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Cost Leadership Strategy in the Telecommunication Sector in Rwanda Post COVID

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ABSTRACT : The telecommunication industry in Rwanda faces increasing pressure to remain competitive, leading firms to adopt modern technologies and strategic management practices. However, these approaches often incur significant costs that hinder financial performance. Price leadership strategies have proven insufficient in the Rwandan market, prompting a shift toward cost leadership strategies. This study aimed to compare how various cost factors influence the performance of Rwanda's telecommunications sector. Specifically, it examined the cost impacts of skilled labor, service outsourcing, office space, and infrastructure. Grounded in agency and managerial risk aversion theories, the study employed a comparative design and focused on data from Mobile Telephone Network (MTN) Rwanda between 2012 and 2016. It was found that hiring expatriates should be limited to short periods, after which local experts who are more cost-effective can take over. While outsourcing saves costs only in the short term, it remains beneficial for urgent tasks. Leasing office space is recommended initially, but constructing permanent premises is more economical in the long-term. Infrastructure sharing yielded results that favored its adoption, making in-house development preferable for established firms. The study concludes that well-planned cost leadership strategies can enhance competitiveness beyond Rwanda's borders and post the COVID period. It recommends further research into additional cost-saving measures and broader applications of the model.

KEYWORDS: Cost Leadership; Post COVID; Comparative Analysis: Rwanda Telecom

1.0 INTRODUCTION

Through their national strategic plan 2020 crafted during the COVID period the government of Rwanda was expected to find a potential path that will enable it to be able to achieve its strategies, objectives and activities laid down in the strategic planning document within the given time limits and set budgets. The strategy, which is integral to its citizens' needs and expectations, aimed to comprehensively address both its common social aspects, political, economic, and technological aspirations, and goals. One of the common means of attaining these strategies was through having an efficient and effective telecommunication industry not only aimed at aiding communication but also towards enhancing efficiency and cost effectiveness in other related activities. Rwanda has over 80% of its population living in the rural areas. The government has invested heavily towards ensuring that these rural regions are fully equipped with efficient telecommunication infrastructure and connected to reliable networks that will enable its rural population to participate effectively in its social and economic growth and development. The ICT sector in Rwanda continues to grow because of enhanced regulations, government support and growth in the private sector. The telecommunication industry in Rwanda continues to contribute heavily to the attainment and growth of the economy as well as the National GDP with key players in the industry such as MTN controlling 42% of the market share, TIGO controlling 40% market share and the new entry Airtel controlling 18%. However, downward forces such as increased levels of poverty and economic inequality are affecting the success and development of the infrastructural sector to its full potential. Thus, the telecommunication industry needs to innovate products and services that are attractive and affordable to the rural population who form the large population and hence if they buy into these innovations would be potential markets that would enhance the industry's growth.

The mobile telecommunication sector in Rwanda has experienced significant growth over the past decade. The sector is dominated by three major players, namely MTN Rwanda, Airtel Rwanda and Tigo Rwanda and as of 2021, there were more than 10 million active mobile subscribers in the country with a penetration rate of over 80% (Dataxis, 2021). This indicated that most Rwandans have access to mobile phones and can benefit from the services offered by these telecommunication companies.

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One notable development in recent years is the expansion of the fourth generation of mobile network technology (4G) network coverage across different parts of the country. This has led to increased internet connectivity and improved access to digital services such as online banking, e-commerce platforms etc. Additionally, there has been an increasing trend towards offering value-added services beyond traditional voice-call messaging. These include mobile money transfer services such as MTN Mobile Money, data bundles for internet usage and other customized packages targeting specific customer segments.

1.0 Background

The potential for the growth of ICT is quite high in Rwanda as it is in most countries' world over due to its rapid and dynamic innovation and development and usefulness. Many organizations and individuals world-wide are gearing their operations, services, and products towards working online having reduced the burden of having physical offices to portable laptops or mobile phones that can be accessed anywhere and anytime. Before the COVID – 19 pandemics, the telecommunication industry in Rwanda was experiencing steady growth. The operational costs were relatively stable with most companies opting for leasing rather than construction of buildings as it was a more cost-effective option. Additionally, there was a preference for hiring local workers over expatriates due to lower labor costs and familiarity with the local workers over expatriates. Outsourcing was also a common practice, particularly in areas such as customer service and technical support to reduce operational costs. However, sharing space wasn't widely adopted by telecom operators then. Studies on Rwanda's telecom sector by Jensen (2014) identified that RURA suffered from limited institutional capacity and struggled with market oversight, operator compliance with rural coverage mandates being inconsistent, undermining universal access goals. A cost differentiation optimizing model would enable Rwanda's telecom sector grapple with these cost issues effectively.

During the COVID – 19 pandemic period, many industries including telecommunications experienced significant disruption that required quick adaptation strategies from companies operating within this space. In response to new challenges surrounding social distancing regulations and remote work requirements, telecommunication firms began investing heavily into digital infrastructure improvements aimed at facilitating remote working arrangements which would minimize operational disruptions caused by lock downs or other restrictions. Telecom Review Africa (2021) reported that telecom infrastructure underwent exponential upgrades (e.g., Wi-Fi and spectrum capacity ramp-ups) to meet the demands of remote work, remote learning, and digital services though it notes short-term revenue dipped as a trade-off. In terms of building options during this period there was increased interest in constructing one's own facilities as opposed to leasing given perceived benefits such as greater control over facilities management, health safety measures and reduced exposure to leasehold risks or uncertainties. In some cases, however, shared workspace solutions have become increasingly popular amongst smaller players who cannot afford their own dedicated facilities but still require an office presence.

The trend towards outsourcing continued throughout the COVID period with telecom firms seeking out external partners capable of providing services while reducing associated overhead expenses related to staffing up internal teams (e.g., call centers). Deloitte (2021) reported that outsourcing, particularly of customer service, IT, and back-office operations, increased during the pandemic as firms aimed to cut costs and increase flexibility. Post-pandemic recovery is still ongoing but early indications suggest that business practices will return somewhat closer back towards pre-covid norms albeit with minor changes influenced by lessons learned during the crisis, for example concerns around supply chain continuity that may lead companies towards greater diversification of supplier networks etc. McKinsey & Company (2022) emphasized a "hybrid" return to pre-pandemic business practices with adaptations in digital strategy, remote work, and risk management.

A very notable occurrence post - the onset of the COVID 19 pandemic onslaught in 2020 was that most meetings were being held online a move that powered the sale of information technology products and services. Acquisition of a mobile phone by individuals became a necessity rather than a luxury in Rwanda. The data used in this research reflected pre-covid periods and since conditions have normalized to these periods the comparative analysis results are expected to guide the decisions making process involving optimal organizations' operational costs going forward as indicated by McKinsey & Company (2021) who emphasized the importance of using historical (pre-COVID) benchmarks for scenario planning and cost optimization post-COVID, as many businesses aim to "reset" rather than merely "recover." and PwC (2021) who suggested that comparing pre- and post-pandemic data helps identify operational cost efficiencies in the "new normal."

1.2 Statement of the Problem

The most common challenge is the adoption of strategy, which will deliver low-cost benefits and lead to productivity post COVID period. This requires the use of suitable low organization's operation cost optimization methods. This study meets this challenge by using a modified contemporary Ricardo's cost comparative advantage model to optimize low operation costs strategies that will increase the organizations performance over time.

Cost Leadership Strategy in the Telecommunication Sector in Rwanda Post COVID

Table 1.1: A Summary of Comparisons of Strategic approaches in Rwanda's Telecom sector. Price Strategy vs Cost Leadership Strategy

Aspect	Price Strategy (Current Trend)	Cost Leadership Strategy (Largely Absent)
Definition	Setting service prices to maximize revenue or target specific segments.	Minimizing operational costs to sustainably offer lower prices.
Primary Objective	Maximize Average Revenue Per User (ARPU).	Achieve economies of scale and reduce prices industry-wide.
Current Application in Rwanda	MTN, Airtel, and former Tigo price services relatively high, targeting urban and business users.	Visible evidence of major cost-reduction efforts (e.g., tower sharing, infrastructure pooling).
Affordability Impact	Prices remain relatively high for rural or low-income consumers.	Could reduce end-user prices and promote broader access.
Market Reach	Focuses on urban, affluent segments.	Enables reach to mass market, especially rural and underserved.
Consequences/Advantage	i) Digital exclusion of rural populations - Slower digital financial inclusion - High churn from price-sensitive users - Lower penetration of e-services (e.g., e-health, e-education) ii) Emphasizes high ARPU - Increased affordability focus over affordability - Cost exceeds UN 2% affordability threshold competitive market	i) Greater user adoption ii) Lower churn and more loyal base iii) Recommends cost-sharing infrastructure, smart spectrum use

Authors GSMA (2023), A4AI (2020), RURA (2023)

A study by Kirabo *et al.* (2022) examined the role of strategic planning in the performance of Rwandan telecommunication companies. The research found that while strategic planning positively influences performance, its implementation is often hindered by weak internal structures and limited managerial capacity. The study concluded that many telecom firms in Rwanda struggle with effective strategic planning, which adversely affects their operational efficiency and competitiveness. Strategic management in Rwanda's telecommunication industry remains a serious challenge in most of the companies. Munyandamutsa, 2020 highlights strategic practices within MTN Rwanda, including cost-related elements, but lacks in-depth documentation or comparative analysis of operational costs across the sector. Similarly, research by Mwangi (2020) on MTN Rwanda indicated that despite employing various competitive strategies, the company faces challenges in sustaining its market share and performance. The study pointed out that losses in market share signal serious long-term issues that necessitate strategic change, indicating difficulties in strategic management within the firm. Thus, this study cannot have come at the opportune time to address the difficulties in the cost management strategies that exist post COVID.

Table 1.2: Current Status and Future Implications of the Telcom Sector in Rwanda

Key Area	Current Status	Implications	Supporting Statistics	Reference
Mobile Data Affordability	Rwanda ranks 11th in Sub-Saharan Africa for affordable mobile data.	While competitive regionally, costs remain high for many users.	1GB costs ~Rwf 1,346 ($1.48); ranges from Rwf 315 ($0.32) to Rwf 5,859 ($6.45).	Africanian.com, 2024
Broadband Internet Costs	Broadband prices have dropped significantly.	Improved affordability, but many still excluded.	Monthly cost fell from $60.96 to $43.22 (29.1% drop).	WebRwanda.com, 2024

Smartphone Penetration	Ownership is still low despite coverage.	Limits access to mobile-based services.	26.7% men, 21% women own smartphones.	Panorama, 2024
4G Network Adoption	Uptake has grown with cheaper packages.	Proves demand for affordable high-speed internet.	4G users rose from 11,000 to ~600,000 in 2023.	Taarifa, 2023
Operational Costs	Telecoms incur high infrastructure expenses.	Cost cutting necessary to improve margins.	A single base station costs ~$250,000.	Rwanda Today, 2024

By accounting for these differences these models provide a more nuanced understanding of how organizations can benefit from well optimized operational costs. The dynamism and rapid advancement of technology play an important role in the success of organizations depending on the preparedness of these organizations to adapt to these changes. Telecommunication change can be detrimental to the progress of organizations that don't plan well for the same. Thus, models that can account for technological differences will also aid adjustments in telecommunication technologies.

The contemporary Ricardo's model emphasizes specialization based on comparative advantage rather than absolute advantage alone. This means that if one organization is adapting several costs, these costs can be compared so that their optimal levels are deducted and hence their incorporation can be advocated during different suitable periods. The cost measures may also be used concurrently but at different levels, for example an organization may desire to hire foreign expatriates at the top levels of the organization but hire local workers at other levels of the organization depending on the expertise of its workforce and its human resource needs.

Table 1.3: A table showing how the Studie's Cost optimization Model Addresses the Rwanda Telecommunication Sector Challenges

Rwanda Telecommunication Sector Issue Identified	How the Studie's Cost optimization Model Addresses the Issue
High cost of services limits access in rural and low-income areas	The model emphasizes comparative cost advantages, showing that firms which focus on minimizing production and operational costs can deliver more affordable services.
Limited market penetration outside urban areas	By optimizing cost structures, the model shows that telecoms can expand profitably into rural markets, turning previously underserved areas into viable markets.
Inefficient infrastructure spending and duplication	Encourages strategic resource allocation and operational efficiency, reducing redundant infrastructure investment.
Focus on pricing over structural cost reduction	The model critiques this approach, showing that long-term sustainability requires cost-driven strategies, not merely pricing adjustments.
Minimal uptake of cost leadership as a strategy by local operators	The study empirically proves that adopting cost leadership improves firm performance, providing strong academic backing for its implementation.
Need for scalable service delivery models that reduce cost per user	The Ricardo-type model proposes efficiency gains via scale and technology adoption, reducing marginal costs.
Insufficient evidence guiding strategic pricing and cost structure decisions	Provides quantitative evidence supporting the superiority of cost leadership for firm performance in Rwanda's telecom sector.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of this study was to compare competing optional cost leadership strategies effect on performance of the telecommunication industry in Rwanda.

1.3.2 Specific Objectives

The study specific objectives were.

i) To compare the cost of hiring experts versus hiring local workers on performance of the telecommunication industry in Rwanda.

ii) To compare the cost of outsourcing versus not outsourcing on performance of the telecommunication industry in Rwanda.

iii) To compare the cost of construction versus leasing property on performance of the telecommunication industry in Rwanda.

iv) To compare the cost of infrastructure sharing versus not sharing on performance of the telecommunication industry in Rwanda.

1.4 Research Hypotheses

The study was guided by the following hypotheses:

Hypotheses:

1. H_0 :There is no difference in the cost saved per cost strategy used
   H_1 :There is a difference in the cost saved per cost strategy used
2. H_0 :There is no difference in the length of period cost is saved per cost strategy used
   H_1 :There is a difference in the length of period cost is saved per cost strategy used

1.5 Significance of the Study

Achievement of social economic growth requires addressing factors, which affect the economy at large. With eminent changes in the business environment and customer taste and preferences, performance remains quite a unified significant aspect of the business world. The telecommunication industry in Rwanda is a key sector towards facilitating the attainment of economic growth and achievement of Vision 2050 which aims at becoming an upper middle-income country by 2035 and a higher income country by 2050 in particular, the industry through its performance will enable the country to meet its economic growth and prosperity goal number one. Towards this end the study is significant since it will enable the proper optimization of the telecom industries organizations operational costs over time thus making its products and services affordable to its citizens as well as competitive in the common market.

1.6 Assumption of the Study

The study assumed that respondents were aware of the relationship between cost leadership and organizational performance.

The study assumed that there is substantial comparative reality on the relationship between cost leadership strategy and performance.

2.0 LITERATURE REVIEW

2.1 Theoretical Review

The current study addressed three specific theories which Agency theory, management risk aversion theory, information section theory, and Contemporary Ricardo's comparative advantage theory.

2.1.1 Agency Theory of Strategic Management

The Agency Theory by Ross (1970) posits that in a corporate or organizational setting, a conflict of interest may arise when one party (the principal) delegates work to another (the agent), who is expected to act on their behalf. Because the agent may pursue their own interests rather than those of the principal, mechanisms such as incentives, monitoring, and contracts are required to align the goals of both parties and minimize agency costs.

Table 2.1: A table showing the application of agency theory in cost optimization strategies within Rwanda's telecommunication sector

Cost Area	Agency Conflict	Implication for Cost Leadership
Outsourcing vs. Insourcing	Agents may prefer outsourcing to international vendors due to ease, relationships, or commissions, even when insourcing would reduce long-term costs.	Without oversight, outsourcing inflates operational costs and weakens internal capacity. Monitoring mechanisms or performance-based contracts help ensure cost-effective sourcing.

Infrastructure Sharing vs. Proprietary Networks	Managers may resist sharing due to fear of losing control or complexity of coordination, even though sharing lowers capital and operational expenditure.	Aligning incentives to shared infrastructure goals (e.g., KPIs tied to CAPEX savings) helps agents act in cost-conscious ways.
Building Construction vs. Leasing	Agents might initiate expensive building projects that offer visibility or long-term presence, even when leasing is cheaper and more flexible.	Principals must implement cost-benefit analysis and budgeting controls to favor leasing where justified.

This framework demonstrates how agency costs arising from conflicts of interest between owners and agents can obstruct cost leadership strategies unless aligned through incentives, controls, and transparent cost evaluation mechanisms like the cost optimization model being championed in this study.

2.1.2 Managerial Risk Aversion Theory

Michael *et al* (1976) in their foundational paper, Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure introduced the idea that managers, as agents, may behave in risk-averse ways to protect their personal interests rather than maximizing shareholder value.

Table 2.2: A table showing the application of managerial risk aversion theory in telecom cost optimization

Strategic Decision Area	Riskier Option	Safer Option (Favored by Risk-Averse Managers)	Implication of the Theory
Outsourcing vs Insourcing	Outsourcing to reduce labor and operational costs	Insourcing to retain full control and ensure internal accountability	Managers may resist outsourcing due to fear of losing control, even if outsourcing could optimize costs.
Infrastructure Sharing vs Full Ownership	Sharing infrastructure to cut capital expenditure and operating costs	Maintaining full infrastructure control despite high costs	Managers may avoid sharing fearing service dependencies or quality risks, though sharing could lower costs significantly.
Leasing Facilities vs Building New	Leasing buildings to reduce long-term commitments and capital requirements	Constructing owned facilities for long-term asset control	Risk-averse managers may prefer ownership to maintain control, even if leasing is more flexible and cost-efficient in uncertain environments.
Adopting Lean Operations or Cost-Cutting	Aggressively downsizing or restructuring to achieve lean operations	Maintaining current structures to avoid conflict and workforce disruption	Managers may resist lean transformations fearing backlash, labor unrest, or the uncertainty associated with drastic changes.

Risk-averse managers in Rwanda's telecom sector may delay or avoid implementing cost leadership strategies even when they are financially beneficial due to perceived threats to stability, control, or their own job security. This reinforces the importance of governance alignment between strategic owners (shareholders) and operational decision-makers (managers) and a cost optimization model supporting this alignment is beneficial to its achievement.

2.1.3 Information Society Theory

Frank Webster first introduced information society theory in the 1970s. The theory argues that information creation, uses, integration, distribution, and manipulation are quite significant in society and a country at large. Information serves a significant purpose in any country or state (Hilbert, 2015). Information has been in the front line towards technological growth, economic

growth, political development, and education. Information is at the center of all factors of economic growth and development. The telecommunication industry plays a significant part in creation, manipulation, distribution, and interpretation of information. In this case, the importance of the telecommunication industry is realized fully in the theory of information society.

Table 2.3: A Table of Cost-related Challenges in Rwanda's Telecommunication Industry, Informed by Information Society Theory

Challenge Area	Cost Leadership-Related Challenge	Link to Information Society Theory
Outsourcing vs. Insourcing	Insourcing may raise operational costs due to lack of local technical expertise; outsourcing can be cost-effective but risks long-term dependency.	Information Society Theory promotes building local ICT capabilities, emphasizing skills development to support internal cost optimization.
Infrastructure Sharing vs. Not Sharing	Refusal to share infrastructure leads to redundant investments and higher service costs.	Encourages collaborative infrastructure use to lower service costs and enhance digital inclusion.
Construction vs. Leasing of Facilities	Constructing telecom buildings can be capital intensive; leasing may reduce initial expenditure but could increase long-term costs.	Supports investment decisions that expand ICT access rapidly while balancing long-term sustainability.
Use of Expatriates vs. Local Workforce	Heavy reliance on expatriates increases labor costs and reduces long-term skill retention.	Supports policies for local capacity building and digital skill empowerment to drive cost efficiency.
Limited Rural Access	High cost of extending services to rural areas discourages network expansion.	Advocates inclusive ICT development, which requires innovative low-cost strategies to expand access.

As Rwanda moves further into the digital age post COVID period, addressing these challenges with cost-effective strategies is crucial. This study has clearly modelled cost optimization of the said challenges and interpreted their results to mitigate them.

2.1.4 Contemporary Ricardo's Comparative Advantage Theory

Contemporary Ricardo's Comparative Advantage Theory is an extension of the original theory that considers modern-day factors such as technological advancements, changing market conditions, and global competition. In the context of the telecommunication sector in Rwanda, this theory has been applied in this study to determine several key decisions such as hiring local workers vs expatriates, outsourcing versus not outsourcing, infrastructure sharing versus not sharing infrastructure, and leasing versus construction of building.

Various studies have been conducted to address comparative analysis of cost leadership strategies on performance of companies in general. Various gaps have been realized which this study has been able to address. The most notable ones are tabled below.

2.2 Research Gaps in Empirical Review

2.4 A table of research gaps in empirical Review

Author of the previous study	Gap raised in the previous study	How the current study addresses the gaps
McKinsey (2022)	Need for real estate to shift from cost center to strategic asset	The study provides evidence on evaluating cost structures (like owning vs. leasing) that directly optimize operational expenditure, aligning real estate use with strategic goals
CBRE & CoreNet (2025)	Managing corporate real estate with a cost lens	It outlines data-driven cost evaluation models that guide telecom firms in Rwanda on whether to lease, share, or

		construct infrastructure, thereby improving real estate decisions.
JLL (2023)	Underutilized potential to raise capital via real estate decisions	By demonstrating the comparative advantage of cost-cutting measures, the study helps firms consider real estate divestment or shared infrastructure to unlock capital.
Björkegren (2019)	High fixed and operational costs in Rwanda's telecom industry	The cost optimization model in the study identifies inefficient cost centers (e.g., duplicated infrastructure, expatriate-heavy operations) and offers localized, sustainable alternatives.
Raza *et al* (2021)	Underappreciated risks of transition and dependency in outsourcing.	It supports scenario-based planning, evaluating when outsourcing or insourcing aligns better with organizational goals.
Mohamed (2019)	Highlight the challenge of aligning leadership and HR strategies with outsourcing decisions.	It provides metrics for evaluating trade-offs between hiring expatriates, upskilling locals, or external contracting based on long-term performance gains
Singhania (2014)	Criticize traditional decision-making models for oversimplifying the cost-benefit analysis in outsourcing decisions	The model incorporates the total cost of ownership

2.3 Conceptual Framework

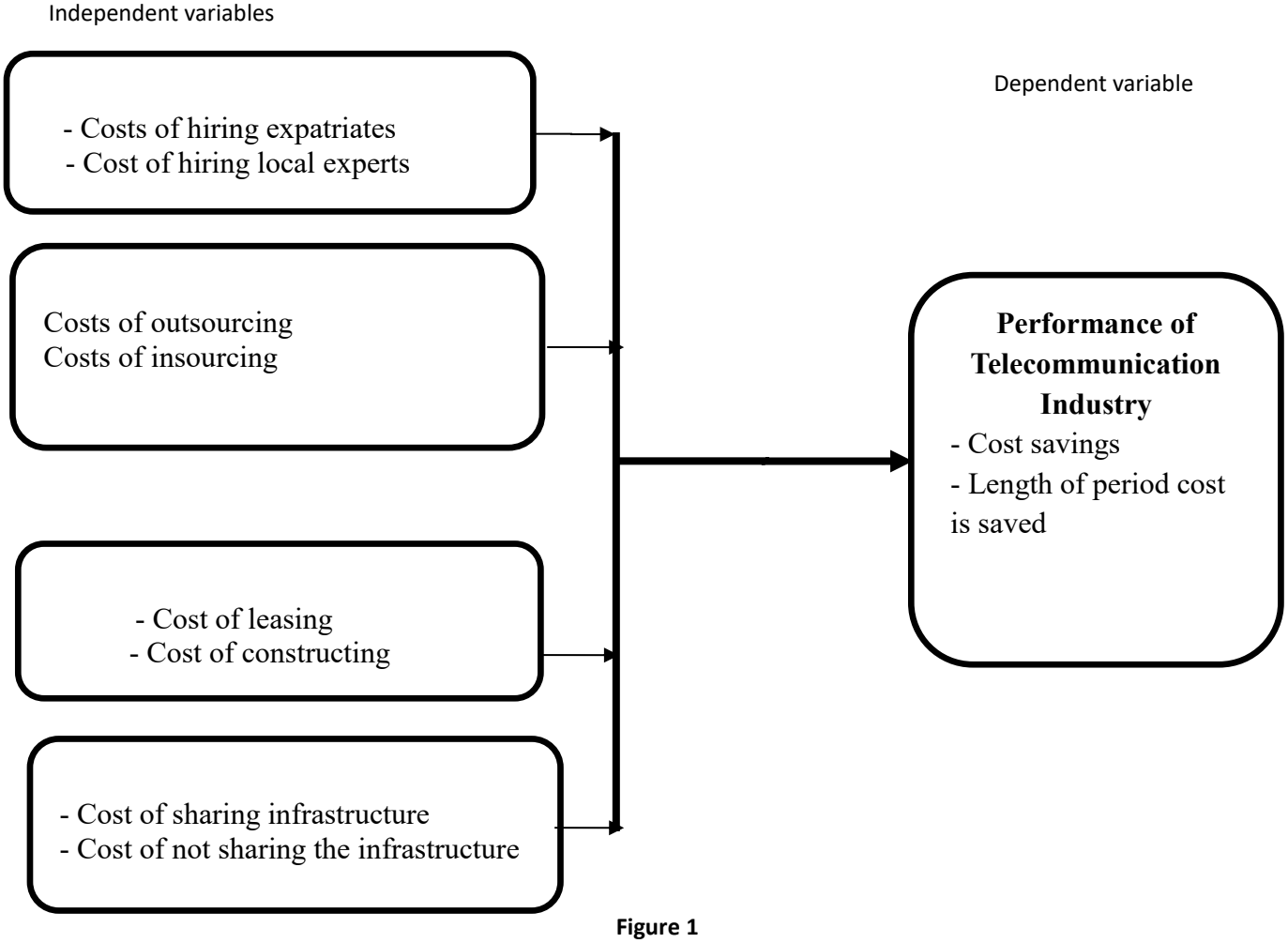

Figure 1

3.0 RESEARCH METHODOLOGY

Comparative research is a research methodology used to systematically compare two or more units of analysis such as countries, organizations, systems, policies, time periods, cost strategies or social groups to understand similarities and differences in how a particular phenomenon occurs or operates. It is widely used in fields such as education, sociology, political science, public policy, economics, and international development. George & Bennett (2005) advanced the case study method for theory development, in comparative research. They emphasized the "process tracing" method to uncover causal mechanisms within cases. This enabled comparative researchers to use case studies not only to describe but also to build and test theories. Their approach promoted in-depth within-case analysis, followed by cross-case comparisons to assess generalizability.

This study adopted a comparative research methodology to examine how cost leadership strategies affect performance in the telecommunications sector in Rwanda. The study compared different competing cost strategy options and thus purposed to discover causes or consequences of their differences and similarities and then understand how contextual factors affected the outcomes of the comparisons. The building of the contemporary Ricardos comparative analysis theory was adopted to guide the research towards identifying best practices, innovations and policy gaps.

The study used quantitative information from secondary data in arriving at specific figures, which can be compared easily without manipulation. Comparative research design was quite important because it aided decision making, especially for the current study, since it facilitated the determination of choices with best favorable cost structures.

The current study was conducted in Rwanda and specifically targeted MTN headquarters in Kigali City. The study population was three telecommunication companies in Rwanda, that is MTN, TIGO and Airtel. The study adopted simple random sampling as a process of picking one specific company and MTN was randomly picked. According to Hogg *et al.* (2015), the central limit theorem can be used for approximating specific probabilities concerning the mean X or the sum Y of a random sample. That is especially true if X is approximately N (μ, σ^2/n), and Y is approximately N ($n\mu$, $n\sigma^2$), when n is "sufficiently large," where μ and σ^2 are, respectively, the mean and the variance of the underlying distribution from which the sample arose. Generally, these approximations will be good if n is greater than 25 or 30 as the rule of thumb. This study applied the central limit theory deduction and its rule of thumb to collect data for sixty months in each category of comparisons since this was secondary data large enough to tend to be normal, and thus good enough to draw inferences and conclusions. The study requested permission from the MTN management team and consent before proceeding with the data collection process. The study focused on secondary data from 2012-2016 in relation to different cost leadership strategies and variables as addressed in the study objectives and conceptual framework. The study used secondary data because it was imperative to arrive at specific quantifiable information without manipulating any information.

The study used data provided by MTN in making informed decisions. The study used codes from level 1-10 to represent information, which needed coding. The study used contemporary Ricardo comparative advantage model as the means of analyzing data and making decisions. In this case, costs of providing the same utility were compared for different sources using a-prior and relative methods (Rashid 1819). The research also used a typical modern interpretation of the classical Ricardian model (Krugman *et al* 2008). It used notation and definitions such as opportunity cost, unavailable to Ricardo. The researcher ensured that all academic ethical considerations were upheld.

4.0 RESEARCH FINDINGS

4.1Mann-Whitney U Test

To determine whether the results observed in this study are significant and can be related to other populations particularly those occurring post COVID period we carry out a Mann-Whitney U Test.

4.2 Test 1

Hypotheses:

H_0 :There is no difference in the cost saved per cost strategy used

H_1 :There is a difference in the cost saved per cost strategy used

The researcher tested whether there's a significant difference in the cost saved per cost strategy used using Mann-Whitney U Test

Table 4.1: A Table of observed data of % cost saved, and cost not saved of competing cost strategies

Cost strategy	% Cost Saved (Strategy 1)	Rank1	% Cost Saved (Strategy 2)	Rank2
Construction	148368	1		
Leasing			3861	3

Sharing Infrastructure	20216	2		
Not Sharing Infrastructure			0	8
Insourcing	3154	4		
Outsourcing			2750	5
Local workers	1350	6		
Hiring Expatriates			172	7
Total		13		23

Test statistics

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

$$U_1 = 4 \times 4 + \frac{4(4+1)}{2} - 13 = 16 + 10 - 13 = 13$$

$$U_2 = 4 \times 4 + \frac{4(4+1)}{2} - 23 = 26 - 23 = 3$$

The test statistics is used to determine the 'critical value' of U with which to compare the calculated test statistic, and the tabulated critical values by referencing the sample sizes (n=4 in both groups) and the two-sided level of significance (α=0.05).

The critical value is determined from the Wilcoxon-signed-rank-table at StatsCalculators.com (2025) as 0. Finally, we can use this to accept or reject the null hypothesis using the following decision rule: Reject H_0 if $U \leq 3$.

Given that our U statistic is equal to 0, we can reject the null hypothesis that there is no difference in the cost saved per cost strategy used and accept the alternative hypothesis that there is evidence of a difference in the cost saved per cost strategy used

4.1.2 Test 2

Hypotheses:

H_0 :There is no difference in the length of period cost is saved per cost strategy used

H_1 :There is a difference in the length of period cost is saved per cost strategy used

The hypotheses tested whether there's a significant difference between competing cost strategies and length of period cost is saved using Mann-Whitney U Test

Table 4.2: A Table of observed values for the period cost is saved and for the period cost is not saved in months of competing cost strategies

Cost strategy	Period cost is saved in months (Strategy 1)	Rank 2	Period cost saved in months (Strategy 2)	Rank 2
Construction	51	2		
Leasing			9	7
Sharing Infrastructure	60	1		
Not Sharing Infrastructure			0	8
Insourcing	24	5		
Outsourcing			36	4
Local workers	50	3		
Hiring Expatriates			10	6
Total		11		25

Test statistics

$$U_1 = 4 \times 4 + \frac{4(4+1)}{2} - 13 = 16 + 10 - 11 = 15$$

$$U_2 = 4 \times 4 + \frac{4(4+1)}{2} - 23 = 26 - 25 = 1$$

The test statistics above is used to determine the 'critical value' of U with which to compare the calculated test statistic, using the reference table of critical values, the sample sizes (n=4 in both groups) and the two-sided level of significance (α=0.05).

The critical value is determined from the Wilcoxon-signed-rank-table at StatsCalculators.com (2025) as 0. Finally, we can use this to accept or reject the null hypothesis using the following decision rule: Reject H_0 if $U \leq 1$.

Given that the U statistic is equal to 0, the researcher can reject the null hypothesis that states that there is no difference in the length of period cost is saved per cost strategy used and accept the alternative hypothesis that there is evidence of a difference in the length of period cost is saved per cost strategy used

5 CONCLUSIONS

A Mann-Whitney U test carried out was significant thus enabling the results determined to be generalized to the rest of the telecommunication sector. This statistically significant Mann-Whitney U test in the study validates the presence of a consistent association between cost strategies and performance outcomes. This enables generalization of the findings to the broader telecommunication sector post COVID period and provides a reliable empirical basis for formulating industry-wide policies. It supports the development of evidence-based regulations, resource allocation strategies, and standardization of best practices across telecom providers, ultimately promoting operational efficiency and sectoral growth.

The study contributes new knowledge by moving beyond traditional cost efficiency metrics toward a dynamic understanding of cost advantage in performance measurement. Unlike prior studies that primarily emphasized short-term cost reduction this research introduces a longitudinal dimension the duration over which cost savings are sustained as a stronger predictor of competitive performance in the Rwandan telecommunications sector. This divergence not only contextualizes performance measurement within a strategic framework but also proposes a more nuanced model suited to developing markets, thereby filling a critical gap in the literature on cost strategy and sector-specific performance analytics.

The study diverges from the dominant literature by reframing cost advantage not merely as a static accounting outcome, but as a strategic, dynamic performance measure. Unlike traditional studies that assess performance based on unit costs or annual expenditure the research highlights the importance of the duration and consistency of cost savings over time, a concept previously underexplored in African telecom contexts. By analyzing temporal cost efficiency the length of time a firm maintains a cost edge the study aligns with broader strategic capability frameworks and provides empirical backing for what Porter theorized: that sustainable cost leadership can deliver superior long-term performance. This offers new knowledge particularly relevant for telecom sectors in emerging economies where market dynamics and cost structures are volatile and evolving.

Furthermore, the study's contextual focus on Rwanda an under-researched market in telecom performance studies fills a geographic gap and enhances relevance for policy formulation, investment strategy, and regulatory benchmarking across Sub-Saharan Africa. It recommends further research on additional cost-saving measures and broader applications of the model.

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