



**COMPENDIUM OF RESEARCH STUDIES ON GREENING UGANDA'S
URBANIZATION AND INDUSTRIALIZATION (2020-2023)**

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ENGINEERING, DESIGN, ART AND TECHNOLOGY
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ACKNOWLEDGEMENT

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1.0 INTRODUCTION

1.1 About the Department of Architecture and Physical Planning, Makerere University

The Department of Architecture and Physical Planning (DAPP), College of Engineering, Design, Art and Technology (CEDAT), Makerere University, promotes research and teaching activities in various fields related to urban planning, physical planning and architecture and urban governance.

1.2 About Global Green Growth Institute

The Global Green Growth Institute (GGGI) is a treaty-based international, inter-governmental organization dedicated to supporting and promoting strong, inclusive and sustainable economic growth in developing countries and emerging economies. GGGI supports emerging and developing countries that seek to develop rigorous green growth economic development strategies. GGGI carries out research into various aspects of green growth theory and practice and facilitates the engagement of the private sector expertise and resources in the implementation of green growth strategies, GGGI works with various partners in the public and private sector in Uganda and globally to put green growth at the heart of economic planning.

1.3 About Greening Uganda's Urbanization and Industrialization Project (2020-2023)

The Department of Architecture and Physical Planning, College of Engineering, Design, Art and Technology received USD 225,000 funding from EU under the 3 year project “***Greening Uganda's Urbanization and Industrialization***” implemented by Global Green Growth Institute (GGGI) from 2020 -2023. The funds are targeted at establishing a ***Knowledge and Engagement Platform*** at Makerere University by conducting cutting-edge research and capacity building of city leaders in Uganda.

The project has supported and sponsored 9 research studies conducted by the department cutting across 9 areas of modern urban greening and industrialization. These studies contain a rich source of information for learning and policy recommendations and thus, provide a critical element in improving the academic research footprint of Makerere University. They are also valuable input for taking corrective actions in promoting greening Uganda's Urbanization and Industrialization agenda and strategy as a trigger for fostering sustainable economic development of Uganda. The research team at the department decided to publish a compendium of 9 complete research studies, based on the critical need and demand of the country.

1.4 About the Compendium

This compendium provides up-to date and real time information to be used by the Government of Uganda policy makers, urban leaders, Makerere University, MDAs, social scientists, researchers and other scholars. The full versions of the 9 research reports have been made available in the public domain through the Makerere University (CEDAT) Virtual Urban Research and Innovation Centre website. The research findings have also been disseminated under established ***Knowledge and Engagement Platform*** by Makerere University to City leaders through the multi-stakeholder dialogue platforms supported by the project. It is expected that the findings and recommendations of various research studies compiled and presented in this compendium will continue to be disseminated to wider audience and be a useful document for those who are interested in promoting urban greening and industrialization agenda in Uganda. The research output from the 9 papers will contribute towards research Goal 1 of the Makerere University Strategic Plan (2020-2030) aimed at transforming the university into a research-led institution responding to national, regional and global challenges and contributing to global knowledge generation

Paper One:

Fostering Urban Growth through Green Growth Practices in Secondary Cities of Uganda.

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Abstract

Uganda is urbanizing fast and this phenomenon is largely found in the country's secondary cities. These secondary cities struggle to cope with the demand of the population influx from the country-side. They are poorly serviced with the necessary infrastructure to support the fast-growing population, are largely unplanned, poorly financed and ill managed, and are unprepared for the challenges they are to face in the immediate and long-term future. Therefore, the objective of this paper was to investigate ways through which secondary cities in Uganda can achieve sustainable development based on green growth development principles. The study employed an exploratory desk research methodology, examining Uganda's Green Growth Development Strategy to foster sustainable growth through analysis of secondary sources, focusing on the country's secondary cities. Official documents and publications on the topic of study formed the main source of information. Results show that Uganda's secondary cities are facing high population growth largely due to rural-urban migration. They are poorly serviced with infrastructure and services, poorly planned, governed and are struggling with high unemployment and with fragile economies that are under the threat of climate change effects. Hence, at the moment Uganda is ill prepared to undertake its green growth and development strategy and achieve the objectives set forth. To realize its objectives, the study recommends that the country should focus on addressing threats to decentralization. Government should enhance productivity of the economy, tackle issues of high informality of the economy, poor economic infrastructure and high infrastructure investment costs, and address threats of climate change while prioritizing environment protection.

Scope /Coverage

The paper investigated ways through which secondary cities in Uganda can achieve sustainable development based on green growth development principles.

The study covered Uganda's cities including the capital city Kampala and a number of secondary cities, and numerous municipalities. The regional secondary cities include Gulu, Mbale, Mbarara and Arua. The strategic cities are Hoima (oil), Nakasongola (industrial), Fort portal (tourism), Moroto (mining) and Jinja (industrial). It was hoped that these regional and strategic cities would act as catalysts for growth, These several secondary cities are affected by fast growing population due to rural-urban migration but with limited planning and guidance,. At the same time, these secondary cities are poorly funded, lack skilled and competent human resource, and suffer from high levels of corruption.

Objectives

- The overall objective of this study was to investigate ways through which secondary cities in Uganda can achieve sustainable development based on green growth development principles.
- This study seeks to investigate how green growth is fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.
- It also examined how green growth development models are applied as key interventions for mitigating both immediate and long-term adverse effects on the environment that urban development comes with

Methods

The study employed an exploratory desk research methodology, examining Uganda's Green Growth Development Strategy to foster sustainable growth through analysis of secondary sources, focusing on the country's secondary cities. The official documents and publications on the topic of study formed the main source of information and analysis as shown with a list of references

Results

Results show that Uganda's secondary cities are facing high population growth largely due to rural-urban migration.

Uganda's secondary cities are poorly serviced with infrastructure and services, poorly planned, governed and are struggling with high unemployment and with fragile economies that are under the threat of climate change effects.

At the moment, Uganda is ill prepared to undertake its green growth and development strategy and achieve the objectives set forth.

Policy Implications

At the national level it is important for the government to accelerate structural transformation, strengthening population management, intensification of national electrification programmes, and establishment of bond markets and pursuance of robust macroeconomic policies. At the local level, there is urgent need to address threats to decentralization; considering population impact in local development planning; formalizing the informal sector for enhanced productivity, high incomes and improved revenue; addressing technological and institutional challenge to revenue mobilization; and coordination of basic infrastructure services from state owned enterprises

Conclusions

Whereas Uganda has a green growth and development strategy with an ambitious vision, it faces a number of challenges both at the central and local levels. At the moment Uganda is ill prepared to undertake its green growth and development strategy and achieve the objectives set forth. Despite the gloomy picture, the country still has prospects for fostering its urban green growth agenda.

Recommendations

The study recommends that the country should focus on addressing threats to decentralization by tackling poor work ethics and corruption, lack of competent and motivated human capital. Improving work ethics and fight against corruption will reduce financial loss, build credibility, and improve efficiency and productivity as well as reducing investment costs in its various sectors of production. For this to happen, the political will has to be inculcated and enforced in leaders at all levels. In addition,

the country should devise pragmatic strategies of dealing with the perpetual poverty experienced by the majority of its citizen by involving various key stakeholders at all levels

Government should enhance productivity of the economy by tackling issues of high informality of the economy in the country and enhance productivity by addressing the poor economic infrastructure and high key infrastructure investment costs, insufficient production methods, and threats of climate change while prioritizing environment protection. Although Uganda has increased spending on infrastructure development to 11 percent of GDP, it should strive to do so using domestic resources other than foreign loans. This can be achieved by bringing a large sector of the informal sector in the formal to contribute to a wider tax base.

.The study also recommends Environmental protection as a key priority of Uganda's action point if the country is to better prepare itself of the climate change effects. Uganda has a number of agencies tasked to regulate activities in their respective docket in order to protect the environment. These agencies should be compelled to play their role devotedly. Uganda should work to reverse the country's forest cover loss by planting more trees, re-defining the use of the different tree species and targeting methods of reducing wastage in the wood consumption activities.

Lastly, Uganda's green growth and development strategies should be implemented in a holistic and pragmatic manner, involving all stakeholders at all levels.

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Paper Two

Assessing Urban and Peri-Urban Agriculture in Jinja City, Uganda

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Abstract

To achieve the second goal of the Sustainable Development Goals (SDGs) which is about ending hunger, it is suggested that towns and cities need to foster and promote urban and peri-urban agriculture (UPA). UPA is also recognized as one of the strategies that can be adopted to address contemporary urban challenges such as food insecurity, climate change as well as urban poverty. Most intermediate and secondary cities such as Jinja however, lack coherent plans to foster urban and peri-urban agriculture (UPA). The purpose of this study is to assess and explicate the practice and dynamics of urban and peri-urban agriculture (UPA) in Jinja city in view of the city's recent experience as well as changing land use and development patterns. To achieve the stated objectives of the study, an eclectic research methodology comprising of both quantitative and qualitative approaches was used. The study also used both questionnaires and face to face interviews as data collection methods. The questionnaire survey targeted 129 household heads from the Northern and Southern Jinja city divisions. Respondents for the key informants' face -to -face interviews were selected using purposive sampling while those for the questionnaires were randomly selected. Results show a varied and diverse practice of UPA in Jinja city. The city's UPA sector is also dominated by poultry farming, crop farming (both food and cash crops), livestock farming (Goat/sheep rearing, cattle rearing/zero grazing, rabbit rearing and pig rearing), Horticulture/vegetables, fish farming, mushroom growing and agro-forestry (fruit/timber growing). The results further revealed that, 38.1% of the HHs in Jinja city used their own land to participate agriculture, 21.6% used backyards / house compounds and 21.6% hired land to engage in farming. The rest, 3.1% used borrowed land. Also 50.9% of the urban farmers used less than an acre to farm while 0.9% had more than 4 acres. Only 33.3% of the HH had adequate food for the family needs throughout the year due to factors such as poor harvest and prolonged droughts caused by erratic rainfall. The situation became worse during COVI-19 lockdowns when food supply was affected. To foster urban and peri-urban agriculture (UPA) in Jinja, it is recommended that the city authorities adopt strategies to establish a functional demonstration farm, provide cheap credit to farmers, strengthen collaboration with the National Animal Genetic Resource Centre (NAGRC) in Njeru town, foster irrigation, promote greenhouse farming, promote school gardens in the city, build local capacity for the newly introduced Parish Development Model (PDM) farming groups, carry out public awareness campaigns targeting the youth to embrace agriculture, support agro- processing and value addition mechanisms for urban farming as well as review the current city zoning laws and building codes to accommodate backyard and roof- top farming

Scope and Coverage

The study investigated and explicated the urban and peri-urban agriculture in Jinja city in view of the city's recent experience as well as changing urban dynamics and land use patterns. Specifically, the study was carried out in all the 2 divisions of Jinja city where urban farming activities in the city are carried out. The Northern Division of Jinja city covers largely areas that were annexed from Jinja district such as Budondo, Mafubira and Bugembe town council. The Southern division on the other hand covers the entire area of the former Jinja municipality. A sample size of 129 urban farming households was selected.

Objectives

The purpose of this study was to assess and explicate the practice and dynamics of urban and peri-urban agriculture (UPA) in Jinja city in view of the city's recent experience as well as changing land use and development patterns

Specifically, the study aims to achieve the following objectives:

- a) To assess the current urban and peri-urban agricultural practices in Jinja city
- b) To investigate people's perceptions towards urban and peri-urban agriculture in Jinja city
- c) To identify best practices that are transferable to improve urban and peri-urban agriculture in Jinja city
- d) To propose more viable and scalable strategies for improving urban and peri-urban agriculture in Jinja city

Methods

To achieve the stated objectives of the study, an eclectic research methodology comprising of both quantitative and qualitative approaches was used. The study also used both questionnaires and face to face interviews as data collection methods. The questionnaire survey targeted 129 household heads from the Northern and Southern Jinja city divisions. Respondents for the key informants' face -to -face interviews were selected using purposive sampling while those for the questionnaires were randomly selected. Results show a varied and diverse practice of UPA in Jinja city. A comprehensive literature review of related documents and reports were carried out to supplement on the quantitative and qualitative data.

Results

Results show a varied and diverse practice of UPA in Jinja city. The city's UPA sector is also dominated by poultry farming, crop farming (both food and cash crops), livestock farming (Goat/sheep rearing, cattle rearing/zero grazing, rabbit rearing and pig rearing), Horticulture/vegetables, fish farming, mushroom growing and agro-forestry (fruit/timber growing). This means that agricultural practices and patterns among the farming HHs in Jinja City were dominated by poultry farming (59%), food crop production (56.6%), cash crop (45.7%), Goat/sheep rearing (32.6%), cattle rearing/zero grazing (21.7%), Horticulture/vegetables (16.3%), piggery (14.7%), fish farming (11.6%), rabbit rearing (10%), mushroom growing (9.3%) and agro-forestry (fruit/timber growing) at 1.6%

The results further revealed that, 38.1% of the HHs in Jinja city used their own land to participate agriculture, 21.6% used backyards / house compounds and 21.6% hired land to engage in farming. The rest, 3.1% used borrowed land. Also 50.9% of the urban farmers used less than an acre to farm while 0.9% had more than 4 acres. Only 33.3% of the HH had adequate food for the family needs throughout

the year due to factors such as poor harvest and prolonged droughts caused by erratic rainfall. The situation became worse during COVID-19 lockdowns when food supply was affected.

To foster urban and peri-urban agriculture (UPA) in Jinja, it is recommended that the city authorities adopt strategies to establish a functional demonstration farm, provide cheap credit to farmers, strengthen collaboration with the National Animal Genetic Resource Centre (NAGRC) in Njeru town, foster irrigation, promote greenhouse farming, promote school gardens in the city, build local capacity for the newly introduced Parish Development Model (PDM) farming groups, carry out public awareness campaigns targeting the youth to embrace agriculture, support agro- processing and value addition mechanisms for urban farming as well as review the current city zoning laws and building codes to accommodate backyard and roof- top farming.

Purchase of food from shop/market by HHs was ranked the main source (60.1%) of food followed by household stocks (30.2%) and farm/gardens or production of own crops (8.6%). This is because some of the farming HH do not have sufficient land to be employed in the agricultural sector. Only 33.3% of the HH had adequate food for the family needs throughout the year due to poor harvest and prolonged droughts. The situation became worse during COVI-19 lockdowns where major food sources were blocked. The study established that only 40% of HH had more than 2 recommended meals a day while the rest (60%) had less than two meals a day.

Some farming families reported that they have reduced the number of meals per day especially those with large families due to high cost of food. This has led to the increase in number of people seeking employment as casual laborers for alternative source of income to supplement their earnings especially women and youth. The study established that most (52.7%) HHs in the city engage in urban farming as a source of income while 45.7% as source food and 2.6% for other reasons such as beauty, environmental protection and herbal medicine among others.

In terms of labour availability, most (55.8%) HH members use family labour to work in the field/garden for 3-5 hours daily and about 19.4% work for more than 5 hours. It shows that, there is adequate time devoted into family labour thereby reducing hired labour. The farming HHs who use mainly family labour on small holdings that use simple farming tools such as hoes and pangas among others.

In terms of markets for agricultural products, 45% of the farming HHs in Jinja city have access to both ready commodity and animal markets. The key accessible markets for agricultural products in Jinja city include Budondo, Bugembe, Busembatya, Buyumba, Jinja Central market, Kyambazinga market, Mpumudde market and Masese landing site market among others. Most of the agricultural products produced by the urban farmers are sold to city food markets (41.2%), estate markets (7.5%), neighbours (10%) and vendors (2.5%) while the rest (37.5%) is consumed by the HHs themselves.

Given that 89.1% of HHs in the city possess piped water system, results show that only 26.4% used some of the available HH water source for agriculture activities.

The results further reveal that, 38.1% of the farming HHs in Jinja city used their own land for agriculture, 21.6% use land from backyard /compound and 21.6% hired. Other 3.1% had used borrowed land. However, due to increasing population in the city, land is likely to be limited resource and smart forms of modern urban farming should be adopted. In terms of land size, 50.9% of farmers use less than one acre of land while 31.1% did not have any land to use. Some 11.3% of the HHs have one acre,

4.7% have two acres and another 0.9% have more than four acres. As a result of limited land, 8.5% of the HHs reported that they have ever carried out agriculture in wetland/swamp.

There is poor mindset for agriculture farming among the urban dwellers in Jinja city especially the youth population. The study established that only 24.6% of HH youth were actively participating in urban farming. Most youth shun agriculture as a dirty activity meant for school drop-outs. There is need to sensitize the dwellers to optimally utilize their plots

Most importantly, 30.2% of the farming HHs were satisfied about urban farming benefits to their households in terms of food and income security, making urban farming a key factor in urban development.

Policy Implications

The policy issue is establishing sustainable source of funding for the urban farmers in Jinja city, since only 21.7% of HH heads had access to cheap credit. The main sources of financing their agricultural ventures included the savings and credit co-operative societies (SACCOs), Baroda Bank, Brac Bank, Finca Uganda Ltd, and Polking Uganda Ltd. There is need to popularize the PDM, since about only 4.7% of HH had already formed groups/associations/saccos to access parish model development (PMD) funds in their respective wards.

Conclusions

Results from the study show that agriculture in Jinja city is currently practiced in various ways. UPA in the city is also dominated by livestock farming where the majority of HH engaged in zero grazing, agro-forestry, poultry, crop production (both food and cash crops such as cassava, maize, yams, banana etc), horticulture crops (especially vegetables such as tomatoes, Sukuma wiki, cabbages, nakati, dodo, onions, egg plants etc), floriculture as well as fish farming at Masese in Lake Victoria.

Besides, the sustainability of UPA in Jinja city is threatened by the growing desire of the urban farmers to grow sugar cane, a crop that has reduced soil fertility as well as contributed to the destruction and degradation of the wetlands and swamps.

While urban agriculture is outlined as one of the key land uses in Jinja city's current physical development plans the reality on ground is that farming activities have not been adequately supported, leaving many poor people in the city without food.

Only 40% of the city residents are able to have more than two (2) recommended meals per day while 60% had less than two meals a day. This means that the food security and nutrition status of the residents of Jinja city is not stable. Besides, the mean caloric intake per person per day in Jinja city has been estimated at 2,190kcal, which is less than the WHO is recommended daily intake of 2,300kcal per adult per day.

Results also revealed that 38.1% of HH participated in urban farming using their own land, 21.6% used house compounds/backyards and 21.6% hired land. The rest 3.1% borrowed land to carry out agriculture. In addition, 50.9% of HH used less than one acre to farm, 11.3% had one acre, 4.7% had two acres and just 0.9% had more than 4 acres. Interestingly, 52.7% of the urban farmers lived on rental accommodation which curtailed their ability to farm.

What is also clear from these findings is that access to land is still a major constraint to farming in Jinja city and new strategies should be adopted to address this challenge. One way to address this challenge is by changing the building codes and zoning laws to promote community gardens as well as backyard and roof-top gardening in the city.

Recommendations

To foster urban and peri-urban agriculture (UPA) in Jinja, it is suggested that the city authorities adopt strategies to establish a functional demonstration farm, provide cheap credit to farmers, strengthen collaboration with the National Animal Genetic Resource Centre (NAGRC) in Njeru town, foster irrigation, promote greenhouse farming, promote school gardens in the city, build local capacity for the newly introduced Parish Development Model (PDM) farming groups, carry out public awareness campaigns targeting the youth to embrace agriculture, support agro- processing and value addition mechanisms for urban farming as well as review the current city zoning laws and building codes to accommodate backyard and roof- top farming

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Paper Three:

Solid Waste Management in Nakawa Division in Kampala City

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Abstract

Solid waste generation and the growth of cities are intimately related and it is critical to pay great attention to its management in large cities. Continued solid waste generation also poses an enormous challenge for city managers, especially in resource poor developing cities. The purpose of this study was to assess the status and condition of solid waste management facilities and practices in Nakawa Division, Kampala city. The study heavily relied on secondary data, especially government reports, textbooks, online data sources as well as published articles. Face to face interviews were also carried out targeting key informants from Nakawa division such as public health officers, Division engineer and Division physical planner. Interviews also targeted private service providers (contracted solid waste collectors) as well as local leaders especially Local Council1 1 (LC1) chairpersons. Findings indicate that the private solid waste collectors and service providers are largely motivated by profits and do mostly serve the interests of rich city residents who can afford the charges. This has forced the urban poor who live in informal settlements to dump solid waste in ungazetted areas such as drainage channels. Also important is that most of the generated solid waste is rarely sorted making recycling difficult but also more hazardous to handle from the point it is generated to final disposal. Garbage skips used in Nakawa urban division are also of poor quality, having weak rusty metal and too small to store huge solid waste generated. Some garbage skips are often placed in wrong places and lacked convenient handles. Among the key sources of solid waste generation in the Nakawa Division are: private households, food markets, commercial areas, industries, public administration, schools and hospitals. To improve solid waste management in Nakawa Division, it is suggested that the city authorities should increase their financing portfolio to support the upgrading and expansion of the existing solid waste management (SWM) facilities such as landfills, collection sites as well as transportation facilities such as garbage trucks. Each garbage truck uses about 40 liters of fuel per day to transport solid waste to the landfill at Kiteezi and this money should be readily available. Campaigns should be launched to increase levels of public awareness about the need for improved solid waste management. It is also necessary to strengthen the capacity of the private and public service providers to embrace modern methods and new technologies of SWM in areas such as collection, transportation, recycling, energy recovery, use of garbage skips, home composting and waste minimization.

Scope and Coverage

The study was conducted in Nakawa division in Kampala city due to poor solid waste management (SWM) facilities, practices and strategies characterized by poor littering of solid waste leading to public health risks and diseases caused by vectors and rodents. Therefore, modern waste management approaches/practices and new technologies should be able to encourage reduced waste generation, re-use, recycling, composting, and safe disposal through landfills.

Objectives

The aim of the study was to assess the current status of facilities, approaches, practices, technologies and strategies adopted in managing solid waste in Nakawa urban division, Kampala city, in view of the areas recent experience and development trends.

Specifically, the study aimed at achieving the following objectives:

- To examine current state of solid waste management facilities in Nakawa Division
- To examine the current solid waste management approaches, practices and technologies/innovations used in Nakawa Division
- To examine the main challenges hindering effective solid waste management in Nakawa urban division; and
- To propose strategies for improving solid waste management in Nakawa urban division in view of the region's recent experience and development trends.

Methods

The study heavily relied on review of secondary data /documents especially government reports, online data sources (internet sources) as well as research papers and published articles to generate more evidence to support the study findings. Also face-to face interviews were conducted with Nakawa division technical staff, policy- makers, community leaders, and private solid waste operators and through field trips to landfills and dumping sites

Results

The results showed that Nakawa Division has demonstrated some level of improvement in SWM with respect to facilities, approaches, methods, technologies and strategies used amid high rates of SW generation by the high population. However, some SWM facilities or garbage skips used in Nakawa division are still of poor quality having weak rusty metal and too small to store huge solid waste generated per week. Some of the containers/garbage skips were in wrong places near the roads and did not allow for sorting at the source and lacked convenient handles. Due to poor support facilities, most of the solid waste ended up being dumped just outside of the collection facilities hence littering the waste collection sites in the division. They therefore failed to support the fundamental principles of “reduce, reuse, and recycle due to their non-compliance despite improvements in staffing and adoption of self-loading system technologies. It means that, a large proportion of waste is not re-used and waste sorting is also rare making it difficult to re-cycle or compost. As a result, a large proportion of solid waste is mostly disposed of on open dump sites (landfill) and many times burnt especially at household level. The variations in waste management practices in the division are due to limited funding, slow adoption of SWM technologies, limited education of the population, limited capacity of private operators, composition and big quantity of waste generated and collection is often from source(temporary dumping ground), and final disposal is often at landfill at Kiteezi.

Policy Implications

The rapid urban population growth in Kampala City and in Nakawa division in particular has increased the generation of waste, making it impossible for the division authority to manage the waste effectively due to limited financial resources. All this, coupled with the declining landfill capacities and rising real costs of disposal due to high fuel prices, has attracted the attention of the growing population, yet the health and sustainability of the environment have to be guaranteed.

There is medium term plan by KCCA to purchase two trucks for each of the five divisions of Kampala. And long term plan to have a truck per the 99 parishes in 5 Kampala City divisions. The KCCA is seeking UGX 12 billion for purchase of garbage collection trucks.

Recycling and use of landfills for waste-disposal doesn't provide a permanent solution. There is need to find better ways of optimizing waste as energy source.

Conclusions

The study concludes that Nakawa Division has demonstrated some level of improvement in SWM with respect to facilities, approaches, methods, technologies and strategies used amid high rates of SW generation by the high population.

Evidence shows that there have been perennial challenges of limited financing; increased population growth, high rates of urbanization, slow adoption of SWM technologies, inadequate facilities, limited capacity of private sector, and limited education of the population that have riddled the prospects of improving SWM by the division .

The solid waste in the division is rarely sorted making recycling difficult but also more hazardous to handle from point it is generated to final disposal posing health risks to the general public. In addition, waste collection and transportation is an important municipal service that involves high expenditures if not handled efficiently

This research paper can be used as an advocacy tool by KCCA to demand for mass sensitization at all levels of its policy, employers, waste handlers and the general public. Based on the foregoing discussion, the following recommendations are proposed

Recommendations

The study findings highlight the need by Nakawa Division to further demonstrate level of improvement in SWM with respect to facilities, approaches, methods, technologies and strategies used amid high rates of SW generation by the high population.

In the view of the researcher and the stakeholders engaged, the following policy recommendations need to be undertaken to improve the facilities and methods of SWM in Nakawa division in the short, medium and long term.

- The Nakawa division should effectively enforce KCCA ordinance 2000 to avoid illegal dumping of solid waste, monitor performance of private and public operators and regulate the fees paid by the solid waste generators.
- The Nakawa division should increase its financing portfolio to support in upgrading and expanding of its existing SWM facilities such as landfills, collection sites, improving access to roads and procurement of effective and sufficient transportation equipment (trucks, trailers and motor-tricycles) suitable for the Uganda SWM terrain. Each truck requires about 40 liters per trip to the landfill at Kiteezi and this money should be readily available.
- The Nakawa division should build the capacity of the private and public operators in technology adoption of modern methods of SWM in collection, transportation, recycling, energy recovery; use of skips; home composting; waste minimization, etc designed for the type and volumes of the Ugandan generators.
- The Nakawa division should provide alternative sources of cheaper solid waste couriers targeting the poor urban residents in form of animal carts, bi or tri-cycles, hand carts, wheelbarrows and some cases individual humans. This is important for the areas not accessed by trucks, tippers and tractors that should be able to transport it to the transfer stations or landfills and hence reduce public and environmental risks.
- The Nakawa division should promote public participation of its citizenry in SWM through public awareness campaigns and training using affordable and effective mass media platforms reaching all categories of people in Nakawa division. Such interventions should encourage the citizens to adopt various methods of re-use; recycle and energy recovery and sorting of solid waste at the source for better SWM as well as source of income especially for the youth and women to create employment and improve public and environmental health.
- Major improvement needed would include daily routine collection of the garbage by the authorized service providers in each collection/dumping site due to the big amount of waste generated per day especially in market areas.
- There is need for at least 2 more trucks as the division has only 3 given high volumes of waste generated
- Add budget for more fuel of 250 liters per day if 3 trucks are used
- Add budget for purchase of enough protective gear for over its 600 workers
- Increase man power. At least one assistant waste management officer, 200 additional cleaners and 15 scouts.
- The division needs more 100 wheel barrows and one more motorcycle
- The refresher training on waste recycling for the waste management officer to reduce waste in the division. Rich people are those dealing with waste
- The division to continue with sensitization of masses on the values of reuse, sorting of wastes in order to reduce on the amount of waste generated, need to increase on the level of funding to the waste management department so as to facilitate acquisition of more trucks and hardware for waste management.
- There are still garbage challenges evident on the streets, in drainage channels, roadsides and at people's shops where heaps are dumped. These issues need to be addressed.
- Waste management should be prioritized as a social service, with adequate budget lines. Important to note that allocating money to waste management will not translate into better results unless there is adequate sensitization, good fiduciary practices and accountability.

- Engage several stakeholders in the management of waste to generate a sense of responsibility and interest from all stakeholders
- Individuals involved in waste management should always wear recommended protective gear. This is partly the responsibility of employers but employees also need to be sensitized on the need to adhere to safety precautions
- Public education on individual citizen's role in ensuring that waste is appropriately managed. Simple actions such as not littering on the road, can go a long way in ensuring a cleaner environment. Gradual introduction of more concrete actions such as waste sorting at point of generation will go a long way in improving solid waste management
- Waste is not useless! The culture of recycling should be encouraged. Recycling can help in reducing volume of waste, and reduce need for exploitation of raw materials. For example, the growing demand of plastics means more petroleum is needed which comes with a cost but also impact on the environment

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Paper Four

Women as the Stimulus of Urban Greening in Uganda- A Case of Jinja City

By

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Abstract

The study crystallizes the idea that women can be precursors of promoting urban greening in city of Jinja because they have been acclimatized to shaping the environment traditionally by virtue of their domestic responsibilities. The study notes that women have not been involved in urban greening activities yet it would be one way of bringing them to the public realm since they have always been relegated to the backyard. In this way, women can also be able to find employment through activities related to urban greening. This paper posits that gender-related perceptions indicate that women can promote urban greening to a larger extent than men. The study was positioned within a hermeneutic tradition, acquiring a qualitative exploratory and descriptive strategy, seeking to comprehend an actual problem in its setting - Jinja city. A literature review was carried out to analyze various studies related to gender and urban greening in an effort to find ways of addressing the problem at hand. The study's findings are intended to inform planning and policy about the plight of Jinja city and other cities in Uganda and to demonstrate that women can contribute to the greening of cities

Scope and Coverage

This paper aims to raise awareness of gender dimensions in urban greening. Gender is an important factor in urban greening. Gender influences how the greening process takes place. This paper examines the city of Jinja and how deforestation is contributing immensely to browning and climate change. The study crystallizes the idea that women can be precursors of promoting urban greening because they have been acclimatized to shaping the environment traditionally by virtue of their domestic responsibilities. The research principally targeted women. They are seen as enablers and can be empowered through urban greening activities. These activities can constitute a security factor that can encourage women to invest their time and resources

Methods

The methodological issues undertaken in this research are positioned within a hermeneutic tradition related to interpretation. Women were chosen to examine how they could contribute to urban greening. Using a qualitative exploratory and descriptive strategy this research focused on women and how they can contribute to urban greening.

The research design was also considered interpretive because it facilitated the answering of “how”, “what” and “where” questions. The research problem being investigated was not clearly understood. The researchers needed to acquire an in-depth understanding of the research problem and its context before the research commenced.

Women as enablers of urban greening are described including their characteristics, so as to gain a

deeper understanding of their activities. This enforces the importance of exploratory and descriptive research as it gives researchers a proper understanding of a research problem being investigated. The personal observation method was used to observe and measure different variables and identify changes and correlations depicted in the data collected.

Results

Women perceive green spaces differently from men and spend more time in green spaces and see greater aesthetic value in them than men. They have higher self-reported well-being associated with urban green spaces. Urban greening can be re-imagined from the perspective of enabling 'everyday life, in which many women are engaged, more than men.

Gender-related perceptions regarding urban green spaces have shown women and men portraying dissimilar sensitivities and expectations regarding these urban green spaces. For example, women are more concerned about gardening in their homes and the provision of safe environments where their children can play. Usually, the green places where children play double as meeting areas for chatting and socialization of women (Braçe et al., 2022; Richardson et al., Sillman et al., 2022). Women spend more time around their neighborhoods since they are principally involved in gardening, household chores, and caring for the child and the extended family in their homes (Nnaggenda-Musana, 2008). Due to their domestic responsibilities, women are more inclined to tend to urban green spaces and therefore should be involved more in the discourse on urban greening

Gender patterns in urban greening seem to correlate with women's positions within the household. Findings suggest that the involvement of women in urban greening can be correlated with their participation in domestic decision-making. Bearing this background in mind it is important to appreciate the lived experiences of climate change within the context of urban poverty where even the slightest weather/climate changes can affect urban households, most especially women. Cities across Africa could be impacted by climate change through *increased droughts, floods, fires and heat waves and reduced ecosystem services* (Lwasa et al. 2015; IPCC 2014). Urban greening can reduce the impact of climate change on poor households through aggressive urban greening. Many households, particularly those with extra open space around their homes practice some form of gardening.

Urban greening can provide benefits most especially important to women, particularly to low-income women such as the ability to involve themselves in income-generating activities. Women could be more receptive to carrying out urban greening because this activity does not differ much from that which they are used to. Through the promotion of self-help, urban greening can change the future of women by detaching them from the intergenerational cycle of poverty if they get involved in urban greening as an income-generating activity (IGA). Women can get trained in urban greening and management. It is important for them to understand what to plant and when. The training can be a sustainable aspect of urban greening because those trained can in turn train other people whether women or men. The concept of IGA can be premised on the idea that if women were paid for urban greening activities and for selling plants to the communities, they would be able to make themselves some income for their well-being.

Policy Implications

The World Health Organization enforces and backs policies that are implemented for the reduction of air pollution from industries and household cooking. It is important that policies that help alleviate the effects of urban heating through the encouragement of urban greening in Jinja City and Uganda at large should be implemented.

Additionally, policies in Uganda have been formulated on a colonial/racial basis in the past, to fully understand their gendered nature it is important to evaluate how they were applied to different races. Policies applied to the Ugandan population can be studied in relation to how they were applied to women primarily within the urban areas, especially in major cities like Kampala and Jinja. Questions need to be raised as to how policies, particularly those related to urban greening can be made all-inclusive.

Conclusions

The debate should emerge about the most appropriate forms of urban greening policy that could include women in Jinja and other cities in Uganda. This article intends to stimulate the discussion of particular key areas of urban greening policy from the gender perspective. The starting point would be analyzing and evaluating how women's access to urban greening has emerged from past and present policies. What would be the effect of such policies on women? Gender issues are often treated as a separate discussion, and the effects of apparently gender-neutral policies are ignored. This observation is the basis of the discussion of issues which should be reflected on when the gender-sensitive urban greening policy is formulated.

Recommendations

Policy needs to be made inclusive and flexible when it comes to urban greening, and government should adopt various strategies to suit all income and gender groups. The needs of all genders should be catered for well in the integration of gender analysis into urban greening. Rigid by-laws marginalize the women by relegating them to housing backyards.

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Paper Five:

Greying in Gulu City: The Impacts to Climate Change and the Potential for Adaptation using Green Infrastructure

By

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Abstract

This study investigates the climate change effects attributed to the dissipation of city greens and examines the prospects of using green infrastructure as urban planning strategy for climate change adaptation. The study employed a multi method approach involving both empirical studies, desk studies, as well as remote sensing approaches including Calculation of NDVI generated in QGIS using a raster calculator. The study revealed a high estimated NDVI value of 0.96 in the wet season, while the lowest was - 0.23 in the dry season. Built-up areas exhibited low NDVI values, while the green vegetated annexed areas exhibited high NDVI values. The proportion of tree cover in the suburbs was higher compared to that of the CBD, where trees and greenery are believed to have been cut down to pave way for settlements, and the implementation of road infrastructure projects thus the predominance of concrete. The result is associated consequences such as increased temperatures for prolonged periods.

Scope and Coverage

This study investigated the climate change effects attributed to the dissipation of city greens and examines the prospects of using green infrastructure as urban planning strategy for climate change adaptation in Gulu City. The target population was the physical planning committee of Gulu city which comprised of the heads of departments at the city level, all of whom were selected purposively from relevant units such as the Department of Natural Resources, Department of Engineering and the Office of the Physical Planner.

Objectives

The main objective of the research was to assess the climate change effects attributed to the dissipation of city greens and examines the prospects of using green infrastructure as urban planning strategy for climate change adaptation in Gulu City.

Methods

The study employed a multi-method approach involving Case study methodology in selection of cases and units of analysis. The data/information was obtained by means of; 1) document reviews and analysis of relevant literature relating to climate change adaption and green infrastructure; 2) *Key informants Interviews (KII)* with purposively sampled key informants from relevant units such as the Department of Natural Resources, Department of Engineering and the Office of the Physical Planner; 3) *Focused group discussions* at City level; 4) Use of hand held Geographical Positioning Systems equipment to map existing greens in the City. Since this study involved an analysis of change detection of green versus greying, remote sensing approaches were employed:

Satellite imagery acquisition: The sentinel and Lands at satellite data (geocoded with UTM projection, spheroid, and datum WGS1984, Zone 36North) of the 10m and 20m spatial resolution were acquired from the open source site of sentinel hub browser (<https://apps.sentinel-hub.com/eo-browser>). During the downloading process, an area of interest (AOI) was created comprising the former Gulu municipal boundaries. Specifications were made about the cloud cover (less than 10%), time span (2015-2022) and other data set requirements. Specific Image bands of sentinel2 (B4, B8) and Landsat 8 (B4, B5) relevant for detecting vegetation index were downloaded. The acquired images were sorted and organized according to the selected years (2015, 2018, and 2022), and seasons (dry and wet).

Image Pre-processing: Sequences of processes were carried out on the images before final analyses to improve visualization and reduce noise. These processes included; geo-referencing, haze reduction, noise reduction, and spectral corrections were done to choose the best band combinations for visualization of the images.

Calculating NDVI: NDVI was generated in QGIS using a raster calculator with the following expression: $NDVI = (NIRB8 - REDB4) / (NIRB8 + REDB4)$, where NIR is near-infrared light and Red is visible red light. Normalized Difference Vegetation Index (NDVI) uses the NIR and red channels in its formula. Healthy vegetation (chlorophyll) reflects more near-infrared (NIR) and green light compared to other wavelengths. Satellite sensors like Lands at and Sentinel-2 both have the necessary bands with NIR and red. The result of the above formula generated values between -1 and +1 as illustrated on the maps. In this study, large positive NDVI values show dense vegetation whereas negative and fewer NDVI values reveal the built-up areas or non-green

Results

The rate at which tree cover and greenery is getting depleted in the CBD of Gulu city is worrying. The dissipation of green in Gulu city is also attributed to the clearing of tree cover and greenery for settlements and during the implementation of the city infrastructure projects such as the road projects. Developers attach less importance to the city greens with the view that “Trees are not as important as houses or roads”.

Apart from establishing factors for dissipation of city green, the Normalized Difference Vegetation Index (NDVI) maps of Gulu city were re-classified into five classes namely: very low (red), low (orange), moderate (yellow), high (green), and very high (apple green) green quality. The classification revealed a high estimated NDVI value of 0.96 in the wet season, while, the lowest was -0.23 in the dry season. Built-up areas exhibited low NDVI values, while the green vegetated annexed areas exhibited high NDVI values. The class of high green quality was the dominant NDVI class in the outer outskirts of the CBD whereas the very low green quality class was mostly dominated by built-up areas, and hence had negative NDVI values. Overall, the NDVI values showed much difference between the dry and wet seasons although the NDVI values in the CBD remain very low due to the density of built-up activities especially the paving of roads and the nature of building materials that absorb a lot of heat.

NDVI 2015-2022 DRY AND WET SEASON FOR GULU CITY

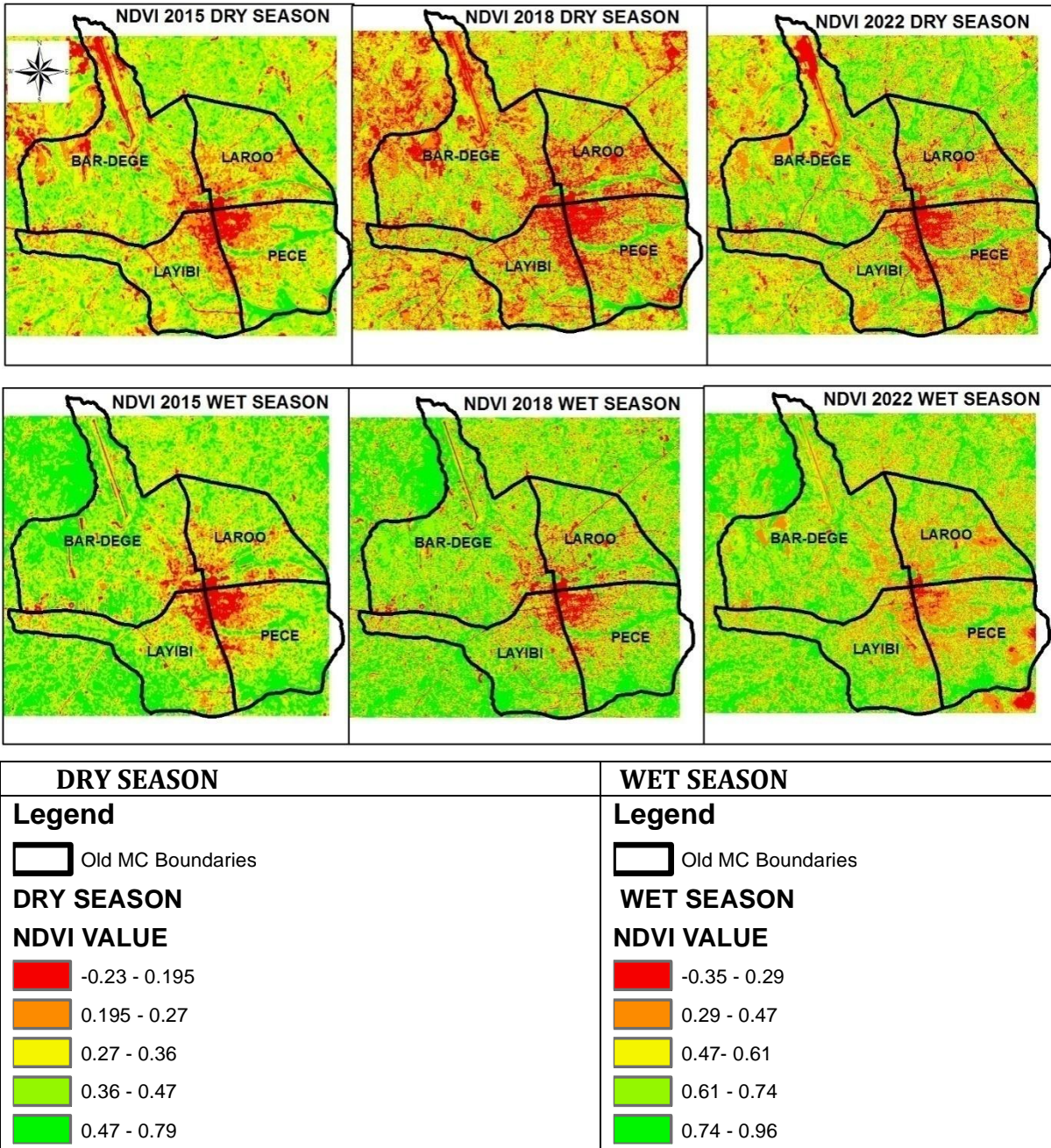


Figure 1: NDVI Values for Dry and Wet Seasons for 2015, 2018 and 2022

Policy Implications

The changing rainfall and temperature trends/patterns has worsened due to lower humidity implying that Gulu City will continue to experience longer droughts and water shortages. It is upon government to mitigate the effect of climate change in the area by implementation of the Climate Change Strategy and Policy for Uganda. Green Infrastructures and their integration in urban planning would potentially improve the microclimate and other impacts of climate change such as flooding and the urban heat island effect.

Conclusions

This study has attempted to examine the dwindling of urban green especially within the former

municipal boundaries and in the central business district of Gulu. The Normalized Difference Vegetation Index (NDVI) of Gulu city reveals a high value of 0.96 in the wet season, while, the lowest was -0.23 in the dry season. Built-up areas exhibited low NDVI values, while the green vegetated annexed areas exhibited high NDVI values. This reflects the distribution and concentration of heat under the land surface. The NDVI value in 2022 slightly improved after the growth of the planted trees along the tarmacked roads by the Gulu city council and many on-government sectors, but still, the green cover in the city is ecologically poor. The very low NDVI values characterize the CBD environment as impermeable surfaces, with building materials that have high heat concentration, and little vegetation, among other factors that prevent the exchange of energy between the atmosphere and surface.

Recommendations

Improving the urban environment condition of Gulu city through the protection and rejuvenation of the greenery and green infrastructure will be of great significance in reducing the gap in tree cover. There is need for the City managers and city planners to consider improving the urban environment condition to increase the city's greenness index. The presence of urban trees increases humidity values, playing a significant role in channeling winds, which are fundamental conditions for dissipating heat from human action. Besides, it attenuates the high surface and air temperatures.

Adaptation planning should be considered key in ensuring climate proofing. In this context, green spaces retrofitting should be considered to increase the quality and the attractiveness of the public spaces. The approach could include the redesign and improvement of green infrastructures such as urban parks, green city corridors, tree planting, as well as other types of interventions that use Nature-based solutions to provide some form of adaptation to climate risks.

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Paper Six

The Contribution of Public-Private Partnerships (PPPS) In Smart City Development in Uganda

By

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Abstract

An innovative (smart) city development paradigm is vital in dealing with the impacts of unprecedented urbanization that most nations, especially developing countries, including Uganda, are experiencing. This paper explored the contribution of public-private partnerships to sustainable city development in Uganda through a literature review. This exploration revealed that public-private partnerships do facilitate innovative city development. However, factors such as a lack of appreciation of the private sector for public sector activities, poor infrastructure, inadequate human resources and weak policy, legal and institutional frameworks affect the implementation of innovative city development in Uganda (Michael, 2018).

For smart city development to work through public-private partnerships, critical factors such as geographical and social contexts shape the conceptualization of a smart city (Kampala Capital City Authority, 2019). The significance of this study lies in its ability to dig deep into the accomplishments of PPPs in promoting smart city development in the country. In doing so, this study focused on the National Land Information System to ensure an efficient land administration system in Uganda, capacity building and networking for climate and people-friendly mobility and smart/ intelligent urban mobility for smart city development in Uganda. Considering the need for more systematic studies on PPPs and smart city development in Africa, this study recommends that it is imperative to empirically explore the contribution of PPPs in smart city development in African contexts as a whole and the Ugandan context in particular.

Scope and Coverage

The Principal Investigator explored the contribution of public-private partnerships to sustainable city development in Uganda through a literature review. The research investigated how public-private partnerships facilitate innovative city development. Other factors investigated with respect to low level of smart PPPs included lack of appreciation of the private sector for public sector activities, poor infrastructure, inadequate human resources and weak policy, legal and institutional frameworks which affect the implementation of innovative city development in Uganda (Michael, 2018). The study also digs deep into investigating the accomplishments of PPPs in promoting smart city development in the country with respect to National Land Information System, capacity building and networking for climate and people-friendly mobility and smart/ intelligent urban mobility for smart city development in Uganda.

Study Objectives

The overall objective of the study was to investigate the PPPs' contribution to the prospects of smart city development in Uganda.

The specific objectives to be achieved include the following:

- To examine the concepts of smart city development and PPPs

- To explore the part played by PPPs in promoting responsible urbanization in Uganda
- To explore the current status of PPP in the context of smart city developments in Uganda

Methods

This desk review study was undertaken by reviewing the existing literature and assessing and analysing secondary data on smart city development and public-private partnerships. Reports, documents, articles, regulations, bye-laws, and newspapers and articles found on different electronic databases, Google and Google Scholar search engines were also reviewed by following the references in the documents that had been reviewed. The keywords used to find these documents were "smart growth", "smart city growth", "public, private partnerships", "smart city development" and "public-private partnerships". The author evaluated these articles based on their depth regarding the subjects under review. The author put aside those that did not offer relevant contributions to the analysis. Research papers were categorised into three general groups and summarised in terms of the different themes. The first group was "smart growth", "smart city growth", "Smart city development". The second group comprised details on public-private partnerships and the third group had details related to both smart city development and public-private partnerships.

Results

The concepts of smart city development and PPPs: Among the key concepts defining smart city development are three critical criteria of conceptualization including smart technology, smart people and smart collaboration (Smith et al., 2022; Appio et al., 2019; Baron, 2012; Meijer & Bolívar, 2016). On the other hand, another criterion of conceptualizing a smart city encompasses smart economy, smart mobility, smart environment, smart people, smart living, and smart governance (Makieła et al., 2022). However; the policy contexts undermine the success of PPP in smart city development

The smart collaboration on the other hand means engagement of a multiplicity of stakeholders, including citizens, in city leadership (Jayasena et al., 2022; Ruhlandt, 2018), which necessitates that local governments work with corporations to tackle pressing concerns of cities including public health, the climate crisis, and pollution (Koppenjan et al., 2004). In this case, the urban deployment of smart technology is critical in the smart city discourse (Angelidou, 2017; Baron, 2012) because smart cities attract and cultivate highly educated people (Shapiro, 2006).

In general understanding, smart cities need to advance in six critical strategic action fields that include smart environment, smart mobility, smart people, smart economy, smart living and smart governance (Dudzevičiūtė et al. 2017; Makieła et al. 2022).

In terms of smart city development, the term Public-Private Partnership describes a spectrum of possible relationships between the public and private actors where they jointly participate in defining the objectives, the methods, and the implementation of a cooperation agreement. The collaborative public-private partnerships (PPPs) model has offered a blueprint for developing smart cities (Liu et al., 2020; Ruhlandt, 2018).

The part played by PPPs in promoting responsible urbanization in Uganda: The idea of "partnering" suggests that a PPP becomes a contractual agreement involving the private sector in the delivery of public services. As the name suggests, a PPP considers a partnership approach, where the responsibility for delivering services is shared between the public and private sectors, bringing their complementary skills to the enterprise. PPPs bring together the public and private sectors in a long-term contractual

relationship to deliver high-quality public services. The private sector becomes the long-term service provider rather than the simple upfront asset builder.

The current status of PPP in the context of smart city developments in Uganda: The Public-private partnerships and innovative city development in Uganda have included the following partners

- The Green Global Growth Institute (GGGI) has supported Uganda's Ministry of Lands, Housing, and Urban Development complete the national urban policy through its smart cities programme. It has also supported in addressing the country's increasing solid waste management crisis and recently completed the national urban solid waste policy. Furthermore, the initiative also supports Arua and Gulu city councils in developing sustainable physical development plans.
- The European Union (EU) has also allocated 60 million euros to support the Uganda government in implementing the smart growth strategy. Sweden, Norway and other individual EU countries are considering funding intelligent growth efforts in Uganda through the Smart Climate Fund, the Global Environment Facility and other international windows for an intelligent economy.
- The United Nations Development Programme country office in Uganda recently mobilized USD 24.1million from the Smart Climate Fund to implement the Presidential Initiative to restore the country's degraded wetlands.
- The "Cities SHIFT Capacity Building and Networking for climate and people-friendly mobility" support cities such as Jinja to identify challenges and opportunities in its urban mobility system with the hope that the cities could shift towards more eco-mobile modes of travel, i.e. walking, cycling, shared and public transport. Funded by Hewlett Foundation and EcoMobility Alliance, a vital part of this project is to adopt EcoMobility SHIFT+, a methodology designed for cities to measure urban mobility performance and make informed decisions based on the areas that need improvement
- World Bank, in 2015, conducted a project that focused on preparing an urban environmental profile for Kampala with a component of the assignment promoting intelligent urban development in Africa: enhancing the relationship between urbanization, environmental assets, and ecosystem services. The overall objective of this project was to link the study of urban environmental issues with the advancement of more sustainable urban growth.
- KCCA signed an MOU with the City and Eurometropole Strasbourg in April 2019 as part of the North-South cooperation agreement. The three main thematic areas of cooperation include Education, Smart spaces, and urban agriculture. In collaboration with ICLEI, Kampala undertook an Urban Natural Assets Mapping Project in 2017 funded by Urban Natural Assets for Africa: Rivers for Life (UNARivers) implemented by ICLEI's Cities Biodiversity Center. The project undertook a participatory mapping process in the Kampala Capital City Authority (KCCA) and the Greater Kampala Metropolitan Area (GKMA) to map the urban natural assets within the set administrative jurisdictions
- Cities Alliance in collaboration with UKAID and UNCDF, undertook an Urban Public Space and Land Management assessment in Gulu. From this report, it was brought to light that there are no regulations and bylaws available to the City Council for the use of public or open space, and no proposal has been fronted to address this issue, despite the continued growth of informal sector businesses in Gulu City. Meanwhile, in collaboration with Coca-Cola Company and Nile Breweries Company, Mbarara City Council maintains Independence Park by planting trees, flowers and grass

Policy Implications

Considering the need for more systematic studies on PPPs and smart city development in Africa, this study recommends that it is imperative to empirically explore the contribution of PPPs in smart city development in African contexts as a whole and the Ugandan context in particular.

Conclusions

Based on the literature reviewed, it is justifiable to conclude that PPPs have played an essential role in promoting responsible urbanization in different parts of the world, including Uganda. Another conclusion drawn from this study is that the current status of PPP in the context of smart city developments in Uganda still needs to improve. This low level of smart PPPs is attributed to many factors, such as the inability of the private sector to participate in public sector activities like the management of the country's natural ecosystems, such as wetlands. Some gaps exist to harmonize smart technology, smart people and smart collaboration in Uganda (Smith et al., 2022; Appio et al., 2019; Baron, 2012; Meijer & Bolívar, 2016). Unless these concepts of smart city development and PPPs are well appreciated in the country, the latter's contribution to the former will remain minimal.

This study also concluded that there exists weak financing, technical know-how, and innovation on the side of the private sector to complement the public-sector efforts. In addition, there needs to be a higher level of understanding, such as minimizing carbon dioxide emissions, accelerating the economy, and advancing industries on the part of the private sector to foster smart city PPPs for smart city development in Uganda. Therefore, considering the need for more systematic studies on PPPs and smart city development in Africa, it is imperative to empirically explore the contribution of PPPs in smart city development in African contexts and the Ugandan context in particular

Recommendations

The current study offers the following recommendations based on its findings and conclusions.

- To sustainably raise agricultural productivity and support effective management and preservation of natural capital, Uganda and Africa would greatly benefit from breaking barriers to adopting innovations to improve climate resilience and managing land and natural resources to enhance opportunities.
- Shifting public funding towards programmatic approaches and multi-sector implementation to support sustainable land management and climate-smart agriculture could have an enormous impact on smart city development initiatives.
- There is also a need to scale up the implementation of payment for ecosystem services mechanisms that have been piloted to provide incentives for addressing the loss of ecosystem services.
- Supporting rapid transition towards higher productivity, climate resilience and environmental sustainability through coherent and cross-sector natural resource governance policies could impact the smart city development vision in Uganda and Africa.
- Prioritizing investments in research and development, extension, and climate services to optimize access to knowledge value chains by farmers and non-state actors has excellent potential to vastly enhance Uganda's smart city development agenda. Hence there is a need to facilitate knowledge development and dissemination, including lessons learned and good practices from the projects nationally and through regional and Africa-wide networks and programmes to create broader

awareness and increase understanding, buying in and uptake of smart economy and sustainable consumption and production ideas among critical stakeholders in the private sector, government and the public.

- There is also a need to strengthen the link between the national, local, and community-based organizations to close the gap between policy and implementation and promote market access for diverse agriculture and natural resource-based commodities that provide opportunities for inclusion and value addition without exerting pressure on natural resources.
- There is a need to support policy makers to become better informed and equipped with relevant scientific information and appropriate tools such as policies, regulatory frameworks, incentive structures, and tax and market-based instruments that promote private sector-led inclusive smart growth. This initiative would be complemented by supporting the private sector to identify opportunities for smart business development and markets (domestic and export) for sustainably produced goods and services. Similarly, to promote sustainable smart growth development, a positive aspect is that a small quantity of environmentally-damaging infrastructure will be replaced, offering a blank canvas for smart development. However, more funding from public and private sources is needed.
- There is also a need to strengthen political frameworks. So far, most progress in pushing smart growth in Africa has come from strong political will and leadership. It is a crucial research challenge to understand what governance model allows such arrangements to work. Some deep-rooted laws and behaviours also need to be modernized.
- There is a need to offer incentives to inculcate ownership of smart policies by African governments and encourage innovation by increasing smart innovation research capacity at universities and research institutions. Relatedly, most funding currently comes from Europe and North America, which means research agendas, may be focused on something other than African concerns.
- Considering there is currently a large gap between the rich and poor in Uganda, there is a need to urgently promote inclusiveness since smart growth emphasizes equity and social inclusion. For example, cooking and farming initiatives directly benefit poorer communities, environmental initiatives are often at odds with social ones, and corruption in government and private sectors is an issue. Consequently, a further systematic study into ensuring that smart growth does not harm the poorest communities could be enormously impactful. It is also worthwhile to note that investment in the above areas is envisaged to generate the following outcomes for the country-smart jobs, low emissions growth trajectory with a focus on climate change mitigation and adaptation, increased incomes and economic gains and opportunities for all, sustainable biodiversity and ecosystem management, food and nutritional security, resource use efficiency and social inclusiveness.

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Paper Seven:

Greening Urban Transport in Secondary Cities in Uganda- Challenges and New Strategies towards Adoption in Gulu City.

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Abstract

Secondary cities in Uganda are experiencing both rapid urbanization and urban population growth with associated negative externalities key among which is the urban transport challenge. The rapid increase in levels of motorization in the form of private cars and motorized two-wheelers (mostly boda-boda) impacts on the accessibility of green, non-motorized transport such as walking and cycling. Taking the case of Gulu city in Northern Uganda, this paper explored the impact of increasing motorization in Gulu city on accessibility of non-motorized transport modes and identified challenges for the adoption of green transport, particularly Non-motorized transport. Using systematic document review and analysis, it was discovered that increasing motorization negatively impacts accessibility of green and active transport modes. Attitude toward NMT; inadequacy, quality and encroachment on NMT mode infrastructure are identified to be the most pressing challenges to the adoption of green transport in Gulu city. It also acknowledges efforts towards green transport infrastructure provision under the USMID World Bank project, albeit with persistent challenges in maintenance and encroachment by motorized transport. It is recommended that greening urban transport in secondary cities in Uganda be promoted by building of well-planned and designed green transport infrastructure as described in the draft National NMT policy 2012. It's imperative that maintenance of this infrastructure and sensitization of the masses is prioritized in city urban transport budgets and that the requisite infrastructure is protected against encroachment by motorized modes. Additionally, urban transport planning policies and practices in secondary cities should look at the entire green transport pyramid and begin to incorporate other modes such as public buses and commuter taxis as a way of promoting green transport alternatives.

Key words: *Greening transport, Urban Transport, Motorization, secondary cities, Non-motorized transport (NMT).*

Scope and Coverage:

The author investigated the transport related challenges that are facing newly created secondary cities in Uganda with a focus on Gulu city, assessing the drivers, dynamics and challenges of rural to urban mobility. This paper sought to address this gap in knowledge through its focus on strategies for green urban transport in secondary cities. The geographical scope of the research was limited to the Central Business District of Gulu City.

Objectives of the Study

The general objective of this paper was to understand the impact of increasing motorization on accessibility of non-motorized transport modes and discuss strategies to promote green mobility in the selected secondary city.

The study focused on achieving the following specific objectives;

- To identify challenges for the adoption of green transport in Gulu and
- To identifying strategies to promote green/zero emissions mobility in the secondary cities in Uganda.

Methods

The research was mainly qualitative and adopted a case study approach. Critical literature review was undertaken to provide a theoretical underpinning to the specific research objectives. The secondary data was collected through desk review of relevant documents and thematically analyzed in relation to the study objectives. This included documents and reports from the city authorities as well as grey literature from online and print media sources. The author also reflected upon his personal lived experiences in the city of Gulu. Supplementary qualitative data was collected using face to face interviews with city leaders and technocrats.

Results

The findings pinpoint that, secondary cities in Uganda are experiencing both rapid urbanization and urban population growth with associated negative externalities key among which is the urban transport challenge. The rapid increase in levels of motorization in the form of private cars and motorized two-wheelers (mostly boda-boda) impacts on the accessibility of green, non-motorized transport such as walking and cycling. Transport is one of the key issues that these new cities will have to grapple with, particularly the impact of the alarming increase in the pace of motorization. It is anticipated that this will only get worse with economic development as incomes rise and private car ownership increases. The National Green Growth Development Strategy estimates that the country has between 700,000 and 1,200,000 vehicles with an annual growth rate estimated at 15 percent with motorcycles, the fastest growing category. Despite the variations seen in the statistics across different sources, they all point to an increase in the level of motorization.

Key challenges related to rapid population and increased vehicle fleets: Although Gulu city has a population of 146,000 people living within a total land area of 55 sq. km as of 2016 (USMID, 2022), the urban mobility is characterized by walking, cycling, use of public motorcycles and then private cars (Kalyango et al., 2018). The study established that there is no information on the share of each of these modes in the city's urban transport structure. Lived experience in Gulu shows that the majority of urban residents walks or cycle from their places of residence to places of employment.

The results show that, there is a rapid growth in private car ownership and use, negatively affecting accessibility of NMT modes due to competition for available infrastructure. This is evidenced by sporadic traffic jams and congestion spotted especially during the rush hours which has become a common and messy occurrence mostly in Queens Lane, Olya road, Moroto road, Gulu Avenue, Awere road, Main street, Labwor road and Coronation road (The Independent, 2022). This challenge is mainly caused by poor road designs and double-parking along streets and the increase in motor vehicles numbers. The use and popularity of non-motorized transport modes on the other hand appears to be dwindling. Mass public transport is non-existent for commute within the city. Gulu has traditionally been a low carbon city with a large number of residents relying on walking and cycling to meet their transport needs. Bicycles and boda-bodas were also very popular in the period before and during the LRA¹ insurgency. Today, they are almost non-existent.

The challenges related to the adoption of green transport alternatives: These challenges in Gulu city range from behavioral, planning and design practices. Attitude toward NMT, inadequacy, poor quality

¹LRA-Lords' Resistance Army

and encroachment on NMT modes infrastructure are identified to be the most pressing challenges. As far as attitude towards green modes is concerned, there is a perception and association of non-motorized modes with poverty. Additionally, due to resource constraints, maintenance of NMT facilities provided under the USMID project mostly in the form of pedestrian walkways and safety has become a challenge. These pedestrian walkways are also heavily encroached on by motorists who park on them and by shop owners who place merchandise on it (the Independent, 2022). Review of the City Council's Works and Technical Department update on the road sector reveals that many roads are improvement and maintenance efforts are focused on the movement of motorized traffic and there is no mention of pedestrian and NMT infrastructure.

Challenge to Transport Mode split in Gulu City: At the top of the green transport pyramid is walking, and cycling then closely followed by public transport in the form public buses and taxis (Wright, 2012). Increase in motorization impacts accessibility for non-motorized transport in negative ways through loss or reduction in NMT accessibility (Badami, 2009). This is true in the case of Gulu city. In recent years, after the return of peace, motorization in the form of private cars and motorized two wheelers (motorcycle *boda-²bodas*) has been steadily rising.

The *boda-boda* bicycles that use to be the main mode of transportation in the town is today non-existent. However, cycle lanes were not included.

Public transport within Gulu city is still non-existent. This implies that little has changed as far as NMT mode accessibility is concerned. There is a deeply rooted attitude that NMT is transport mode of the poor who cannot afford cars or motorcycles has contributed to the increase in motorization. Green mobility options such as walking and cycling still have to compete for available infrastructure and are poorly integrated to other modes.

Challenge of NMT Infrastructure: The findings show that there is neglect of NMT infrastructure and its poor maintenance which affects the functioning of the NMT facilities hence limiting accessibility. In the case of Gulu city, the infrastructure challenge and deficit is made worse by the current urban growth pattern which encourages sprawl as opposed to compact development. This discourages adoption of green transport modes specifically walking and cycling, because activities become more widely separated across space and time and more investment is required to extend green modes infrastructure to connect places and land uses.

Strategies to Promote Green/Zero Emissions Mobility: Adoption of green transport and repositioning it at the center of the urban transport strategy in secondary cities in Uganda require putting people's needs first. It means movement of people rather than cars should be the ultimate focus of transport policy, planning and practices. From the literature it was revealed that green transport modes are normally used by the poorer city residents (Khayesi et.al. 2010, CDKN³, 2021). By implication therefore, greening urban transport in secondary cities such as Gulu would address inequalities in urban transport access where the urban poor are often marginalized. In Gulu, greening transport would mean return to the heydays when owning a bicycle was prestigious and when motor vehicles did not own the road space to the detriment of pedestrians and cyclists.

Policy Implications

²Motorcycle publicly used to carry passengers.

³CDKN- Climate and Development Knowledge Network

Transport policies and planning practices are critical to the development of a greener urban transport in the new cities in Uganda. In order to avoid deterioration to the state of transport in Kampala today, urgent evidenced based decisions and measures need to be taken now to support the development and implementation of policies and practices that promote sustainable, green and inclusive urban transport in the new cities. There is a need to develop new strategies for the promotion of zero-emissions mobility in the secondary cities, and to decouple these cities' development from motorization. As stated in the literature, urban transport policies that focus on improving the movement of vehicles rather than people is counter-productive. This is because it leads to loss of accessibility for large sections of the urban population who cannot afford motorized transport options hence reducing urban mobility. This highlights the current ubiquitous gap between the current urban transport needs and policy.

As identified earlier, key challenges affecting the adoption of the NMT modes in Gulu is the inadequacy and poor quality of the infrastructure as well as attitudes and behavior towards NMT modes. Urban transport policy can contribute to the addressing of the challenges that hinder the adoption of NMT modes in secondary cities such as Gulu. The existing national NMT policy 2012 therefore needs to be scaled down and the local authorities provided with technical and financial capacity to implement and maintain NMT infrastructure programs and projects in these cities. This would also imply that the local authorities be given more powers of decision making regarding NMT policy implementation in their cities, including budgetary allocations to NMT programs and projects. This would go a long way in clearing the current challenges such as poor maintenance of NMT infrastructure and facilitate sensitization of all road users with the goal of asserting NMT mode right of way. In essence, there is need for legally enforceable legislation to govern the rights and responsibility of NMT mode users and to govern the behavior of other mode users towards NMT modes.

Beyond the national NMT policy, NDP III discusses aiming to have a seamless, safe, inclusive and sustainable multi-modal transport system but is not explicit on increasing the modal share of green transport modes and addressing the increasing motorization with its negative impacts on the accessibility of green transport options. Similarly, the national green growth development strategy (2018) recognizes the role of sustainable transport in promoting sustainable green growth and argues for cities to provide alternatives to private vehicles, increase public transit infrastructure by improving existing public transit services, and make cities friendly to pedestrians and non-motorized vehicles. These policy directives are important in providing the broader guides but don't go far enough in offering concrete steps on implementation. There is need for new legislation that further detail steps in implementation of green mobility options in cities.

Conclusions

At the national level, the development of the national NMT policy was a step in the right direction as far as mainstreaming green, active transport in the broader urban transport policy and planning is concerned. The subsequent attempts to incorporate green transport in urban transport interventions in Gulu through USMID can also be lauded. As discussed above, one of the main challenges that still exist is the NMT infrastructure gap relating to quality and adequacy. The quality challenge is exemplified in extent of universal design considerations, maintenance, and integration to other modes. With the current development of the green growth aligned PDP⁴, opportunities exist to address the existing challenges to better integrate land-use and transport planning and subsequently greening urban transport in Gulu and promote non-motorized transport and other green modes such as mass public transit. "The sustainable

⁴Physical Development Plan

transport alternatives will contribute by reducing the energy intensity of vehicles and carbon intensity of fuels, reducing high density and agglomeration, providing context appropriate transport and options for non-motorized transport modes” (UGGDS, 2018, 41)

Recommendations

The role of good quality infrastructure in ensuring a shift towards green transport is invaluable. Future road improvement in Gulu or any other secondary city in Uganda ought to return to the infrastructure issue and place great emphasis on providing adequate and quality green transport infrastructure that connects places of residence to places of employment and recreation. This could include; dedicated pedestrian lanes, safety features, public transport infrastructure such as bus stops, terminals, parking, lighting and way-finding features that promote safety of NMT modes. Improvements are desired in relation to ensuring that green transport mode infrastructure meets the universal design standards set out in the draft national NMT policy 2012. The lessons from the Kampala NMT pilot project earlier discussed can also be drawn because the project followed to a good extent the recommendations of the NMT policy especially in regards to design standards.

NMT infrastructure also ought to be designed and planned for easy maintenance and that local authorities mobilize and allocate resources for routine maintenance of green transport mode infrastructure. In Gulu, existing green transport facilities provided under the USMID project such as pedestrian walkways also need to be protected from encroachment by addressing the mindset that disfavors green transport modes in the road traffic hierarchy and through stringent enforcement of traffic and road use regulations. Behavioral change campaigns are also required to sensitize road users on the rights of pedestrians and assert their right to urban road space. This change in attitude and behavior would go a long way to address the current accessibility impediments affecting green transport modes in the city.

At a macro level, city-scale land use transport integration through promotion of compact urban development in Gulu would set the stage for the adoption of green transport modes. Transport network connectivity and land-use planning should incorporate non-motorized transport modes and ensure that key land uses are within NMT modal reach or accessible by NMT modes. This would ease the processes of providing infrastructure for NMT modes and their integration to other modes of transport within the city and ensure complementarity, efficiency and effectiveness. Public transport for commute within the city also needs to be piloted, encouraged and incentivized. This could be in the form of commuter taxis or mini-buses.

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Paper Eight

An Assessment of Walkability and Pedestrian Perceptions in Jinja Central Business District of Uganda

By

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Abstract

There is a close relationship between walkability and liveability in growing cities such as Jinja. Non motorisation has economic, social and environmental benefits. This paper assessed the walkability conditions and pedestrian perceptions in Jinja Central Business District in view of the regions urbanisation trends and development.

The study was evaluative and employed a cross sectional research design with a range of data diverse triangulation quantitative and qualitative techniques. The perception field survey data was collected from a random sample of 80 pedestrians on 8 selected roads of Jinja City in the Central Business District. Additionally, 10 agency forms that involved rating of the walkability parameters for the 8 selected roads in Jinja city Central Business District based on the Global Walkability Index (GWI) were filled by the City officials. The results showed that the Walkability Index (WI) of Jinja Central Business District considering the busiest 8 selected roads is neutral at a rate score of 51. This means that there are some walkable locations but most of the daily trips and some errands still require a bike, car or public transport.

The study also recommends establishment of diffused walkable approaches for the city through involving a series of comprehensive urban policies and actions that affect the urban quality and city plans as well as innovative interventions that encourage the development of walkable communities.

Scope and Coverage

This paper was about a critical assessment of walking conditions in Jinja and determined the condition of the existing pedestrian facilities. If pedestrian facilities are not well designed in suitable locations, it becomes a discomfort for users and thus their importance might not be realised.

This study was conducted in Jinja Central Business District on the streets of Alidina, Kutch, Nizam, Lubas, Main Street, Gokhale, Clive Road and Rippon Road. The 80 pedestrians and 10 agency (Jinja City) officials from 4 departments of physical planning, engineering and works, environment and natural resources, and city council) were interviewed. These roads were selected because they attract a relatively huge number of pedestrians as compared to other streets in the Central Business District of Jinja.

Walking is one of the most sustainable ways of transport and mobility. With the increasing urbanisation, it is critical to encourage people to walk especially in busy towns. Walking makes the urban environment more pleasant, safer and less polluted (Dalton, 2019). Improved walkability in cities can ease traffic congestion and as well improve on the overall public health.

Walking provides mobility to a large percentage of people in many cities of Uganda especially the urban poor who often do not have other alternatives. A good number of workers in Jinja city walk to and from the city centre especially for work.

The quality of the pedestrian environment is key to encouraging people to choose walking over other means of mobility (Southworth, 2005). To create walkable cities, it's important for city planners and managers to know and understand what sorts of infrastructure encourage people to walk. This is important in facilitating what to build and where. From garden city to the concept of the neighbourhood unit and

from post modern experimentation to the era of digitisation, a good design always involved the intention to provide walkable urban forms (Blecic et al., 2020).

Objectives

The general objective of the study was to assess and provide information on the walkability and condition of the current pedestrian facilities along selected busy roads in Jinja Central Business District that could be used to develop and propose non motorised transport focused solutions for other newly created cities in Uganda

The Specific Objectives of the study included the following:

1. To generate a walkability index for Jinja Central Business District in accordance to the Global Walkability Index.
2. To investigate the perceptions of the public on walkability conditions and existing pedestrian facilities in Jinja Central Business District
3. To develop appropriate policy recommendations on how non-motorised transport could be fostered and promoted in Jinja City and other newly created cities in Uganda

Methodology

The study was evaluative and employed a cross sectional research design with a range of data diverse triangulation quantitative and qualitative techniques. The data collection methods were phased as described below:

Pedestrian Perception Survey: In this phase, field survey was conducted to collect data from a representative sample of 80 pedestrians (men and women) walking on the 8 selected roads (Gokhale, Kutch, Main street, Lubas, Clive, Aldina, Nizam and Rippon roads) in Jinja city using a structured questionnaire to assess their perception levels on walking conditions and pedestrian facilities. The questionnaire was developed, in line with the Global Walkability Index (GWI) survey requirements and parameters. Special attention was given to the sex and age disaggregation to allow for gender analysis.

Agency Survey to determine the Walkability Index: Based on the Global Walkability Index (GWI) developed by H.Krambeckm the pedestrian survey and the agency survey were conducted. The walkability survey forms/questionnaires were developed for both pedestrians and agency officials using parameters given by the GWI with some modification to suit Jinja City. The agency rating was done by Jinja City Officials while the field rating was done by pedestrians along the selected case study roads/streets. The 80 pedestrians and 10 agency (Jinja City) officials from 4 departments of physical planning , engineering and works, environment and natural resources, and city council) were asked to rate the walkability parameters on a scale of 5 point for each attribute with 1 being the lowest and 5 being the highest on each of the selected streets. The average of each of the parameters were converted into a rating system from 0 (lowest) and 100 (highest). Hence, the summation of these surveys gave the Walkability Index for Jinja Central Business District. The walk score was then determined for Jinja Central Business District. The walk score is a number between 00-100 and to evaluate this, (Minhas, 2017) highlighted the guidelines in table below;

Table 1: The Walk Score Guidelines

Score (%)	Code	Description	Interpretation for Walking
90-100	5	Walkers paradise: Owning a car isn't necessary and most errands can be done by walking	Very satisfactory for walking
70-90	4	Very walkable locations: Some amenities might be at walkable locations; some amenities but everyday errands must require proper transportation facilities	Satisfactory for walking
50-70	3	Neutral	Neutral for walking
25-50	2	Not walkable; only a few destinations are within easy walking range. For most errands, driving or public transportation is a must.	Unsatisfactory for walking
0- 25	1	Driving only; virtually no neighbourhood destinations within walking range. You can walk from your house to your car.	Very unsatisfactory for walking

Source: Minhas, 2017

Results

The Walkability Index for Jinja Central Business District in accordance to the Global Walkability Index: In this case the pedestrian field survey (FS) was conducted in the 8 roads to rate the walkability these roads. The results were compared with those of the agency survey (AS) using 10 officials from Jinja City.

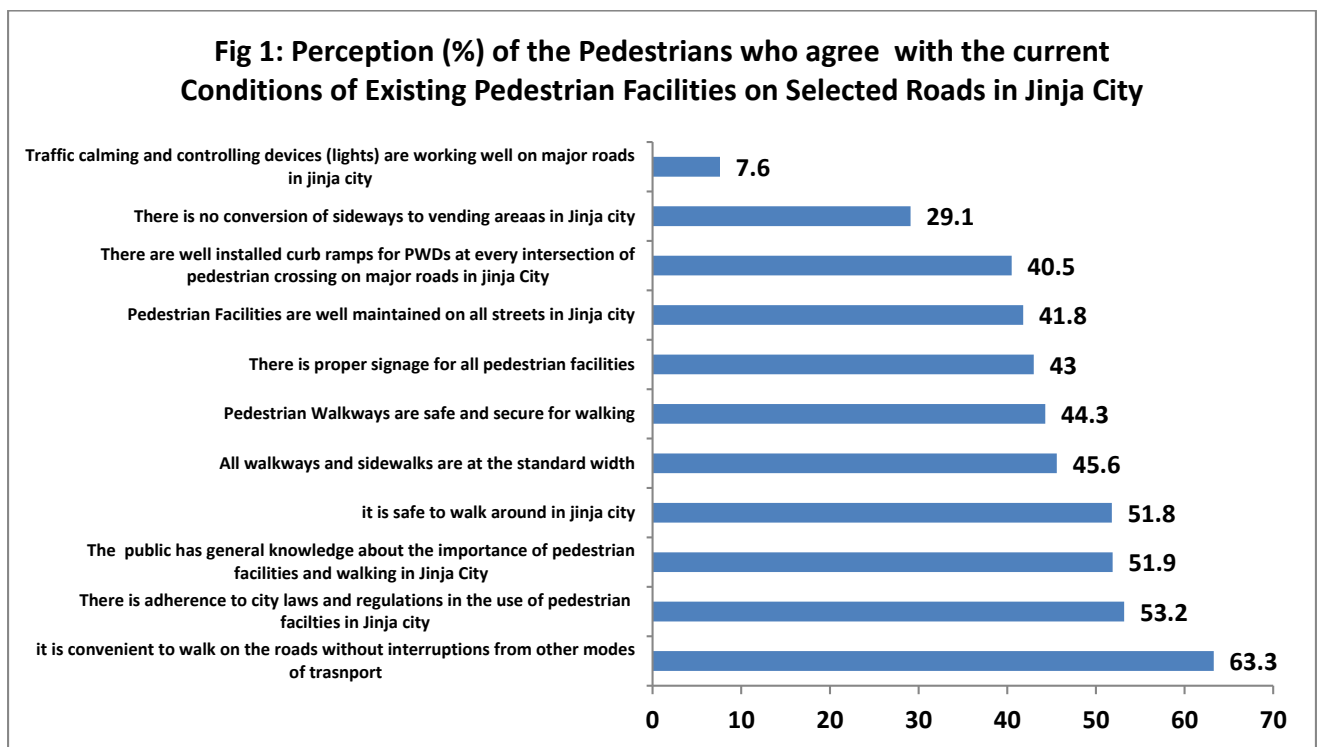
The average field survey (FS) rating of the 8 selected roads in Jinja Central Business District was 2.6 and the average of public agency survey (AS) result was 2.5.

Therefore, the Walkability Index (WI) = Average of public agency survey (AS) + Average of field Walkability survey (FS) = 5.1. This means that on a 100 point scale it becomes 51. And according to the methodology deployed, 50-70 holds neutrality for walking. This means that there are some walkable locations in the 8 roads but most of the daily trips and errands still require a bike, car or public transport. The results of 8 roads studied reveal that only a few destinations are within easy walking range. For most errands, driving or public transportation could give the best option. On the whole, the pedestrians and technical officers in the 4 departments of physical planning, works and engineering, environment and natural resource as well as the city council departments have rated the facilities in central business district of Jinja city as neutral (51 on a scale of 100). Improvements should be done to encourage people to walk while accomplishing different daily errands.

The Perceptions of the Public on Walkability in Jinja Central Business District: When pedestrians were asked whether they agreed or not with the current conditions of the pedestrian facilities in Jinja city, 45.6% confirmed that all existing walkways and sideways are at the standard width followed by 43% who agreed that there is proper signage for all existing pedestrian facilities.. While 41.8% agreed

that, pedestrian facilities are well maintained, 29.1% were positive about non conversion of walkways into vendor areas. Only 7.6% supported the idea that traffic lights are working well and yet there are virtually no traffic lights on any main road of Jinja city. Additionally, 40.5% believed that there are curb ramps installed for PWDs on major roads in Jinja city. The public still believes that persons with disabilities are not well catered for in the city. The safety of the walkways is rated at 44.3% taking into consideration the walking path modal conflict among the motorists, cyclists and vendors. The safety of walking in Jinja city rated at 51.8% is also attributed to adherence to city laws and regulations on use of pedestrian facilities as well as general knowledge and public awareness about pedestrian facilities in the city. Most pedestrians (63.3%) also reported that, they find it convenient walking along the roads of Jinja city due to lack of traffic jam on most of the roads.

As earlier on reported, in general, the study has established that the existing pedestrian facilities in Jinja city are not well maintained. Additionally, most of these pedestrian facilities in most roads have been over taken by vendors. This is where the Jinja city authorities should take drastic actions to rectify the current plight of vendors in the city. The vendors are among the urban poor in Jinja city whose occupation in the city is mainly petty trade to support their livelihoods. It was also established that while some roads such as Main Street road has all the standard pedestrian facilities others like Lubas Road do not have any.



Source: Primary Data (August, 2022)

Policy Implications

NMT Policy of Uganda should be enforced to encourage satellite city planning and development in Jinja city where people can easily access centralised pedestrian facilities and services on each road. The policy call for sustainable funding from development partners and government to improve on pedestrian facilities urgently needed on the roads which include walkways, security lights, and traffic control signals/lights, curb ramps, sign posts, zebra crossings, waiting shades and other road amenities.

Conclusions

Jinja Town has a good road network with a chess board grid pattern. The roads are wide enough to allow for provision of drainage, pedestrian side walk, cycling lanes and carriage way/ lane for vehicles. These have since got dilapidated and maintenance is wanting through with little or hardly any support. In light of the roads under this assessment, the Main Street and Clive Roads have benefited from funding/ support from USMID and this can be seen from the quality of the roads. Nonetheless, the facilities to promote walking on these roads are inadequate and the provisions have been abused by the roadside vendors and developers who go against their building lines. Jinja is increasingly growing in population attracted by industrialisation, tourism and accommodation. The pressure on facilities as well increases and in the end they are abused. There is need to renovate the roads and provide for facilities that will promote walking since the space is available.

Policy Recommendations

In order to improve pedestrian facilities and walkability in Jinja city the following should be done:

Establishment of diffused walkable approaches for the city through involving a series of comprehensive urban policies, actions that affect the urban quality and city plans as well as innovative interventions that encourage the development of walkable communities. Temporary removal of vehicles from cities can transform roads into open spaces. This could be possible by having car free initiatives. Car free days have been trialled across the globe and so many cities with efficient transport systems have adopted it. In Paris, car free events have been successful and their city government vowed to implement a permanent downtown ban on diesel cars by 2030. As part of the EcoMobility World Festival, an area of Swon City in South Korea was converted into an ecomobile neighbourhood with the aim of providing residents with a taste of car-free urban living.

Institutionalising of non motorised transport units into the city structure. This could promote a more understanding of non motorised transport issues. Jinja is largely hindered by the lack of information on non motorised transport and public perception and demand for NMT among the city residents. Institutional responsibilities for pedestrian mobility and infrastructure are fragmented. Different city departments are responsible for roads, pedestrian crossings, parks among others. This leads to negligence leading to under provision and deterioration of the available pedestrian infrastructure.

Provision of specific spaces for vending and parking. Many sidewalks in Jinja Central Business District are occupied by vendors and parked vehicles. There should be reconciliation between street vending and pedestrian walkability. Clearly, if sidewalks are crowded with stalls and parked vehicles, pedestrians cannot walk easily and quickly along corridors which were constructed for their benefit. However, it should be noted that pedestrians are not just moving from origin to destination. Rather, they are the main consumers of especially street food, groceries and other items sold on street. Therefore, in the quest to reallocate the vendors from streets, the proposed alternative spaces should directly and continuously be accessible by their primary markets, the pedestrian consumers.

Adoption of technological tools and innovative approaches contributing to a city's monitoring and evaluation. The public realm and outdoors are more accessible and appealing to the public through digital platforms that make it easier for them to understand their state and plan. Real-time data allows users to assess features such as noise or crowds of a place and smarter booking platforms make booking and planning activities easier. Mobile phone applications and computer algorithms analysing vast quantities of data are now able to evaluate abstract yet important metrics like walkability. These provide a useful resource for urban planners, transport planners, architects and decision makers in designing spaces and routes that suit the needs of pedestrians by also considering the softer or more psychological aspects of route and mode

choice. In Copenhagen Denmark, they adopted the talking street sign navigation concept. This is particularly beneficial to the blind and partially sighted people. These interactive street signs provide an audio recording of street names along with illumination of the component sounds helping pedestrians to pronounce complex Danish place names.

Establishing strategies and proposals that encourage the active and emotional participation of citizens in everyday urban life. A bottom up community driven participatory planning process is a fundamental tool to place making. Thus it is absolutely essential to listen to people and shape their values into the places they love or want to love more. Practically, a phenomenological approach towards community engagement should be encouraged. This is because great places are embedded in people's memories and experiences.

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Paper Nine

The Role of Masons in Promoting Urban Greening in Greater Kampala, Uganda

By

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Abstract

The construction sector is growing in the Greater Kampala metropolitan Area (GKMA) due to rapid investment and demand for real estate and is an important source of employment for the masons and other skilled manpower especially for residential and non-residential construction as well as engineering construction works. This paper examined the role of masons (popularly known as Fundis in local dialect) in promoting urban greening in Greater Kampala, Uganda specifically in the 5 divisions of Kampala Capital City Authority (KCCA) namely: Makindye, Kawempe, Nakawa, Rubaga and Central Division. The study's specific objectives included; (i) to assess the operating levels of masons in terms of skills, knowledge and innovation in building/ construction industry (ii) to assess the masons' understanding of professional building codes and standards and tools they use and how they can operate within the current construction legal framework (iii) to identify the challenges affecting the operations of the masons) in the construction sector and (iv) to identify strategies for improving the operations of the masons in the informal construction industry in Greater Kampala Metropolitan Area. Information

in this report was gathered from sample size of 82 masons purposively selected from masonry firms and workshops across Kampala City and 12 key informants that included policy makers, regulatory bodies, urban authorities, professional associations, training institutions and local leaders. The findings revealed that more men (84.8%) especially youth were engaged in masonry work in the GKMA than women with 58.7% of the masons assessed having secondary level qualifications (O level and A-Level holders) compared to other higher education levels. In addition, 54.3% had worked for more than 6 years in the construction sector and were largely (43%) on contract terms and 28% self employed. In the GKMA, while brick masonry (47.8%) was found to be a common occupation among the masons, followed by stone (19.6%) and concrete blocks (15.2%), about 80.4% of the masons were specialized in residential housing construction compared to only 15.2% of commercial housing. In terms of skills training, 67.4% of the masons underwent either formal or informal vocational training, while the rest had learnt masonry work on the job. Noticeably, 73.9% of the masons were able to understand and apply building codes, housing laws and standards as well as tools and equipment used in the sector and this ensured good environmental practices in the building industry, hence improving urban greening. The 77.7% of masons reported that the quality, condition and standard of the tools and equipment used in GKMA were reasonably in appropriate working condition despite the financial constraint being a major setback limiting acquisition and possession of better and modern tools required for modern masonry construction work. While only 30.4% of the masons in the GKMA were duly registered and were able to enjoy social security and operate with minimal disruptions from the regulatory bodies, 19.6% had their own companies or services while the rest operated informally as self-employed workers. The study concluded that the masonry in GKMA who consist majorly of informal construction workers have played a crucial role in the green building industry of the GKMA and providing employment opportunities to the youth who do not have employment, work and social security. Therefore, the National Construction Industry Policy should seek to improve coordination, regulation and development of the masons in GKMA that have remained fragmented and largely informal. There should be a deliberate government effort to strengthen local capacity of masons through establishment of capacity building fund to support apprenticeship of masons to enhance new technologies in urban greening and sustainable development in collaboration with KCCA, Directorate of Industrial Training (DIT) and College of Engineering, Design Art and Technology (CEDAT), Makerere University. The National Building Review Board (NBRB) should also continue to monitor and supervise the work of masons for quality assurance. In this case it is recommended that (i) the masons should be encouraged to formalize/ register their services in order to increase potential benefits, security of tenure and opening up of new opportunities for growing their businesses (ii) masons investing in their businesses in terms of improved facilities, skilled personnel, permits, insurances, administration, transport, paying taxes and this requires access to cheap credit facilities and (iii) masons adhering to code of work ethics, building codes and laws governing constructions at the sites

Scope /Coverage

This paper examined the role of masons in promoting urban greening in greater Kampala, Uganda specifically in the 5 divisions of Kampala City namely: Makindye, Kawempe, Nakawa, Rubaga and Central Divisions.

Information in this report was gathered from sample size of 82 masons purposively selected from masonry firms and workshops across Kampala City and key informants who included policy makers, regulatory bodies, urban authorities, professional associations, training institutions and local leaders.

Objectives

The study's specific objectives included the following:

- To assess the operating levels of masons in terms of skills, knowledge and innovation in building/construction industry
- To assess the masons' understanding of professional building codes and standards and tools they use and how they can operate within the current construction legal framework
- To identify the challenges affecting the operations of the masons/builders in the construction sector and
- To identify strategies for improving the operations of the masons in the informal construction industry in Greater Kampala Metropolitan Area

Methods

The study adopted a cross-sectional design, with both qualitative and quantitative sets of data. The study selected 82 masons from both registered and non-registered firms or workshops from the 5 divisions of Kampala Capital City.

The masons were purposively selected by the local leaders at ward level in each division due to lack of official records from the urban authorities.

The study used structured questionnaire to collect primary data from the 82 purposively chosen masons based on convenience sampling. The questionnaire was pretested and results used to improve the assessment questionnaire. The sample size of masons selected by division in KCCA is shown in table 1 below

Division	Number of Masons	Percent
Kawempe	25	30.5
Central	10	12.2
Makindye	12	14.6
Nakawa	19	23.2
Rubaga	16	18.5
Total	82	100

Source: Primary Data (July 2022)

A key informant interview guide was developed and used to interview the purposively 12 key informants from Ministry of Works and Transport, NBRB, Uganda Contractors and Masons Association, Leaders from KCCA, Uganda Green Building Council, GGGI, DIT, CEDAT, and Ministry of Education and

Sports (MoES) to supplement on the quantitative data. Using this method, the researcher was able to probe for more information not covered in the questionnaire.

The researcher accessed secondary data from various reports from the Ministry of Works and Transport (MoWT), urban local governments, journals, internet sources, and other external sources which were established by scholars and academicians about the role of masons. The list of references is found in reference section

During field interviews, some data was collected through observation especially from the construction sites concerning the quality of tools used, nature and capacity of masons available, the building materials used and other vocational training institutions which were visited.

The study protocol was approved by Makerere University Research Committee in the Department of Architecture and Physical planning. The permission to conduct the field study was approved by the KCCA Executive Director. The field data collection by 5 research assistants was supervised by the selected division supervisors alongside the Principal Investigator

The quantitative data was processed and analysed using Statistical Package for Social Scientists (SPSS) V16 software which produced both descriptive and analytical data. The qualitative data from the open ended items were transcribed and analyzed through content analysis;

Results

Demographic Characteristics of the Masons: The findings revealed that more men (84.8%) especially youth were engaged in masonry work in the GKMA than women with 58.7% of the masons assessed having secondary level qualifications (O level and A-Level holders) compared to other higher education levels. Results show that 73.9% of masons earned through their profession (as masons) while (10.9%) had full time employment and business sources (8.7%). The 6.5% was other sources of income through temporary work especially from agriculture and consultancy services among others

The Skills and Knowledge of Masons in Construction Industry in GKMA: The 54.3% of masons had worked for more than 6 years in the construction sector and were largely (43%) on contract terms and 28% self employed.

In the GKMA, while brick masonry (47.8%) was found to be a common occupation among the masons, followed by stone (19.6%) and concrete blocks (15.2%), about 80.4% of the masons were specialized in residential housing construction compared to only 15.2% of commercial housing.

In terms of skills training, 67.4% of the masons underwent either formal or informal vocational training, while the rest had learnt masonry work on the job. The masons with no vocational skills training had the following reasons (i) limited financial support to cater for expensive fees in formal Institutions (ii) they learnt masonry skills from job (iii) lack of time to attend training (iv) arrogant training institutions which were bureaucratic in admitting school drop outs or masons with poor academic performance and (v) easy access to getting construction job and quick money. The general skills training identified and required of masons to improve their capacity in the GKMA included (i) construction technology (ii) construction management (iii) contract management and (iv) business management.

Masons' Understanding of Professional Building Codes and Standards and Tools/ Equipment and Their Current Legal Operations: Noticeably, 73.9% of the masons were able to understand and apply

building codes, housing laws and standards as well as tools and equipment used in the sector and this ensured good environmental practices in the building industry, hence improving urban greening. The major benefits gained however, have been the harmonization of professional practice in the building construction in Uganda and curtailment of informal developments so as to ensure well-planned, well-maintained, safe, cost effective and decent building developments and human settlements throughout the GKMA. The positive role played by the masons in promoting greening is therefore reflected in the Building Control Regulations of Uganda under MoWT (2012) which serve as a standard reference for regulating building designs and construction. The National Building Review Board (NBRB) and the Green Building Council of Uganda have emphasized the urgent need to develop, localize and benchmark the green building codes adopted from outside Uganda and have been able to oversee the activities of the building committees. The aim is to ensure that “Uganda achieves strong, inclusive and sustainable economic growth”; and fully aligned with the Uganda Vision 2040 goals, which is being implemented currently through the National Development Plan III FY2020/21 – 24/25; and the Uganda Green Growth Development Strategy (2018-2031). In this case, the building committees established in 2013 under the Building Control Act of Uganda established in each district and urban authorities of GKMA have been able to work with the masons for quality assurance. The builders including masons have been able to help building owners and operators in GKMA identify and implement green building designs, construction operations, and maintenance solutions and helping to cut on-site energy consumption and building carbon footprint.

The quality, condition and standard of the tools and equipment used by masons: The 77.7% of masons reported that the quality, condition and standard of the tools and equipment used in GKMA were in reasonably appropriate working condition despite the financial constraint being a major setback limiting acquisition and possession of better and modern tools required for modern masonry construction work. While some masons usually borrowed equipment and tools to use only when they got the work, the quality of hand tools and equipment, their proper use and maintenance was not taken seriously by some of them due to lack of the required skills and knowledge in their correct use. The required composition and number of hand tools used by masons at GKMA depended on the nature of work, local conditions and practices as well as the size of the workforce.

Legal Status, Standards, Regulation and Social Safeguards of Masons in the GKMA: The results show that 69.6% of the masons in GKMA operate informally as most are self-employed workers. While only 30.4% of the masons in the GKMA were duly registered and were able to enjoy social security and operate with minimal disruptions from the regulatory bodies, 19.6% had their own companies or services while the rest operated informally as self-employed workers. The study established that masons are a large workforce in GKMA but most of the time recruited informally and engaged by contractors with or without contracts.

Policy Implications

The National Construction Industry Policy of Uganda should seek to improve coordination, regulation and development of the masons in GKMA that have remained fragmented and largely informal. The MoWT as the main regulator of the construction sector should continue to enforce the Building Control Act 2013 to consolidate, harmonise and amend the laws relating to the erection of buildings as well as provision of building standards under the National Building Review Board

There should be a deliberate government effort to strengthen local capacity of masons through establishment of capacity building fund to support apprenticeship of masons to enhance new technologies in urban greening and sustainable development in collaboration with MoWT, KCCA, DIT and CEDAT, and Makerere University. The dialogue on enforcement mechanisms and the collaboration between the Ministry of Labour, contractors and representatives of masons should be initiated at an early stage of project implementation to ensure good working conditions of masons at construction sites.

Conclusions

The study concluded that the masonry in GKMA who consist majorly of informal construction workers have played a crucial role in the green building industry of the GKMA and providing employment opportunities to the youth who do not have employment, work and social security. The competent masons are the backbone of well-managed work sites in GKMA and thus key to the profitability of most contractors. Therefore, creating a cadre of qualified construction masons is an essential and cost-effective investment for the green building industry in GKMA.

The construction sector is growing in the GKMA due to rapid investment and demand for real estate and is an important source of employment for the masons and other skilled manpower especially for residential and non-residential construction as well as engineering construction works.

Recommendations

The National Building Review Board (NBRB) and GKMA authorities should also continue to monitor and supervise the work of masons for quality assurance. In this case it is recommended that (i) the masons should be encouraged to formalize/ register their services in order to increase potential benefits, security of tenure and opening up of new opportunities for growing their businesses (ii) masons investing in their businesses in terms of improved facilities, skilled personnel, permits, insurances, administration, transport, paying taxes and this requires access to cheap credit facilities and (iii) masons adhering to code of work ethics, building codes and laws governing constructions at the sites

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