveal that average maintenance costs per site can be reduced, depending on TowerCos' clustering strategies. Effective supply chain integration also contributed to operational efficiencies. For example, ATC, which has operations in five African countries, leveraged its scale economies to procure things in bulk using a centralized procurement facility. The company is also improving customer relations and innovation effectiveness by appointing local managers in charge of innovation.

#### 4.2.2.2.External Relationships and Adaptation Strategies

TowerCos' most important relationship is with the MNOs, who are the most influential players within the SSA telecoms value chain. In general, large sized MNEs leveraged on their reputation and existing relationships with MNO subsidiaries in foreign countries to achieve improved bargaining influence while smaller TowerCos could offer less bureaucracy as a unique proposition. In order to enhance margins, TowerCos would aim to have multiple MNOs collocating on their tower sites. However, in many cases, TowerCos were ready to accept temporary loss of having single tenant sites with a bigger picture in mind, e.g. opportunities to make profit through selling of multiple services.

Given the homogeneous nature of TowerCo offerings, customer relationships, site availability, and after-sales service were important sources of differentiation. However, insights from the cases reveal that TowerCos maintain a different kind of unique relationship with anchor tenants that cannot necessarily be cloned with other customers. The highest-pressure relationships were with these anchor tenants, who continue to have attachments to the towers they previously owned. This influences the pace of innovation, as TowerCos continually seek to drive the highest levels of performance.

A central theme among TowerCos is the emphasis on formal long-term relationships with the MNOs. Value capture is enhanced through lock-in strategies, i.e. tying MNOs to long term contracts, typically 10 years. This approach is reflected in the TowerCo's insertion of a 'clause of first refusal' in contracts with anchor tenants. This clause implies that the MNO would not go to a competitor unless the TowerCo is unable to meet the customers' needs. In general, TowerCos understood the fluidity of the market, and occasionally would do flexible deals in a bid to maintain customer satisfaction and wade off competition. This is achieved through strategies such as offering discounts and trading price cuts for more volume. Another trend observed is the bundling of multiple services to a customer and charging less than the sum of those services. This helped to enhance customer satisfaction, increase tenancies, and reduce overall costs on the customers.

There were also wider influences beyond the customers, which dictated TowerCo's innovation strategies and value creation. Such influences include beliefs about the health hazards of citing towers around house locations and local norms that mandate the TowerCo to pay certain unofficial royalties to 'area boys' or community chiefs before acquiring a land and building on it. An operations manager in one of the MNE TowerCos made the following statement:

*"There is an area where we don't work on Saturday due to their religious belief. One of the biggest challenges I ever had was a site going down and I couldn't do anything. And we had all the operators on that site. We had to wait until the next day"*

Paying attention to these informal institutional factors, TowerCos tailor their strategies to adapt to the local environment. For home-grown TowerCos, better access to local networks, deeper

contextual knowledge, and ability of key decision-makers to navigate political networks and local norms were important adaptation strategies. On the other hand, local interactions by MNEs were governed through a combination of relational mechanisms enacted through international codes of practice and administered by the parent organizations. These mechanisms contributed to the MNEs' vulnerable positioning in terms of external relationships, and hampered their ability to get prompt permissions to build sites and perform necessary maintenance activities. The MNEs accepted the short-term disadvantages in order to manage future risks. Additional external determinants included the extent of local partnerships and the level of involvement of TowerCos with the local communities. MNE TowerCos adapted into new markets by partnering with locals to enhance legitimacy. An interviewee in one of the MNEs stated:

"*For us, we try as much as possible to partner with local companies. Most of our contractors are local firms except we want to bring something from abroad which makes us partner with manufacturers. We involve in CSRs to localize ourselves, to make people accept us in the communities"*

Table 6: Overview of interplays between BMI and BMI drivers

| | **BM Elements** | **Observed Patterns** |
|---|---|---|
| Internal determinants | Resources & Competencies | - access to international innovation-networks (MNEs)<br>- enhanced access to finance (MNEs)<br>- experience in other markets (MNEs)<br>- stronger knowledge and ability to navigate local preferences (home-grown TowerCos) |
| External drivers | Regulatory regimes and Institutional factors | - strong networks and lobbying of regulators<br>- international code of ethics influences local operations (MNE TowerCos)<br>- regulation outpaced by technology changes<br>- regulatory inefficiencies (multiple regulations; taxation)<br>- restrictive regulations inhibit easy expansion<br>- negatively impacting local behaviours and social norms |
| | Competition | - price competition<br>- increased activities; acquisitions; first-buyer advantages<br>- dominant players benefit from economies of scale and scope |
| | Customer influences | - high-pressure relationships, especially with anchor tenants<br>- customers' bargaining power |
| Innovation strategies | Value Proposition | • build-to-suit models to enhance growth<br>• diversification beyond core infrastructure into services<br>• focus on unique strengths for differentiation |
| | Value Chain Reorganization | • finding alternative technologies to achieve similar results<br>• focus on close relationships with MNOs<br>• decentralizing innovation processes to enhance effectiveness<br>• aggregating maintenance contracts and teams to enhance efficiency |
| | Process Optimization | • centralized procurement facilities to reduce costs through bulk discounts (MNEs)<br>• operational efficiencies and new technologies<br>• reliance on scale economies |

### 4.3. External Environmental Trends Impacting Business Model Change

The cell tower market is characterized by naturally-existing, structural barriers to entry, i.e. technology and capital-intensive nature of industry. The regulators seek to promote a level playing field but do not allow completely open access to markets. For instance, TowerCos require permission and licenses to deploy services, often from multiple regulatory agencies at national and local levels. A common observed feature is the outpacing of regulation by rapid technology advancements, with resultant effects on coverage quality and diffusion of telecom services. For example, rules about tower location and height were created in an era of only 2Gs and 3Gs. With the emergence of 4G, however, TowerCos need to be able to put up towers that meet certain height and distance requirements in order to provide the best levels of service and drive broadband penetration especially in high-density areas. This often requires TowerCos to apply, sometimes unsuccessfully, for special permits from regulator. A combination of innovative approaches enabled TowerCos to overcome this challenge, including the deployment of rooftops, distributed antenna systems (DAS) and iDAS.

Additional restrictive regulation faced by TowerCos include multiple taxation by different regulatory agencies at national and state levels. The inconsistent application of rules and permissions among regulatory bodies directly impact roll-out of networks across Nigeria and Ghana. From the point of view of TowerCos, challenges relating to right-of-way and land acquisition permissions were made worse by informal local authorities. In terms of local norms, home-grown TowerCos adapted better compared to the MNEs, mainly because of strict international code of ethics governing MNEs. On the other hand, while home-grown firms could boast of local knowledge and strong informal political networks, their relatively smaller size hampered efforts to lobby for formal regulatory changes.

Competition was another determinant of innovation in the cell tower market in Ghana and Nigeria. Although TowerCos were rarely in competition with one another as there is hardly a lot of overlap in competing tower company's network, considerations such as telco's radio frequency (RF) plans impacted on the conduct of TowerCos. TowerCos are interested in agreements with the most dominant customer as a strategy to ensure involvement across wide areas and increase market share.

IHS, for example, benefitted from acquiring all of MTN's towers in Nigeria – MTN is the leading telco in Nigeria and had built towers on custom RF plans. This gave IHS significant 'buyer advantages' because, unless another TowerCo on a similar RF plan offered significantly better signal and lower prices, MTN were unwilling to switch providers in those locations. However, other TowerCos, notably ATC, expanded by competing for remaining telcos' towers and adopting build-to-suit models. Moreover, the analysis shows that total number of sites did not exactly translate into higher profitability levels, as other factors such as tenancy ratios and operational efficiencies determined overall performance. For example, effectiveness of site clustering impacted on maintenance costs per site.

These factors, coupled with the oligopolistic nature of markets and homogeneity of offerings, often resulted in price competition. This favoured dominant firms who could rely on their size and scale economies to absorb costs and offer low prices. Furthermore, strategies to remove competitors from the market was common among dominant players, through acquisition strategies. While relatively less dominant MNEs and smaller TowerCos were forced to lower their prices, they typically competed by focusing on unique strengths and capabilities. ATC leveraged its reputation and initiated engagements at the C-level (with the CEOs, CTOs etc) to project its brand. On the other hand, the niche TowerCo BCTEK relied on ability to offer enhanced security at tower sites, thereby safeguarding against network and equipment vandalism. In SSA, security and safety arrangements are particularly important.

## 5. DISCUSSION

This study shed light on the BMs adopted by TowerCos operating in SSA. The findings highlight the importance of the interplay between BMI and external contextual factors in the cell tower market. An example of interplay between external drivers and BM changes is the constraining effect of strict regulation on value creation. For example, as TowerCos face regulatory challenges in the deployment of macro towers, DAS technology has emerged as an alternative approach to expand coverage. In terms of competition, TowerCos generally seek to develop unique competencies to enhance differentiation.

Overall, three types of innovation were identified: (1) value proposition extension or bundling; (2) value chain reorganization; and (3) process optimization. These required resources & competencies,

which may be acquired externally or be developed internally. In terms of value proposition, TowerCos went from a mono-product (tower maintenance) with one source of revenue (mobile operators) to a multi-product offer (tower maintenance, energy etc.) by adding non-MNO customers. Process innovations were aimed primarily at delivering operational efficiencies through economies of scale, new technologies, and the use of established processes to extract economic value. Value chain reorganization focused on leveraging, recombining, or changing the way resources are used to meet evolving customer needs in order to deliver greater value and overcome challenges. It also relates to the restructuring of activities and external relationships; for example, by streamlining innovation processes to enhance effectiveness or centralizing procurement. Both value chain reorganization and process optimization contributed to the TowerCo objective of operational excellence. Achieving excellence in operations - for example, through provision of backup power or proactive network monitoring - was an important determinant of customer value creation (i.e. network availability).

In terms of resources and competencies, the analysis reveals insights regarding the differentials between MNEs and local companies. While MNEs could rely on their assets, vast experience and innovation networks, local TowerCos had better knowledge of social norms, and thus, stronger adaptability in the challenging SSA cell tower environments. These findings are consistent with studies on the internationalization of MNEs in emerging economies (Spencer, 2008; Wanjiru et al., 2019).

## 6. CONCLUSION

The cell tower industry has increasingly received attention from researchers, who analyse the evolution of the industry, describe the current trends, and highlight the overall benefits of the TowerCo business model. From a theoretical point of view, this study applies the BM concept to analyse the tower markets in SSA. By exploring the role of the BM and the external environment in creating and extracting value from the sharing of passive network elements, this paper adds to the meagre collection of academic research articles that examine the phenomenon of infrastructure sharing from a BM perspective.

The study contributes to the literature in at least two ways. First, the paper identifies and investigates the underlying BMs for delivering telecom tower infrastructure in SSA, and contributes to

our understanding of shared-use models in telecom. Second, the RCOV framework provided a fine-grained representation of the configuration and interactions between BM elements, and how these impact on TowerCo value creation. The framework incorporates a dynamic view to the BM, helping us to understand the interaction between TowerCo BM's and the business environment.

This study suggests a number of practical implications. First, the regulatory and licensing regimes in in SSA have yet to mature. However, with fast exploding data traffic and the relatively restrictive regulation regarding tower specifications, there are significant opportunities for innovation. SSA TowerCos can deeper explore the use of small cells in order to overcome regulatory barriers and enhance coverage in high-density areas. Second, site ownerships are usually not the most important determining factor of TowerCo performance. Often, firms that focus on operational excellence through, for example, process optimization, can turn up consistently high-performance figures.

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