

Exploring the Phenomenon of Knowledge Management and Performance of MNOs in Nigeria

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Abstract

This study explored the phenomenon of knowledge management and performance of mobile network operators (MNOs). The study investigated the effect of the knowledge culture of MNOs on customer satisfaction and examined the effect of knowledge creation on the competitiveness of MNOs. In this study, the survey research design was utilized. For this study, the researcher employed the technique of stratified random sampling to select the sample. A sample size of three hundred and sixty-six was chosen. Quantitative data was gathered and analyzed using statistical methods like mean, standard deviation, and regression to establish the effects and relationship between the independent and dependent variables. Findings showed that the knowledge culture of MNOs has a significant positive effect on customer satisfaction and that knowledge creation has a significant positive effect on the competitiveness of MNOs. The study concluded that managing knowledge is crucial for the performance of MNOs. The study recommended that MNOs prioritize and actively cultivate a robust knowledge culture within their organizations and that MNOs should actively foster continuous knowledge creation within their organizations.

Keywords: knowledge culture, customer satisfaction, knowledge creation, competitiveness, knowledge sharing, service quality

Introduction

Managing knowledge remains top-notch in management research. Strategic knowledge management continues to hold an indisputable position as a paramount concern within mobile network operators (MNOs). In an era where technology is evolving and customer expectations are ever-increasing, the effective handling and utilization of knowledge have emerged as pivotal factors that directly influence a mobile network operator's success and overall standing within the industry (Nair, 2016). MNOs are confronted with an intricate web of challenges and opportunities in the dynamic landscape of telecommunications, characterized by rapid advancements in network infrastructure, the proliferation of smart devices, and the widespread adoption of data-intensive applications. The sheer complexity of these challenges, ranging from network optimization and spectrum allocation to cybersecurity and quality of service enhancements, underscores the essentiality of knowledge management (Rejeb et al., 2023).

The significance of effective knowledge management becomes apparent when one considers its diverse aspects. Firstly, adeptly utilizing amassed knowledge enables operators to swiftly detect and resolve network irregularities, ensuring uninterrupted service and satisfying customers. Secondly, it aids in strategic decision-making, permitting operators to make well-informed decisions regarding technology investments, infrastructure enhancements, and market growth. Thirdly, the capacity to harness knowledge empowers MNOs to rapidly foster innovation, developing new services and solutions that align with the changing preferences of their customer base. In a study conducted

by Li and Li (2020), it was suggested that knowledge management substantially influences the operational performance of MNOs within China.

Similarly, in Saudi Arabia, Alghamdi and Alghamdi (2021) highlighted how knowledge management has been substantially used to boost the financial performance of MNOs in the country. Additionally, Kafando and Kafando (2020) conducted a study in Burkina Faso, providing empirical support that knowledge management has played a critical role in enhancing the performance of MNOs within that nation. Effective knowledge management is a pivotal factor for MNOs to maintain their performance and thrive within the industry.

In the distinctive and dynamic context of North Central Nigeria, there is a compelling necessity to thoroughly examine the intricate complexities associated with knowledge management. This undertaking holds exceptional significance due to the extensive consequences that these facets have on various essential aspects that define the region's telecommunications sector. The interaction between knowledge management and the intricate array of factors such as competitiveness, network coverage, subscriber base, service quality, and the overarching pinnacle of customer satisfaction presents a captivating scenario that warrants thorough investigation. Within the larger framework of Nigeria, North Central Nigeria stands as a microcosm characterized by its distinct socio-cultural fabric and economic dynamics. The region's telecommunications domain, which significantly contributes to its development path, hinges

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upon the effectiveness of knowledge management practices. As the industry navigates the intricate trajectory of growth and innovation, comprehending the profound repercussions of these practices emerges as a crucial compass guiding this journey. Exploring the potential effects of knowledge management on the aforementioned parameters offers insights into how MNOs can optimize their operations, achieve higher levels of service quality, and enhance overall customer satisfaction in a dynamic and competitive environment.

The MNOs are faced with several challenges. Suraj and Ajiferuke (2013) identified that the advancement of technologies that are expanding business operations beyond their core business scope, globalization, international competition, and an unstable business environment consisting of high uncertainty, risk, and constant regulation are some of the challenges. These challenges may be narrowed down to knowledge management in the Nigerian MNOs. The performance of MNOs in Nigeria remains low due to more relative variables. This is evident in recent times as performance seems to be declining (Research Clue, 2020). There are issues relative to service configuration, order fulfillment, voice service quality, service reliability, and data consumption. Knowledge culture, knowledge creation, and knowledge sharing are traceable to the problem of poor customer satisfaction, competitiveness, and service quality of MNOs in North Central Nigeria.

Review of the Related Literature

Conceptual Review

Exploring the concept of 'knowledge management' delves deeper by first understanding the essence of knowledge itself. Knowledge is not merely a collection of facts; it is intricately intertwined with the capacity to gather information and the innate ability to wield intellect to synthesize, juxtapose, and ultimately achieve positive outcomes. Knowledge represents the reservoir of cognitive content and resources that empower individuals to rectify situations and navigate challenges effectively. Anwar and Ghafoor (2017) emphasized that knowledge is not just any resource; it is the paramount asset businesses possess to generate value and foster growth. The amalgamation of 'knowledge' and 'management' encapsulates the application of managerial expertise to orchestrate knowledge using scientific methodologies, principles, and techniques. At a surface level, Knowledge Management might involve efficient oversight of knowledge resources. However, this concept transcends mere resource management. It entails the orchestration of a strategic symphony, where the conductor – the organization – orchestrates the harmonious integration of information, expertise, experiences, and insights. This harmony is not achieved by happenstance; rather, it is cultivated through a purposeful alignment of managerial insight, technological tools, and human interaction. Knowledge Management is a dynamic interplay where intellectual assets are harnessed, cultivated, shared, and creatively combined to drive innovation, decision-making, and problem-solving. It is about fostering a culture that champions learning, collaboration, and adaptability. As organizations navigate the complexities of the modern world, they must harness their collective wisdom, past experiences, and insights to not only survive but thrive in a landscape where knowledge is a currency.

As we delve into the viewpoints shared by various scholars, we start to get a clearer picture of what knowledge management is all about. O'Dell and Hubert (2018) posit that at its core, knowledge management is like a structured plan that guides how information and knowledge are shaped, spread, and utilized to create something valuable. Going a step further, Kraft and Donoso (2017) present a more dynamic view, describing knowledge management as an ongoing journey that involves a series of steps – from identifying and gathering information to creating, accessing, developing, keeping, sharing, using, and even reusing knowledge. This is not a passive process; it is more like a driving force that pushes for better service to those involved. Getting into the details, Young (2022) unveils the careful planning that goes

into knowledge management. This planning involves setting up clear methods and ways of doing things, all designed to make the most out of the knowledge available. To ensure knowledge is used effectively from the moment it is born, as it moves around, and when it is put into action. In simple terms, it is like making sure every piece of knowledge is used wisely to contribute to the overall success of an organization. Looking at the bigger picture, Omotayo (2015) highlights how important knowledge management is in the competitive world. For organizations aiming to stay competitive for a long time, knowledge management is not just a choice – it is a fundamental part of the foundation that supports ongoing success. Similarly, Girard and Girard (2023) back up this idea, describing knowledge management as a dynamic process. This process involves a sequence of steps – from creating knowledge to sharing it, absorbing it, and carefully managing it – each step is carefully planned to make the organization better at what it does.

Varying measures have been considered for knowledge management. In this study, knowledge culture, information gathering and analysis, training, and education are considered as the appropriate constructs of knowledge management in the Telecommunication Industry. Knowledge culture comprises four elements. According to Travica (2013), these are bureaucratic, market, individualistic, and group cultures. Wang and Chen (2017) discovered that the major factor influencing knowledge management is bureaucratic culture. Other empirical research suggests that knowledge-seeking is badly impacted when a competitive culture is combined with a bureaucratic culture (Baker & Ellis, 2018; Hendryadi *et al.*, 2019). A market culture is a form of corporate culture that encourages competition among employees, the firm, and its market competitors.

MNOs must draw from marketing principles to create knowledge for quick adaptability to the dynamic market situation. Knowledge relating to the market environment (with respect to sales volume, customer taste, promotion, advertisement, and improved distribution channel) needs to be codified. Kudryavtsev and Gavrilova (2017) expressed that codification aids in the creation of shared understanding through communicating concepts, facts, and processes. Codification of knowledge is significant for knowledge creation (Kotlarsky *et al.*, 2014; O'Meara & Kelliher, 2021). Travica (2013) posited that individual innovation is necessary in a knowledge culture but should not be primarily based on personal skills. To progress beyond a fiefdom, an organization must rely on creative collaboration. Based on the literature review, knowledge management is associated with knowledge culture, creation, knowledge sharing, application, information gathering, and analysis.

The term "performance" has garnered substantial attention and contributions within the realm of research. Organizational performance emerges as a pivotal focal point within the expansive management domain. This concept, characterized by its multifaceted perspectives, has undergone meticulous examination, revealing its inherent intricacies. A salient point of emphasis is assessing how organizations gauge their performance, a facet that has sparked considerable inquiry. Notably, Maduekwe and Kamala (2016) illuminate a pertinent line of inquiry wherein one of the pivotal concerns revolves around the methodologies employed for quantifying performance. This investigation avenue delves into the essence of how organizations ascertain the efficacy of their endeavors, unveiling a discourse encompassing diverse paradigms. At the heart of this discourse lies the distinctive position that MNOs occupy within their industry. Their performance, a dynamic interplay of operational prowess and strategic prowess, signifies their unique standing within the competitive landscape. Crucially, high-performing MNOs carve their presence by attaining and even surpassing their overarching objectives, juxtaposed against established benchmarks. This distinction underscores their ability to manifest their aspirations into tangible achievements, solidifying their status as exceptional players within the industry. Expanding on this trajectory, Ankrah and Mensah (2015) contribute an insightful perspective, suggesting that the measurement and control of a Telecommunication Organization's performance are contingent on a structured performance

measurement framework intricately aligned with a preconceived strategic roadmap. This proposition suggests a proactive and systematic approach to orchestrating organizational performance, guided by a predetermined strategy. By invoking this methodology, MNOs stand to elevate their present accomplishments and sculpt a trajectory of sustained growth and strategic excellence.

Knowledge Culture and Customer Satisfaction

In the dynamic landscape of organizational operation, a knowledge culture emerges as a guiding principle within enterprises. At its core, a knowledge culture underscores the profound significance of cultivating an environment that nurtures knowledge sharing, celebrates learning, and fuels innovation among the ranks of employees (Mabey & Zhao, 2016). This culture forms through an intricate interplay of factors, ranging from the art of leadership practices and the cadence of communication norms to the bedrock of organizational values. It has been widely acknowledged that a robust knowledge culture wields the potential to usher in a new era of improved organizational performance, catalytic innovation, and, ultimately, heightened customer satisfaction (Rubin, 2016).

In the contemporary business landscape, specifically in telecommunications, MNOs take on the role of pioneers in ensuring connectivity. These organizations, which are highly regarded in the telecommunications industry, coordinate the array of mobile communication services to a vast customer base. Central to this is the immense significance of maintaining customer contentment, which significantly shapes their prosperity. Positioned as the pivotal factor influencing customer retention, loyalty, and market leadership, ensuring customer satisfaction plays a crucial role in this domain (Ali, 2023; Khalayleh & Al-Hawary, 2022). It finds its foundation in service excellence, accurate pricing, expansive network coverage, responsive customer assistance, and the overall user experience. In the dynamic realm of telecommunications, customer satisfaction is the guiding principle that leads MNOs to success (Ahmad *et al.*, 2019).

A significant connection exists between the organizational culture of knowledge, particularly in MNOs, and the core of customer satisfaction. Scholarly investigation has illuminated a noteworthy relationship between an organization's approach to knowledge and the levels of customer contentment (Anderson & Ostrom, 2015; Bordean & Sonea, 2018). It becomes apparent that in MNOs, fostering a culture that ardently supports the exchange of insights not only equips the workforce with the means to meet customer needs, address concerns, and pave the way for innovation but also opens the door to enhanced service provision. As this intricate interplay unfolds, the harmonious relationship between knowledge culture and customer satisfaction reaches its peak, lifting the dimensions of user contentment to unprecedented levels. Embedded within knowledge management practices, organizations, especially MNOs, engage in a series of orchestrated processes and strategies. This orchestration involves the creation, capture, storage, sharing, and application of knowledge, with the aim of transforming raw information into valuable insights.

In the context of MNOs, those adept at navigating the currents of knowledge management find themselves well-placed to explore customer preferences, market trends, and the emerging horizons of technological progress. By seamlessly integrating this awareness into their operational landscape, MNOs skilfully prepare the groundwork for a rich array of services, forming a harmonious composition that enhances the very fabric of customer satisfaction. The significance of fostering a knowledge culture cannot be underestimated, especially when cultivating employee training and development. In MNOs, a strong emphasis on knowledge often leads to investments in programs aimed at nurturing employee growth. The outcomes of these endeavors are substantial: employee skills are refined, knowledge is enriched, and capabilities are amplified. A diverse range of expertise emerges, enabling employees to excel in providing enhanced customer support and driving the evolution of products and

services. As this remarkable process unfolds, the impact of employee training and development creates a harmonious arrangement that resonates through heightened customer satisfaction. Amidst the rapid technological shifts that characterize the telecommunications industry, the value of innovation and adaptability becomes undeniable. At its core, a knowledge culture provides MNOs with a wellspring of innovation and flexibility. Within this context, MNO innovation thrives due to the culture that encourages the proliferation of ideas and the courage to experiment. This mind-set positions MNOs at the forefront of effectively addressing evolving customer demands, akin to a masterpiece in motion. In this realm of constant change, a stage is set where a knowledge culture, intertwined with innovation and adaptation, emerges as a guiding light, leading MNOs toward the realms of customer satisfaction and triumph.

Knowledge Creation and Competitiveness of MNOs

Extensive research consistently highlights the profound and far-reaching influence of knowledge creation on an organization's competitive prowess within the ever-evolving landscape of modern business. The essence of knowledge creation embodies the intricate process of engendering, amassing, and amalgamating novel information, discerning insights, and specialized expertise within the confines of an organization. This knowledge orchestration is steered by many mechanisms, including but not limited to research and development (R&D), collaborative endeavors, educational initiatives, and the nurturing of a culture that champions knowledge sharing (Caiazza *et al.*, 2015).

The effect of knowledge creation on the competitiveness of MNOs is a pivotal factor that can significantly shape their success in the dynamic telecommunications industry. Knowledge creation within MNOs involves the process of generating, accumulating, and disseminating new information, insights, and expertise. This practice is instrumental in influencing various aspects of MNOs' competitiveness. Knowledge creation fosters an environment of innovation within MNOs. MNOs can identify emerging trends, technologies, and customer preferences by continually generating and sharing knowledge. This knowledge empowers them to develop novel products, services, and features that differentiate them from competitors (Gutierrez-Gutierrez *et al.*, 2018; Karia, 2018). In a rapidly evolving industry, the ability to offer unique and innovative solutions can establish MNOs as market leaders. A culture of knowledge creation enables MNOs to stay attuned to changes in the telecommunications landscape. By monitoring market trends and customer feedback, MNOs can promptly adjust their strategies and offerings. This agility allows them to respond swiftly to shifts in consumer demands and technological advancements, positioning them ahead of competitors that might lag in adaptation. Effective knowledge-creation practices contribute to operational efficiency (Abubakar *et al.*, 2017; Kianto *et al.*, 2017). As MNOs accumulate knowledge about best practices, optimal processes, and performance benchmarks, they can streamline their operations. Efficiency gains result in cost savings, improved resource allocation, and the ability to provide services at competitive price points.

Knowledge Sharing and Service Quality

A substantial body of scholarly research has consistently highlighted the pivotal and transformative role of knowledge sharing in enhancing the quality of services offered (Nguyen & Malik, 2022; Yan *et al.*, 2016). These studies collectively shed light on the potent link between the dissemination of knowledge and the optimization of service standards within various organizational contexts. Organizations that have proactively cultivated a culture of knowledge sharing among their workforce have invariably reaped the rewards through enhanced service delivery and elevated levels of customer satisfaction. The practice of facilitating the exchange of insights, expertise, and information among employees has been observed to empower them with a broader skillset and a deeper understanding of customer needs (Kopalle *et al.*, 2020; Valk & Planojevic, 2021).

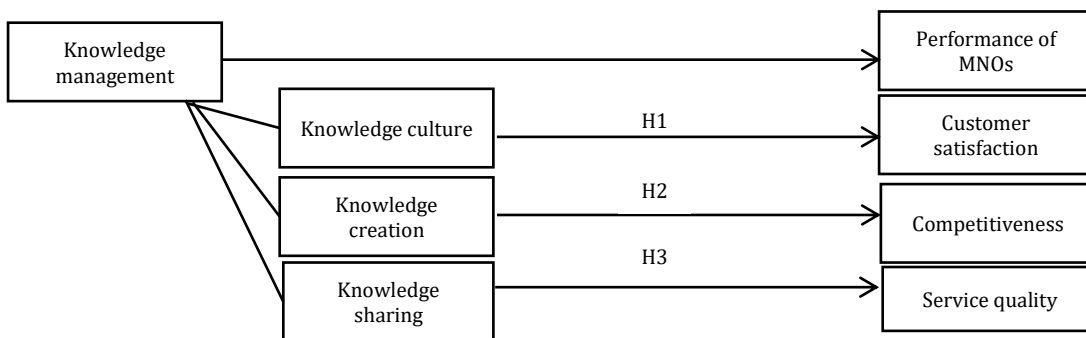
The emergence and widespread adoption of digital platforms and collaborative tools today profoundly influenced the landscape of knowledge sharing. Research endeavors delved into the dynamics of technology-mediated knowledge-sharing platforms, such as internal social networks and knowledge bases, and their intricate interplay with enhancing service quality (Lavrynenko et al., 2018; Kopalle et al., 2020). These investigations illuminated a notable trend: the instrumental role of such platforms in augmenting the accessibility of information and fostering seamless, real-time communication among organizational members. By enabling a more interconnected and responsive knowledge-sharing environment, these platforms played a pivotal role in expediting problem-solving processes (Lim et al., 2022). The pace at which challenges were addressed and resolved was accelerated, culminating in an overall enhancement of service quality.

Researchers Cvitanovic et al. (2016) and Kumar et al. (2018) have explored the challenges and obstacles that impede effective knowledge sharing. Within this realm, certain issues like a lack of

motivation, apprehensions regarding knowledge hoarding, and the presence of organizational silos have consistently emerged as stumbling blocks to successful knowledge-sharing practices. Addressing these barriers emerged as an imperative task, as their resolution was key to fostering positive impacts on service quality. Organizations that fostered a culture characterized by trust, collaboration, and recognition for knowledge sharing were observed to yield superior outcomes in terms of service quality. This highlights the crucial role of an organizational environment that champions the open exchange of knowledge in nurturing enhanced service experiences.

In a broader context, the ties between knowledge sharing, innovation, and continuous service enhancement have been widely acknowledged. Organizations that effectively facilitated knowledge sharing were naturally inclined to spot service gaps, devise novel solutions, and adeptly adapt to customers' ever-evolving needs (Tarek, 2023). Knowledge sharing has proven to be an indispensable catalyst for organizational growth and agility. *Conceptual Framework of Knowledge Management and Performance of MNOs.*

Figure 1



Note: Author's design.

Objectives

The study's main objective was to explore the phenomenon of knowledge management and performance of MNOs in Nigeria. The specific objectives of the study were to:

1. Investigate the effect of the knowledge culture of MNOs on customer satisfaction in North Central Nigeria.
2. Examine the effect of knowledge creation on the competitiveness of MNOs in North Central Nigeria.
3. Ascertain how knowledge sharing affects service quality among MNOs in North Central Nigeria.

Methodology

Design

The research design is a crucial aspect of any research as it outlines the procedures and methods for conducting the study. In this study, the survey research design was utilized. This design involved gathering data from a sample of individuals through a questionnaire survey.

Population

The target of this study was the MNOs operating in North Central Nigeria, specifically focusing on those within the telecommunications industry. This included all MNOs that provide mobile services and operate within the defined geographical region. The total number of 7,750 employees of MNOs makes up the population size. Through strategic initiatives, innovative services, and a relentless commitment to meeting customer needs, these operators persistently bolster the knowledge of these employees and solidify their influence and presence within the mobile communication sector.

Sampling Techniques

For this study, the researcher employed the stratified random sampling technique to select the sample. This approach involved partitioning the targeted population, in this case, the staff members of the MNOs, into distinct strata based on shared characteristics. These strata encompassed departments, organizational levels, or any other pertinent attributes deemed significant by the researcher. The strata were defined, and a random sample was drawn from each group, employing a random number generator. This procedure guarantees that each stratum's representation in the sample is proportional to its size within the entire population (Ganju & Zhou, 2011).

Sample Size of the Study

To optimize the statistical accuracy of the research, a specific parametric statistical equation was utilized to derive a suitable sample size for the study. The sample size was determined through the application of Sallant and Dillman's (1997) sampling methodology. This approach is advantageous due to its robust statistical capability, ensuring a precise measurement level and effective stratification. It assures the selection of pertinent units of analysis with a heightened degree of accuracy. The formula is shown below:

$$N_s = \frac{N_p (p)(1 - p)}{(N_p - 1) \left(\frac{B}{C}\right)^2 + (p)(1 - p)}$$

Where:

Ns= completed sample size required

Np= Sample population

P= proportion expected to answer in a certain way (50% or 0.5 is most conservative)

B= acceptable level of sampling error (0.05 = ±5%; 0.03 = ± 3%)

C= Z statistic associated with the confidence interval (1.645=90% confidence level; 1.960=95% confidence level; 2.576=99% confidence level)

Table 5 presents the marital status of respondents. Among the 357 total respondents, a substantial 285 individuals identify as single, representing 79.8%. This dominant segment implies that a significant proportion of the study's cohort navigates their professional responsibilities independently, without the additional considerations and commitments associated with marital life. Seventy-one respondents, constituting 19.9% of the total, report being married. This demographic segment is crucial for exploring how the responsibilities and dynamics of married life intersect with professional roles within the MNO industry. A singular case, representing .3% of the total responses, identifies as a widow(er). Insights from this individual may offer a unique perspective on managing knowledge and performance.

Table 6
Educational Qualifications of Respondents

	Respondents	<i>f</i>	%
Valid	OND/Equivalence	240	67.2
	HND/B.Sc	112	31.4
	MBA/M.Sc	5	1.4
Total		357	100

Note. Data collected by author on the 2023.

Table 6 shows the educational qualifications of the respondents, providing valuable information about the academic backgrounds that contribute to the professional landscape within Nigeria's MNO industry. The most prevalent educational qualification among the respondents is OND/Equivalence, with 240 individuals accounting for 67.2% of the total. This indicates a substantial representation of individuals with a diploma or its equivalent, highlighting the importance of considering diverse educational backgrounds within the workforce. A significant portion of respondents, 112 individuals (31.4%), possess HND/B.Sc qualifications. With higher national diplomas or bachelor's degrees, this group brings a different set of skills and knowledge to the industry, potentially influencing knowledge management practices and overall performance. A smaller yet noteworthy segment, consisting of 5 respondents (1.4% of the total), holds an MBA/M.Sc qualifications. With advanced degrees, this group may contribute unique perspectives to the study, particularly in areas related to strategic knowledge management and its impact on performance.

Table 7
Experience of Respondents

	Respondents	<i>f</i>	%
Valid	Below 5 Year	102	28.6
	6-11 Years	102	28.6
	12-17 Years	66	18.5
	18-23 Years	56	15.7
	24-29 Years	15	4.2
	30-35 Years	16	4.5
Total		357	100

Note. Data collected by author on the 2023.

Table 7 shows the professional experience of the respondents. The result reveals that 102 respondents (28.6%) possess professional experience below five years. This group represents a substantial segment of relatively early-career professionals, potentially bringing fresh perspectives and adaptability to the industry. An equivalent number of respondents, 102 (28.6% of the total), fall within the 6-11 years' experience range. This suggests a balanced representation of mid-level professionals, contributing to the richness of the study by offering insights into the challenges and opportunities faced during this phase of their careers. A slightly smaller group of 66 respondents (18.5%) has accumulated experience in the 12-17 years' range. This cohort likely includes seasoned professionals with a wealth of industry knowledge and practical insights into the details of mobile network operations. The result indicates that 56 respondents

(15.7%) fall within the 18-23 years' experience range. This group represents a significant cadre of experienced professionals, potentially offering a deep understanding of the historical and evolving aspects of the industry. A smaller yet notable segment consists of 15 respondents (4.2% of the total) with experience spanning 24-29 years. This group likely comprises industry professionals who have witnessed substantial changes in the MNO landscape. The study captures 16 respondents (4.5%) with extensive experience ranging from 30 to 35 years. This group represents a select cadre of professionals with a long-standing and profound understanding of the MNO industry, contributing valuable perspectives shaped by their extensive tenure.

Table 8
Descriptive Statistics of Knowledge Culture

Knowledge culture	Min.	Max.	<i>M</i>	<i>SD</i>
Knowledge sharing encouragement	1.00	5.00	3.20	1.51
Continuous learning opportunities	1.00	5.00	3.19	1.50
Promotion of collaboration and communication	1.00	5.00	3.19	1.51
Learning from mistakes	1.00	5.00	3.22	1.50
Support for innovation and creative thinking	1.00	5.00	3.17	1.52
Accessible knowledge repository	1.00	5.00	3.20	1.50
Management commitment to the learning culture	1.00	5.00	3.20	1.50
Recognition for knowledge-sharing contributions	1.00	5.00	3.21	1.50
Facilitation of knowledge exchange	1.00	5.00	3.21	1.52
Alignment of training programs with organizational goals	1.00	5.00	3.19	1.51

Note. *N* = 357. Min. = minimum; Max. = maximum.

Table 8 unveils descriptive statistics of knowledge culture within MNOs. The *M* and *SD* values offer a quantitative understanding of the degree of consensus and response variability. The result shows knowledge-sharing encouragement (*M* = 3.20, *SD* = 1.51). This implies that knowledge sharing is perceived to be moderately encouraged and rewarded within the organization. The *SD* suggests some variability in opinions, indicating diverse perspectives among participants. The table shows continuous learning opportunities (*M* = 3.19, *SD* = 1.50). Respondents express a moderate perception that employees are provided opportunities for constant learning and development. The *SD* implies a relatively consistent viewpoint among respondents.

The result shows the promotion of collaboration and communication (*M* = 3.19, *SD* = 1.51). The MNOs are seen as actively promoting collaboration and cross-functional communication to a moderate extent. The *SD* indicates a degree of variability in participant perceptions. The table shows learning from mistakes (*M* = 3.22, *SD* = 1.50). Mistakes being treated as learning opportunities are moderately perceived within the MNOs. The *SD* suggests some diversity in how respondents perceive this aspect.

The table reveals support for innovation and creative thinking (*M* = 3.17, *SD* = 1.52). This implies that innovation and creative thinking are perceived to be moderately valued and supported. The *SD* indicates a notable range of opinions among participants. Accessible knowledge repository (*M* = 3.20, *SD* = 1.50). This implies that participants report a moderate perception of a clear and accessible knowledge repository. The *SD* suggests some variability in opinions about the accessibility of information. The result shows management commitment to learning culture (*M* = 3.20, *SD* = 1.50). That is, senior management is perceived to moderately demonstrate commitment to fostering a culture of learning. The standard deviation indicates a degree of variability in participant perceptions.

The result reveals recognition of knowledge-sharing contributions ($M = 3.21, SD = 1.50$). This means that employees feel moderately recognized and appreciated for their contributions to knowledge sharing. The SD suggests some diversity in perceptions of recognition within the MNOs. The result shows facilitation of knowledge exchange ($M = 3.21, SD = 1.52$). The MNOs are perceived to provide moderate support through platforms or tools for knowledge exchange. The standard deviation implies varying opinions among participants. Alignment of training programs with organizational goals ($M = 3.19, SD = 1.51$). Training and development programs are perceived to be moderately aligned with the organization's goals and strategies. The SD indicates some diversity in participant perspectives. These M and SD values offer a comprehensive overview of the perceived strengths and variabilities in the organizational knowledge culture as reported by the study participants.

Table 9
Descriptive Statistics of Knowledge Creation

Knowledge creation	Min.	Max.	M	SD
Active encouragement for exploring new ideas	1.00	5.00	2.84	1.45
Formation of cross-functional teams for innovation	1.00	5.00	2.67	1.34
Freedom to Experiment and Take Calculated Risks	1.00	5.00	2.62	1.32
Formal process for capturing and documenting new knowledge	1.00	5.00	2.60	1.32
Organized sessions for creative thinking and brainstorming	1.00	5.00	2.57	1.34
Established feedback loops for learning from successes and failures	1.00	5.00	2.59	1.33
Regular tapping into external sources for inspiration	1.00	5.00	2.64	1.33
Encouragement and recognition for introducing new concepts	1.00	5.00	2.64	1.35
Allocation of time and resources for research and development	1.00	5.00	2.70	1.39
Availability of forums for sharing emerging knowledge	1.00	5.00	2.76	1.41

Note. $N = 357$. Min. = minimum; Max. = maximum.

Table 9 shows descriptive statistics illuminating the landscape of knowledge creation within the MNOs. The result shows active encouragement for exploring new ideas ($M = 2.84, SD = 1.45$). This implies that the MNOs are perceived to encourage employees to explore new ideas and concepts moderately. The SD suggests a notable range in respondents' opinions regarding the extent of encouragement. Formation of cross-functional teams for innovation ($M = 2.67, SD = 1.34$). Forming cross-functional teams for collaborative innovation is perceived at a moderate level. The SD indicates variability in respondent perceptions of the effectiveness of such teams.

The table shows the freedom to experiment and take calculated risks ($M = 2.62, SD = 1.32$). This means that employees are perceived to have moderate freedom to experiment and accept calculated risks. The SD implies diversity in opinions on the level of freedom provided. Also, the result shows the formal process for capturing and documenting new knowledge ($M = 2.60, SD = 1.32$). That is, the existence of a formal process for capturing and documenting new knowledge is perceived at a moderate level. The SD suggests variability in opinions regarding the effectiveness of this process.

The result shows organized sessions for creative thinking and brainstorming ($M = 2.57, SD = 1.34$). This means creative thinking and brainstorming sessions are perceived to be organized to a moderate extent. The SD indicates a range of

opinions regarding the effectiveness of these sessions. Established feedback loops for learning from successes and failures ($M = 2.59, SD = 1.33$). This signifies that the presence of feedback loops to learn from both successes and failures is perceived at a moderate level. The SD implies diversity in opinions on the effectiveness of these feedback mechanisms. The result shows 'regular tapping into external sources for inspiration' ($M = 2.64, SD = 1.33$). This means regular tapping into external sources of information and expertise for inspiration is moderate. The SD suggests variability in participant opinions regarding the efficacy of this practice.

The result in the table shows encouragement and recognition for introducing new concepts ($M = 2.64, SD = 1.35$). This implies that the encouragement and recognition of employees who introduce new concepts occur at a moderate level. The SD indicates varying opinions on the extent of encouragement and recognition. The allocation of time and resources for research and development ($M = 2.70, SD = 1.39$) implies moderate time and resources allocated for research and development initiatives. The SD implies diversity in opinions regarding the adequacy of these allocations. The result shows the availability of forums for sharing emerging knowledge ($M = 2.76, SD = 1.41$). Regular forums or platforms for sharing emerging knowledge are available to a moderate extent. The SD suggests variability in opinions regarding the effectiveness of these forums. However, the descriptive statistics in Table 9 provide a nuanced understanding of participants' perceptions of knowledge creation within the MNOs.

Table 10
Descriptive Statistics of Knowledge Sharing

Knowledge sharing	Min.	Max.	M	SD
Willingness to share knowledge and expertise	1.00	5.00	2.73	1.31
Readiness of colleagues to provide information	1.00	5.00	2.55	1.22
Open communication about lessons learned	1.00	5.00	2.47	1.18
Freely exchanged knowledge across Departments and teams	1.00	5.00	2.51	1.20
Mechanisms for sharing best practices and success stories	1.00	5.00	2.51	1.22
Facilitation of information sharing through Collaborative tools or platforms	1.00	5.00	2.57	1.20
Comfort in asking for help or guidance from peers	1.00	5.00	2.47	1.19
Recognition and valuing of knowledge Sharing by the organization	1.00	5.00	2.46	1.19
Regular opportunities for informal knowledge exchange	1.00	5.00	2.46	1.19
Training and workshops are provided to enhance knowledge-sharing skills	1.00	5.00	2.75	1.37

Note. $N = 357$. Min. = minimum; Max. = maximum.

Table 10 shows the descriptive statistics on the dynamics of knowledge sharing within the MNOs. The result shows a willingness to share knowledge and expertise ($M = 2.73, SD = 1.3$). This means employees are moderately willing to share their knowledge and expertise with colleagues. The SD indicates a range of attitudes among participants, reflecting varying levels of willingness. The readiness of colleagues to provide information ($M = 2.55, SD = 1.22$) reveals that participants perceive a moderate level of preparedness among colleagues to provide information when needed. The SD suggests variability in opinions about the accessibility and willingness of colleagues to share information. The result shows that open communication about lessons learned ($M = 2.47, SD = 1.18$). There is a perception of moderate open communication about lessons learned from past experiences. The SD indicates diversity in opinions about the extent of openness in sharing lessons learned.

The result shows 'freely exchanged knowledge across departments and teams' ($M = 2.51, SD = 1.20$). Knowledge is perceived to be moderately exchanged across departments and teams. The SD suggests variability in opinions about the effectiveness of knowledge exchange mechanisms. Also, the result shows mechanisms for sharing best practices and success stories ($M = 2.51, SD = 1.22$). This means that participants perceive the existence of moderate mechanisms for communicating best practices and success stories. The SD implies varying opinions on the effectiveness of these mechanisms. The result on facilitating information sharing through collaborative tools or platforms ($M = 2.57, SD = 1.20$) indicates that collaborative tools or platforms are perceived to facilitate the easy sharing of information moderately. The SD indicates variability in opinions about the effectiveness of these tools.

The result in table 10 shows comfort in asking for help or guidance from peers ($M = 2.47, SD = 1.19$). This implies that employees feel moderately comfortable asking for help or guidance from their peers. The SD suggests diversity in opinions about the perceived comfort level. Recognition and valuing of knowledge sharing by the organization ($M = 2.47, SD = 1.19$) reveals that knowledge sharing is perceived to be moderately recognized and valued by the organization. The SD implies varying opinions on the extent of recognition and value attributed to knowledge sharing.

The result on regular opportunities for informal knowledge exchange shows ($M = 2.46, SD = 1.19$). That is, there is a perception of moderate regular opportunities for informal knowledge exchange. The SD indicates variability in opinions about the frequency and effectiveness of these opportunities. The result also shows 'provision of training and workshops to enhance knowledge sharing skills' ($M = 2.75, SD = 1.37$). That is, training and workshops provided a moderate extent for enhancing knowledge-sharing skills. The SD suggests diversity in opinions about the effectiveness of these training initiatives. The descriptive statistics in Table 10 offer a nuanced understanding of participants' perceptions regarding knowledge sharing within the organization.

Table 11
Effect of Knowledge Culture of MNOs on Customer Satisfaction

Variable	Coefficient	SE	t-Statistic	Prob.
C	.23	.12	1.82	.07
KCE	.80	.03	23.34	.000
R^2	.61	M dependent var		2.77
Adjusted R^2	.60	SD dependent var		1.55
SE of regression	.97	Akaike info criterion		2.790557
SS resid	335.75	Schwarz criterion		2.81
Log likelihood	-494.72	Hannan-Quinn criter.		2.80
F-statistic	544.91	Durbin-Watson stat		1.81
Prob(F-statistic)	.00			

Note. SS = sum of square; KCE = Knowledge Culture; CSN = Customer Satisfaction; μ = Stochastic Error Term. Author's Computation Using E-view 12.

$$Model\ Line : CSN_{it} = \beta_{0it} + \beta_{1it} KCE + \mu$$

$$Regression\ Line : CSN = 0.22 + 0.80KCE$$

Table 11 shows the effect of the knowledge culture of MNOs on customer satisfaction ($R^2 = .61$). This implies that the proportion of the variance in customer satisfaction explained by the knowledge culture of MNOs is 60.62%. This indicates a relatively strong explanatory power of the model. The remaining 39.38% shows that other variables can also account for the variations in customer satisfaction. The adjusted R^2 value for the predictor in the model is 60.51%. The F -statistic tests the overall significance of the model. The high F -statistic of 544.91 with a very low associated probability (0.00) suggests that the model as a whole is statistically significant. The probability associated with the F -statistic is .00, indicating that the overall regression model is highly important. The Durbin-Watson statistics is 1.81, showing that there is no issue of autocorrelation in the residual.

The table presents the regression analysis results examining the effect of the knowledge culture of MNOs on customer satisfaction. The constant term is .22. This represents the expected value of the dependent variable (customer satisfaction) when the independent variable (knowledge culture of MNOs) is zero. The standard error for the constant term is .12. The t -statistic for the constant is 1.82. Its associated probability is .07 (slightly above the common significance threshold of .05). The coefficient for the Knowledge Culture of MNOs is .80. This shows that for a one-unit increase in the knowledge culture of MNOs, customer satisfaction is expected to increase by approximately .80 units. The standard error for the knowledge culture variable is .03. The t -statistic for it is 23.34, and its associated probability is .00 (highly significant).

Table 12
Effect of Knowledge Creation on the Competitiveness Of MNOs

Variable	Coefficient	SE	t-Statistic	Prob.
C	1.96	.14	13.71	.00
KCN	.49	.05	10.03	.00
R^2	.22	M dependent var		3.24
Adjusted R^2	.21	SD dependent var		1.39
SE of regression	1.23	Akaike info criterion		3.26
SS resid	535.22	Schwarz criterion		3.28
Log likelihood	-577.72	Hannan-Quinn criter		3.27
F-statistic	100.54	Durbin-Watson stat		1.59
Prob(F-statistic)	.00			

Note. SS = sum of square; KCN = Knowledge Creation; COM = Competitiveness of MNOs; μ = Stochastic Error Term. Author's Computation Using E-view 12

$$Model\ Line : COM_{it} = \beta_{0it} + \beta_{1it} KCN + \mu$$

$$Regression\ Line : COM = 1.96 + 0.49KCN$$

Table 12 shows R^2 of .22 for the effect of knowledge creation on the competitiveness of MNOs. The proportion of the variance in the competitiveness of MNOs explained by knowledge creation is 22.12%. This suggests that knowledge creation accounts for a moderate portion of the variability in competitiveness. The remaining 77.88% shows that other variables can account for a very high portion of the variability in competitiveness. The adjusted R^2 value for the predictor in the model is 21.90%. The F -statistic tests the overall significance of the model. The high F -statistic of 100.54 with a very low associated probability (.00) suggests that the model as a whole is statistically significant. The Durbin-Watson statistics is 1.59, showing that there is no issue of autocorrelation in the residual.

The table shows the regression analysis results examining the effect of knowledge creation on the competitiveness of MNOs. The constant term is 1.96. This represents the expected value of the competitiveness of MNOs when knowledge creation is zero. The standard error for the constant term is .143. The t -statistic for the constant is 13.71, and its associated probability is .00, indicating its significance. The coefficient for knowledge creation is .49. This indicates that for a one-unit increase in knowledge creation, the competitiveness of MNOs is expected to increase by approximately .49 units. The standard error for the knowledge creation variable is .05. The t -statistic for the variable is 10.03, and its associated probability is .00, indicating its high significance.

Table 13
Effect of Knowledge Sharing on Service Quality among MNOs

Variable	Coefficient	SE	t-Statistic	Prob.
C	.79	0.12	6.64	0.00
KSG	.84	0.04	19.28	0.00
R^2	.51	<i>M</i> dependent var		2.86
Adjusted R^2	.50	<i>SD</i> dependent var		1.40
SE of regression	.98	Akaike info criterion		2.80
SS resid	337.46	Schwarz criterion		2.82
Log likelihood	-495.62	Hannan-Quinn criter		2.80
<i>F</i> -statistic	371.59	Durbin-Watson stat		2.18
Prob(<i>F</i> -statistic)	.00			

Note. SS = sum of square; KCN = Knowledge Sharing; SQY = Service Quality among MNOs; μ = Stochastic Error Term.

Author's Computation Using E-view 12

Model Line: $SQY_{it} = \beta_{0it} + \beta_{1it}KSG + \mu$

Regression Line: $SQY = 0.79 + 0.84KSG$

Table 13 examines the effect of knowledge sharing on service quality among MNOs (given the $R^2 = .51$). The proportion of the variance in service quality among MNOs explained by knowledge sharing is 51.21%. This suggests that knowledge-sharing accounts for a substantial portion of the variability in service quality. The adjusted R^2 value for the predictor in the model is 51.07%. The F -statistic tests the overall significance of the model. The high F -statistic of 371.59 with a very low associated probability (.00) suggests that the model as a whole is statistically significant. The Durbin-Watson statistics is 2.18, showing that there is no issue of autocorrelation in the residual.

The coefficient of constant term is .79. This represents the expected value of service quality among MNOs when knowledge sharing is zero. The standard error for the constant term is .12. The t-statistic for the constant is 6.64, and its associated probability is .00, indicating its significance. The coefficient for knowledge sharing is .84. This indicates that for a one-unit increase in knowledge sharing, the service quality among MNOs is expected to increase by approximately .84 units. The standard error for the knowledge-sharing variable is .04. The t-statistic for the knowledge-sharing variable is 19.28, and its associated probability is .00, indicating its high significance.

Discussion

Findings showed that the knowledge culture of MNOs has a significant positive effect on customer satisfaction in North Central Nigeria. This supports the finding of Smith and Brown (2021) that a robust knowledge culture has a significant and positive impact on customer satisfaction. The findings of Gupta and Sharma (2020) also demonstrated a strong positive correlation between knowledge culture and customer satisfaction. How MNOs approach, knowledge and culture significantly affect their customers' satisfaction (Nguyen & Le, 2017). This connection is crucial in a region where technology, culture, and innovation shape the customer experience. Within MNOs, this culture becomes crucial as the telecommunications sector undergoes continuous change. North Central Nigeria, known for its diverse demographics and cultural richness, becomes a distinctive environment where the interaction between knowledge culture and customer satisfaction becomes noticeable. The deployment of cutting-edge technology necessitates a workforce with the requisite knowledge and skills. MNOs in the region, cognizant of this imperative, have embraced a knowledge culture that prioritizes continuous learning and development. Employees are adept at utilizing the latest technological tools and are encouraged to explore innovative solutions to address customer needs. This proactive approach contributes significantly to a seamless customer experience, where technical issues are resolved promptly and services are tailored to individual preferences (Chen & Zhang, 2019).

The positive effect of knowledge culture is not confined to the internal operations of MNOs; it also permeates the customer-facing aspects. Customers are increasingly discerning and well-

informed in an era where information is a potent currency. MNOs that foster a knowledge culture empower their customer service teams to provide accurate and relevant information, enhancing overall customer satisfaction. This synergy between organizational knowledge and customer interactions creates a virtuous cycle, where satisfied customers become brand advocates, further bolstering the MNO's reputation in the market.

Findings showed that knowledge creation has a significant positive effect on the competitiveness of MNOs in North Central Nigeria. This aligns with the findings of Anderson and Smith (2022) and Martinez and Garcia (2018) that a strong positive connection exists between creating new knowledge and heightened competitiveness. Also, the study of Jensen and Brown (2019) unveiled a significant and positive relationship between knowledge-creation activities and the overall competitiveness of startups. In the dynamic and competitive landscape of North Central Nigeria's telecommunications industry, the role of knowledge creation within MNOs emerges as a pivotal factor influencing their overall competitiveness. This finding underscores the importance of fostering an environment where the generation, dissemination, and application of knowledge are encouraged and deeply ingrained in the organizational culture.

The telecommunications sector is inherently technology-driven, with rapid advancements shaping the industry's trajectory. MNOs that prioritize knowledge creation are better equipped to navigate this ever-evolving landscape. This adaptability stems from a workforce that is well-versed in current technologies and actively engaged in staying ahead of emerging trends. One of the key ways in which knowledge creation positively impacts MNO competitiveness is through enhanced innovation (Yu et al., 2017). In an era where consumer expectations are continually evolving, MNOs that foster a culture of creativity and knowledge sharing are better positioned to develop and launch products that resonate with the market. This innovation is not confined to technical aspects alone; it extends to the design of customer-centric service plans, pricing models, and even novel approaches to customer engagement. By leveraging internally generated knowledge, MNOs can differentiate themselves from competitors, offering unique and tailored solutions that meet the evolving needs of their customer base.

Findings revealed that knowledge sharing significantly affects service quality among MNOs in North Central Nigeria. This advances the study of Zamir and Kim (2022), which found that service quality significantly influences only knowledge sharing. The finding also asserts clarity on the study of Gupta and Sharma (2020), which found that a culture of knowledge sharing and learning significantly tailors services to customer preferences. In the dynamic and rapidly evolving landscape of North Central Nigeria's mobile telecommunications sector, the significance of knowledge sharing within MNOs emerges as a critical factor influencing service quality. This finding highlights the pivotal role of collaborative information exchange and dissemination within organizations in a region characterized by diverse demographics and cultural nuances. Knowledge sharing is not merely the transfer of information; it represents a collaborative process where insights, experiences, and expertise are shared across different levels of an organization. In the context of MNOs in North Central Nigeria, where the telecommunications industry is a key player in connecting communities, the positive impact of knowledge sharing on service quality is substantial.

One of the primary ways knowledge sharing enhances service quality is by developing collective expertise among employees (Shujahat et al., 2017). In a technologically advanced sector such as mobile telecommunications, staying abreast of the latest technological advancements is paramount. MNOs that foster a culture of knowledge sharing create an environment where employees can pool their skills and experiences, resulting in a more informed and proficient workforce. This collective expertise not only aids in quicker problem resolution but also facilitates the identification and implementation of best practices, ultimately elevating the overall quality of services provided. Moreover, knowledge sharing contributes to a more streamlined and efficient customer support system. With a shared pool of information and experiences, customer service representatives are better equipped to address various customer queries and

concerns. This translates into quicker response times, accurate issue resolution, and improved customer experience. In a region as diverse as North Central Nigeria, where customer expectations and needs vary, a well-informed and collaborative customer support system becomes essential for ensuring service quality that resonates with the local populace.

Conclusion

Managing knowledge is crucial for the performance of MNOs in North Central Nigeria. The symbiotic relationship between customer satisfaction and knowledge culture within MNOs in North Central Nigeria is evidence of the transformational power of such organizational practices. Prioritizing the development of a knowledge culture can help MNOs negotiate the industry's challenges and become architects of unmatched customer satisfaction as the telecommunications landscape changes. This intersection of knowledge culture and customer satisfaction drives MNOs into a future where success in the dynamic market is defined by innovation, empathy, and agility.

Knowledge creation has a variety of beneficial effects on MNOs' competitiveness in north-central Nigeria. The effects of a strong culture of knowledge creation are seen in many areas of MNO operations, from encouraging innovation to raising employee satisfaction and operational effectiveness. MNOs who recognize and capitalize on knowledge creation are better positioned to survive in the quickly changing telecommunications world and better positioned to take the lead in an industry where innovation and agility are critical.

In north-central Nigeria, knowledge sharing among MNOs has a significant and wide-ranging positive effect on service quality. Knowledge sharing helps to create a more robust and customer-focused mobile telecommunications industry by empowering employees with pooled expertise, improving customer support systems, and encouraging industry collaborations. In addition to being better positioned to deliver high-quality services, MNOs that prioritize and invest in efficient knowledge-sharing methods can also be more competitive in an industry where flexibility and teamwork are critical. This is because MNOs must continue to negotiate the complexity of the market.

Recommendations

Based on the findings of the study, the study makes the following recommendations:

1. MNOs should prioritize and actively cultivate a robust knowledge culture within their organizations. They should invest in training programs, knowledge-sharing platforms, and collaborative initiatives that promote a culture of curiosity, innovation, and adaptability among their employees. By nurturing a knowledge culture, MNOs can enhance their ability to understand and respond to customer needs, resolve issues efficiently, and stay ahead of industry trends. This proactive approach will positively impact customer satisfaction.
2. MNOs should actively foster continuous knowledge creation within their organizations. They should invest in research and development initiatives, provide opportunities for skill-building and training, and create cross-functional knowledge-sharing platforms. By prioritizing knowledge creation, MNOs can position themselves as industry leaders, stay ahead of market trends, and continuously innovate their products and services. This proactive approach will enhance the overall competitiveness of MNOs in the rapidly evolving telecommunications sector.
3. The management of MNOs should establish and nurture a culture of effective knowledge sharing within their organizations. MNOs can invest in digital collaboration tools, encourage cross-departmental knowledge exchange, and create forums for regular communication. By fostering a culture where information flows freely and insights are shared, they can enhance problem-solving capabilities, improve operational efficiency, and ultimately elevate customer service quality.

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