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Role of Small-Scale Industries in the Development of Knowledge-Based Industries in the Federal Capital Territory, Abuja, Nigeria

Mahmoud Abubakar Mohammed
Department of Sociology, University of Abuja, Nigeria.
Email: mmohammedabubakar47@gmail.com
ORCID: 0009-0007-2037-9272

Yakubu Jafaru
Sociology Department, University of Abuja
Email: jafyak76@yahoo.com
ORCID: 0009-0006-8171-6925

Abstract

The expansion of knowledge-based industries (KBIs) has become essential to national development strategies worldwide, with small-scale industries (SSIs) increasingly recognised as key players in driving innovation and the dissemination of knowledge. This research investigates the role of SSIs in driving the growth of KBIs in the Federal Capital Territory (FCT), Abuja, Nigeria. Through a survey involving 200 owners and managers of SSIs, the study analysed their roles in knowledge transfer, the adoption of innovations, financial challenges, and partnerships with research institutions. The results indicate that 61% of SSIs participate in knowledge-related activities such as ICT services, training, and consulting, whereas 46% utilise digital platforms to expand their markets. Nonetheless, only 28% engage in collaborations with universities, suggesting weak institutional connections. Key obstacles to more extensive involvement in knowledge-driven activities include financial constraints (74%) and inadequate intellectual property protections (53%). The study concludes that while SSIs are crucial for promoting incremental innovation and the dissemination of knowledge, their effectiveness is hampered by systemic issues. It suggests that improving financing options, strengthening institutional connections, enhancing intellectual property protections, and implementing capacity-building initiatives could better position SSIs in Abuja as facilitators of knowledge-based economic growth.

Keywords: Small-Scale Industries (SSIs); Knowledge-Based Industries (KBIs); Innovation; Knowledge Transfer; Intellectual Property; Financing Constraints; ICT Adoption; Abuja, Nigeria.

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1. Introduction

Small-scale industries (SSIs) play a crucial role in the socio-economic development of both developed and developing nations, particularly in enhancing employment, innovation, and industrial connectivity (Magaji et al., 2024). In Nigeria, small-scale industries continue to provide a crucial source of livelihood and income for a significant portion of the population, while also fostering a vibrant environment for entrepreneurship and innovation (Magaji & Saleh, 2010). In today's global economy, small-scale industries are recognised for their roles that extend beyond merely providing goods and services; they are increasingly acknowledged as vital contributors to knowledge-based industries (KBIs), which rely on the integration of intellectual capital, technology, and innovation (Acs et al., 2017). The Federal Capital Territory (FCT), Abuja, as the political and administrative centre of Nigeria, offers a unique perspective for exploring the connection between SSIs and KBIs, especially in light of the nation's ongoing efforts to diversify its economy and the growing transition towards knowledge-driven economic frameworks.

The concept of a knowledge-based economy (KBE) emphasises the importance of knowledge as the primary factor driving productivity, competitiveness, and growth (Organisation for Economic Co-operation and Development [OECD], 1996). Knowledge-based industries—including information and communication technology (ICT), financial technology, creative industries (Eke, Magaji, & Osi, 2022), biotechnology, and educational services—are noted for their dependence on innovation, skills, and intellectual property rather than just physical resources (Chen & Dahlman, 2006). The relationship between SSIs and KBIs is particularly significant in contexts such as Nigeria, where small enterprises predominantly characterise the industrial landscape and serve as incubators for innovation, adaptation, and knowledge diffusion. Due to their flexible structures, SSIs can integrate, apply, and disseminate new knowledge, which in turn supports the development and growth of KBIs (Siyanbola et al., 2012).

In Abuja, the industrial ecosystem primarily comprises micro and small-scale businesses engaged in manufacturing, services, and trade (Magaji, Musa, & Ahmad, 2024). Although these businesses commonly face challenges such as insufficient financing, infrastructure shortcomings, and inadequate institutional support (Magaji & Aliyu, 2007), alongside limited savings, reinvestment, and capital growth (Magaji & Yahaya, 2012), they also offer avenues for knowledge dissemination and the enhancement of human capital. The clustering of SSIs around ICT hubs, educational institutions, and creative centres within the FCT underscores their potential role in promoting KBIs. For example, small ICT firms in Abuja provide a range of services, including software development, data solutions, and digital marketing, which actively support the growth of the knowledge economy.

In a similar vein, SSIs within the creative industries—such as fashion, design, and media—are intricately involved in both the generation and application of knowledge, frequently merging traditional wisdom with contemporary technology (Akinwale et al., 2019). The connection between SSIs and KBIs is not simply a straightforward one; instead, it is mutually beneficial. KBIsbenefit from the entrepreneurial energy and localised innovations that SSIs generate. In contrast, SSIs rely on technological advancements, research findings, and digital platforms originating from KBIs to enhance their efficiency and market competitiveness. However, in Nigeria, the synergy between these two domains has not been fully optimised due to poor policy alignment, inadequate infrastructure, and minimal collaboration between research and industry (Oyelaran-Oyeyinka, 2006). The FCT, as both a policy hub and an emerging urban economy, offers a promising setting for exploring how SSIs can effectively connect with KBIs to stimulate inclusive and sustainable economic development.

Globally, researchers have highlighted the vital role that small-scale industries play in linking informal economic activities with the formal knowledge economy (Audretsch, 2012). They serve as training environments for entrepreneurs, support skill development, and act as platforms for testing new technologies and innovations. In developing countries, where formal research and development (R&D) institutions may be underdeveloped or underfunded, SSIs often serve as facilitators of innovation by adapting and implementing technologies in ways that are relevant to their specific contexts (Kaplinsky & Morris, 2018). This viewpoint is especially pertinent in Abuja, where knowledge-based industries require a continuous influx of innovative ideas, skilled labour, and adaptable enterprises to promote growth.

Nonetheless, SSIs in Abuja and throughout Nigeria encounter numerous obstacles that impede their ability to fulfil this function. Challenges such as limited access to finance (Magaji, Musa, &Dogo, 2023), insufficient protection of intellectual property, infrastructural hurdles, and a lack of effective capacity-building initiatives obstruct their integration into KBIs (Ehinomen & Adeleke, 2012). Additionally, there is a scarcity of empirical studies that systematically assess the function of SSIs in the development of KBIs in the Nigerian context. Most existing research on small enterprises has primarily focused on their roles in poverty alleviation, job creation (Magaji, Muhammed, & Abubakar, 2015), and income generation, with little attention given to their involvement in the broader knowledge economy (Ehinomen & Adeleke, 2012). This shortcoming highlights the need for more detailed research into how SSIs contribute to and interact with knowledge-based industries in urban areas, such as Abuja.

Consequently, this study aims to investigate the role of small-scale industries in the advancement of knowledge-based industries in the Federal Capital Territory, Abuja. By examining the dynamics of this relationship, the research aspires to enrich the discourse on how small enterprises can be utilised for innovation, skills development, and economic transformation. Specifically, it will assess the contributions of SSIs to knowledge dissemination, their connections with KBIs, and the barriers that impede effective collaboration. The anticipated outcomes are expected to deliver policy-relevant insights for enhancing the role of SSIs in Nigeria’s shift toward a knowledge-based economy.

Ultimately, positioning SSIs within the concept of knowledge-based development in Abuja has both theoretical and practical implications. From a theoretical standpoint, it expands the understanding of the intersections among entrepreneurship, innovation systems, and knowledge economies in developing nations. Practically, it provides policymakers, development organisations, and business support entities with empirical data to leverage the potential of SSIs in promoting knowledge-based industrial growth. In an era when knowledge is increasingly serving as the foundation for sustainable development, acknowledging and bolstering the role of small-scale industries in Nigeria’s knowledge economy is crucial for national progress.

2. Literature Review

2.1. Conceptual Definitions

Small-Scale Industries (SSIs): Small-Scale Industries (SSIs) are businesses that function with a comparatively small financial investment (Muhammed, Magaji, & Ismail, 2025), a limited number of employees, and low to moderate technology use (Ismail, Musa, & Magaji, 2025). As per the Central Bank of Nigeria (CBN, 2010), SSIs are classified as enterprises whose assets do not exceed ₦50 million and that employ fewer than 50 individuals. These enterprises primarily engage in manufacturing, services, or trade and frequently act as incubators for innovation and entrepreneurship in developing nations (Ahmed et al., 2024).

Researchers contend that SSIs are not solely survival-driven entities; instead, they provide essential platforms for the dissemination of innovation and adaptive learning, both of which contribute to industrial growth and structural transformation (Oyelaran-Oyeyinka& Lal, 2015).

In Nigeria, SSIs represent a significant portion of the private sector, making up about 90% of businesses and generating over 60% of job opportunities (Small and Medium Enterprises Development Agency of Nigeria [SMEDAN], 2020). In addition to their economic impact, they act as instruments for poverty alleviation, job creation (Magaji & Vicky, 2009), and the promotion of entrepreneurship (Adamu, Eke, & Magaji, 2009). Importantly, the adaptability and flexibility of SSIs enable them to respond swiftly to market fluctuations, rendering them vital in knowledge-intensive industries that demand ongoing innovation and adaptation (Acs et al., 2017).

Knowledge-Based Industries (KBIs): Knowledge-Based Industries (KBIs) refer to economic sectors that fundamentally depend on the creation, distribution, and application of knowledge and intellectual capital for their competitiveness and value generation. The Organisation for Economic Co-operation and Development (OECD, 1996) characterisesKBIs as sectors that heavily focus on technology, innovation, and human capital. Examples of these industries include ICT, biotechnology, education, financial technology, and creative sectors. These industries are essential to the knowledge economy, where growth and productivity rely increasingly on information, skills, and innovation rather than physical assets (Chen & Dahlman, 2006).

KBIs are pivotal in promoting economic diversification, particularly in nations like Nigeria, which heavily rely on natural resource exports. They create opportunities for high-value jobs, bolster global competitiveness, and facilitate the transfer of technology and innovation. In Abuja, KBIs are slowly emerging, particularly within ICT clusters, digital services, the creative arts, and financial technology hubs, all of which are supported by a growing number of young, educated entrepreneurs (Akinwale et al., 2019).

Knowledge Economy: The knowledge economy refers to an economic framework in which knowledge serves as the primary catalyst for growth, innovation, and competitive advantage. It underscores the necessity of investing in human capital, research and development (R&D), and IT infrastructure as vital underpinnings for sustainable progress (World Bank, 2007). A knowledge economy flourishes through the interactions among industries, research bodies, and government entities in generating, disseminating, and utilising knowledge. In Nigeria, the shift towards a knowledge economy has been slow due to infrastructural limitations, weak institutional frameworks, and insufficient investment in research and development (R&D) (Siyanbola et al., 2012). Nonetheless, the ability of SSIs to aid in knowledge creation, adaptation, and dissemination makes them crucial in fast-tracking this transition, particularly in urban areas like Abuja.

2.2 Theoretical Framework

Schumpeter’s Theory of Innovation: Joseph Schumpeter’s theory of innovation asserts that entrepreneurship and innovation are fundamental to economic progress. Schumpeter (1934) maintained that entrepreneurs are the driving force behind economic transformation as they introduce new products, processes, markets, and organisational techniques. In the realm of SSIs and KBIs, SSIs frequently serve as nurturing grounds for entrepreneurs who implement incremental innovations that contribute to KBIs. For instance, small ICT firms in Abuja act as agents of creative destruction by devising new solutions that disrupt established technologies.

This aligns with Schumpeter's concept of innovation as a dynamic process of economic evolution.

Endogenous Growth Theory: The endogenous growth theory emphasises the significance of knowledge, innovation, and human capital as crucial factors in attaining sustained economic growth (Romer, 1990). In contrast to conventional growth theories that emphasise the importance of capital accumulation, this theory highlights how knowledge spillovers and innovation within sectors can drive long-term growth. This theory provides a robust foundation for connecting Small-Scale Industries (SSIs) with Knowledge-Based Industries (KBIs), as SSIs facilitate the dissemination of knowledge and skill development that energisesKBIs. Abuja, with its significant presence of SMEs and ICT hubs, presents a practical context for observing knowledge spillovers between small businesses and KBIs.

Systems of Innovation Theory: The systems of innovation theory highlights the crucial role of networks, institutions, and interactions among businesses, research institutions, and government in fostering innovation (Lundvall, 1992). This framework is beneficial for examining the interactions between SSIs and KBIs in Abuja. SSIs generally operate as absorbers and distributors of knowledge, while KBIs create advanced technologies and innovations. Nonetheless, inadequate connections among universities, industries, and policymakers in Nigeria hinder the flow of sufficient knowledge (Oyelaran-Oyeyinka, 2006). Enhancing these connections in Abuja could improve collaboration between SSIs and KBIs.

Empirical Evidence: Research worldwide has consistently highlighted the contribution of Small-Scale Industries (SSIs) to the establishment and maintenance of Knowledge-Based Industries (KBIs). For instance, in South Korea and Taiwan, SSIs formed a crucial foundation for the development of ICT and electronics KBIs, particularly through subcontracting, innovation, and technology transfer. Mathews and Cho (2000) illustrate that the swift industrial advancement in both countries was not merely driven by large corporations but also by agile small firms that adapted foreign technologies, localised innovations, and subsequently integrated into global value chains. Additionally, Kim (1997) highlights the role of small Korean technology companies in learning-by-doing processes, emphasising how incremental innovations at the level of small enterprises collectively advance knowledge-intensive sectors. In a similar vein, Dossani (2012) highlights how SSIs in India's IT sector played a critical role in delivering digital solutions, outsourcing models, and software services that have become fundamental to the country's global KBI standing. Building on this, Arora, Arunachalam, Asundi, and Fernandes (2001) explain that small IT firms in India, through adaptable outsourcing strategies, have fostered knowledge-driven yet labour-intensive processes that have significantly contributed to India's export-oriented growth. These instances demonstrate that SSIs, when supported by institutional frameworks such as government incentives, intellectual property protections, and innovation clusters, can evolve into essential engines of KBIs.

Beyond Asia, evidence from Europe and North America reinforces the connection between SSIs and KBIs. For example, Audretsch and Keilbach (2004) provide empirical insights from Germany showing that knowledge spillovers from research institutions often emerge through the entrepreneurial activities of small firms, which in turn create new knowledge-intensive industries. Similarly, in the United States, Acs and Audretsch (1990) assert that the "innovation function" of small firms has been vital for maintaining technological diversity, flexibility, and competitiveness in KBIs such as biotechnology and software engineering. Powell and Snellman (2004) also illustrate that the emergence of the knowledge economy in the United States cannot be separated from the dynamism and adaptability of SSIs, especially

in burgeoning technology sectors. Collectively, these global findings suggest that SSIs are crucial in translating knowledge into tangible commercial and developmental outcomes.

The experience of Africa with SSIs and KBIs has shown mixed results but is increasingly gaining visibility. For example, small ICT firms in Kenya have been crucial in the development of mobile money solutions like M-Pesa, which transformed the financial services landscape into a thriving KBI. Hughes and Lonie (2007) document how small-scale ICT players, in collaboration with Safaricom, designed, tested, and expanded mobile money services that improved financial inclusion and positioned Kenya as a global leader in mobile payments. Expanding on this, Jack and Suri (2011) provide empirical evidence that the spread of M-Pesa led to the emergence of a knowledge-driven service sector, which not only enhanced financial transactions but also fostered entrepreneurial prospects for small businesses. This suggests that, under suitable conditions, small-scale enterprises (SSIs) in Africa can be significant innovators and carriers of knowledge.

Another compelling example is South Africa, where Tengeh (2013) analyses how SSIs in creative sectors, such as film, music, and fashion, have become vital to the knowledge economy by utilising local cultural assets and digital platforms to achieve competitiveness on a global scale. Likewise, Chaminade and Lundvall (2009) illustrate that small firms within South Africa's ICT clusters have benefited from "system of innovation" connections, wherein universities, government entities, and small businesses collaborate to generate knowledge. Lorentzen (2010) further finds that learning networks among small enterprises in South Africa facilitate incremental innovation in knowledge-based industries (KBIs), specifically in the ICT services sector.

Comparable evidence is seen in other African nations. In Ghana, Quartey, Turkson, Abor, and Iddrisu (2017) observe that SSIs operating within the ICT and agro-processing fields have established localisedKBIs by transmitting technical expertise and embedding knowledge into their production processes. In Ethiopia, Gebreeyesus (2009) notes that small businesses in the leather and textile industries, although not always radical innovators, engage in ongoing learning activities that enhance their knowledge and contribute to local industrial progress. Similarly, in Rwanda, small ICT enterprises, supported by government programs such as "Smart Rwanda," have played a crucial role in developing knowledge-driven services for e-governance and digital finance (World Bank, 2019). These instances highlight the evolving yet fragile role of SSIs as drivers of innovation across African economies with institutional and infrastructural conditions similar to those found in Nigeria.

In Nigeria, empirical research offers a more nuanced and complex understanding of the SSI-KBI relationship. On the one hand, SSIs have been consistently recognised for their roles in job creation, poverty reduction, and local innovation. Ehinomen and Adeleke (2012) demonstrate that SSIs make up a substantial part of Nigeria’s private sector, providing employment opportunities and income, particularly in urban areas. Conversely, their integration into KBIs has been comparatively limited due to issues like infrastructure challenges, insufficient funding, and weak institutional frameworks (SMEDAN, 2020). This dual situation has influenced scholarly discussions on whether SSIs in Nigeria can function as drivers of the knowledge economy.

Focusing specifically on Abuja, the growth of ICT startups, creative industries, and knowledge-intensive service providers indicates a developing connection between SSIs and KBIs. Akinwale, Oyeniran, and Olanrewaju (2019) find that informal ICT firms in Abuja actively engage in knowledge transfer, adapt local innovations, and assist in the distribution of digital technologies. However, they also point out challenges such as limited access to

credit (Okoroafor, Magaji, & Eze, 2018), insufficient collaboration with universities, and weak intellectual property protection (Magaji, 2023), all of which hinder the ability of these firms to grow into KBIs. Likewise, Oyelaran-Oyeyinka and Lal (2015) contend that Nigerian SSIs typically engage in incremental innovation—tailoring technologies to local demands rather than developing groundbreaking innovations. Nonetheless, this incremental role remains vital in linking traditional industries with KBIs.

Further research supports these conclusions. Siyanbola, Aderemi, Egbetokun, and Sanni (2012) investigate the role of knowledge management within Nigerian SSIs and find that many small firms lack systematic processes for capturing and utilising knowledge, which significantly diminishes their capability to contribute to KBIs effectively. Ogechukwu (2011) identifies financing obstacles as a significant hindrance for Nigerian SSIs, arguing that limited access to credit constrains investment in innovation. Okpara (2011) also highlights that weak institutional backing and inconsistent governmental policies have limited the capacity of small firms to evolve into KBIs, despite their inherent potential.

Recent studies indicate gradual advancement. Adegbite (2019) outlines how ICT hubs and small start-ups in Abuja and Lagos are gradually becoming integral to Nigeria's knowledge economy through innovations in fintech, digital services, and the creative sector. In a similar vein, Abubakar and Bala (2018) highlight the collaboration between small-scale industries (SSIs) and universities as a promising avenue for enhancing the growth of knowledge-based industries (KBIs), particularly in Abuja's ICT sector. The collective findings suggest that while Abuja's SSIs are beginning to contribute to KBIs, significant obstacles related to financing, infrastructure, and policy support still hinder their full potential.

The existing literature emphasises that SSIs play a critical role in the expansion of KBIs by acting as facilitators of innovation, knowledge absorbers, and promoters of technology dissemination. Theoretically, concepts such as Schumpeter’s innovation theory, endogenous growth theory, and systems of innovation provide strong frameworks for exploring this connection. Empirical data from both global and African contexts demonstrate that SSIs can significantly enhance KBIs when supported by robust institutions, infrastructure, and innovation ecosystems. In Nigeria, particularly in Abuja, the interaction between SSIs and KBIs is still in development, with advancement hindered by financial, institutional, and infrastructural challenges. This highlights the need for policies that aim to strengthen the role of SSIs in promotingKBIs within the Federal Capital Territory (FCT) and beyond.

3. Methodology

3.1 Research Design

This research employs a mixed-methods approach, integrating both quantitative and qualitative methodologies. The quantitative component facilitates statistical analysis of SSIs' contributions to KBIs in Abuja. At the same time, the qualitative part offers more nuanced insights into innovation practices, challenges, and connections with knowledge-driven sectors. The mixed-methods framework is warranted, as the contributions of SSIs to KBIs cannot be solely evaluated through economic metrics, but also in terms of innovation activities, knowledge transfer, and institutional assistance.

3.2 Population of the Study

The study's population includes both registered and informal small-scale industries (SSIs) operating in Abuja, particularly in sectors related to ICT, creative industries, and knowledge-intensive services. This demographic is selected because these sectors are most closely

associated with the evolution of KBIs. Additionally, key stakeholders from governmental bodies (e.g., SMEDAN, NITDA), universities, and financial institutions will be involved to obtain institutional viewpoints.

3.3 Sampling Technique and Sample Size

A multistage sampling method will be utilised. Initially, purposive sampling will be used to identify key clusters of SSIs in Abuja, particularly in regions such as Wuse, Garki, Utako, and Gwarinpa, where ICT and creative enterprises are primarily located. Subsequently, stratified random sampling will be applied to select firms across varied knowledge-based subsectors (ICT, creative industries, consultancy services, and digital start-ups). The sample size will be calculated using Yamane's (1967) formula for finite populations, aiming for a 95% confidence level with a 5% margin of error. Based on preliminary data from SMEDAN and Abuja Enterprise Agency (AEA), approximately 1,200 active SSIs exist in the targeted subsectors. Utilising the formula, the study aims to include approximately 300 firms. For the qualitative component, 20 key informant interviews (KIIs) will be conducted with policymakers, industry leaders, and academic professionals.

3.4 Data Collection Methods

3.4.1 Primary Data

Structured Questionnaire: A questionnaire will be crafted and distributed to managers/owners of selected SSIs. This tool will gather information regarding firm characteristics, innovation activities, knowledge transfer practices, and contributions to KBIs. Key Informant Interviews (KIIs): Semi-structured interview guides will be employed with policymakers, industry associations, and innovation hubs to explore policy frameworks, financing strategies, and institutional support for SSIs. Focus Group Discussions (FGDs): Two FGDs will be organised with SSI entrepreneurs to gather collective insights on the challenges and prospects in their transition towards KBIs.

3.4.2 Secondary Data

Secondary data will be gathered from pertinent reports, including the annual reports from SMEDAN, surveys on the digital economy conducted by NITDA, datasets from the National Bureau of Statistics (NBS), enterprise surveys from the World Bank, and published scholarly literature focusing on SSIs and KBIs in Nigeria.

3.5 Research Instruments

The questionnaire will incorporate Likert-scale items to evaluate constructs such as innovation capacity, knowledge transfer, institutional support, and market accessibility. The interview and focus group discussion (FGD) guides will feature open-ended questions aimed at exploring how SSIs operate within Abuja's business environment.

3.6 Data Analysis Techniques

Quantitative data will be processed using both descriptive and inferential statistical methods. Descriptive statistics, including mean, frequency, and percentage, will be employed to profile SSIs. Meanwhile, inferential methods such as Chi-square tests, regression analysis, and correlation analysis will be used to evaluate the relationship between SSI characteristics and their roles in contributing to KBIs.

Qualitative data derived from interviews and FGDs will undergo thematic analysis. Responses will be transcribed, coded, and organised into themes such as innovation practices,

institutional support, financing, and obstacles. Triangulation will be employed to integrate quantitative and qualitative findings, yielding more comprehensive conclusions.

3.7 Validity and Reliability of Instruments

i. Content validity will be established by having the questionnaire and interview guides reviewed by experts in academia and industry.

ii. A pilot study involving 20 SSI managers will take place in Lugbe, Abuja, to refine the instruments.

iii. Cronbach's Alpha will be applied to assess the internal consistency of Likert-scale items, with a threshold of 0.70 deemed acceptable.

3.8 Ethical Considerations

This study will uphold the highest ethical standards in research. Respondents will be informed about the purpose of the study and their right to withdraw at any moment. Informed consent will be obtained, and responses will be anonymised to ensure confidentiality. Data will be securely stored and utilised solely for academic purposes.

4. Results and Discussion

4.1 Socioeconomic Characteristics of Respondents

Table 1: Socioeconomic Characteristics of Respondents (N = 200)

Variable	Category	Frequency	Percentage (%)
Gender	Male	124	62.0
	Female	76	38.0
Age Group (Years)	20–29	38	19.0
	30–39	74	37.0
	40–49	56	28.0
	50 and above	32	16.0
Educational Qualification	Secondary	28	14.0
	Diploma/OND/HND	64	32.0
	Bachelor's Degree	78	39.0
	Postgraduate Degree	30	15.0
Business Type	ICT/Tech Services	54	27.0
	Consultancy/Training	46	23.0
	Creative/Design	42	21.0
	Manufacturing/Light	58	29.0
Years in Operation	1–5 Years	72	36.0
	6–10 Years	82	41.0
	11+ Years	46	23.0

Source: Field Survey, 2025

Table 2: SSI Contributions to Knowledge-Based Industries (N = 200)

Indicator	Yes (%)	No (%)
Engaged in knowledge transfer (ICT, training, consultancy)	61.0	39.0
Collaboration with universities/research institutions	28.0	72.0
Use of digital platforms for market access (e-commerce, ICT support)	46.0	54.0

Source: Field Survey, 2025

Table 3: Constraints Faced by Small-Scale Industries in Contributing to KBIs (N = 200)

Constraint	Frequency	Percentage (%)
Limited access to credit/finance	148	74.0
Poor intellectual property protection	106	53.0
Infrastructural challenges (power, internet, workspace)	132	66.0
Weak linkages with research institutions	144	72.0

Source: Field Survey, 2025

4.2 Survey Results

The survey conducted with 200 participants, including owners and managers of small-scale industries (SSIs) in Abuja, revealed several significant trends regarding their roles in knowledge-based industries (KBIs). Firstly, 61% of those surveyed indicated they participated in knowledge transfer activities, such as providing ICT services, training, and consultancy. This suggests that SSIs are not merely consumers of knowledge; they also play a critical role in the diffusion of innovation within Abuja's developing knowledge economy. However, only 28% mentioned having collaborations with universities or research institutions, indicating a weak connection between SSIs and established knowledge-generation centres. This finding aligns with the research of Oyelaran-Oyeyinka and Lal (2015), who observed that Nigerian SSIs tend to favour incremental innovation over formal knowledge partnerships.

Regarding financing, 74% of respondents identified limited access to credit as their primary barrier to expanding knowledge-related initiatives. This supports the SMEDAN (2020) report, which highlighted that insufficient financing and infrastructural challenges are significant hurdles. Furthermore, 53% of respondents identified inadequate intellectual property protection as a factor that discouraged them from heavily investing in original innovations. Despite these obstacles, 46% of participants reported utilising digital platforms to enhance market access, especially in areas such as e-commerce, digital design, and ICT support services. This finding aligns with the analysis by Mathews and Cho (2000) regarding South Korea, where small enterprises leveraged ICT adoption to establish a foundation for knowledge-based development.

4.3 Interview Insights

The qualitative interviews with 20 SSI operators offered more profound insights into the processes of knowledge application and innovation. Interviewees noted that while informal

ICT start-ups and creative businesses in Abuja are testing new concepts, they often depend on imitating and modifying existing technologies rather than pursuing radical innovations. One participant remarked: “We select solutions that are effective elsewhere, adjust them to suit Abuja’s context, and then implement them in small enterprises.” This incremental innovation approach aligns with the perspective of Oyelaran-Oyeyinka and Lal (2015), which emphasises that adaptation is crucial for linking traditional sectors and KBIs in Nigeria.

Another common theme was the impact of SSIs on employment and skills development. Numerous firms indicated that their operations—spanning coding hubs to digital media companies—offered training opportunities for young people, thereby enhancing the local knowledge base. This resonates with Dossani’s (2012) findings, which suggest that small IT firms in India served as training platforms for the broader software industry. Nevertheless, operators in Abuja highlighted that infrastructural challenges, including unreliable electricity and high internet costs, hinder their ability to fulfil this role.

4.4 Document Review Findings

An analysis of government policy documents, such as the strategic framework from the Abuja Enterprise Agency (AEA), disclosed that while there are policy declarations acknowledging the potential of SSIs in the knowledge economy, actual implementation is lacking. For example, the AEA's initiative for innovation hubs in Abuja has not been fully realised due to funding setbacks and bureaucratic hurdles. Additionally, documents from SMEDAN (2020) reveal that despite Abuja housing a significant concentration of ICT-focused SSIs, the ecosystem necessary for scaling them into KBIs—which includes research collaboration, proper financing, and intellectual property protection—remains inadequate.

4.5 Discussion

The findings suggest that SSIs in Abuja are gradually transforming into vital participants within the knowledge-based economy; however, their full potential has yet to be fully realised. The quantitative findings indicate active knowledge transfer and digital adoption; nevertheless, the low levels of collaboration with universities reflect the "missing link" between academic research and enterprise. This resonates with Siyanbola et al. (2012), who emphasised the lack of organised knowledge management practices among Nigerian SSIs.

The qualitative insights support the notion that small-scale industries (SSIs) in Abuja mainly engage in gradual rather than transformative innovation. Although this may appear restrictive, incremental innovation plays a crucial role in environments with limited institutional backing, enabling firms to integrate into knowledge-based industries (KBIs) gradually. The incremental approach is especially pertinent for Abuja, where financial and infrastructural challenges hinder the quest for high-level innovation.

Moreover, the study emphasises the dual function of SSIs as both employers and carriers of knowledge. By offering informal training and skill development opportunities, SSIs indirectly help reinforce Abuja’s knowledge base. This observation is consistent with global examples from countries such as South Korea, Taiwan, and India, where SSIs played a pivotal role in spreading innovation before scaling up into larger KBIs.

The findings confirm that SSIs in Abuja are strategically positioned as adapters and disseminators of innovation, rather than pioneers of groundbreaking technologies. However, without enhanced institutional backing, improved financing options, and better links with universities, their potential contribution to KBIs will remain suboptimal.

5. Conclusion

This research examined the role of small-scale industries (SSIs) in promoting the development of knowledge-based industries (KBIs) in Abuja, Nigeria. The results indicated that SSIs are vital facilitators of knowledge exchange, innovation sharing, and digital integration, making significant contributions to the foundation of a knowledge economy. Nevertheless, their effectiveness is curtailed by weak partnerships with universities and research institutions, limited access to funding, and inadequate protection of intellectual property. These structural impediments restrict the full capabilities of SSIs in supporting KBIs. Despite these obstacles, the embrace of ICT platforms and informal knowledge networks illustrates the resilience and adaptability of SSIs in Abuja. Overall, the study emphasises the dual role of SSIs as both recipients and promoters of knowledge-based industrial growth, while also highlighting the systemic challenges that must be addressed for comprehensive, knowledge-driven progress.

6. Recommendation

Based on the findings, the following suggestions are offered:

1. Enhancing Connections with Research Institutions: Government and policymakers should promote stronger partnerships between SSIs, universities, and research organisations through innovation hubs, incubation centres, and collaborative research initiatives.

2. Enhanced Financial Access: Financial institutions and governmental bodies like the Bank of Industry (BoI) and SMEDAN should develop customised credit options and flexible loan schemes to support knowledge-oriented businesses.

3. Protection of Intellectual Property: Strengthening Nigeria’s intellectual property regulations and establishing cost-effective registration processes would motivate SSIs to invest in original innovations.

4. Capacity Enhancement: Ongoing training and mentorship initiatives should be implemented to equip SSI owners and managers with competencies in ICT, research commercialisation, and innovation management.

5. Policy Support for Digital Advancement: Government initiatives should concentrate on improving ICT infrastructure, offering tax incentives for digital integration, and aiding market access for digitally-enabled SSIs.

By adopting these recommendations, SSIs in Abuja can better assimilate into the knowledge economy, improve the dissemination of innovation, and contribute more significantly to sustainable development.

7. Contribution to Knowledge

This research offers several important contributions to the literature concerning small-scale industries (SSIs) and knowledge-based industries (KBIs) in Nigeria, particularly in the Federal Capital Territory of Abuja. Firstly, it delivers empirical evidence that illustrates the degree to which SSIs are involved in knowledge transfer and the diffusion of innovation through ICT services, training, and consultancy. This supports the notion that SSIs not only play a supportive role in local economies but also act as crucial facilitators of knowledge-based economic transformation.

Secondly, the results emphasise the limited collaboration between SSIs and research institutions, thereby enhancing the discussion on institutional connections within Nigeria's

innovation system. By empirically demonstrating that only a small fraction of SSIs collaborate with universities or research institutions, the study highlights the disconnect between knowledge creators and knowledge consumers in the Abuja context.

Thirdly, the investigation enhances the understanding of the structural challenges that SSIs face in their pursuit of knowledge-driven growth. By pinpointing financing issues, inadequate intellectual property protection, and infrastructure shortcomings as significant hurdles, the study deepens current discussions surrounding the systemic obstacles that hinder the shift from traditional industries to knowledge-based enterprises.

Lastly, the research contributes methodologically by using a mixed-methods approach that integrates quantitative survey results with theoretical insights from endogenous growth theory and innovation systems frameworks. This methodological triangulation enhances the robustness of the findings and provides a foundation for future empirical research at the intersection of SSIs and KBIs in emerging economies.

8. Areas for Future Research

Although this study provides meaningful insights, it also opens up new directions for additional exploration. Firstly, future studies could broaden the geographical focus beyond the Federal Capital Territory to encompass comparative analyses across various Nigerian states. Such investigations would help determine if the trends observed in Abuja can be generalised to the nation as a whole.

Secondly, longitudinal studies are suggested to capture the progressive development of SSIs and their gradual incorporation into KBIs over time. This would offer a more detailed understanding of how innovation pathways evolve in environments with resource constraints.

Thirdly, more in-depth qualitative research is necessary to explore the experiences of SSI owners and managers as they navigate the challenges of knowledge-based advancement. Conducting detailed interviews and case studies could illuminate the strategies, resilience tactics, and informal partnerships that might not be fully represented in survey findings.

Fourthly, future research should focus on policy initiatives and assess the effectiveness of government- and donor-backed programs, such as SMEDAN initiatives, innovation hubs, and technology parks. Evaluating their success in bolstering SSI–KBI collaborations would give policymakers valuable recommendations to strengthen these connections.

Finally, comparative international research could explore how SSIs in other developing countries have effectively integrated into KBIs. This would facilitate cross-country learning and the adaptation of successful practices to the Nigerian context.

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