

Monitoring and Analysis of Classical and Contemporary Factors of Production in Uganda: A Qualitative Study

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ABSTRACT

The Ugandan economy is a combination of traditional agriculture-based production and emerging knowledge-intensive sectors. Production factors, according to classical economic theory, are a function of land, labour, and capital, representing the agrarian and industrial roots of the economy. According to Smith (1776), Ricardo (1817), land remains an important input in production, although labour and physical capital are generally limited by inadequate skills and financing in Uganda. The increase in contemporary production emphasizes entrepreneurship, innovation, and knowledge/technology as the driving forces behind value creation. Drucker (1993) and Romer (1990) advance that the qualitative approach involves policy analysis and a series of in-depth interviews with key informants who can provide evidence for an in-depth critical examination of how productive capacity in Uganda relates to both classical and contemporary factors. In that context, the study adopts an interpretivist-constructivist paradigm in which stakeholders contextualize the meaning of and implement a strategy for production. The findings indicate that classical factors remain foundational but that contemporary factors, mainly entrepreneurship and ICT-driven innovations, serve as critical drivers of economic diversification and structural transformation. However, incomplete access to quality education and technology, and financing opportunities, hinders complete exploitation of such contemporary production factors. These factors lead to a hybrid framework that incorporates both classical and modern factors as likely to constitute a far more comprehensive model against which Ugandan development could be understood. This includes policy implications involving investing in the development of skills and digital infrastructure, along with supporting entrepreneurship programs to harmonize productive capacity between traditional and modern sectors. These measures will enhance economic productivity, decrease unemployment, and strengthen Uganda's competitiveness within regional and global markets.

Keywords: Uganda, factors of production, entrepreneurship, knowledge economy, economic development.

INTRODUCTION

Factors of production are an important aspect of economic development, relating to resources needed to produce goods and services. For instance, classical economists like Adam Smith in 1776 and David Ricardo in 1817 identified land, labour, and capital as the fundamental inputs. Indeed, the economic structure of Uganda has traditionally been based on such a model, with agriculture as the mainstay and a low level of industrialization. More than 70 percent of the available labour force in Uganda is employed in agriculture, which is heavily dependent on land and human labour, though its capital accumulation is currently constrained by financial and infrastructural bottlenecks.

Over recent decades, there has been growth in knowledge-based and service sectors in Uganda, including fintech, mobile money platforms, digital agriculture, and SMEs driven by entrepreneurial activity. Such emerging sectors reflect the increasing relevance of knowledge, technology, and entrepreneurship as factors of production. Traditional frameworks, with their focus on land, labour, and capital, cannot therefore explain Uganda's changing economic landscape, particularly in urban and technology-driven sectors.

This study critically looks into the development from classical to contemporary factors of production in Uganda, with emphasis on the interrelation between traditional resources and modern innovation. Using a qualitative research design that incorporates policy analysis and interviews with key informants, this study investigates perceptions, institutional practices, and strategies that shape productive capacities. The research is intended to show how the use of classical and contemporary production factors can enable Uganda to accelerate economic growth and sustainability.

Philosophical Assumptions

This study adopts a dual philosophical approach, combining Interpretivism and Constructivism, with a qualitative methodology matching. Using an interpretivist and constructivist approach has enabled the research to capture multi-perspective perceptions held by various stakeholders. For example, government officials might consider entrepreneurship programs as vehicles of economic transformation, whereas local entrepreneurs may perceive such programs as having limited resources or being impeded by bureaucracy. This variation in perceptions is what makes the use of multiple perspectives particularly relevant for analysing the production strategies in Uganda. Knowledge and Innovation: Lastly, this philosophical lens is critical in the examination of how knowledge and technology are becoming productive factors. By treating these elements as socially constructed, the study puts forward the processes of learning, innovation networks, and knowledge-sharing practices in contouring contemporary economic growth. This finds resonance with Uganda's rising knowledge-based sectors like ICT and digital entrepreneurship, where it is mainly interpretation, collaboration, and innovation that create value beyond physical input. This is in line with Romer (1990) and Drucker (1993).

METHODOLOGY

Research Design

This study has adopted a qualitative research design, which incorporates policy analysis and key informant interviews in exploring the classical and contemporary factors of production in Uganda. Qualitative research is appropriate when examining complex social phenomena because it allows deep insight into participants' perspectives, institutional practices, and the socio-economic contexts in which policies come into play (Creswell & Poth, 2018). By focusing on stakeholders' interpretations, the study moves beyond a mere description of policies into examination of the motivations, constraints, and practical realities that shape production processes in Uganda. The qualitative design supports an inductive approach by allowing emergent themes and patterns to be identified from rich narrative data rather than any pre-determined quantitative measures (Patton, 2015). This design is thus appropriate for understanding both how the production-related policies are implemented and perceived to be effective in different sectors of agriculture, trade, and technology.

Sampling and Participants

Purposive sampling was used to select participants who have vast knowledge and experience in the economic, agricultural, and technological aspects of Uganda. As largely documented in qualitative research, purposive sampling targets information-rich cases that are most likely to be representative of the insights into the research questions (Etikan, Musa, & Alkassim, 2016). Participants included officials from MoFPED, Ministry of Trade, industrial leaders, and entrepreneurs. A total of 18 participants were interviewed, ensuring diversity of perspectives on production factors from a classical and modern standpoint. Such diversity was key to capturing different meanings of policy implementation and the interaction between institutional, technological, and entrepreneurial factors impinging on production. Although limited, the sample size is within qualitative research norms since the emphasis is towards an in-depth insight rather than statistical generalization (Guest et al., 2006).

Data Collection

Data were gathered through three complementary approaches. First, the policy analysis entailed the study of government reports, strategic plans, and industrial development guidelines to comprehend institutional strategies, priorities, and regulatory frameworks. According to Bowen (2009), policy analysis develops an understanding of institutional priorities, strategies, and regulatory frameworks through a review of such

documents. Second, semi-structured key informant interviews captured participants' perceptions of production factors, implementation challenges, and recommendations for policy improvements. Semi-structured interviews are advantageous because they provide consistency in questioning while allowing flexibility to probe for nuanced insights (Kallio et al., 2016). A review of secondary data from sources such as UBOS, the World Bank, and peer-reviewed research articles provided contextual and historical evidence on production trends, resource allocation, and sectoral performance. The combination of these data sources allowed for the reconciliation of both policy intent and actual practical outcomes.

Data Analysis

Data analysis was done using thematic analysis, which is appropriate for identifying, analyzing, and reporting patterns within qualitative data (Braun & Clarke, 2006). Interview transcripts and policy documents were coded into themes pertaining to land utilization, labour productivity, capital investment, entrepreneurship, and knowledge/technology integration. Initial coding was done manually to closely engage with the data, while verification and organization were done using NVivo software to enhance the accuracy and manage complex datasets. Triangulation across interviews, policy documents, and secondary data enhanced validity through cross-checking findings to reduce potential bias (Flick, 2018). This multi-source approach ensured that emergent themes reflected both stakeholder perceptions and empirical evidence.

Trustworthiness

In this study, traditional qualitative criteria were used to ensure trustworthiness: credibility was enhanced through member checking, with participants reviewing and confirming the key findings to ensure that the interpretations reflected their views (Lincoln & Guba, 1985); dependability was attained through the keeping of audit trails, recording methodological decisions, coding, and data management procedures; transferability was ensured by using thick, contextual descriptions of the research setting and participants, which enabled other researchers to engage in judgments about applicability in similar contexts in East Africa. These measures collectively ensured that the findings are robust, reliable, and meaningful within the Ugandan production landscape. 3.6 Ethical Considerations Ethical considerations were followed to the letter in the conduct of the research. All participants gave informed consent before data collection, with the assurance that their participation was voluntary and that they understood the purpose of the study. Participants were anonymized to protect their identity, and the data was stored securely to prevent unauthorized access. Ethical clearance was obtained from the Research Ethics Committee of Makerere University, pursuant to institutional and national guidelines on the involvement of human subjects in research. The measures taken demonstrate that such a study would uphold the rights of the participants while ensuring that integrity and transparency are maintained in data collection and reporting.

LITERATURE REVIEW

Classical Factors of Production in Uganda

Land, labour, and capital are considered basic inputs in production and the creation of wealth under classical economic theory (Smith 1776; Ricardo 1817). In Uganda, land remains at the centre, given that over 70% of Ugandans are employed in agriculture, which contributes a fundamental share to GDP (UBOS, 2024). Unfortunately, land productivity remains low due to the general insecurity of tenure, fragmentation, and dependence on rain-fed farming systems (MoFPED, 2023). Uganda has abundant labour, but a large percentage remains unskilled, lacks technical training, and access to capacity-building opportunities critical for modern farming or higher value addition in industrial pursuits (World Bank, 2022). Capital, both physical and financial, remains scarce for many smallholder farmers and other entrepreneurs. While capital credit schemes by governments, microfinance institutions, and cooperation societies ensure some sort of access, high interest rates, collateral requirements, and limited outreach considerably weaken their effectiveness (BoU, 2023). Overall, as appreciable as these classical factors may be, they are not enough to engender robust and sustained economic growth in any economy, particularly in the face of rapid technological change and growing global competition.

Contemporary Factors in Uganda

Finally, modern economic thought builds on classical insights by emphasizing knowledge, technology, and entrepreneurship as principal drivers of productivity and competitiveness. According to Drucker (1993) and Romer (1990), evidence from Uganda has rapidly growing information and communication technologies that have revolutionized many aspects of life in the country. For example, mobile money platforms, digital agriculture, and e-commerce applications facilitate fast and efficient financial transactions, market access, and decision making based on big data for farmers and small businesses. Similarly, entrepreneurship has emerged as a major driver of innovation, employment generation, and addition of value, especially in urban and peri-urban areas of Uganda, where SMEs are reportedly large contributors to GDP and employment. According to Ndiwalana & Popov (2014), technological adoption facilitates mechanization and precision agriculture and promotes industrial efficiency because of the increasingly important role played by service-based intangible inputs in the form of intellectual capital, skills, and organizational know-how. These are particularly important in transforming Uganda from an agrarian to a knowledge-based and industrialized economy.

Policy Frameworks Supporting Production Factors

There is an increasing integration of both classical and contemporary production inputs in Uganda's policy environment. The NDP III emphasizes industrialization, innovation, and digital transformation as a conduit for economic growth (MoFPED, 2020). Accompanying policies on financial inclusion, digital literacy, entrepreneurship, and ICT infrastructure have been targeted at improving access to capital and knowledge, complementing the more conventional inputs of land and labour. However, there are still challenges with implementation. Skills gaps, uneven digital infrastructure, and regional disparities impede the uniform benefits of development across the country (UBOS, 2023). Besides, quality education, vocational training, and innovation hubs remain concentrated in urban areas, putting a limit on the capacity of rural populations to exploit the more contemporary factors of production (World Bank, 2022). As such, it is expected that necessary policy interventions address the structural bottlenecks that will allow an enabling framework to enhance both traditional and modern inputs to synergistically drive development.

Literature Synthesis

A synthesis of the literature would indicate that economic development within Uganda needs a hybrid approach that combines both classical and contemporary factors of production. While land, labour, and capital remain critical for sustaining livelihoods and underpinning industrial activities, productivity and competitiveness-and, by extension, innovation-are increasingly underpinned by knowledge, technology, and entrepreneurial capacity (Drucker, 1993; Romer, 1990). The empirical evidence in Uganda also suggests that a sole reliance on the traditional inputs restricts the full potential of growth, while the increased use of digital tools, innovative approaches, and entrepreneurship serves to enhance efficiency and value (Kaggwa et al., 2021; Ndiwalana & Popov, 2014). As such, both theoretical and practical information points toward an integrated framework that considers tangible and intangible assets, balancing classical economic principles with their contemporary drivers in a way that can be inclusive and sustainable.

Table1: Classical vs Contemporary Factors of Production in Uganda¹

Factor Type	Specific Factor	Examples in Uganda	Policy/Intervention Support
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- ¹ It is true that the classical factors do predominate in rural livelihoods, but productivity is usually limited in the absence of complementary contemporary factors.
- Contemporary factors are increasingly driving urban and peri-urban economic growth while integrating Uganda into the knowledge-based economy.
- Policy interventions should therefore try to bridge the gaps between classical and modern factors to stimulate inclusive and sustainable growth.

Classical Factors	Land	Agricultural land for crops like coffee, maize, and tea; grazing land	Land Act (1998), Uganda Land Policy (2013) – promote secure tenure and dispute resolution
	Labour	Rural smallholder farmers, informal sector workers, industrial labour	Skills development programs by MoES, vocational training initiatives, Youth Livelihood Programme
	Capital	Physical capital such as farm equipment, machinery, microfinance loans	Bank of Uganda credit schemes, Uganda Development Bank financing, SACCOs and microfinance programs SACCOs and microfinance programs
Contemporary Factors	Knowledge	Technical know-how, education, agricultural best practices	National Skills Development Strategy, ICT in education programs, agricultural extension services
	Technology	Mobile money platforms (e.g., MTN Mobile Money), digital agriculture apps, mechanized farming	Digital Uganda Vision 2025, National ICT Policy, Uganda Industrial Research Institute (UIRI) support
	Entrepreneurship	SMEs, startups, agro-processing ventures	SME Policy 2020, Uganda Investment Authority initiatives, Uganda National Entrepreneurship Ecosystem programs
	Innovation	Introduction of high-yield crops, solar-powered irrigation, e-commerce	NDP III innovation programs, incubation hubs, Uganda Industrial Research Institute support

Conceptual and theoretical framework

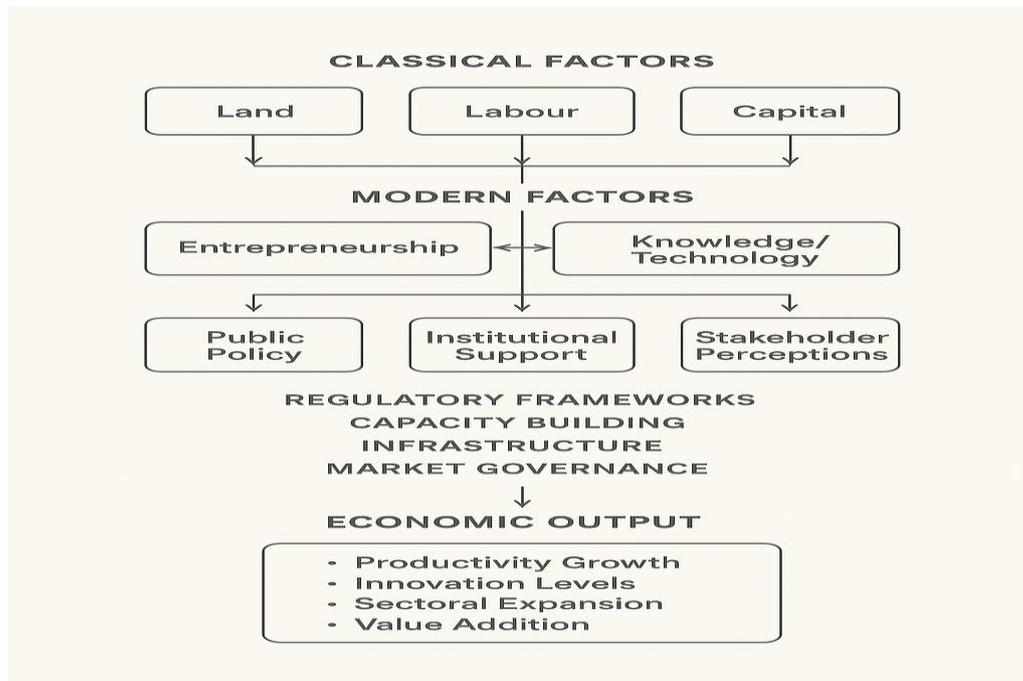
Conceptual Framework

This study conceptualizes factors of production as a combination of both classical and contemporary elements that, together, shape productive capacity in developing economies like Uganda. The classical factors—land, labour, and capital—finally express the resources foundationally needed in any form of production. These inputs have traditionally been perceived as core to the accumulation of economic output because they directly impact resource availability, workforce participation, and investment capacity (Smith 1776; Ricardo 1817). Indeed, within Uganda's economy, access to land for farming and industry, labour productivity, and capacity to mobilize capital through financial markets remain key determinants of output in key sectors of the economy that include agriculture, manufacturing, and services (Kasekende & Ssemogerere, 2018). These classical elements therefore provide the structural basis on which modern forms of production operate.

The study further incorporates contemporary perspectives that emphasize entrepreneurship and knowledge/technology as additional, dynamic factors of production. Unlike classical inputs, these modern factors embody innovation, creativity, intellectual capital, and technological capability, which enable economies to achieve efficient utilisation of resources and enhanced competitiveness (OECD, 2015). Entrepreneurship

brings in the impetus for the creation of new firms, introduces new business models, and fosters risk-taking that supports market expansion, whereas knowledge and technology enhance productivity through research, data-driven decision making, and mechanization (Acs, Audretsch & Lehmann, 2013). In developing economies, the synergy between entrepreneurship and technology has been quite critical, leading to the transformation of traditional sectors, such as agricultural value addition and digital finance (UNCTAD, 2022).

Figure 1: Conceptual Framework Diagram



Source: Adapted from Smith (1776), Schumpeter (1934), Romer (1990).

The conceptual framework displays how classical factors-land, labour, and capital-are the foundation that supports and provides input to modern factors, which are entrepreneurship and knowledge/technology. Bidirectional arrows show the relationships between public policy, institutional support, and stakeholder perceptions; that is, the efficiency of both classical and modern factors depends on regulatory frameworks, capacity building, infrastructure, and market governance. This eventually leads to increased economic output, evidenced by productivity growth, innovation levels, sectoral expansion, and value addition. Productive efficiency, therefore, is not merely determined by the abundance of resources but rather by the ability of institutions and entrepreneurs to combine the factors of production-classical and modern-optimally.

Theoretical Framework

The study is anchored on three complementary theories that explain both the traditional and emerging dynamics of production. From a classical production theory perspective, production is seen as typically being driven by the input of land, labour, and capital. This framework contends that such economic growth can only be achieved through an optimal allocation of these factors within a competitive market system. In the context of developing economies, land ownership systems, labour productivity challenges, and accessibility of capital continue to shape industrial and agricultural outcomes; the theory therefore remains relevant. It thus helps contextualize how structural resource constraints influence productivity.

The study applies Schumpeterian Entrepreneurship Theory as it seeks to incorporate modern economic realities in which innovation, risk-taking, and “creative destruction” are the engines of economic transformation. To Schumpeter, competition and productivity growth were ignited by entrepreneurs who disrupted market routines through the introduction of new technologies, goods, and processes. In the Ugandan context, entrepreneurial innovation has been instrumental in informal sector growth, technology-driven business models, and agribusiness value addition, reaffirming the role of entrepreneurial capability in production enhancement.

The theory thus links entrepreneurial behavior with changes in the structure of production. Finally, the study incorporates the Knowledge-Based View, which postulates that knowledge, skills, intellectual capital, and technology are important intangible resources that create competitive advantage. According to Drucker (1993) and Romer (1990), KBV theorizes that economies investing in human capital development, research, and information systems have higher returns through innovation, efficiency, and technological advancement. In a knowledge-based global economy, productive capacity depends more and more on the capacity to create, distribute, and effectively apply knowledge. This theory benefits Uganda and other similar economies, where investment in science, technology, and education is increasingly being linked with agricultural modernization, industrialization, and digital entrepreneurship. Put together, they offer a wide-ranging theoretical framework that explains how the interplay between classical resources and modern drivers like innovation and knowledge determines production results. The integration of theoretical components emphasizes that sustained productivity is not just dependent on the resource availability end but also on entrepreneurship, institutional capacity, and technological advancement.

FINDINGS AND ANALYSIS

Rural agriculture – classical factors remain central

In much of rural Uganda, the productivity and sustainability of agriculture continue to depend heavily on classical agronomic and environmental factors. Smallholder farms — often with limited land, minimal external input use, and rain-fed agriculture — remain the backbone of rural livelihoods. Research shows that the average use-rate for fertiliser across Uganda is strikingly low: only about 2.2 kg per hectare (including both users and non-users), compared to a global average of about 119 kg/ha. Moreover, only around 3 % of households report using any agro-chemical inputs.

A recent empirical study among maize farmers in Western Uganda (2025) found that just 32% of surveyed farmers used inorganic fertilizers. However, those who adopted fertilizers recorded measurable increases: yield gains of approximately 55.38 kg per acre compared to non-adopters. Logistic regression analysis in the same study identified several socio-economic factors that positively influence fertilizer adoption: larger farm size, non-agricultural income (diversified income sources), affiliation in farmer groups (cooperatives), and use of hired labour. On the other hand, factors such as greater distance to markets, high fertilizer costs, and for some demographic groups (e.g. women, smaller landholders) negatively affected adoption.

Beyond fertilizer, other sustainable soil fertility practices — such as organic matter management (e.g. composting, residue retention) — have also been studied. In the Rwenzori region, smallholder farmers average around 2 hectares per farm. The study found that the adoption of these organic matter management (OMM) practices is not simply a matter of availability, but is shaped by institutional, socio-cultural and informational factors: farmer's age, gender, education status, and cultural norms influence whether and how these practices are used.

Moreover, access to information — via mobile phones or radios — and social networks plays a significant role in influencing adoption of agricultural inputs. A survey across four rural communities in Uganda found that households with greater access to ICT (cell phones) and with more “weak-tie” social connections (i.e. networks beyond immediate family) were significantly more likely to use inputs such as fertilizer.

These findings reinforce that classical agronomic factors — soil fertility, proper input use, effective land and water management — remain indispensable. Modern interventions may help, but unless classical constraints are addressed, agricultural productivity in rural areas will remain limited.

Urban SMEs, fintech, and ICT-driven innovations — contemporary transformations

In parallel to agriculture, Uganda is witnessing growing dynamism in urban and peri-urban economic activities. The expansion of small and medium enterprises (SMEs), powered by digital financial services and fintech, is reshaping how production, trade and value-addition are conducted. A recent study in the urban context (2025) notes that SMEs in areas like Kampala increasingly rely on mobile money and digital banking for daily

operations. According to that study, more than 85% of SMEs in Kampala Central Division reported using mobile money platforms for operations such as receiving payments, paying suppliers, and accessing credit.

Broadly, digital financial services via mobile money have driven financial inclusion: formal financial service use in Uganda has expanded, with mobile money serving as a leading channel. A 2025 survey of agri-entrepreneurs in northern Uganda observed that access to mobile banking can improve livelihoods by enabling savings, credit, and enabling investment in agricultural inputs — although uptake remains limited.

Moreover, ICT is not limited to finance: a growing number of initiatives use ICT to deliver agricultural extension, market information, weather forecasts, and advice to rural farmers. For instance, some projects combine mobile/SMS-based services with satellite or GPS-based data to give farmers localized weather tips, planting/harvesting advisories, and market linkages.

Recently, cutting-edge proposals — such as IoT-based precision agriculture — have been advanced. A 2025 framework for “smart agriculture” in Uganda envisions using soil-moisture, weather, and environmental sensors (connected to mobile/web platforms) to enable real-time crop and irrigation management, especially important under climate variability. If scaled and adapted properly, such innovations could significantly improve water-use efficiency, reduce risk, and boost yields — especially where classical constraints (soil, input access) are complemented by modern tools.

Thus, for many urban/peri-urban SMEs, agri-entrepreneurs, and progressive farmers, ICT and fintech offer new pathways to increase productivity, market access, and inclusion. These emerging trends represent a contemporary factor transforming production and livelihoods in ways that classical agriculture alone cannot achieve.

Policy, institutional and enabling environment — gaps and limitations

Despite the evident potential of ICT, fintech, and modern agricultural practices, the realisation of these benefits at scale is constrained by institutional and resource limitations. While there have been policy efforts and interest in digital agricultural transformation — for instance through programmes advocating digitization of farming practices, market linkages, and climate-smart agriculture — implementation remains uneven.

For example, though ICT-based advisory services and digital finance are available, many rural farmers still lack access because of poor infrastructure: inadequate mobile network coverage, inconsistent electricity supply, or limited access to smartphones. A study of mobile banking adoption among agri-entrepreneurs in northern Uganda (2025) notes that low digital literacy, weak telecom coverage, and poverty continue to hinder uptake.

Furthermore, uptake of sustainable soil-fertility practices such as organic matter management is influenced by socio-cultural factors (gender distinctions, decision-making norms) that are not always addressed by standard policy interventions. For instance, in the Rwenzori region, decisions on land use and soil management are often gendered: men make most decisions, while women and younger family members may be excluded.

In the context of SMEs and digital finance, while mobile money and fintech have expanded, challenges remain: many SMEs still operate in informal settings, lacking formal registration or land title, which limits their capacity to access credit, collateralized loans, or to scale operations. Policies may exist on paper, but resource limitations (infrastructure, extension services, training, financing) and institutional weaknesses undermine effective application.

Overall, while the enabling environment shows promise, gaps in infrastructure, capacity, institutional coordination, and socio-cultural inclusion significantly limit the extent to which contemporary innovations deliver on their transformative potential — especially in rural and marginalized areas.

Stakeholder perceptions — divergence in priorities and constraints

Qualitative and empirical evidence suggests substantial divergence in how different stakeholders perceive the main constraints and enablers of productivity, growth, and development. On one side, policy makers, government agencies, and institutional actors tend to emphasise creating enabling frameworks: supportive regulations, digital

finance inclusion, ICT deployment, and promotion of value-chain development. The push for digitalizing agriculture, promoting fintech, and developing value chains reflects this institutional orientation.

On the other side, many farmers, agri-entrepreneurs, and small-scale producers perceive the core challenges as being access to tangible resources: finance, inputs (fertilizers, improved seeds), reliable infrastructure (roads, mobile networks, electricity), and technical skills. A 2025 study on mobile banking uptake among agri-entrepreneurs in northern Uganda found that socioeconomic factors — including income, assets, and access to infrastructure — strongly conditioned adoption. Similarly, the low use of inorganic fertilizers (only 32% in a 2025 Western Uganda survey) underscores that many farmers remain constrained by cost, access, and perhaps knowledge.

Moreover, in the adoption of organic matter management practices, social factors — age, gender norms, education — influence whether farmers embrace these techniques. These differences in perspective can lead to misaligned policies: while institutions may design broad-based, technology-driven interventions, the target communities may prioritize affordability, accessibility, and social inclusion. This divergence is critical because sustainable change requires both institutional frameworks and ground-level buy-in — not only in terms of compliance to policy but real improvement of livelihoods.

Implications: Toward a Mixed, Context-Sensitive Strategy

The coexistence of classical and contemporary factors suggests that Uganda’s agricultural and economic transformation needs a hybrid strategy — one that strengthens foundational agronomic systems in rural areas, while simultaneously enabling modern, ICT-driven entrepreneurship and value-chain development.

- In rural agriculture, policies and interventions should support affordable input access (fertilizers, improved seeds), extension services, and information access (via ICT) — but also consider socio-cultural factors (gender, land access, farmer groups) to ensure equitable uptake.
- For value-chain development and SMEs, policy should enable broader financial inclusion (digital finance, credit), infrastructure development (electricity, network), skills training, and support for formalization (land titles, registration, cooperatives).
- Recognizing stakeholder perceptions — especially the constraints faced by farmers and entrepreneurs on the ground — is crucial for designing interventions that are relevant, accessible, and sustainable.

Such a context-sensitive, multi-pronged approach will maximize the potential of both classical and contemporary factors — enhancing agricultural productivity, economic diversification, and inclusive development.

Summary Table: Key Findings by Theme

Theme / Factor	Empirical Findings / Observations	Constraints / Key Limitations
Classical agriculture (soil & inputs)	Only ~2.2 kg/ha of fertiliser use (much lower than global average). Among maize farmers in Western Uganda, only 32% use inorganic fertilizer — but adopters record ~ 55.38 kg/acre higher yield.	High cost of fertilizer; small farm sizes; long distance to markets; gender disparities; smallholder resource constraints.
Soil fertility & organic matter management	In regions like Rwenzori, farmers with access to information, institutional support more likely to adopt organic matter management (OMM) practices.	Socio-cultural constraints (gender norms, decision-making structures), low education levels limit adoption.

<p>ICT & digital finance for rural agriculture</p>	<p>Mobile money and digital financial services increase likelihood of adopting improved seeds and chemical fertilizers, enhancing farm investments and income.</p> <p>ICT (mobile phones, social networks) significantly correlates with higher input use among smallholders.</p>	<p>Digital infrastructure gaps, low digital literacy, low smartphone ownership, weak network coverage in rural areas.</p>
<p>Urban SMEs & fintech-driven entrepreneurship</p>	<p>Over 85% of SMEs in Kampala Central Division use mobile money for business operations (payments, credit, transactions).</p> <p>Fintech sector expanding: mobile money remains core; digital banking, lending, savings platforms increasing financial inclusion.</p>	<p>Many SMEs informal, lack collateral or formal registration, limiting growth and access to credit; infrastructure gaps may affect scalability.</p>
<p>Institutional / policy environment & implementation</p>	<p>Government and other stakeholders support digitization of agriculture, value-chain development, and innovation adoption.</p>	<p>Weak implementation, poor coordination, lack of resources/infrastructure, socio-cultural barriers limit effectiveness.</p>
<p>Institutional / policy environment & implementation</p>	<p>Government and other stakeholders support digitization of agriculture, value-chain development, and innovation adoption.</p>	<p>Weak implementation, poor coordination, lack of resources/infrastructure, socio-cultural barriers limit effectiveness.</p>

Policy and Strategic Recommendations

1. Strengthen Access to Affordable Agricultural Inputs for Smallholder Farmers

Rationale: Key factors like soil fertility and fertilizer use are vital to agricultural output. Data from Western Uganda shows that only 32% of farmers use inorganic fertilizers; those who do see yield increases of about 55.38 kg/acre.

Recommendation: The government and development partners should set up input subsidies and credit-linked delivery systems for fertilizers, improved seeds, and soil amendments. Using farmer cooperatives can boost bargaining power, improve distribution, and reduce transaction costs.

Implementation Strategy:

- Partner with private agro-dealers to provide inputs through micro-credit and installment plans.
- Use mobile platforms to promote subsidy programs and improve transparency.
- Create community-based input storage centers to ease transport challenges and cut spoilage.

2. Promote ICT-Enabled Agricultural Advisory and Extension Services

Rationale: Digital advisory services greatly improve access to farming, weather, and market information, which helps smallholder farmers adopt inputs and boost productivity.

Recommendation: Expand ICT-driven extension systems using mobile phones, SMS updates, and interactive apps that offer timely, localized farming advice.

Implementation Strategy:

- Invest in improving mobile network coverage in rural areas that lack service.
- Develop user-friendly, multilingual apps designed for farmers.
- Use remote sensing technologies for weather and soil moisture forecasts.

3. Enhance Physical and Digital Infrastructure for Production and Market Access

Rationale: Poor roads, insufficient electricity, and weak digital networks limit agricultural commercialization and hinder SME and fintech growth. Strong infrastructure supports both traditional and modern production factors.

Recommendation: Focus on investing in key rural road networks, electricity, and internet connectivity to cut post-harvest losses, support technology use, and speed up market access.

Implementation Strategy:

- Create transport routes that connect production areas to urban markets.
- Expand solar-powered mini-grids and other off-grid solutions in remote areas.
- Collaborate with telecom companies to boost mobile internet access.

4. Facilitate Financial Inclusion for Farmers and SMEs

Rationale: While mobile money has improved financial access, opportunities for formal credit remain limited, which affects farm investment and SME growth. Blended finance can provide affordable production capital.

Recommendation: Develop financial products that combine digital payments, micro-credit, and group lending designed for smallholders and rural businesses.

Implementation Strategy:

- Encourage banks and fintech companies to use mobile money transaction records for credit evaluations.
- Use cooperatives and associations as substitutes for collateral.
- Provide financial literacy programs along with credit options.

5. Integrate Gender and Social Inclusion in Program Design

Rationale: Gender norms, land ownership issues, and limited decision-making power keep women and youth from accessing resources and technology. Inclusive programs improve adoption rates and promote equity.

Recommendation: Incorporate gender-sensitive and socially inclusive practices in input distribution, financing, ICT training, and capacity-building efforts.

Implementation Strategy:

- Offer targeted training and priority access to inputs and funding for women and youth.

- Encourage joint decision-making processes within cooperatives and farmer groups.
- Gather and analyze gender-specific data on participation and outcomes to track equity effects.

6. Strengthen Institutional Coordination and Policy Implementation

Rationale: Current policies for agriculture modernization, SME growth, and digital finance often face implementation issues due to sector fragmentation, limited resources, and weak coordination.

Recommendation: Create multi-sector coordination platforms to streamline efforts, support public-private partnerships, and ensure consistent policy execution in production and technology.

Implementation Strategy:

- Form inter-ministerial task forces connecting agriculture, ICT, finance, and local governments.
- Set up regular reviews to monitor and evaluate progress and adjust policies as necessary.
- Involve private stakeholders to tap into technical skills, innovation, and financial support through organized partnerships.

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