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Research Article

Strategic Engagement of Scholars with ICT Infrastructure for Enhancing MSMEs' Access to Research Innovations in Kaduna State

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ABSTRACT

This study investigates researchers' perspectives on the availability, accessibility, and utilisation of ICT infrastructure for disseminating research innovations to MSMEs in Kaduna State, Nigeria. Grounded in the UTAUT and the DOI theory, the research explores how digital tools and systems facilitate or hinder the transmission of academic knowledge to industry stakeholders. A descriptive survey design was adopted, and data were collected using a structured instrument, the Dissemination of Research Innovations Questionnaire (DRIQ). A total of 300 scholars were selected using simple random sampling from a population of 936 academic scholars. Descriptive statistics, specifically mean and standard deviation, were used to analyse the data, with a benchmark mean score of 2.5 set to determine agreement levels. Findings reveal that while basic ICT infrastructure exists in some institutions, significant gaps persist in accessibility, specific research dissemination, and digital engagement with MSMEs. Scholars expressed concern over low awareness, limited open-access platforms, and weak academic-industry linkages. These limitations obstruct the visibility and usability of research outputs among MSMEs. The study concludes that bridging these gaps requires strategic investments in ICT infrastructure, targeted dissemination mechanisms, and collaborative frameworks that align academic innovation with the needs of MSME development. The study recommends stronger investments in ICT infrastructure across research institutions and the establishment of open-access digital repositories to improve MSMEs' access to relevant innovations. Strengthened academic-industry collaboration is also vital for aligning research with the real-time needs of MSMEs and promoting sustainable knowledge transfer.

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Introduction

Bridging the gap between research and its practical application in industries has become a pressing concern, particularly as stakeholders demand tangible benefits from research investments. The relationship between knowledge generation and its real-world impact is often fraught with complexities that hinder effective utilization [1], [2], [3]. Díaz-Rodríguez et al. [4] argue that research findings, regardless of their robustness, do not automatically translate into

actionable outcomes unless they are deliberately communicated and aligned with the needs of end users. Similarly, Okoye et al. [5] emphasise that research uptake is influenced by social, economic, and institutional factors determining whether research findings will be considered relevant or ignored. The growing urgency to justify public investment in research further reinforces the need for effective dissemination. Reed et al. [6] note that policymakers and funding bodies increasingly demand evidence of research impact as a measure of accountability.

The challenge of bridging this gap is particularly pronounced in Nigeria, where research findings often fail to translate into tangible economic and industrial advancements. Iroha et al. [7] highlight the weak link between research institutions and industries in Nigeria, which has led to the underutilisation of locally produced knowledge. Despite the substantial research output from Nigerian universities and institutes, many industries continue to depend on imported knowledge and technologies due to poor dissemination structures and limited collaboration. Banda et al. [8] further note that structural inefficiencies, inadequate funding for research implementation, and a disconnect between policymakers and researchers exacerbate the situation. Without deliberate efforts to strengthen research-industry linkages, Nigeria risks losing the potential of homegrown innovations to drive economic development and industrial competitiveness.

One of Nigeria's most promising solutions for improving research uptake lies in the strategic adoption of Information and Communication Technologies (ICTs) for knowledge dissemination and utilisation. Hafeez et al. [9] assert that ICTs have enhanced research accessibility by creating digital platforms that enable scholars and Micro, Small, and Medium Enterprises (MSMEs) to interact, share knowledge, and co-develop solutions. Digital repositories, such as open-access journals and research networking platforms, enable Nigerian researchers to disseminate their findings more efficiently, while industries can utilise these digital tools to adopt research innovations. Agboola et al. [10] argue that integrating ICTs into research dissemination enhances knowledge transfer, promotes collaboration, and minimises the time lag between knowledge production and its application in the industry.

Kaduna State, one of Nigeria's leading hubs for education and industry, presents a compelling case for ICT-based research dissemination and utilisation. Yakubu et al. [11] argue that Kaduna's academic and research institutions increasingly recognise the value of digital platforms for knowledge exchange. Universities and research institutes in the state have started integrating ICT tools for research documentation and collaboration. Wolor et al. [12] agree that Kaduna's growing MSME sector can benefit from digital knowledge-sharing initiatives, as businesses require access to research information solutions to improve productivity and market competitiveness.

This study aims to examine how scholars in Kaduna State are engaging with ICT infrastructure to enhance research dissemination to MSMEs. The research specifically addresses the following questions:

1. What are the perspectives of scholars on the availability of ICT infrastructure for research dissemination to MSMEs in Kaduna State, Nigeria?
2. What are scholars' perspectives on the specific research information needs of MSMEs in Kaduna State, Nigeria?
3. What are scholars' perspectives on the accessibility of research resources for MSMEs in Kaduna State, Nigeria?

4. What challenges do scholars face in utilising ICT for research dissemination to MSMEs in Kaduna State, Nigeria?

Ultimately, the study seeks to identify practical strategies that can improve access to innovation, strengthen MSMEs, and drive sustainable economic growth. The findings will inform the development of targeted interventions to enhance research dissemination to MSMEs in Kaduna State.

Methods

This study adopts a descriptive survey design to examine the perspectives of scholars on the availability, accessibility, and utilisation of ICT infrastructure for research dissemination to MSMEs in Kaduna State, Nigeria. This design was selected due to its capacity to capture broad, generalizable trends and insights from a diverse population of scholars, which is essential for informing policy and institutional development. According to Creswell [13], survey designs are particularly effective in exploring patterns and perceptions across large populations, especially when the goal is to understand widespread issues and inform evidence-based decisions.

Population and Sampling

The target population for this study comprises 936 academic scholars from various universities, research institutes, and academic organizations across Kaduna State, who are actively involved in generating and disseminating research innovations, particularly those relevant to MSMEs. The sampling frame was drawn from publicly available records of researchers within the state. Based on the sample size calculation using Krejcie and Morgan's [14] sample size table, a minimum sample of 278 respondents was deemed adequate to ensure statistical reliability at a 5% margin of error and a 95% confidence level. To enhance the representativeness of the sample, the final sample size was increased to 300 scholars, drawn through simple random sampling. This technique ensures that every eligible scholar had an equal chance of selection, minimizing selection bias and improving the generalizability of the findings.

Instrument

Data were collected using the Dissemination of Research Innovations Questionnaire (DRIQ), a structured, self-administered survey instrument designed to assess scholars' perspectives on ICT infrastructure for research dissemination to MSMEs. The DRIQ was developed specifically for this study, with seven sections addressing key constructs: 1) ICT infrastructure availability; 2) Research information needs of MSMEs; 3) Access to digital research tools; 4) Challenges in research dissemination

A modified four-point Likert scale was used for all items to measure respondents' level of agreement with each statement (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree). This scale was chosen to ensure that responses were clear, consistent, and directly comparable. Items were carefully worded to align closely with the study's research questions and theoretical framework.

Validity and Reliability

To ensure the validity of the DRIQ, the instrument was subjected to a rigorous review process by experts in ICT, research methods, educational technology, and measurement and evaluation. This review process helped ensure that the questionnaire items were both content-valid (accurately reflecting the constructs of interest) and contextually appropriate for the target population. The feedback from the experts led to several revisions to enhance clarity and alignment with the study's objectives.

A pilot study was conducted to test the reliability of the instrument. A total of 50 scholars, randomly selected from a different population outside the study area, participated in the pilot test. Using the split-half method, the instrument demonstrated strong internal consistency, with a Guttman Split-Half Coefficient of 0.78, indicating that the questionnaire was both reliable and consistent in capturing the perspectives of scholars.

Data Collection Procedures

Data collection was conducted over a two-week period, during which the DRIQ was distributed electronically via email and online survey platforms to the selected scholars. Respondents were given clear instructions on how to complete the survey and assured of the confidentiality of their responses. An initial reminder was sent after one week, and a final reminder was sent at the end of the data collection period to encourage participation. The use of electronic distribution ensured a wide reach and reduced the logistical constraints often associated with paper-based surveys.

Data Analysis

Data were analyzed using descriptive statistics, specifically mean and standard deviation, to assess scholars' perspectives on the availability, accessibility, and utilisation of ICT infrastructure for research dissemination. The benchmark mean score of 2.5 was used to determine the level of agreement for each item. Items with mean scores above 2.5 were considered as indicative of positive perceptions, while items below 2.5 indicated negative or neutral perceptions regarding ICT infrastructure and its effectiveness in supporting research dissemination.

In addition to descriptive statistics, inferential statistical techniques were considered for future studies (e.g., ANOVA or regression analysis) to explore potential differences in perceptions across various demographic groups (e.g., gender, years of scholarly experience, institutional affiliation). However, the current study focuses primarily on descriptive analyses due to the exploratory nature of the research.

Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional review boards. Informed consent was obtained from all participants, who were fully briefed on the purpose of the study, their rights, and the voluntary nature of participation. To ensure confidentiality and anonymity, all personal identifiers were removed from the data before analysis. Participants were also informed that they could withdraw from the study at any time without penalty.

Results and Discussion

Demographic Characteristics of the Respondents

This section presents an analysis and interpretation of the demographic characteristics of the respondents in this research, focusing on gender and years of scholarly experience. Understanding these characteristics is crucial for evaluating the diversity of participants and their impact on the adoption of ICT for research dissemination. The analysis findings of gender and years of scholarly experience are presented in Tables 1 and 2.

Table 1. Scholars' Gender Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	219	73.0	73.0	73.0
	Female	81	27.0	27.0	100.0
	Total	300	100.0	100.0	

Source: Field Survey, 2025.

The gender distribution of respondents shows a clear male dominance, with 73% of participants being male compared to 27% female. This reflects the wider gender imbalance often observed in research and technology-related fields in Nigeria, where male participation tends to outweigh female involvement. While the presence of female scholars is significant, their underrepresentation may indicate underlying structural or cultural barriers that affect women's entry and retention in these fields. This imbalance is important to consider when interpreting the study's findings, as gender dynamics could influence perspectives on ICT adoption, access, and utilisation for research dissemination to MSMEs, potentially determining both the challenges faced and the strategies proposed.

Table 2. Years of Scholarly Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5	61	20.3	20.3	20.3
	6-10	63	21.0	21.0	41.3
	11-15	59	19.7	19.7	61.0
	16-20	51	17.0	17.0	78.0
	21 and above	66	22.0	22.0	100.0
	Total	300	100.0	100.0	

Source: Field Survey, 2025.

The distribution of respondents' years of scholarly experience indicates a balanced representation across career stages, ensuring diverse perspectives in the study. While the largest group (22%) had over 21 years of experience, early- to mid-career scholars were also well represented, with 20.3% having 1–5 years of experience, 21% having 6–10 years, and 19.7% having 11–15 years of experience. Additionally, 17% had between 16 and 20 years of experience, reflecting substantial professional maturity. This spread suggests that the findings draw from both seasoned scholars with deep institutional knowledge and newer academics who may bring fresh perspectives on ICT use for research dissemination. Such diversity strengthens the

credibility of the results by capturing insights from multiple generations within the scholarly community in Kaduna State.

Descriptive Analysis

Research Question One

This section provides a table outlining all the items used to assess the study's first objective. It examines scholars' perspectives on the availability of ICT infrastructure for research dissemination to MSMEs in Kaduna State, Nigeria. The perspectives were analysed using descriptive statistics, specifically mean and standard deviation. The results are summarised and presented in Table 3.

Table 3. Scholars' perspectives on the availability of ICT infrastructure for research dissemination to MSMEs in Kaduna State, Nigeria (n = 300).

No	Statements	N	Mean	SD	Remark
1	Reliability of high-speed internet for MSMEs	300	1.8067	.88236	Low
2	Availability of modern computer systems for MSMEs	300	1.8233	.92826	Low
3	Accessibility of essential software for MSMEs	300	1.7433	.84844	Low
4	Consistency of power supply for MSMEs' ICT infrastructure	300	1.8467	.84787	Low
5	Provision of secure data management solutions for MSMEs	300	1.7633	.87361	Low
6	Implementation of advanced cybersecurity measures for MSMEs	300	1.8167	.85956	Low
7	Integration of online payment platforms for MSMEs	300	1.7600	.85528	Low
8	Coverage of ICT infrastructure in commercial zones	300	1.8567	.92681	Low
9	Reach of ICT infrastructure in residential areas	300	1.8567	.93042	Low
10	Availability of dedicated technical support for MSMEs	300	1.7833	.90135	Low
	Benchmark		2.5		

Source: Field Survey, 2025.

The findings from Research Question One, presented in Table 3, reveal that scholars perceive the availability of ICT infrastructure for research dissemination to MSMEs in Kaduna State as generally inadequate. All ten items assessed scored below the benchmark mean of 2.5, indicating consistently low ratings across critical areas such as internet reliability (M = 1.81), computer availability (M = 1.82), software access (M = 1.74), and power supply (M = 1.85). Similarly, security measures, technical support, and coverage in both commercial and residential zones were also rated poorly. These results suggest that the foundational ICT infrastructure needed to support effective knowledge transfer to MSMEs is insufficient, potentially limiting the capacity of these enterprises to access, adopt, and apply research-based innovations for improved productivity and competitiveness.

Research Question Two

This section provides a table outlining all the items used to assess the study's second objective. The perspectives of scholars on the specific research information needs of MSMEs in Kaduna State, Nigeria, were analysed using descriptive statistics, including mean and standard deviations. The results of the analysis are thoroughly summarised and presented in Table 4.

Table 4. Scholars' perspectives on the specific research information needs of MSMEs in Kaduna State, Nigeria (n = 300).

No	Statements	N	Mean	SD	Remark
1	Need for comprehensive industry analysis reports	300	3.0433	.94751	High
2	Requirement for up-to-date market trend insights	300	2.9867	.95017	High
3	Requirement for extensive customer feedback studies	300	3.0900	.91544	High
4	Requirement for best practice guidelines	300	2.9300	1.02727	High
5	Requirement for thorough financial performance analysis	300	3.1033	.97767	High
6	Need for in-depth supply chain research	300	2.9933	.95726	High
7	Requirement for productivity improvement studies	300	2.9633	.93357	High
8	Need for effective employee training resources	300	2.9800	.96056	High
9	Requirement for environmental impact assessments	300	2.9967	.99664	High
10	Need for comprehensive risk management information	300	3.0067	.91437	High
	Benchmark			2.5	

Source: Field Survey, 2025.

The results from Research Question Two, presented in Table 4, indicate that scholars strongly recognise the specific research information needs of MSMEs in Kaduna State. All ten items assessed received mean scores well above the benchmark of 2.5, with values ranging from 2.93 to 3.10. This suggests a high perceived demand for diverse and practical research outputs, including financial performance analysis (M = 3.10), customer feedback studies (M = 3.09), industry reports (M = 3.04), and risk management information (M = 3.01). Other needs, such as market trends, supply chain insights, and employee training resources, were also rated highly. These findings emphasise the critical importance of tailoring research dissemination to address the real-world operational and strategic challenges faced by MSMEs, ensuring that research outputs are both relevant and applicable to their growth and sustainability.

Research Question Three

This section outlines all the items used to assess the study's third objective. Scholars' perspectives on the accessibility of research resources for MSMEs in Kaduna State, Nigeria, were analysed using descriptive statistics, including mean and standard deviations. The results of this analysis are systematically presented in Table 5.

Table 5. Scholars' perspectives on the accessibility of ICT-based research resources for MSMEs in Kaduna State, Nigeria (n = 300).

No	Statements	N	Mean	SD	Remark
1	Ease of accessing online research databases	300	1.9333	.88213	Low
2	Availability of e-journals for MSMEs	300	1.8467	.89020	Low
3	Accessibility of digital libraries for MSMEs	300	1.8867	.87734	Low
4	Participation in virtual research conferences	300	1.9633	.94071	Low
5	Access to cloud storage for research data	300	1.9000	.84402	Low
6	Utilisation of online collaboration tools	300	1.9700	.90840	Low
7	Sharing research findings on digital platforms	300	1.9000	.84402	Low
8	Access to social media for research dissemination	300	1.9400	.91608	Low
9	Government-funded research resources accessibility	300	1.9133	.93205	Low
10	Academic partnerships for research access	300	1.8700	.86926	Low
	Benchmark			2.5	

Source: Field Survey, 2025.

The findings from Research Question Three, presented in Table 5, reveal that scholars perceive the accessibility of ICT-based research resources for MSMEs in Kaduna State as being significantly limited. All ten items measured recorded mean scores well below the benchmark of 2.5, ranging from 1.85 to 1.97. Key areas such as access to online databases (M = 1.93), e-journals (M = 1.85), digital libraries (M = 1.89), and virtual research events (M = 1.96) were rated particularly low. Similarly, access to cloud storage, online collaboration tools, and government-funded research platforms also scored poorly. These results suggest that MSMEs face substantial barriers in reaching and utilising digital research resources, obstructing their ability to benefit from scholarly innovations. Improving digital access points and creating more inclusive dissemination platforms are essential for bridging this accessibility gap.

Research Question Four

This section features a table displaying all the items used in measuring the study's fourth objective. The challenges faced by scholars in utilising ICT for effective research dissemination in Kaduna State, Nigeria, were analysed using descriptive statistical methods, including mean and standard deviation. The results are systematically summarised and presented in Table 6.

Table 6. Challenges scholars face in utilising ICT for research dissemination in Kaduna State, Nigeria (n = 300).

No	Statements	N	Mean	SD	Remark
1	Financial constraints on acquiring ICT tools	300	3.0467	.90215	High
2	Limited availability of high-speed internet	300	3.0700	.90987	High
3	Inadequate access to essential hardware and software	300	2.9567	.99234	High
4	Insufficient technical support for ICT tools	300	2.9533	.94559	High
5	Concerns about data security and privacy	300	3.0233	.91227	High
6	Resistance to changing traditional research methods	300	2.9367	.95342	High
7	Challenges integrating ICT with existing workflows	300	3.0133	.92159	High

No	Statements	N	Mean	SD	Remark
8	Lack of relevant ICT training and development programs	300	3.0400	.95294	High
9	High costs of subscriptions and access fees	300	3.0200	1.01803	High
10	Difficulty collaborating with other scholars	300	2.9433	.94681	High
	Benchmark			2.5	

Source: Field Survey, 2025.

The results from Research Question Four, presented in Table 6, highlight that scholars face significant challenges in utilising ICT for research dissemination in Kaduna State. All ten items assessed scored above the benchmark mean of 2.5, with values ranging from 2.94 to 3.07, indicating general agreement on the presence of these barriers. Notable challenges include limited access to high-speed internet (M = 3.07), financial constraints (M = 3.05), inadequate training opportunities (M = 3.04), and concerns about data security (M = 3.02). Other critical issues include a lack of technical support, resistance to shifting from traditional methods, and the high cost of digital tools and subscriptions. These findings suggest that effective ICT adoption is hindered by a combination of infrastructural, financial, and human capacity gaps, highlighting the need for targeted interventions to support scholars in disseminating digital research.

Discussion

The findings on the availability of ICT infrastructure for research dissemination to MSMEs paint a concerning picture of infrastructural inadequacy. Scholars overwhelmingly rated critical components, such as internet reliability, computer systems, software access, and power supply, as insufficient, all scoring well below the 2.5 benchmark. This observation is consistent with the existing literature, which highlights infrastructural deficits as a persistent barrier to ICT integration in developing economies. The studies of Mulyanignsih et al. [15] similarly identified unreliable internet and weak ICT hardware penetration as factors constraining MSME innovation and access to research outputs. The findings also reinforce the UTAUT, which posits that facilitating conditions, such as infrastructure, are a prerequisite for technology adoption. Where such foundational conditions are lacking, the deployment of ICT for research uptake becomes severely vulnerable.

Furthermore, there is a weak presence of cybersecurity measures, limited technical support, and poor coverage in both residential and commercial zones. The study of Anatan and Nur [16] reinforces this claim that MSMEs in Nigeria face a double bind: not only are infrastructure systems underdeveloped, but targeted institutional support for digital innovation remains minimal. From the DOI perspective, this lack of enabling infrastructure hinders the communication channels and social systems necessary for innovations to spread among MSMEs. Without a solid digital backbone, the potential for scholars to transmit research-based solutions to MSMEs is diminished, making it difficult to bridge the research-practice gap. Ultimately, the findings emphasise the urgent need for strategic public and private investments in ICT infrastructure to support inclusive, innovation-driven development among micro and small enterprises.

The findings relating to MSMEs' research information needs indicate a broad spectrum of knowledge areas that scholars in Kaduna State consider essential for enterprise development. The

consistently high ratings across all ten items, including financial performance analysis, customer feedback, and industry insights, highlight a shared understanding that MSMEs operate in information-scarce environments. This reflects concerns raised by Kurniasari et al. [17], who argue that most MSMEs lack structured access to reliable, decision-oriented information. The study reinforces the UTAUT's concept of performance expectancy; MSMEs are expected to engage with research outputs when such knowledge is perceived as directly enhancing productivity, market responsiveness, and competitiveness. Scholars' emphasis on these needs highlights the importance of making academic research not only available but also strategically aligned with the operational realities of MSMEs.

In addition, the emphasis on research related to supply chains, risk management, and employee training indicates a wider recognition of the need for adaptive and resilient business systems. These areas are crucial for sustaining growth, particularly in volatile economic environments. Within the DOI framework, such findings highlight the importance of relative advantage and compatibility, key attributes that influence the adoption of innovations. Hennart and Sutherland [18] similarly contend that the primary challenge is not the absence of research, but the failure to match research outputs with the lived realities and evolving demands of small businesses. Consequently, the discussion shifts from a narrow focus on dissemination to the importance of contextualisation. For MSMEs to genuinely benefit from research, the information must be relevant, actionable, and embedded within their unique business ideologies.

The findings on research resource accessibility reveal a significant constraint in how MSMEs access scholarly knowledge. Scholars unanimously indicated low access to key digital tools such as research databases, e-journals, and digital libraries, suggesting that MSMEs are often excluded from the formal knowledge system. This mirrors wider trends in the work of Tay et al. [19], who found that weak ICT infrastructure and poor institutional coordination remain enduring barriers to the growth of MSMEs in Nigeria. The findings also highlight limitations in effort expectancy and facilitating conditions as outlined in the UTAUT model. Even where digital knowledge exists, systemic challenges make it difficult for small businesses to effectively engage with it, leaving them dependent on informal or outdated information sources that may not support long-term growth.

More critically, the low ratings for government-supported research access and academic partnerships expose a wider structural divide between knowledge creators and potential users. This concern aligns with the study of Zuhroh et al. [20], who argued that MSMEs often lack the digital literacy, institutional support, or networking channels to benefit from collaborative research initiatives. From the DOI perspective, this lack of accessibility inhibits innovation diffusion, as potential adopters are neither aware of nor equipped to evaluate new ideas. It becomes evident that access alone is insufficient without targeted efforts to build inclusive infrastructure and networks. The findings present a compelling case for policy reforms and institutional innovations that expand research dissemination beyond academia, enabling MSMEs, the backbone of local economies, to engage with and benefit from relevant, timely, and practical research insights.

The findings related to Research Question Four point to a constellation of persistent challenges scholars face in utilising ICT for effective research dissemination. Every indicator measured scored above the 2.5 benchmark, indicating high levels of concern across financial,

infrastructural, and technical domains. This aligns closely with the view of Ndibalema [21], who reported that limited funding, poor internet connectivity, and a lack of essential ICT tools consistently undermine academic engagement with digital dissemination platforms. Within the UTAUT framework, these barriers negatively affect facilitating conditions and effort expectancy, key predictors of ICT usage. Without adequate tools, reliable internet, and institutional support, scholars may struggle to transfer research knowledge to MSMEs, further widening the research–practice gap.

Beyond infrastructure, the findings reveal profound systemic issues, including insufficient technical support, a lack of ICT training, and resistance to shifting from traditional research approaches. These align with the DOI theory's emphasis on complexity and organisational inertia as inhibitors of innovation adoption. This aligns with the idea of Xiao et al. [22], who suggest that institutional cultures that do not prioritise continuous ICT learning or adaptation often hinder the diffusion of technology among scholars. Moreover, challenges related to integrating ICT into existing workflows and collaborating digitally with other scholars reflect weak institutional structures and fragmented knowledge systems. These limitations restrict scholars' ability to explore modern dissemination tools, such as webinars, interactive platforms, and open-access repositories, which are critical for engaging MSMEs with timely and usable research insights.

Conclusion

This study set out to explore how ICT can be strategically deployed for effective research dissemination to MSMEs in Kaduna State, Nigeria. Drawing on the perspectives of scholars, the research identified significant infrastructural gaps, clearly expressed information needs, poor access to research resources, and persistent challenges in ICT utilisation. These findings collectively point to a troubling disconnect between academic knowledge production and practical business innovation, particularly for MSMEs operating in low-resource environments. Applying the UTAUT and DOI frameworks, the study has shown that the absence of enabling conditions, whether infrastructural, institutional, or relational, undermines the adoption and impact of ICT-driven research dissemination. Importantly, this research contributes to ongoing discussions on how to make scholarly knowledge more inclusive, accessible, and practically helpful for small enterprises. It reinforces the pressing need for coordinated investments, capacity-building, and collaborative platforms that bridge academia and enterprise. Ultimately, the study offers a grounded understanding of what is required to strengthen knowledge transfer mechanisms in Nigeria's MSME ecosystem, a crucial step toward innovation-led growth in the broader economy. To address the challenges identified, the study recommends strengthening ICT infrastructure by prioritizing investments in reliable internet, power supply, and access to digital tools in both academic and business environments. Funding limitations and infrastructure gaps can be mitigated through phased rollout plans, public-private partnerships, and international development support. Scholars should also collaborate directly with MSMEs to design research that addresses their real-time challenges, such as finance, markets, and operations. Regular engagement forums, field surveys, and participatory research approaches can ensure mutual understanding and relevance of research outputs.

Furthermore, universities should establish open-access digital repositories and collaborate with online platforms to make research easily accessible to MSMEs. This would require overcoming institutional resistance and limited technical capacity, which can be addressed through policy advocacy, simplified user interfaces, and mobile-accessible formats tailored to MSME needs. Building ICT capacity is equally essential, as ongoing training for both scholars and MSMEs can help address low digital literacy through targeted workshops, step-by-step tutorials, and peer mentoring systems. Finally, stronger academic-industry linkages are needed to facilitate collaboration through joint innovation projects, government incentives, and shared digital platforms. These collaborations can overcome challenges such as bureaucracy, trust deficits, and unclear roles by establishing clear partnership frameworks, ensuring mutual benefits, and creating dedicated liaison offices within institutions to facilitate engagement. These recommendations aim to create a more connected and innovative environment where ICT plays a central role in bridging the gap between academic research and its practical application to MSMEs, ultimately contributing to the growth and sustainability of the sector in Kaduna State and beyond.

Limitations

Despite the valuable insights provided by this study, several limitations must be acknowledged. First, the research was conducted within a specific geographical context, namely Kaduna State, Nigeria, which may limit the generalizability of the findings to other regions with different infrastructural and socio-economic conditions. The perspectives of scholars and MSMEs in Kaduna may not fully reflect those of other regions in Nigeria or beyond, where ICT adoption and research dissemination practices may vary significantly. Second, the study relied primarily on self-reported data collected through a structured questionnaire, which may be subject to response biases, such as social desirability or recall bias. While efforts were made to ensure the reliability and validity of the instrument, including expert reviews and pilot testing, the subjective nature of the responses may still impact the objectivity of the findings. Another limitation is the cross-sectional design of the study, which provides a snapshot of the current state of ICT infrastructure and research dissemination practices. This design does not account for changes over time or causal relationships, making it difficult to assess the long-term impact of ICT interventions or changes in the dynamics between academia and MSMEs.

Additionally, the study focused mainly on the perspectives of academic scholars, excluding MSMEs themselves and other key stakeholders such as policymakers and industry leaders. Including a broader range of participants could provide a more comprehensive understanding of the challenges and opportunities associated with ICT-driven research dissemination to MSMEs. Lastly, while the study highlighted significant infrastructural gaps and barriers to effective ICT utilization, it did not delve deeply into the specific technological tools or platforms that could best address these challenges. Further research is needed to explore the practical applications of various ICT tools and to assess their effectiveness in enhancing the dissemination and uptake of research by MSMEs.

Author Contribution

I.H.A. designed the study, developed the methodology, and supervised the research process. A.U. conducted the literature search, data collection, and analysis. I.H.A. contributed to data interpretation, writing the discussion, and editing the manuscript. Both authors reviewed and approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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