The impact of Kigali City Master Plan implementation on the living conditions of urban dwellers: Case of Nyarugenge District.

Master's Thesis

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Master's Thesis submitted to the Technische Universität München, Department of Civil, Geo and Environmental Engineering, as partial fulfilment of the requirements for the award of a Master of Science Degree in Land Management and Land Tenure.

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2. Dr. Jean Pierre Bizimana

Declaration

According to § 18 section 9 ADPO (General examination regulations) of TU Munich, I herewith confirm that I wrote this thesis entirely by my own and that I did not use any other sources, means of support and aid than those mentioned within the text.

Munich, 5th February 2019.

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NYIRANSABIMANA Marie Jeanne

Abstract

A master plan is an important tool which guides, controls and manages an urban growth and development in a planned manner. However, a master plan preparation alone does not ensure the implementation of what proposed. To ensure its implementation, it requires implementation assessment since failure to implement plans has long been considered as significant barrier to effective planning. Nevertheless, there are no studies that evaluated the implementation of the Kigali City master plan and its impact on the living condition of urban dwellers. The aim of this study was to bridge that gap by evaluating the implementation of Kigali City master plan and assessing its impact on the living condition of urban dwellers in Nyarugenge District.

The implementation evaluation was based on the three indicators of the degree of conformity: accordance, unfulfillment and deviation. By using ArcGIS software as the main tool for analysis, the actual land uses that exist on ground were compared to the planned land uses on the master plan using GIS overlay tools. The impact of master plan implementation on the living condition of urban dwellers was evaluated, based on the indicators of urban quality of life which are related to the objectives of the master plan and to the living condition of the urban dwellers. By comparing the current situation and the situation before the adoption of the master plan, this study evaluated the level of availability and accessibility of these indicators of urban quality of life in the study area. The comparison was done using the paired sample t-test analysis by SPSS. A statistically significant difference between the two situations indicates an improvement of the living condition of the urban dwellers.

The results of this study are that there is high conformance for public facilities; a medium conformance for infrastructure, commercial and natural area; a low conformance for agriculture; a very low conformance for industries, residential and open spaces. The result from the paired sample t-test analysis revealed that the master plan implementation has partly played role in the improvement of the dwellers' living condition whereby the level of availability and accessibility of some elements of urban quality of life was improved in dwellers' neighbourhoods. However, there are other elements which are not significantly improved. I conclude that the low level of Kigali City master plan implementation is based among others on the zoning categories and regulations which are not feasible by the low-income citizens. I recommend the review of the master plan by considering all categories of people including the low, medium and high-income communities. I also recommend that the implementation of the muster plan should consider the improvements of the living condition of urban dwellers by focussing most importantly on elements that were found to be deficient.

Keywords: Master plan, implementation, living condition, urban quality of life and indicators

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List of acronyms

AMA: Accra Metropolitan Assembly

C1 :   Mixed Use Commercial District

C2 :   Neighbourhood Level Commercial District

C3 :   City Level Commercial District,

C3A :   City Level Commercial District

C3B :   City Level Commercial District

C3C :   City Level Commercial District

C4 :   Regional Level Commercial District

C4A :   Regional Level Commercial District

C5 :   Retail Warehouse District

CBD :   Central Business District

CGIS :   Centre for Geographic information System

CIP :   Capital Improvement Program

Df :   Degree of freedom

DLUP :   District Land Use Plan

ELU :   Existing Land Use

GIS :   Geographical Information System

GoR :   Government of Rwanda

I1 :   Light Industrial District

I2 :   General Industrial District

KCMP :   Kigali Conceptual Master Plan

MP :   Master plan

MSc :   Master of Science

NISR: National Institute of Statistics of Rwanda

NLUDMP : National Land Use Development Master Plan

OUA :   Organization of African Unity

P1 :   Passive Recreational District

P2 :   Active Recreational District

P3 :   Agricultural Area

P4 :   Protected Area

PCT :   Percentage

R1 :   Single Family Residential District

R1A :   Mixed Single-Family Residential District

R1B :   Rural Residential District

R2 :   Low Rise Residential District

R2A :   Low Rise Residential District

R3 :   Medium Rise Residential District

R4 :   High Rise Residential District, See

REMA :   Rwanda Environmental Management Authority

RTDA :   Rwanda Transport Development Agency

RLMUA: Rwanda Land Management and Use Authority
Sig :   Significant

SPSS :   Statistical Package for the Social Sciences

Std :   Standard deviation

UBC :   Union of the Baltic Cities

UN-Habitat : United Nations Human Settlement Programme

UR :   University of Rwanda

Chapter one: Introduction to the research

1.1. Background of the study.

Attracted by the economic opportunities, a large number of people are moving from rural area to Kigali City (The City of Kigali, 2010b). This resulting in the creation of informal settlements in the city and tend to have major impacts on the environment and human health such as unplanned buildings, poor social infrastructure, open drains, poor sanitation and environmental degradation due to high urban population growth (REMA, 2017). Therefore, such growth needs to be guided by careful and timely planning to ensure that Kigali is able to address the increasing real estate demand in an organized and controlled manner. For this reason, the City of Kigali has adopted a legal framework which guides and regulates urban planning and development in the City of Kigali.

One of the constituents of this legal framework, is the Kigali Conceptual Master Plan (KCMP) which was approved by the Ministry of Infrastructure in 2008 (The City of Kigali, 2010a). The KCMP stipulates the broad range development vision for the City of Kigali and the need to develop detailed master plans for each of its three Districts (The City of Kigali, 2010b). Therefore, the approval of KCMP has been followed by the approval of the detailed master plan of Nyarugenge District in 2010. Later, in 2013, the detailed master plans for the other two constituent Districts of Kigali City and the whole master plan for the entire City were approved. The objectives of the Kigali City master plan and that of the detailed Master Plan for Nyarugenge District are related to each other. Some of those objectives are the following: to ensure adequate allocation of land uses; to provide modern and comprehensive housing solutions for all groups of people; to develop efficient transportation, infrastructures and public facilities; and to create and conserve alluring recreational features (The City of Kigali, 2010b). These objectives are expected to be achieved through the implementation of this master plan.

Apart from the general land uses allocation, the developments proposed by the master plan of Nyarugenge District are expected to be implemented in phases. Some developments priorities were planned to be completed by 2020, while other developments will be implemented in long term. This study evaluated the status of the implementation of the detailed master plan of Nyarugenge District and evaluated the achieved outcomes of those developments priorities whose implementation was expected to be completed by 2020. In addition, this study assessed the impact of master plan implementation on the living condition of urban dwellers.

1.2. Problem statement

While the soul of a master plan lies in its implementation framework (Hameed & Nadeem, 2008), some studies state that urban plans in African cities tend to fester on city council shelves, with only a tiny percentage of proposed urban development plans taking place (Silva, 2015). Failure to implement plans has long been considered as significant barrier to effective planning (Berke et al., 2006). To ensure the implementation of a master plan, a continuous follow up is required and assessments within certain periods of time are needed. The assessment of plans can be done by planners, policy makers, donors and scholars.

However, apart from the studies that generally discus the unsuccessful implementation of plans for African cities, for example that of Silva, (2015) mentioned above, there are no studies that evaluate specifically the implementation of the Kigali City master plan. Instead, there is a study of Pätsch, (2017) which only evaluates the impact of an urban master plan implementation on institutional innovation in Kigali but without assessing its impact on living conditions of urban dwellers. Therefore, the aim of this study was to bridge that gap by evaluating the implementation of Kigali City master plan and assessing its impact on the living condition of the urban dwellers in Nyarugenge District. Such impact was conceptualized as a change which can be attributed to urban quality of life through the accessibility of the following elements among others: affordable housing, efficient transportation, infrastructures, public facilities, recreational areas, commercial buildings and office spaces. Those elements are among the main objectives of Nyarugenge master plan which have a direct impact on urban quality of live.

Therefore, the impact of the master plan implementation was evaluated based on those objectives. The output of this work may be useful to guide Kigali City towards enhancing the plan implementation follow up measures and identifying the best practices towards improving living condition of the inhabitants of Nyarugenge District.

1.3. Research objectives

General objective

The main objective of this study was to evaluate the status of Kigali City Master Plan implementation in Nyarugenge District and to assess how such implementation is impacting on the living condition of the urban dwellers.

Research specific objectives

1. To identify development priorities whose implementation is expected to be completed by 2020,
2. To identify the completed developments with respect to those proposed to be completed by 2020,
3. To assess the level of conformance of master plan of Nyarugenge District to the current situation on the ground,
4. To determine challenges of master plan implementation within Nyarugenge District,
5. To determine how the implementation of master plan of Nyarugenge District is impacting on the living condition of the dwellers,
6. To recommend strategic interventions for sustainable implementation of Kigali City Master Plan

1.4. Research questions

2. What are the development priorities in the master plan of Nyarugenge District that should be completed by 2020?
3. What are the completed developments with respect to those planned?
4. To which extent do the current land uses conform to the master plan of Nyarugenge District?
5. What are the challenges that affect the implementation of Kigali City master plan?
6. How is the implementation of the master plan of Nyarugenge District impacting on the living conditions of the urban dwellers?
7. What are the recommendations on strategic interventions for sustainable implementation of Kigali City Master Plan? The appendix A relates the research objectives with research questions, the data required and methods.

1.5. Research motivation

The rationale for this study was threefold: the first was a lack of sufficient studies that evaluated the implementation of the master plan of Kigali City while its evaluation should ensure its continual contextual relevance. The second one was a need for continuous studies that asses the sustainability of different actions concerning urban planning and development. The findings and recommendations of this research may be used by Kigali City authorities for the improvement of implementation measures. The last was a need to give a contribution in the enhancement of the living condition of the inhabitants, through the identification of priority areas where the urban quality of life needs to be enhanced and which enhancement is needed.

1.6.   Significance of the study

This research would be beneficial to the City of Kigali since the authority of the City will be aware of the area where the master plan is not yet well implemented. Thus, urban planners may work toward achieving better implementation of the master plan. Again, this research would be beneficial to the Kigali City since through the identification of challenges of master plan implementation, Kigali City may work toward overcoming these challenges. In addition, this research may be used by Kigali City authority for the improvement of implementation measures by adopting the identified strategies of overcoming the challenges of master plan implementation. Moreover, this research would enable the City of Kigali to be aware of which elements of urban quality of life are deficient, thus the authority may seek way to provide these elements of urban quality of life in the area where those elements are needed. Thus, dwellers will benefit from this research since the identification of urban quality of life deficiency may serve as way for the Government to provide these lacking elements by increasing the level of their accessibility. Lastly, this research would serve as reference for further researches relating to the implementation of the master plan and its impact on urban dwellers.

1.7.   Thesis outline

The thesis is organised into five chapters as follow: Chapter one describes the background of the study, problem statement, research objectives, research questions, research motivation, significance of the study and the outline of the research.

Chapter two presents the review of literature on master plan implementation evaluation and on the living condition of urban dwellers evaluation. It also presents the analytical and conceptual frameworks concerning these evaluations. this chapter is presented into ten sections. Section one defines and discusses key terms and concepts that are included in this research. Section two describes steps in preparing a master plan. Section three presents an overview of land use planning in Kigali City. Section four describes the tools and strategies for Kigali City master plan implementation in Nyarugenge District. Section five presents the development priorities proposed in the land use plan for the Nyarugenge, Muhima and Kigali sector. Section six explain the analytical framework about plan implementation evaluation. Section seven discusses the conformance evaluation approach of urban master plan. Section eight describes how the used indicators of urban quality of life were selected. Section nine describes the conceptual framework for evaluating the impact of master plan implementation in Nyarugenge District. The last section is a conclusion of this chapter.

Chapter three presents a description of the methods used from the rational understanding of the study area to the data collection and data analysis. The first part of this chapter describes the study area in terms of its location, its size and its administrative constituents as well as the justification of why this area has been chosen as the as the area of study. The second part discusses the research approach adopted in this study. The third part presents a description of the sampling technic that was used for samples selection. The fourth part presents a detailed description of the research methods that were used during data collection and how the data quality was checked. The fifth part describes how data were processed and analysed. In addition, the methods and tools used for data processing and data analysis are presented in this chapter. The sixth part presents the limitation encountered during this research. Then, a conclusion of what has been discussed in the whole chapter is presented.

Chapter four presents the results into three sections: Section one presents the level of conformance of the current land uses to the master plan for Nyarugenge District. Section two presents a descriptive statistic of the surveyed respondents. Section three gives the in-depth description and discussion of the impact of master plan implementation on the living condition of urban dwellers in Nyarugenge, Muhima and Kigali sectors.

Chapter five discusses the general conclusion and recommendations based on research process and research findings. Firstly, it relates the research findings with the research objectives and their corresponding research questions. Secondary, it suggests recommendations for the Kigali City and for further researches based on the gaps of this research.

Chapter two: Literature review

2.1.   Introduction

This chapter is about the review of literature on master plan implementation evaluation and on the living condition of dwellers evaluation. It also presents the analytical and conceptual frameworks concerning these evaluations. This chapter is presented into nine sections. Section one defines and discusses key terms and concepts that are included in this research. Section two describes steps in preparing a comprehensive plan/master plan. Section three presents an overview of land use planning in Kigali City**.** Section four describes the tools for Nyarugenge District Detailed Master Plan implementation. Section five explain the analytical framework about plan implementation evaluation. Section six discusses the conformance evaluation approach of urban master plan. Section seven describes how the used indicators of urban quality of life were selected. Section eight describes the conceptual framework for evaluating the impact of master plan implementation in Nyarugenge District. The last section is a conclusion of this chapter.

2.2.   Definition of key terms

Apart from the terms: quality of life and urban quality of life which will be discussed under section seven of this chapter for better and logical connection of arguments, the key terms and concepts relating to this study are defined and discussed under this section, for better understanding of this research. These include for example planning, urban planning and master plan.

❖ **Planning**

Different authors define the term "planning" differently. However, the definitions of this term seem to express the same concepts. For instance, Shapiro (2001), defines "planning" as a systematic process of establishing a need and then working out the best way to meet the need, within a strategic framework that enables you to identify priorities and determines your operational principles. In addition, Berke (as cited in Dukale, 2012) tries to conceptualize the term "planning" as a general activity in the making of an orderly sequence of action that will lead to the achievement of stated goals. Moreover, Planning was viewed as a technical activity, developing comprehensive plans showing the projected density and intensity of various land uses and their spatial distribution (Watson, 2008 as cited in Tiwary, 2015). Typically, planning

may be an activity for rural as well as urban areas. The next subsection gives a description of what urban planning is, together with its problems and its benefits on the quality of life.

❖ **Urban planning**

Urban planning is the technical and political process concerned with the control of the use of land and design of urban environment, including transportation networks, to guide and ensure the orderly development of settlements and communities (Serag et al., 2015). Additionally, Pinson (2010) defines "urban planning" as a notion that encompasses the whole set of social activities aimed at anticipating, representing and regulating the development of an urban or a regional area. Thus, urban planning articulates intellectual activities of study and prospective, social and economic forecasting with more concrete activities such as infrastructure programming, land reservation and land use regulation (Pinson, 2010). However, agencies (such as UN-Habitat) argued that in many part of the world, urban planning systems are parts of the problems since they serve to promote social and spatial exclusion by pushing the poor away (Watson, 2009). Normally, in many poorer cities, urban planning is being driven by private sector property developments and increased rental markets; due to this, low-income households are being pushed further out and into marginal locations (Watson, 2009). However, besides these problems, planning plays several roles in the development process such as promoting job opportunities through economic development and enhancing urban amenities of the communities through urban design regulations among others (Myers, 2016). Below is a brief discussion about "master plan", one of the instruments of urban planning.

❖ **Master plan**

Different authors have defined the term "master plan" and their definitions are related to each other. For instance, Buch (1987) defines the term "master plan" as one of the important planning documents to facilitate and encourage the optimal growth of dominant functions of urban centres, strengthening the intra-urban linkages and providing an elbow room for spatial growth. This definition is related to that of Hameed & Nadeem (2008), who define the term master plan as a tool to guide and manage the future growth of cities in a planned manner. Thus, the master plan is based on study of existing situation of each and every component of a City comprising land use, socio-economic and other facilities based on analysis of existing situation, forecasting of future trends, and finally making proposals for the growth and management of the city (Hameed & Nadeem, 2008). In addition, Tiwari (2010), defines the term "master plan" as a long-term plan which provides guidelines for urban growth and guides people in locating their investment in the City in an orderly manner. Moreover, Mishra (2012), defines the master plan

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approach as a form of spatial planning based on comprehensive land use maps, zoning and planning standards. A master plan is prepared by the planning board of the State. The following section describes steps that are involved in its preparation.

2.3. Steps in preparing a comprehensive plan/master plan

According to Chandler (2000), there is a sequence of ten steps that can be followed in developing a comprehensive plan/a master plan. These are discussed hereafter as follow:

Plan to Plan; the key factors associated with this step include the allocation of time, human resources, money, and energy to the effort. when planners mistakenly think that they will deal with these issues as problems arise, this logic is faulty and potentially fatal to the planning process.

Structure and schedule the process; this step involves featuring discrete planning activities, the party(s) responsible for each activity, and the due date as well as the key stakeholders.

Gather and analyse the data. The master plan must address both issues and concerns of the present and what will likely face the community in the future. Therefore, there is a need to gather and analyse a wide array of data that will help in accomplishing this task appropriately.

Identify problems, issues, and concerns as well as opportunities. In fact, it is crucial to identify the significant problems, issues, and concerns facing the community as well as the opportunities. It is during this step that planning commissions engage the public through community meetings, surveys, focus groups, or advisory committees. This helps in ensuring the plan's decisive adoption and implementation.

Develop a vision for the plan. Once community problems and opportunities have been identified, planning commissions prepare a vision statement which shows what the community intends or wishes to become at some point in the future. This gives direction to the development of plan goals and objectives.

Develop plan goals and objectives. Once the plan's vision statement is completed, the next step is to establish specific plan goals and objectives.

Generate and evaluate plan options.
This step involves the development of a draft plan which contain a series of chapters or elements by focusing on selected topics. Elements to be included on a draft plan are for example, the community's natural environment, transportation system, public facilities, residential, commercial, and industrial uses.

Select and develop a preferred Plan. Once the various plan options have been reviewed and studied, the planning commission will need to select a preferred option or approach. The final

draft plan can then be prepared and formally received and considered for adoption by the planning commission.

Adopt the plan and set an implementation schedule. Once the plan is adopted by the commission, the plan is forwarded to the governing body for consideration and final adoption. This should be accompanied by setting plan implementation strategy and schedule. The plan development process is considered incomplete if plan implementation strategy and schedule are not included in the document. This is critical since a plan will make a difference only if it is implemented.

monitor for results and impact. Generally, plans must be written in a manner that allows people to measure the impact of these plans on the life of a community. In addition, plans need to be regularly reviewed and updated. In Virginia for example, comprehensive plan for a locality, must be reviewed at least every five years (Chandler, 2000). Similarly, in Rwanda, master plan of Kigali City is reviewed every five years. The following section gives an overview of the historical evolvement of land use planning in Kigali City.

2.4.   Land use planning in Kigali City

In 2008, the Rwanda's Ministry of Infrastructure has developed and approved the KCMP (The City of Kigali, 2010b). The KCMP specifies the need to develop Detailed Master Plans for each of the three Districts as well as the key areas of Kigali City. In addition, in 2010 the Kigali City has developed an urban design for the Central Business District (CBD) areas (The City of Kigali, 2010a) and a Detailed Master Plan for Nyarugenge District (The City of Kigali, 2010b). Later, in 2013, the Detailed Master Plans for the other two constituent Districts of Kigali City namely Kicukiro and Gasabo were approved (The City of Kigali, 2013c). After the approval of the Detailed Master Plans for the three Districts, the whole master plan for the entire Kigali City was also approved in 2013. In order to implement the Detailed Master Plan for Nyarugenge District, various zoning categories have been proposed into the following zoning Districts (The City of Kigali, 2013a):

❖ **Seven Residential Districts**
The residential district is made of Single-Family Residential District (R1), Mixed Single-Family Residential District (R1A), Rural Residential District (R1B), Low Rise Residential District (R2), Low Rise Residential District (R2A), Medium Rise Residential District (R3) and High-Rise Residential District (R4).

❖ **Nine Commercial Districts**

The commercial district is made of the Mixed-Use Commercial District (C1), Neighbourhood Level Commercial District (C2), City Level Commercial District (C3), City Level Commercial District (C3A), City Level Commercial District (C3B), City Level Commercial District (C3C), Regional Level Commercial District (C4), Regional Level Commercial District (C4A) and Retail Warehouse District (C5).

❖ **Two Industrial District**s

The industrial district is made of Light Industrial District (I1) and General Industrial District (I2).

❖ **Four Parks and Open Space Districts**

The parks and open space District is made of Passive Recreational District (P1), Active Recreational District (P2), Agricultural District (P3) and Protected Area (P4). The description for each zoning category is presented in appendix B. The following section describes the tools for the implementation of the detailed master plan for Nyarugenge District.

2.5. Tools and strategies for Kigali City master plan implementation in Nyarugenge District.

A master plan preparation alone does not ensure the implementation of what proposed (Hameed & Nadeem, 2008). For a successful implementation of a plan, it requires comprehensive implementation tools. According to Bahtti (1993), the general tools for implementing the master plan include legal protection of the plan, Capital Improvement Program (CIP), zoning regulations, land sub-division regulations, building regulations, and urban renewal program. For the implementation of the Detailed Master Plan of Nyarugenge District, the key tools and strategies proposed are the following: the implementation of the Zoning Plan, the Capital Improvement Plan, and the development of Special Projects (The City of Kigali, 2010b).

❖ **Zoning Plan**

The Zoning Plan is composed of a zoning map and a set of zoning regulations. The zoning map identifies specific zoning districts within the planning area, it also identifies the desired intensity and building height for that area (The City of Kigali, 2013a). The implementation of Zoning Plan is expected to regulate the development in different parts of the District and the development or redevelopment of prioritized areas. Below is a map that shows the zoning categories proposed for Nyarugenge District.
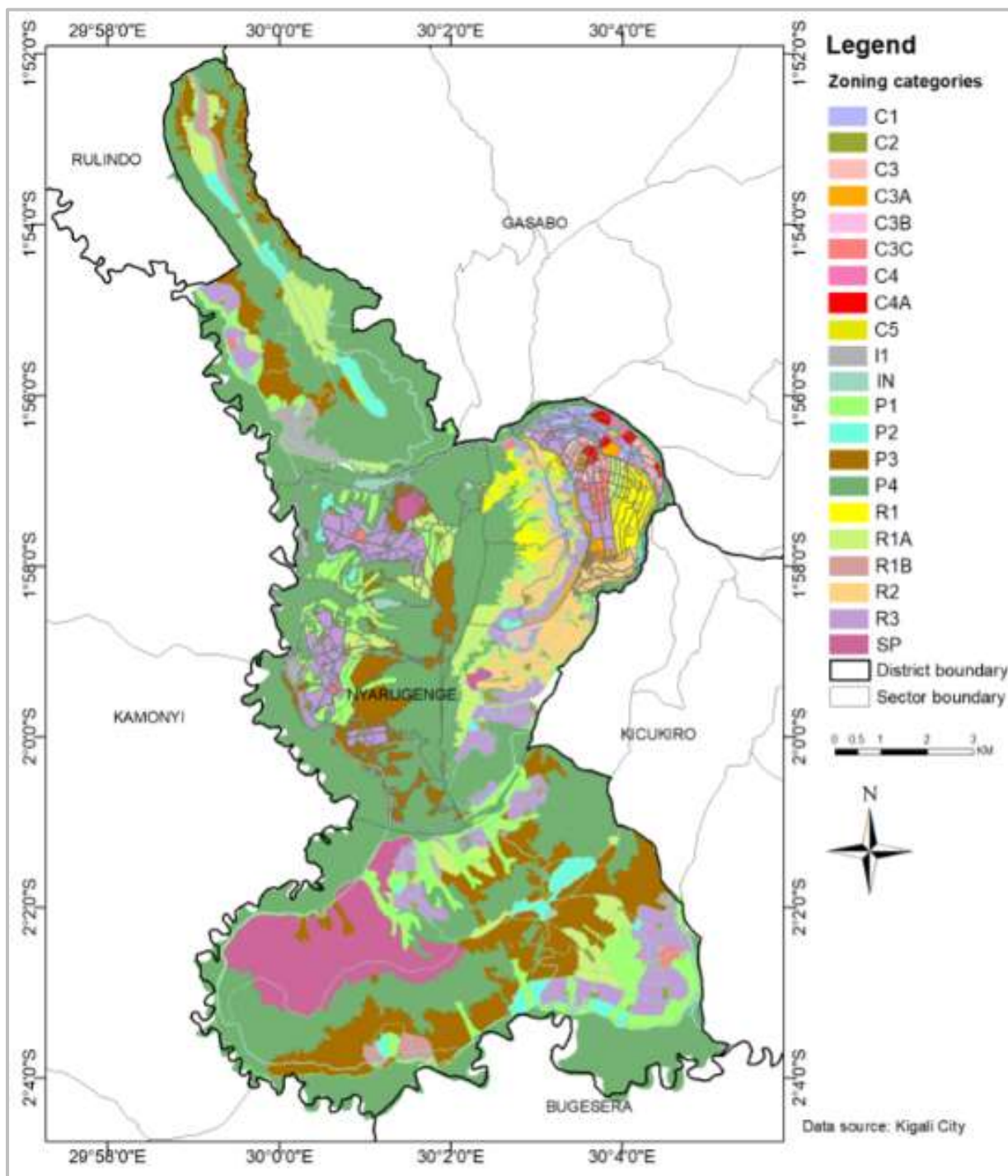
Map 1: Zoning categories proposed for Nyarugenge District

Data source: The City of Kigali

The above map shows the zoning categories proposed for Nyarugenge District. The Zoning Map indicates the specific boundaries of the various zoning districts proposed for Nyarugenge District

❖ **Capital improvement plan**

The capital improvement plan is proposed for the development of Nyarugenge District, by focusing on the development of infrastructures and providing essential public facilities required to support the proposed land use plans.

❖ **Special projects**

Some special projects have been identified within Nyarugenge District. Those are for instance, the development of the market and commercial centre in Gitega Sector, the development of proposed golf course in Mageragere sector and the development of proposed equestrian club and resort in Mageragere Sector. In addition to the master plan implementation tools, it is necessary to set out the follow- up measures among which evaluation of the implementation is a crucial element to successfully implement the master plan. This helps in finding out whether there are deviations and thus means to handle them. The following section presents the developments priorities whose implementation is expected to complete by 2020 in Nyarugenge, Muhima and Kigali sector.

2.6. Developments priorities proposed in the Land Use Plan for the study area

To ensure the successful implementation of the master plan, the Kigali city has proposed implementation mechanism made of special projects which are supposed to be undertaken in phases. For Nyarugenge, Muhima and Kigali sectors, there are key priorities that have been proposed to be implemented in phase the 1st (2010-2015) and the 2nd (2016-2020). These developments are discussed hereafter.

2.6.1. Key development proposed in Nyarugenge Sector

Since Nyarugenge sector is part of CBD, it is prioritised to be redeveloped into an attractive area for investment for creating employment opportunities. The developments priorities proposed for Nyarugenge sectors are among others the following(The City of Kigali, 2010a):

- **Centre Ville Roundabout Redevelopment**

The existing City centre located in the Centre Ville Roundabout is proposed to be revitalized. This involves the redevelopment of the prime area of Nyarugenge CBD, around the centre ville roundabout. This is proposed to be done through consolidation, amalgamation and

regularization of the existing small commercial parcels into a single integrated strata development parcel; improvement of road and infrastructures, as well as development of circular pedestrian bridge around the roundabout.

- **Nyarugenge commercial and Heritage Village redevelopment**

The Nyarugenge Heritage Village which is a short distance away from the Centre Ville Roundabout Redevelopment, is located in the western part of the Nyarugenge Sector and it is surrounded by various existing and new landmarks. This is proposed to be an intimate low-rise low-density commercial and cultural district that is pedestrian-friendly. The redevelopment of this area is supposed to be undertaken through various activities such as the acquisition of land areas required for public use, development of public spaces including the pedestrianization of one of the existing roads, redevelopment and regularization of the existing small commercial parcels and improvement road and infrastructures

- **The Upper Kiyovu Residential Development**

This involves the redevelopment of the area around the current statehouse into a modern residential complex. The scope of works includes **the** conversion of the statehouse into museum, community club and public park, as well as land sale of the residential and hotel parcel.

2.6.2. Key developments proposed for Muhima sector

Being another part of the CBD, Muhima sector is proposed to be redeveloped into attractive commercial and office spaces. To achieve this objective, key priorities include the following among others (The City of Kigali, 2010a)

- **Kigali CBD Phase 1**

The eastern corner of Muhima, is proposed to be developed as the new CBD and is envisioned to house a mix of high-end retail and office spaces. This is supposed to be done through the development of infrastructure, public open spaces and land sale of commercial parcels.

-   **Nyabugogo Transport Hub and Market**

The existing taxi park at Nyabugogo is proposed to be developed into an integrated transportation interchange, with complementary commercial and office facilities, serving as an important transportation node at the junctions of Muhima, Kanyinya and Gitega Sectors. It is proposed that the Taxi Park be upgraded into an integrated Transport Hub, to allow for a more organized flow of public transport, and thus creating a safer environment for both vehicles and pedestrians.

-   **Kigali CBD Wetland Park**

The wetlands located north of Muhima are proposed to be developed as a Wetland Park offering a range of recreational, educational and critical environmental benefits. The scope of work for this project includes land clearing., development of the Wetland Park and development of pedestrian bridge connecting the park and the CBD phase1

2.6.3. Key developments proposed in the Land Use Plan for Kigali Sector

Whereas Nyarugenge and Muhima sector are located in the CBD, Kigali sector is not part of the CBD, instead it was largely unoccupied, except for the few housing settlements and small public facilities on the upper flat areas of the sector and the industrial developments along the wetlands in the west. Due to different opportunities identified in Kigali sector, it is envisioned to house attractive residential townships complete with comprehensive public facilities. It would also become a tourist attraction offering sports activities. For that reason, the key developments proposed in the Land Use Plan for Kigali sector are the following (The City of Kigali, 2010b): to allow for the development of a high-density medium rise residential township on top of the hill, to allow for the development of single-family residential neighbourhoods as part of the township development, to develop recreational venues along the wetlands, to develop public facilities and commercial facilities that support the residential growth and to provide sufficient land for industries. The paragraphs hereafter present analytical framework for evaluating the implementation of urban plans.

2.7.   Analytical framework.

According to Alexander & Faludi (1989), there are two plan implementation evaluation approaches: performance and conformance. The performance approach is often applied when plans are considered rather as visions, and it focuses on the role of plans in decision-making (Faludi, 2000). The conformance approach however, generally considers plans as blueprints, with their provisions eventually reflected in actual spatial development (Laurian et al., 2004). Therefore, the conformance approach assumes that plans are successfully implemented if their policies are executed and if outcomes on the ground correspond to plan provisions (Alexander & Faludi, 1989). This research is based on conformance approach. The study evaluated if the outcomes on the ground in Nyarugenge, Muhima and Kigali sectors correspond to plan provisions. Below are presented different studies that evaluated the conformance of urban master plan in different countries.

2.8.   Conformance evaluation of urban master plan

Different studies evaluated the implementation of urban master plans based on the conformance approach using GIS as a tool for evaluation. Normally, GIS is a very useful tool for assessing the conformance, especially in land use planning and implementation (Loh, 2011). Mabaso et al. (2015), used GIS to evaluate the degree of conformance of physical developments in the City of Mutare in Zimbabwe. They used the overlay analysis to assess whether land use proposals conform to the existing developments in the City. The results of their study showed that there was a high overall conformance, although some proposed land uses did not conform to the master plan. In addition, Tian & Shen, (2011) evaluated the implementation of the Guangzhou Urban Master Plan in China, using the overlay analysis to identify the level of conformance. Their evaluation identified three categories of implementation indicators. Those are type of accordance, type of unfulfillment and type of deviation. They compared the planned land uses to the actual land developments for each piece of land. Then, they calculated the percentage of land in which the actual uses followed the plan. Their findings showed that while the actual land uses were very different from what was in the plan and from what was pre-existing, several main roads area were built as planned.

Moreover, Johar, et al., (2013) evaluated the implementation of the physical development strategy in Iskandar Malaysia. Their study compared the original physical development strategies with subsequent development activity using the overlay analysis. They also applied three indices: accordance, unfulfillment and deviation to measure the level of conformance between the plan and actual land use of five major land uses: residential, commercial, public

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facilities, industrial and open space. Their findings showed that the accordance level was relatively high for industry and open space while relatively low for residential and public facilities. Referring to these previously discussed studies, this study evaluated the implementation of Kigali City master plan in Nyarugenge District, based on conformance approach using the overlay analysis by GIS software. Additionally, this study evaluated the impact of such implementation on the living condition of urban dwellers. This impact was conceptualized as a change which can be attributed to urban quality of life through the availability and accessibility of urban quality of life indicators. The following section presents the description of how urban quality of life indicators were selected based on the case study.

2.9.   The selection of urban quality of life indicators

The term "quality of life" represents the concept with broader meaning and consists of many different aspects of human being which indicates its multidimensional character (Nováková & Šoltés, 2016). There is no universally accepted definition of this term; however, it overlaps with several terms, including "well-being," "social indicators," and "way of life" among others (Andrews as cited in Gilhooly & Gilhooly, 2005). The concept of quality of life is usually both objective and subjective (Eckersley, 1999 as cited in Georgiou, 2009). Objective indicators of quality of life involve tangible objects such as finances, employment, place of residence, education and one's social or physical environment (Bowling, 2005 as cited in Georgiou, 2009).

However subjective quality of life is further influenced by events in one's life and how one reacts to life's events. so its measurement should include how people think about their lives (Glicksman, 2000 as cited in Georgiou, 2009), and it is measured by personal opinions. Feneri, Vagiona, & Karanikolas (2013) evaluated urban quality of life, focusing on subjective dimension. This was done through satisfaction measurements by asking a categorical question and rating the responses on a point scale. The purpose was to identify satisfaction with the respondent's wellbeing, social, environmental aspects, as well as infrastructure facilities. In addition, Czapiński (2013) assessed objective and subjective quality of life in Poland with emphasis on Poles' living conditions.

The quality of life can be measured in both rural and urban areas. In fact, urban quality of life is the human satisfaction with different urban attributes such as transportation, quality of public spaces, recreational opportunities, land use patterns, population and building densities, ease of access of all to basic goods, services and public amenities (Serag et al., 2015). Garau & Pavan, (2018) evaluated urban quality of life in Italian Cities, using both subjective and objective quality of life indicators. Normally, various indicators of urban quality of life exist. However,

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depending on the case study, purpose and the available data, researchers select indicators differently. In this study, I used the indicators which are related to the living condition of urban dwellers and to the main objectives of the detailed master plan for Nyarugenge District. Below are the selected indicators of urban quality of life. They are presented in a table to relate those indicators to the objectives of the detailed master plan for Nyarugenge District.

Table 1: Selected urban quality of life indicators

Dimension/master plan objectives	Indicators	Means of measuring indicator	Source of indicator
1. Provision of efficient transportation infrastructure and public facilities	Safe traffic availability and accessibility	Satisfaction with availability of pedestrian infrastructures, streets and traffic lights in the neighbourhood.	(Garau & Pavan, 2018)
		Satisfaction with appropriate accessibility of bus stops (in terms of time taken).	
	Access to waste management facilities	Satisfaction with the system of garbage collection	(Khaef & Zebardast, 2016; (Shoeibi et al., 2015); Stein, 2001)
		Satisfaction with the condition of the City's sewage system.	(Shoeibi et al., 2015)
	Access to educational services	Satisfaction with accessibility of kindergarten and primary school (in terms of time taken).	(Khaef & Zebardast, 2016; (Shoeibi et al., 2015); Stein, 2001)
	Health facilities accessibility.	Satisfaction with accessibility of health facilities (in terms of time taken to health centre)	
	Accessibility of power of electricity	Satisfaction with the availability of power of electricity	(UNHabitat, 2004)
	Access to clean water	Satisfaction with accessibility of daily useful clean water (in terms of time taken to the water tap)	

Dimension/master plan objectives	Indicators	Means of measuring indicator	Source of indicator
2. Adequate allocation of land	Access to governmental administrative office	Satisfaction with accessibility of local government administration office (in terms of time taken)	(Ali et al., 2014)
	Access to commercial centres	Satisfaction with accessibility of commercial facilities (in terms of time taken)	
3. Provision of modern and comprehensive housing solution for all groups of people	Affordable housing accessibility	Satisfaction with rental cost/house price compared to household income	(Garau & Pavan, 2018; Shoeibi et al., 2015)
4. Creation of alluring recreational features	Access to recreational area	Satisfaction with the availability and accessibility of recreational facilities (whether accessed free of charge of or payment fees.)	
5. Creation of local employment opportunities	Availability of employment opportunities	Satisfaction with one's occupational status	(Garau & Pavan, 2018; Shoeibi et al., 2015)

As previously mentioned, the selected indicators of urban quality of life are those related to the main objectives of the master plan of Nyarugenge District to evaluate the level to which master plan is impacting on the living condition of the urban dwellers. The following section presents the conceptual framework for this evaluation.

2.10. Conceptual Framework

To ensure a sustainable development in urban areas, not only the plan implementation is necessary to be evaluated, but also the impact of the implementation to the living condition of urban dwellers. To evaluate the impacts of master plan of Kigali City on the living condition of the dwellers in the study area, the author of this study proposed a framework to guide the evaluation. The framework has the following five dimensions according to the objectives of

master plan of Nyarugenge District: adequate allocation of land use; creation of attractive recreational features; provision of efficient transportation, infrastructure and public facilities; creation of employment opportunities and provision of comprehensive housing solution for all groups of people. The selection of these five dimensions was based on the main objectives of the detailed master plan for Nyarugenge District that have a direct impact on urban quality of life. The following figure is an illustration of this framework.
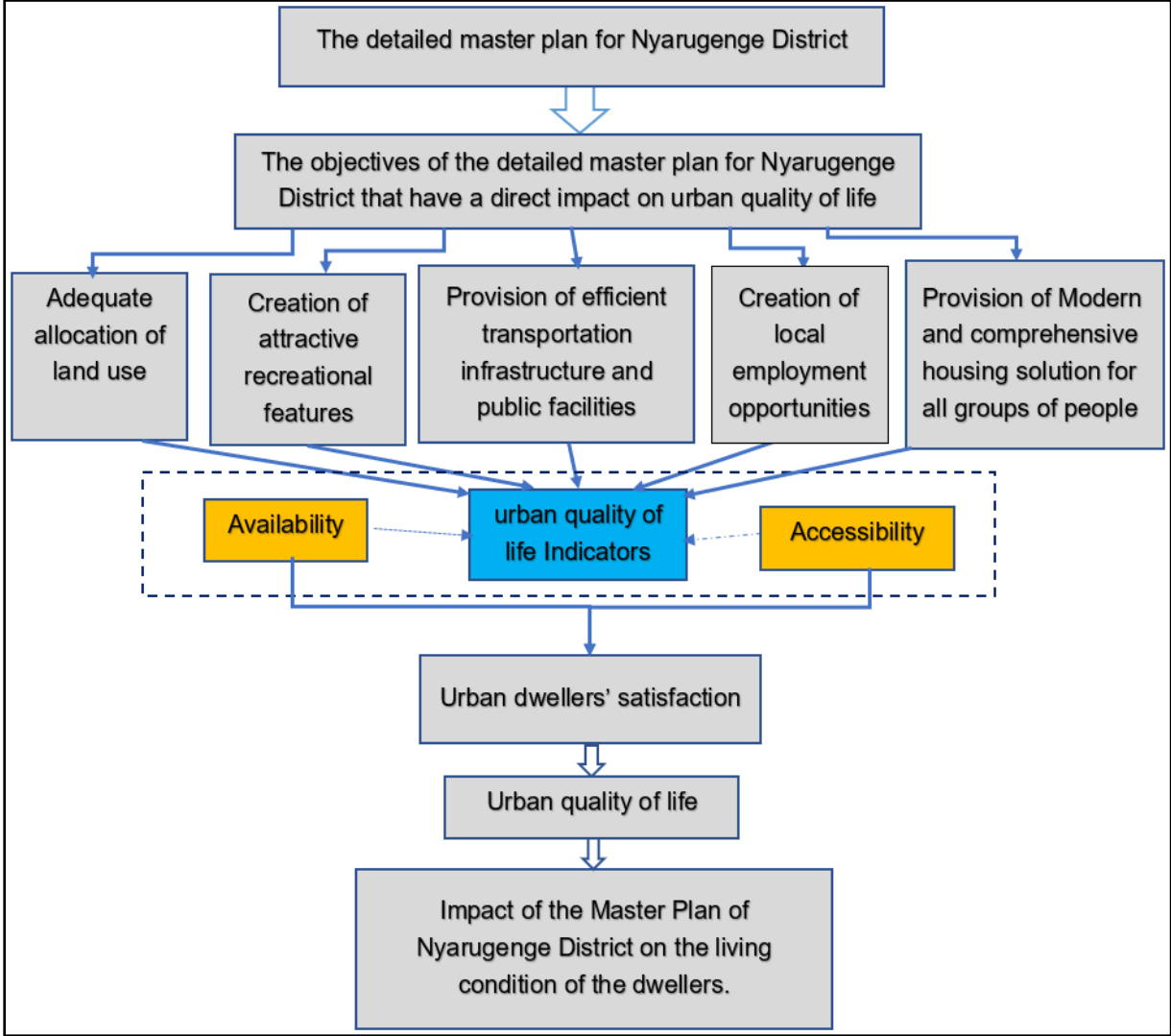
Figure 1: Conceptual Framework

Source: Author (2018)

The figure above is a conceptual framework which has been proposed in order to evaluate the level to which master plan is impacting on the living condition of the dwellers. For this evaluation, indicators of urban quality of life which are at the same time related to the living condition of the urban dwellers and to the objectives of the Detailed Master Plan for

Nyarugenge District were analysed. The selected indicators are shown in table 1 above. The level to which those indicators are available in the neighbourhoods and accessible by dwellers, were assessed. In addition, the peoples' level of satisfaction with such availability and accessibility of those indicators in neighbourhoods was also assessed. The availability and accessibility of the selected indicators as well as people's satisfaction help in the identification of urban quality of life and the living condition of urban dwellers in the study area. In fact, the quality of life correlates with the general living condition (UBC Environment and Sustainable Development, 2011).

2.11. Conclusion

This chapter has discussed two approaches of plan implementation evaluation. Depending on the category of the plan, some researchers use performance approach while others use conformance approach. Performance approach is often used when plans are considered as visions and it focuses on the role of plans in decision-making. However, conformance approach considers plans as blueprints and assumes that plans are successfully implemented if their outcomes on the ground correspond to plan provisions. This study used the conformance approach since the Kigali City master plan is considered as blueprint rather than a vision. In addition, this chapter has discussed the evaluation of the impact of master plan implementation on the living condition of urban dwellers based on urban quality of life. It has been identified that urban quality of life is assessed using various indicators. However, the selection of indicators depends on the purpose and on the scope of the research. Therefore, different researchers have assessed urban quality of life using different approaches and different indicators. Some researchers assessed urban quality of life using satisfaction approach to assess subjective quality of life, while others used objective indicators of tangible objects to assess objective quality of life. In this study, I used the indicators which are related to the living condition of urban dwellers and to the main objectives of Nyarugenge District master plan. In addition, I used satisfaction approach to assess dwellers living condition. The next chapter explains methods, tools and procedures used for attaining the research objective of this study.

Chapter three: Research methodology

3.1.   Introduction

As it is previously mentioned, this study explored the degree to which the master plan of Kigali City is implemented and how such implementation impacts on the living condition of urban dwellers in Nyarugenge District. Therefore, based on the proposed research objectives and research questions, different research methods were applied to meet these objectives and to answer to these questions. This chapter presents a description of the methods used from the rational understanding of the study area to the data collection and data analysis. The first part of this chapter describes the study area in terms of its location, its size and its administrative constituents as well as the justification of why this area has been chosen as the area of study. The second part discusses the research approach adopted in this study. The third part presents a description of the sampling technic that was used for samples selection. The fourth part presents a detailed description of the research methods that were used during data collection and how the data quality was checked. The fifth part describes how data were processed and analysed. In addition, the methods and tools used for data processing and data analysis are presented in this chapter. The sixth part presents the limitation encountered during this research. Then, a conclusion of what has been discussed in the whole chapter is presented.

3.2.   The study area and justification

Nyarugenge District, with an area of 134.2 km^2 is the smallest of the three Districts of Kigali City and lies to the west of the City. It is located 10 km from the Kigali international Airport. A large part of its land (69%) lies in areas of natural constraints, either within steep unbuildable slopes or covered by forests and wetlands (The City of Kigali, 2010b). Nyarugenge District is divided into 10 sectors (*imirenge*): Gitega, Kanyinya, Kigali, Kimisagara, Mageragere, Muhima, Nyakabanda, Nyamirambo, Nyarugenge and Rwezamenyo. This District was chosen as a case study since its master plan was adopted before the adoption of the master plans for other Districts of Kigali City. Therefore, it was possible to detect significant difference between the current situation and the situation before the adoption of the master plan. Thus, enabling the determination of the impact of master plan implementation on the living condition of urban dwellers. However, by considering the time frame for the research, Nyarugenge District is too big for a research period of only six months. Therefore, this study was carried out only in three sectors namely: Nyarugenge, Muhima and Kigali. These three sectors were selected among ten sectors of Nyarugenge District based on where the implementation of the master plan has started

earlier than other sectors. The map below shows the location of Nyarugenge District in Rwanda and the location of the three selected sectors in Nyarugenge District.
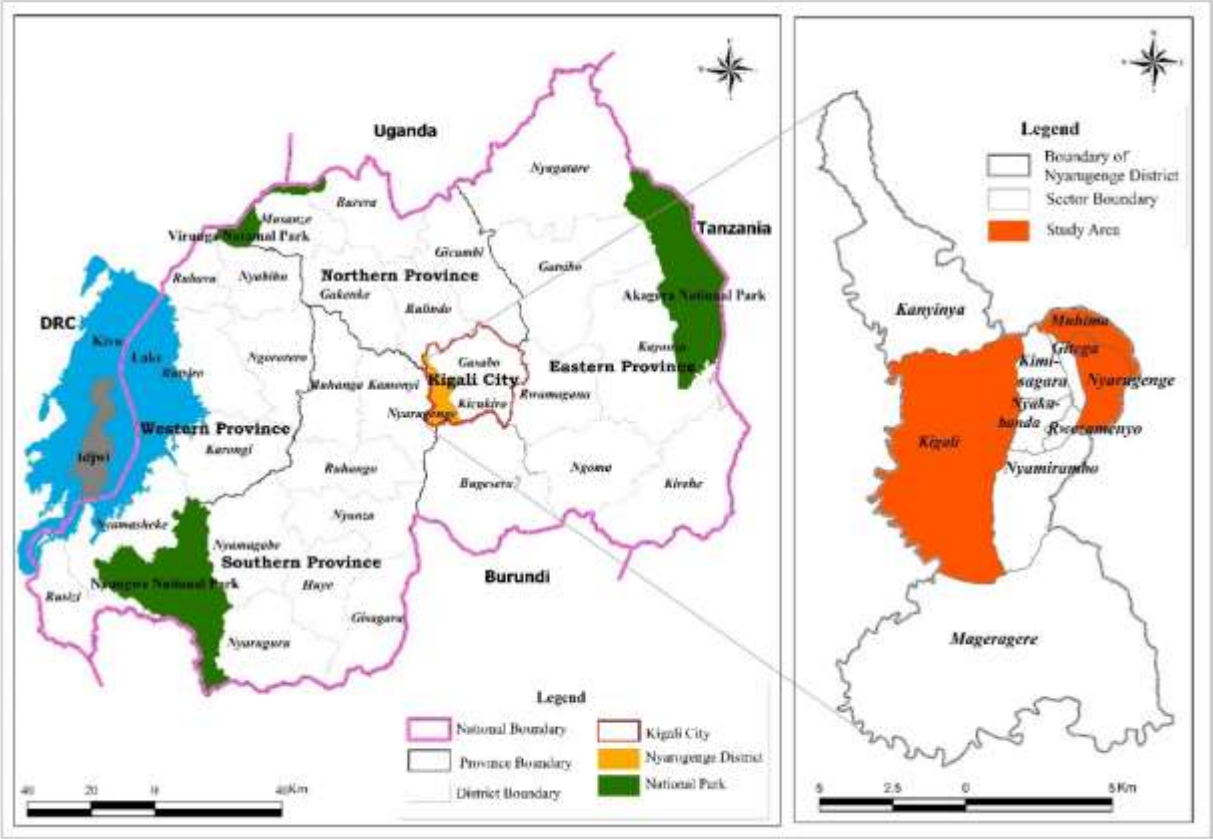
Map 2: Location of the study area

Data source: NISR and CGIS_UR. 2012

3.3.   Research Approach

Research approach is a plan and procedure that consist of the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation (Chetty, 2016). According to Creswell (2014), there are three main research approaches: quantitative approach, qualitative approach and mixed methods research. The quantitative approach is used when the researcher needs to respond to research questions requiring numerical data. However, the qualitative approach is used when the research questions need textural data. The mixed methods approach is used for research questions that want both numerical and textural data (Williams, 2007). The core assumption of this approach is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone (Creswell, 2014). For this study I used the mixed method approach through the

combination of both quantitative and qualitative approaches since the data that was needed was both numerical and textual data.

3.4. Sampling method

To get the required information mentioned above, it was necessary to select the number of households and authorities to be surveyed. This number is termed as sample size. In fact, a sample is defined as "a collection of units which has been selected to represent a set of items, such as people, out of the whole population" (Gwaleba, 2016). The process of determining the sample is called sampling and it requires taking any portion of a population as representative of the whole population.

For this study, the sample size was selected by using multilevel Mixed Methods sampling technique. This method involves combining well-established qualitative and quantitative techniques in creative ways to answer the research questions (Teddlie & Yu, 2007).
In reality, when a combination of qualitative and quantitative methods is used to investigate phenomena, the research yields greater information than it could be achieved through single method (Azorín & Cameron, 2010). In addition, Multilevel Mixed Method is used in hierarchical organized social institutions, in which one level is nested with another(Teddlie & Tashakkori, 2009). For this reason, I have used this method because the required data was from hierarchical institutions (from Kigali City level to local level) and because the data was both qualitative and quantitative in nature. Therefore, the use of mixed methods was the most appropriate methodology for this study.

For sample cells selection, it was necessary to select cells whose implementation of the master plan started earlier than in other cells in order to find changes between the current situation and the situation before the adoption of the master plan. For this reason, a meeting with land managers at sector level was organized to select two cells where the implementation of master plan started earlier than in other cells. This kind of selection is called a purposive sampling since those cells were selected purposely based on where the implementation of the master plan started earlier than in other cells. The sample size was calculated using the following formula.

$$n = \frac{N(Z\alpha/2)^2}{4(N-1)l^2 + (Z\alpha/2)^2}$$

Source: Gwaleba, (2016)

Whereby

- **n** stands for the sample size;
- **N** stands for sampling frame (6393 for this study);
- **Zα/2** is the value obtained from normal distribution table for the confidence interval of 95%. It is 1.96 for this study and it was selected according to the precision desired.
- **α** stands for the level of significance (risk level) and it is 5% for this study;
- **l** stands for tolerable error and it is 5% in this study.

The total households in the selected cells was 6393, counting 1526 for Rwampara cell, 1306 for Agatare cell, 36 for Ubumwe Cell, 822 for Nyabugogo cell, 1941 for Kigali cell and 762 for Rwesero cell. Those correspond to 23.87% for Rwampara cell, 20.43% for Agatare cell, 0.56% for Ubumwe Cell, 12.86% for Nyabugogo cell, 30.36% for Kigali cell and 11.92% for Rwesero cell. By applying the formula shown above, the sample size was calculated as follow:

$$\mathbf{n} = \frac{6393(\mathbf{Z}0.05/2)^2}{4(6393-1)0.05^2 + (\mathbf{Z}0.05/2)^2}$$

$$\mathbf{n} = \frac{6393(\mathbf{Z}0.025)^2}{4(6393-1)(0.05)^2 + (\mathbf{Z}0.025)^2}$$

$$\mathbf{n} = \frac{6393(1.96)^2}{4(6392)(0.05)^2 + (1.96)^2}$$

$$\mathbf{n} = 362$$

This sample size (362 households) corresponds to a total of 82 households in Rwampara cell, 75 households in Agatare cell, 2 households in Ubumwe cell, 47 households in Nyabugogo cell, 112 households in Kigali cell and 44 households in Rwesero cell. These samples were picked up proportionally to the number of households in sampled cells. Then, the systematic random sampling method was additionally applied to precisely determine the households to be surveyed. I have chosen to use this method since according to Ahmed (2009), systematic random sampling method is easy to implement, and it may be started without a complete listing frame.

Regarding the interviews, purposive sampling was used to determine the interviewees based on the authorities in charge of urban planning and master plan implementation at Kigali City level and those who oversee master plan implementation at local level. Purposive sampling was chosen since the information about the master plan implementation can only be obtained from the authorities in charge of these issues. These authorities are the urban planner who works at Kigali City level and the sector land managers of the three selected sectors. The figure below is an illustration of the Multilevel Mixed Methods Sampling that was used in the selection of samples for household survey.
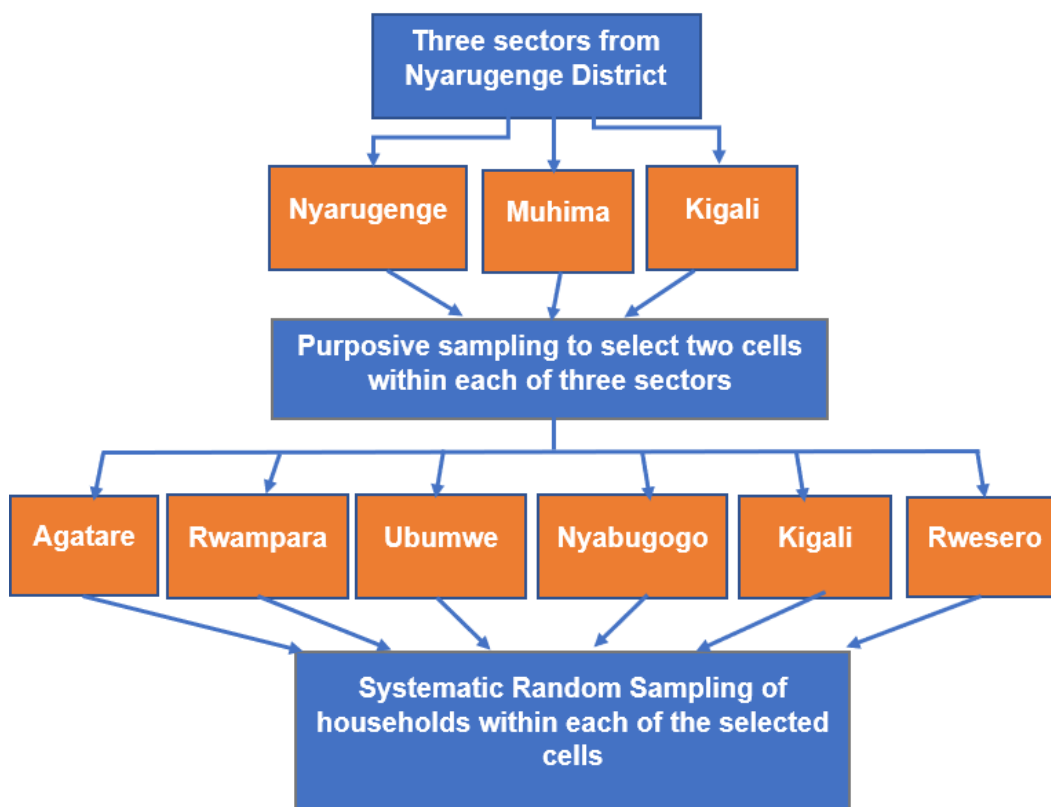
Figure 2: Multilevel Mixed Methods Sampling

Source: Author (2018)

3.5. Data collection methods

Data that were used in this study are categorised into two main categories. Those include primary data and secondary data. The primary data is the data collected for the first time, and thus happen to be original in character. On the other hand, secondary data is the data already collected by others (Kothari, 2004). In this study, these two categories of data were collected from various sources. Figure 3 below summarizes the methods for data collection that were used in this research and they are further discussed in the subsequent paragraphs.
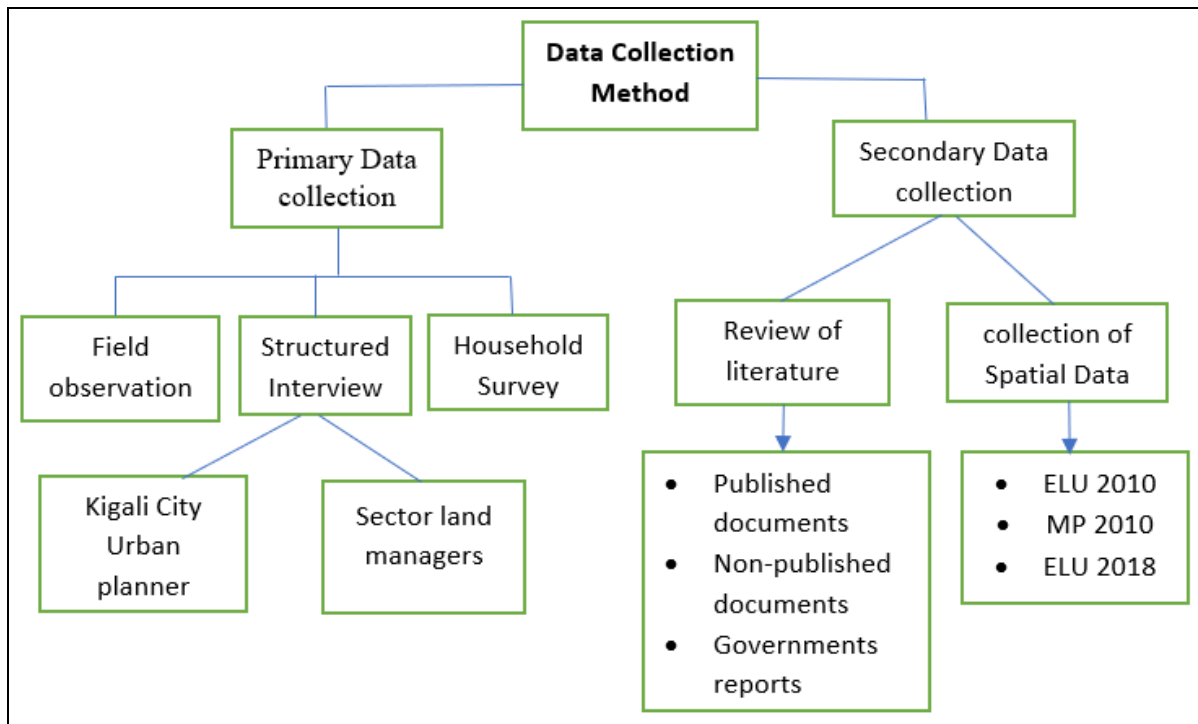
Figure 3: Data collection methods

Source: Author (2018)

3.5.1. Primary data collection

❖ **Field observation**

During this research, firstly the data was collected through field observation in order to be familiar with the study area and to observe the physical status of the master plan implementation on the ground. Photos have been taken to show that modern buildings are being constructed in line with the master plan, while non-modern houses which were constructed contradictory with the master plan, are being demolished. Below are photos showing that old houses that were not in conformance with the master plan re being destroyed while new modern buildings are under construction due to the implementation of the master plan.

Photo 1: Area of land where houses were demolished
Source: Field survey

The photo above shows an area of land where old houses were destroyed in Nyarugenge sector since they were not in conformance with the master plan.

Photo 2: Modern building under construction
Source: Field survey

The photo above shows a modern medium rise building that is under construction in Nyarugenge sector (*Cartier commercial*) because of master plan implementation. It replaced old and small houses that were not in conformance with the master plan. It is expected to be a mixed-use building.

❖ **Interview with urban planner and local leaders**

In order to get the detailed information about master plan implementation, the related challenges, and the developments priorities proposed in the study area. I interviewed urban planner at Kigali City and the local leaders. Below is a table that shows the information about the key informants interviewed.

Table 2: Information on key informants interviewed

Institution	Position of the interviewee	Method/tools	Number
Kigali City	Urban planner	Structed questionnaire and recording	1
Nyarugenge sector	Sector land manager	Structed questionnaire	1
Muhima sector	Sector land manager	Structed questionnaire	1
Kigali sector	Sector land manager	Structed questionnaire	1

Source: Author (2018)

As show in the table above, four people were interviewed, one person is the urban planner at Kigali City and others are sector land managers who oversee the implementation of the master plan in Nyarugenge, Muhima and Kigali sectors. They were asked various questions about the implementation of the master plan, the challenges they encounter during the implementation of the master plan as well as the development priorities proposed in the study area. The detailed questionnaires of all asked questions during interview are shown in the appendix of this thesis.

❖ **Household survey and quality control.**

In order to acquire data about the impact of master plan implementation on the living condition of urban dwellers, data was collected through household survey using questionnaires. Dwellers were asked various questions relating to the master plan preparation, implementation and its impact on their living condition. The detailed questionnaire of all asked question in household

survey is shown in the appendix of this thesis. To ascertain the relevance of formulated questionnaire the quality control was performed. This is explained in the next paragraph.

For quality control of the data collected, a pilot survey of 10 questionnaires was firstly carried out in Rwampara cell of Nyarugenge sector. This helped in testing whether the questionnaire was well organized and understood. The result from the pilot survey showed that some questions needed to be reformulated for making them more understandable. In addition, further training of enumerators was done to avoid misinterpretation of the questions. Moreover, during data collection, a back-checking method was used to check the reliability of the data collected from household survey. According to Joppe (cited in Golafshani, 2003), reliability is the extent to which results are consistent over time when similar methodology is used. In this study, kappa coefficient was used to test the reliability using both the data collected by back checker and the data collected by the original enumerators.

3.5.2. Secondary data collection

The secondary data that was needed for this study, is made of documents and geospatial datasets. The documents reviewed include the published and non-published documents as well as governmental reports. Those reports include among others the detailed master plan for Nyarugenge District, the detailed District physical plan for Kicukiro and Gasabo, the Nyarugenge District zoning report and the Rwanda outlook report 2017. Geodata sets that were collected include the following: the 2010 existing land use map for Nyarugenge District (ELU 2010), the 2010 detailed master plan for Nyarugenge District (MP 2010) and the 2018 existing land use map for Nyarugenge District (ELU 2018). All the three types of datasets were collected from the office of the City of Kigali. The following section describes the scope of this study.

3.6. Data processing and data analysis

As already mentioned, this study evaluated two cases: one was the conformance between the master plan and the current existing land use on the ground; the second evaluation was the impact of master plan implementation on the living condition of urban dwellers in Nyarugenge, Muhima and Kigali sectors. Therefore, data processing and data analysis were done in two ways accordingly. The section hereafter describes the methodology used to evaluate the conformance between the master plan and the outcomes on the ground.

3.6.1. Evaluation of the conformance between master plan and existing land uses

The level of conformance of master plan implementation was evaluated based on the three indicators of the degree of conformity. According to Tian & Shen (2011), those three indicators are the following: accordance, unfulfillment and deviation. A high level of conformance is identified when the accordance level is high with low level of unfulfillment and low level of deviation. In such case the master plan is said to be highly implemented.

In this study, ArcGIS software was used as the main tool for processing geodata sets through the overlay analysis method. The actual land uses that exist on ground were compared to the planned land uses on the master plan to determine the above-mentioned indicators of the degree of conformity. This evaluation focused on eight major types of land use: residential, commercial, public facilities, natural area, infrastructures, agriculture, industrial and open space. For each type of land use mentioned above, the following geodata sets were overlaid: the 2010 existing land use map (2010 ELU), the 2010 master plan (2010 MP) and the 2018 existing land use map (2018 ELU). The purpose of overlaying these maps was to determine the level of conformance based on its previously mentioned indicators: Below is a description of how these indicators were determined.

- **The accordance**

The accordance was identified in two cases: 1°. if the use of a piece of land in 2010 ELU, in 2010 MP, and in 2018 ELU is consistent. In this case the use of land is as it was before the adoption of the master plan and it is also consistent with the land use proposed in the master plan.
2°. If the use of a piece of land in the 2010 MP and in the 2018 ELU is consistent, but different from the use in the 2010 ELU. In this case, the plan is implemented as proposed. Briefly, the accordance is observed when the actual land use corresponds to plan provision. For this study, the accordance was determined as follow: Intersect all the three datasets for every type of land use (first case of accordance); and intersect the 2010 MP and the 2018 ELU. Then remove the 2010 ELU from the pre-determined output for every type of land use by using erase tool in ArcMap 10.6 (second case of accordance). After determining the accordance level in these two cases, the overall accordance for every type of land use was identified as the union of the results gotten from these two cases.

- **The unfulfillment**

The unfulfillment was found when the land use in the map of 2010 ELU is consistent with the land use in the 2018 ELU map, but different from the land use in the 2010 MP. In this case, it means that the master plan is not yet implemented, even if it may or may not be implemented in the future. Therefore, to determine the unfulfillment for each type of land use, the 2010 ELU was intersected with 2018 ELU, then the 2010 MP was removed from the pre-determined output by using erase tool in ArcMap 10.6. The purpose was to get the land use that is common on both the two ELU maps but not appearing in the master plan for a piece of land.

- **The deviation**

The deviation simply means that the actual land use that is newly developed on a piece of land after the adoption of the master plan is different from what proposed in the master plan. For this reason, the deviation was determined by using erase tool in two steps: Firstly, each land use in the 2018 ELU was used as input feature and each land use in 2010 ELU as the erased feature. Secondly the output from the first step was then used as input feature while the land use in 2010 MP was used as erase feature. The final output is the actual land use that is newly developed after the adoption of the master plan and that is not in conformance with the plan provision. Below is a figure that illustrates how I did data processing and analysis for the evaluation of the conformance of the master plan implementation.
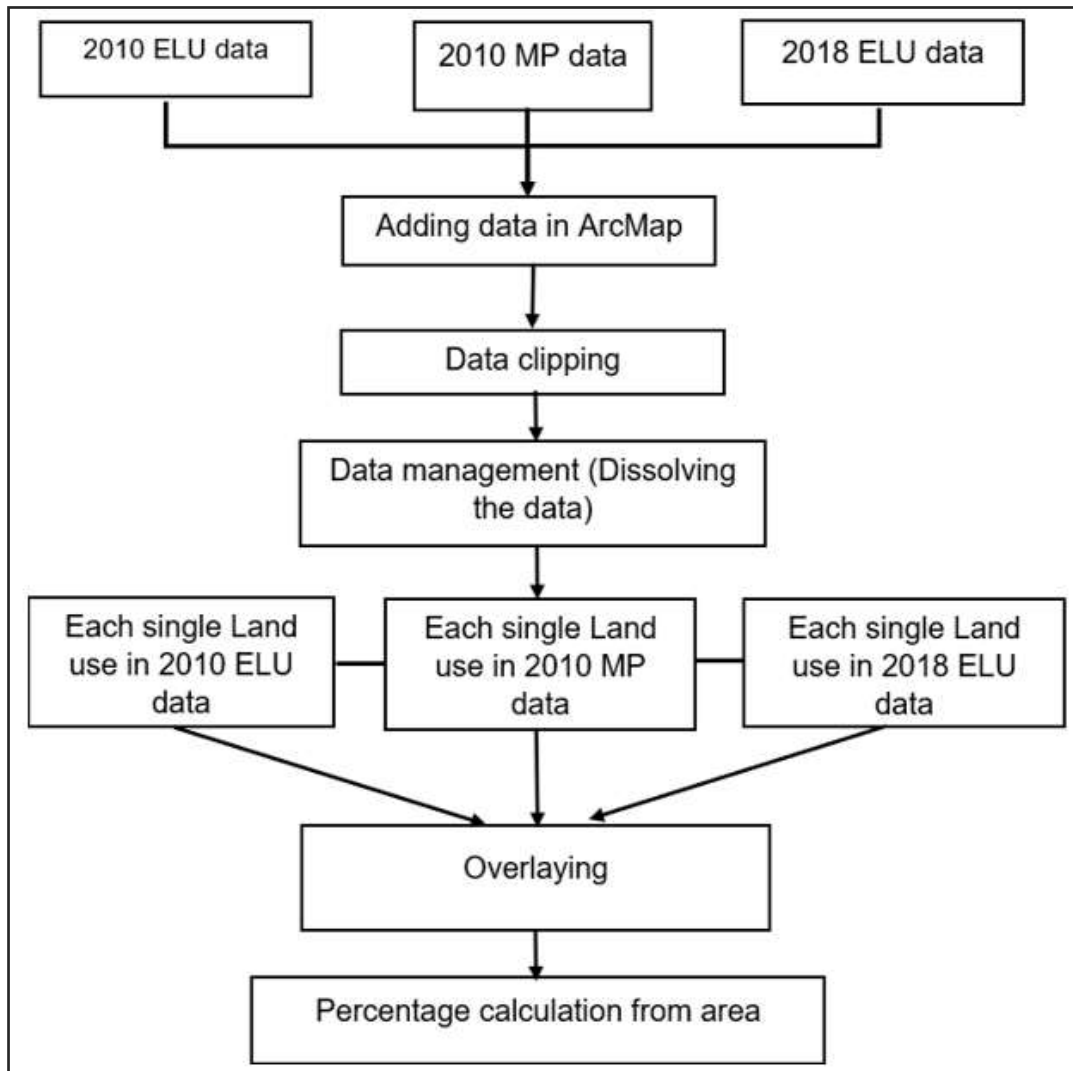
Figure 4: Data processing for evaluating the conformance

Source: Author

As it is shown in the above figure, the following steps were applied to process the data for evaluating the level of conformance between the actual land uses and the proposed land uses.

1. **Adding the data in ArcMap:** The three above mentioned datasets were added in ArcMap to be processed.

2. **Data clipping:** The data given from the City of Kigali covered the whole District of Nyarugenge. Therefore, data clipping was applied for each of the three maps to get the data of only three selected sectors (Nyarugenge, Muhima and Kigali) and to make sure that the size of the three maps is consistent.

3. **Dissolving the data:** For each of the three maps (2010 ELU, 2010 MP and 2018 ELU), the data was dissolved to create new map feature that is made of single land use type. This has been applied to all eight types of land use previously mentioned.

4. **Overlaying:** Each land use type in 2010 ELU map was overlaid with the same land use type in 2010 MP as well as with the same land use in 2018 ELU map. The overlay tools such as intersect, erase and union were used depending on whether the output needed is the type of accordance, unfulfillment or deviation.

5. **Percentage calculation**: In the attribute table of each output, the shape area was obtained; then, this area was used for percentage calculation with respect to the total area occupied by the actual existing land use. The section hereafter describes how the impact of master plan implementation was evaluated.

3.6.2. Evaluation of the impact of master plan implementation.

The impact of master plan implementation on the living condition of the dwellers was evaluated, based on the indicators of urban quality of life which are related to the objectives of the master plan and to the living condition of urban dwellers. By comparing the current situation and the situation before the adoption of the master plan, this study evaluated the level of availability and accessibility of the indicators of urban quality of life mentioned in Table 1. This comparison was done to determine the statically significance difference between the current level of accessibility/availability of these elements of urban quality of life and their accessibility/availability before the adoption of the master plan.

The analytical tool that was used for this comparison is the paired sample t-test analysis. According to Lani (2010), the paired sample t-test is used to compare two means of two observations, for instance, two different methods of measurement, or the before-and-after observations on the same subjects. Similarly, Shier (2004) and McGready (2006) said that this analytical tool may be used in 'before-after' studies. Therefore, I used this method since this study required to compare the situation of before the adoption of the master plan and the current situation. Thus, the use of paired sample t-test was the most appropriate analytical tool for this study. A statistically significant difference between the two situations indicates how is the level of improvement regarding the availability and accessibility of indicators of urban quality of life.

In addition, to ascertain whether the identified level of availability and accessibility of these indicators of urban quality of life is acknowledged by the dwellers, the level of satisfaction of the dwellers was evaluated and analysed by descriptive statistics. This evaluation was done through the analysis of Likert scale responses from household survey. These analyses were performed using the Statistical Package for the Social Sciences (SPSS). Moreover, the roles prayed by accessible indicators were identified from households' responses. Hence, the level of availability and accessibility of urban quality of life indicators, the roles played by these indicators and the level of satisfaction, indicate the impact of the master plan on the living condition of the dwellers.

3.7. Limitations of the study

The following limitations in their descending sequence of difficulties were encountered during the research period. The critical limitation was the delay of getting official permission to conduct field observation, interviews and household survey due to hierarchical procedures in government administration. This problem affected the research work plan that has been yet set. Thus, delaying required time to finish the whole thesis. Following this, the delay of getting secondary data from government administration was another limitation during this research. In fact, lack of willingness by few officers to provide relevant data was major limitation. In addition, there was a limitation in terms of unavailability of enough literature relating to the evaluation of the impact of master plan implementation on the living condition of dwellers. Finally, the unavailability of some of local readers due to their high workloads was observed as a limitation in this research. Really, some sector land managers were rarely available since each one works within two sectors simultaneously. Therefore, it became a big problem to meet them at the desired sector for conducting the interview with them. This also was a problem which delayed the research.

3.8. Conclusion

This chapter presented a brief description of the area of study, how this area has been selected, the research approach used in this study, sampling technic as well as the description of how data was gathered and analysed towards achieving research objectives. In addition, this chapter has discussed the limitations encounter during this research. The study area of this research is made of three sectors of Nyarugenge namely Nyarugenge, Muhima and Kigali. The area of study was selected based on where the master plan implementation has started earlier than other areas and based on the time frame of the research. This study is both qualitative and quantitative. Therefore, the adopted approach is a mixed method. Consequently, the multilevel mixed

method sampling technic was used for sample selection. The data collected for this study, include both primary and secondary data. Therefore, the methods used to collect these data comprise visual observation, structed interview, household survey, a review of literature and the collection of geospatial data. Geospatial data was processed and analysed in ArcGIS using ArcMap 10.6 with the help of overlay tools. The data relating to the urban quality of life was processed and analysed in SPSS using either the paired samples t-test or the descriptive statistics depending on the type of the data. Some limitations encounter during this research are among others the delay in getting official permission for collecting primary data and the delay in getting the secondary data. This has negatively impacted on the time frame of the research. The following chapter presents the findings of the study including also these from the reviewed literature to achieve the research objectives, thus, answering to the research questions.

Chapter four: Results and discussions

4.1.   Introduction

This chapter gives a detailed description and discussion of the results revealed by this research. As it was previously mentioned, this research analysed the level to which Kigali City Master Plan is implemented in Nyarugenge District and the impact of such implementation on the living condition of urban dweller. Two cases of analysis (one for the implementation and the other for the impact) were undertaken accordingly. The first case of analysis identified that different land uses show different levels of conformance. There are some land uses whose levels of conformance are significantly high while others have low levels of conformance. The low levels of conformance are caused by different challenges people encountered during the implementation of master plan. This study has identified some of these challenges and they are presented in this chapter. The second case of analysis revealed that the dweller's living condition in the study area is partly significantly improved. The improvement is based on the level of availability and accessibility of different elements of urban quality of life. The detailed explanation and discussion of findings revealed by this study is given hereafter in four sections as follow. The first section presents and discusses the levels of conformance of the current land uses to the master plan for Nyarugenge District. The second section presents the challenges of Kigali City Master plan implementation. The third section presents a descriptive statistic of the surveyed respondents. The last section gives the in-depth description and discussion of the impact of master plan implementation on the living condition of urban dwellers in Nyarugenge, Muhima and Kigali sectors.

4.2.   Level of conformance of the current land uses to the master plan

As previously mentioned in chapter three, the evaluation of conformance between the master plan and the outcomes on the ground, focused on eight major types of land use: residential, commercial, public facilities, natural area, infrastructures, agriculture, industrial and open space. The results from the overlay analysis for each of these eight land uses are summarized in the following tables and further discussed deeply in next sections.

Table 3: Level of conformance for existing land uses to the master plan

S/N	Land use type	Accordance		Unfulfillment		Deviation		Total existing	
		Area(m^2)	PCT (%)	Area(m^2)	PCT (%)	Area(m^2)	PCT (%)	Area(m^2)	PCT (%)
1	Residential	1629212.9	42.3	2186324.4	56.8	32559.9	0.8	3848097.2	100
2	Commercial	715883.5	64.6	385372.6	34.8	6342.5	0.6	1107598.5	100
3	Public facilities	1246062.3	80.4	303779.1	19.6	-	-	1549841.5	100
4	Natural area	7807893.1	92.4	573270.1	6.8	69808.6	0.8	8450971.8	100
5	Infrastructure	1883797.6	72.2	336343.3	12.9	389998.7	14.9	2610139.7	100
6	Agriculture	3146599.5	16.9	15456676.5	83.1	-	-	18603276.0	100
7	Industries	69810.6	20.9	263742.7	79.1	-	-	333553.3	100
8	Open spaces	10695.8	40.9	15481.6	59.1	-	-	26177.4	100

Source: Author (2018).

The above table shows the summarized result from the overlay analysis. The percentages were calculated based on the total existing areas for each land use type among the eight analysed land uses. A high level of accordance with low unfulfillment and with low deviation indicates a good conformance between the master plan and the current existing land use.

However, when the total existing area for a certain land use is much smaller than the total area proposed for such land use, a high percentage of accordance level calculated based on the total area proposed for a certain land use does not necessarily means the high conformance. In steady, it means that most of the land occupied by such land use is consistent with the master plan. However, it may happen that a huge area of land is still missing to be implemented as proposed. Therefore, for better interpretation of the result, it is also necessary to consider how much is such accordance level with respect to the total area proposed for such land use. Therefore, below is a table that shows the accordance level whereby percentages were calculated based on the total area proposed for each land use type.

Table 4: Level of conformance with respect to the total area proposed for each land use

S/N	Land use type	Area in conformance with the master plan		Total area proposed	
		(m^2)	PCT (%)	Area (m^2)	PCT (%)
1	Residential	1629212.9	33.6	4849427.6	100
2	Commercial	715883.5	41.5	1723885.2	100
3	Public facilities	1246062.3	68.9	1807246.7	100
4	Natural area	7807893.1	49.5	15774928.9	100
5	Infrastructure	1883797.6	48.6	3876471.8	100
6	Agriculture	3146599.5	81.2	3876471.8	100
7	Industries	69810.6	29.0	240895.4	100
8	Open spaces	10695.8	0.3	3467442.7	100

Source: Author (2018)

The table above shows the level of conformance by considering the percentages that were calculated based on the total area proposed for each land use type. It is identified that apart from agriculture and public facilities, other land uses do not significantly conform with the master plan. The detailed explanation and discussion for the results mentioned in both the two tables (table 3 and table 4) is presented hereafter.

4.2.1. Residential developments

Different land uses have been proposed in the land use plan for Nyarugenge District. Residential developments are included among these proposed land uses. This study analysed whether the existing residential uses are consistent with the proposed residential use. The following map illustrates the result from this analysis about residential developments.
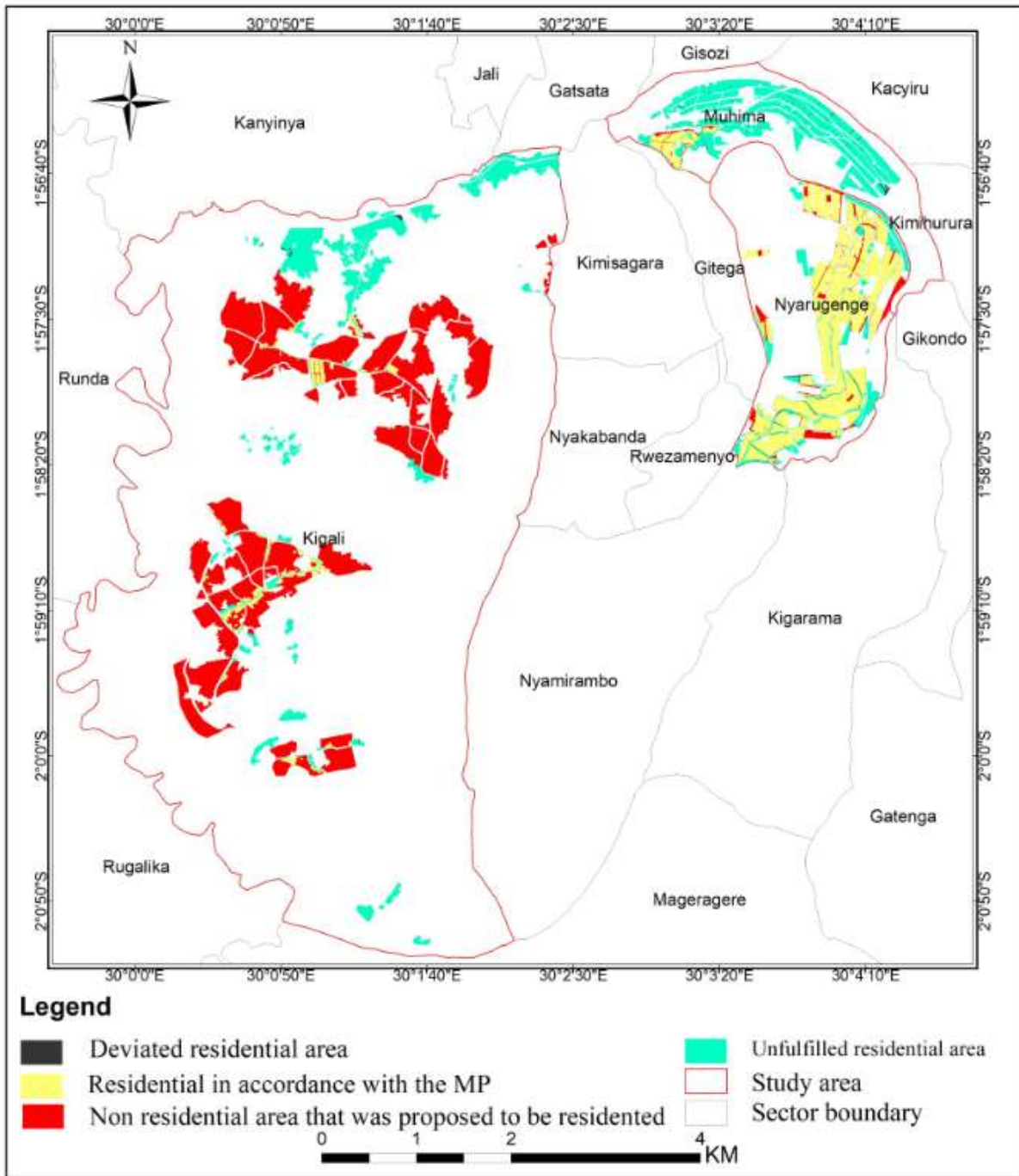
Map 3: Level of conformance for residential

The above map illustrates the level of conformance between the current existing residential developments and the proposed residential area. It shows the areas that correspond to the three indicators of the degree of conformity. The map shows that most of the land that was used as residential before the adoption of the master plan and that was supposed to remain as residential land, is consistent with the master plan. This area of consistency corresponds to 42.3% (Table 3) of the total area currently occupied by residential developments and it is named the residential area that is in accordance with the master plan.

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The accordance is high in Nyarugenge Sector where it corresponds to 35.5% of the total area occupied by residential in the study area. Since the upper Kiyovu (*Kiyove Cy'Abakire*) was among the prioritized areas where the implementation of the master plan should be complemented by 2020 (The City of Kigali, 2010b), the City of Kigali has highly developed this area into modern residential area.

However, most of the land that was used as residential before the adoption of the master plan and that was supposed to change its uses, did not change. This land corresponds to 56.8% (Table 3) of the total area occupied by residential developments. This area is named the unfulfilled residential area. In addition, there is a piece of land developed as residential after the adoption of the master plan, that is not consistent with the plan provision and it corresponds to 0.8% (Table 3) of the total area occupied by residential developments. This area is called a deviated residential area.
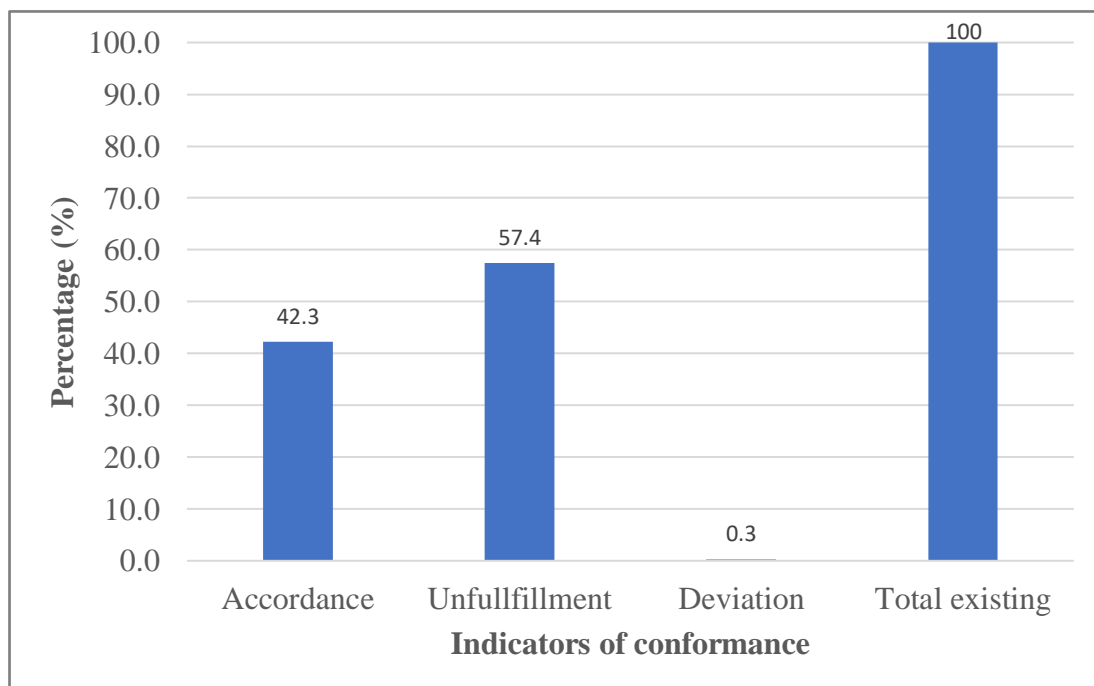
Figure 5: Level of conformance for residential

The above figure shows clearly the level of conformance between the existing residential land use and the residential land proposed by the master plan. Those percentages were calculated based on the existing residential area in the study area. By considering the total area proposed for residential use, the analysis shows that the accordance level for residential use corresponds only to 33.6% (Table 4) of the total area proposed for residential use. Meaning that, up to 66.4% of the total area proposed for residential is still not yet developed as proposed. This is due to that most of the proposed types of houses to be constructed (almost row and medium rise residential) are not affordable for the majority of people. Therefore, people are still applying the usual activities even if those activities are not allowed. For instance, in Kigali sector, there

is 62.1% of the total area planned for residential which is still being used as agriculture. Therefore, it is identified that although the deviation level is low for residential, the level of master plan implementation is also low since the unfulfillment is high with low accordance.

4.2.2. Commercial developments

By considering the location of the existing commercial developments with respect to everywhere commercials are supposed to take place in the study area, the analysis showed that there is a high level of conformance between the current existing commercial area and the area proposed for commercials in the study area. Below is a map that shows the locations of area of accordance, area of unfulfillment and area of deviation as well as area where commercial use is missing while it is planned to be there.
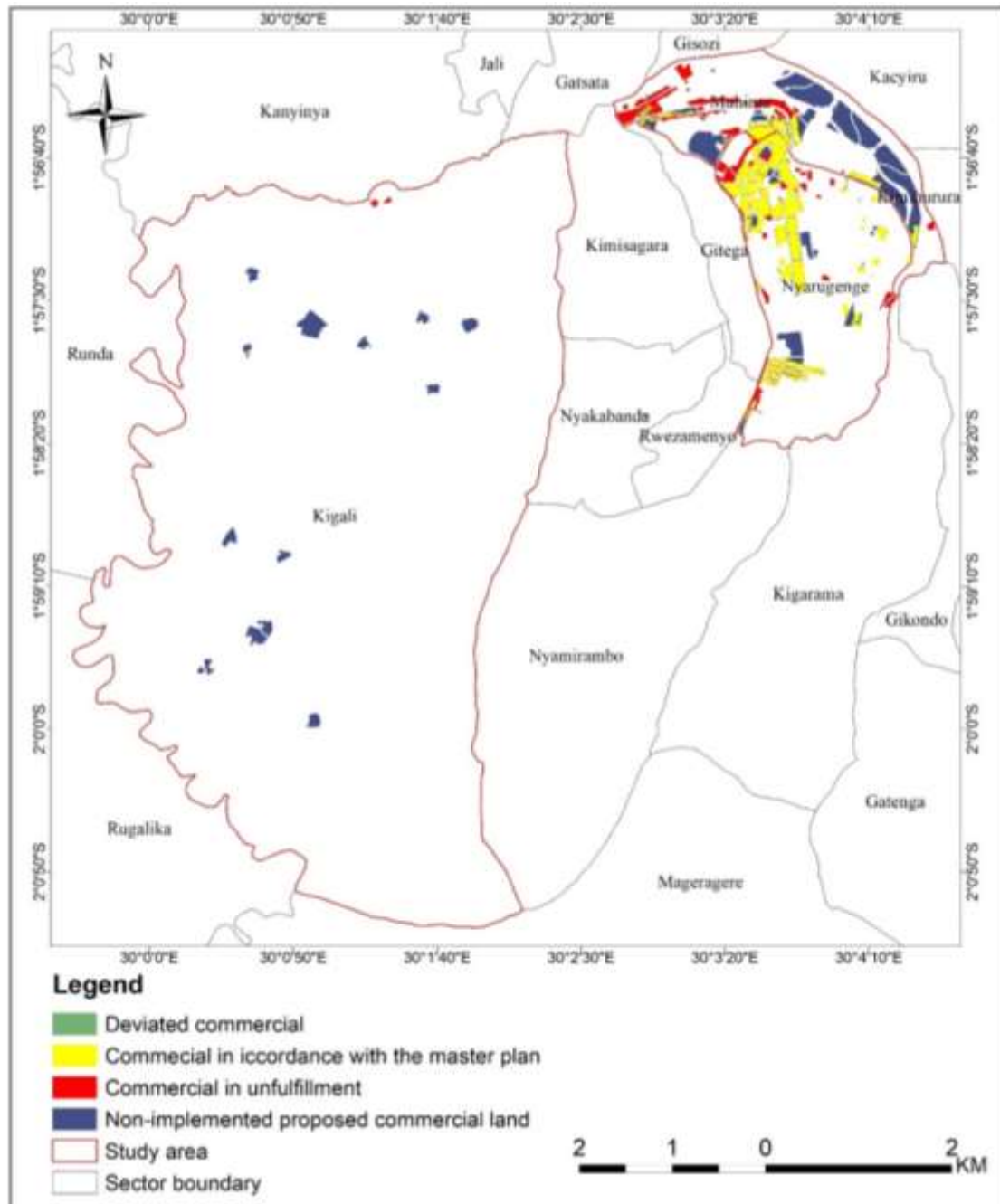
Map 4: Level of conformance for commercial development

The above map illustrates the level of conformance for the current existing commercial development. It shows the three indicators of the degree of conformity as well as the proposed land for commercial developments in which other land uses than commercial are being applied. The analysis identified that there is an area of land in which new commercial developments have been constructed after the adoption of the master plan, but those commercials deviated from what was proposed. This deviation is small with only 0.6% (Table 3) of the total area occupied by commercial developments in the study area. Since this area of deviation is very little, it is not clearly seen on the map shown above.

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In addition, 34.8% (Table 3) of the existing commercial area was proposed to change the use but it is still being used as commercial. This indicates the unfulfillment level of the master plan implementation. This level of unfulfillment is high in Muhima sector where 20% of the total commercial area are taking place in the boundary of hazardous wetland, while that wetland is planned to be developed into an open space. In Muhima sector, there are also small shops that are supposed to be replaced by modern mixed-use buildings. The unfulfillment is again observed in Nyargugenge Sector where 15% of the total existing commercial area is made of small shops which are proposed to be replaced by medium rise mixed-use buildings. The rest of unfulfillment is being undertaken in Kigali Sector in a wetland that is planned to be conserved as a natural area.

However, 64.6% (Table 3) of the total area occupied by commercial developments is consistent with the plan and this area is termed as area of accordance. Among this area of accordance 55.6% of the total existing commercial area is observed in Nyarugenge sector especially in *quartier commercial* and *quartier Mateus* where new modern buildings are constructed. Some of them are hotels, banks, and modern shops and supermarkets. The redevelopment of Nyarugenge Sector into modern commercial area is due to that CBD1, Nyarugenge commercial and Heritage Village are among the prioritised areas whose implementation is supposed to be completed by 2020.

Therefore, informal commercial shops are being relocated and replaced by modern and comprehensive low and medium rise commercial buildings and offices as required by the master plan. This level of implementation is being achieved also because the low-income groups in Nyarugenge Sector especially in low income settlement of Kiyovu (*Kiyovu Cy' Abakene*) who were not able to comply with the master plan, were given new housing units in Batsinda at Gasabo District, while some chose to be compensated with money to buy new homes elsewhere (Goodfellow, 2014; Mugisha, 2016; Rose et al., 2016). Below is a figure that shows the level of conformance between the actual commercial use and the master plan.
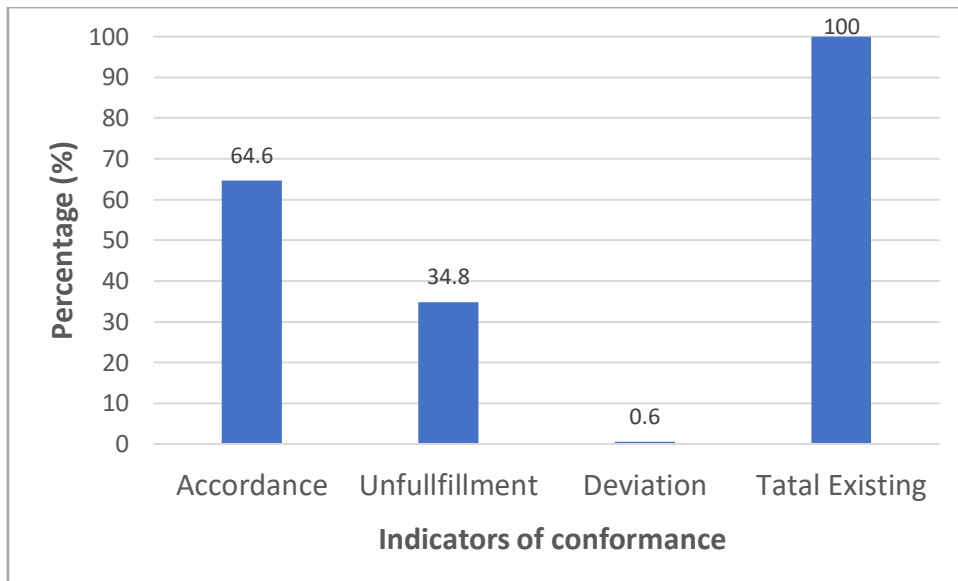
Figure 6: Level of conformance for commercial use

As it is seen on the above figure, the accordance level is high, with low unfullfillment and low deviation. Therefore, the level of conformance is also high when considering the total existing commercial area. However, by considering the total area proposed for commercial development, the accordance corresponds only to 41.5% (Table 4) of the total area proposed for commercial development. Meaning that about 58.5% of the area proposed for commercials currently is occupied by other uses than commercial. For instance, in Kigali sector there is a piece of land proposed for commercial but actually part of this land is being used as agriculture and another part is being used as residential. Additionally, in Muhima Sector 18.9% and 11% of the total area proposed for commercial are being used as residential and special uses respectively.

4.2.3. Public facilities

The overlay analysis revealed that most of the existing public facilities conform with the master plan with low unfulfillment and low deviation. This is illustrated in the following map and further described in the next paragraphs.
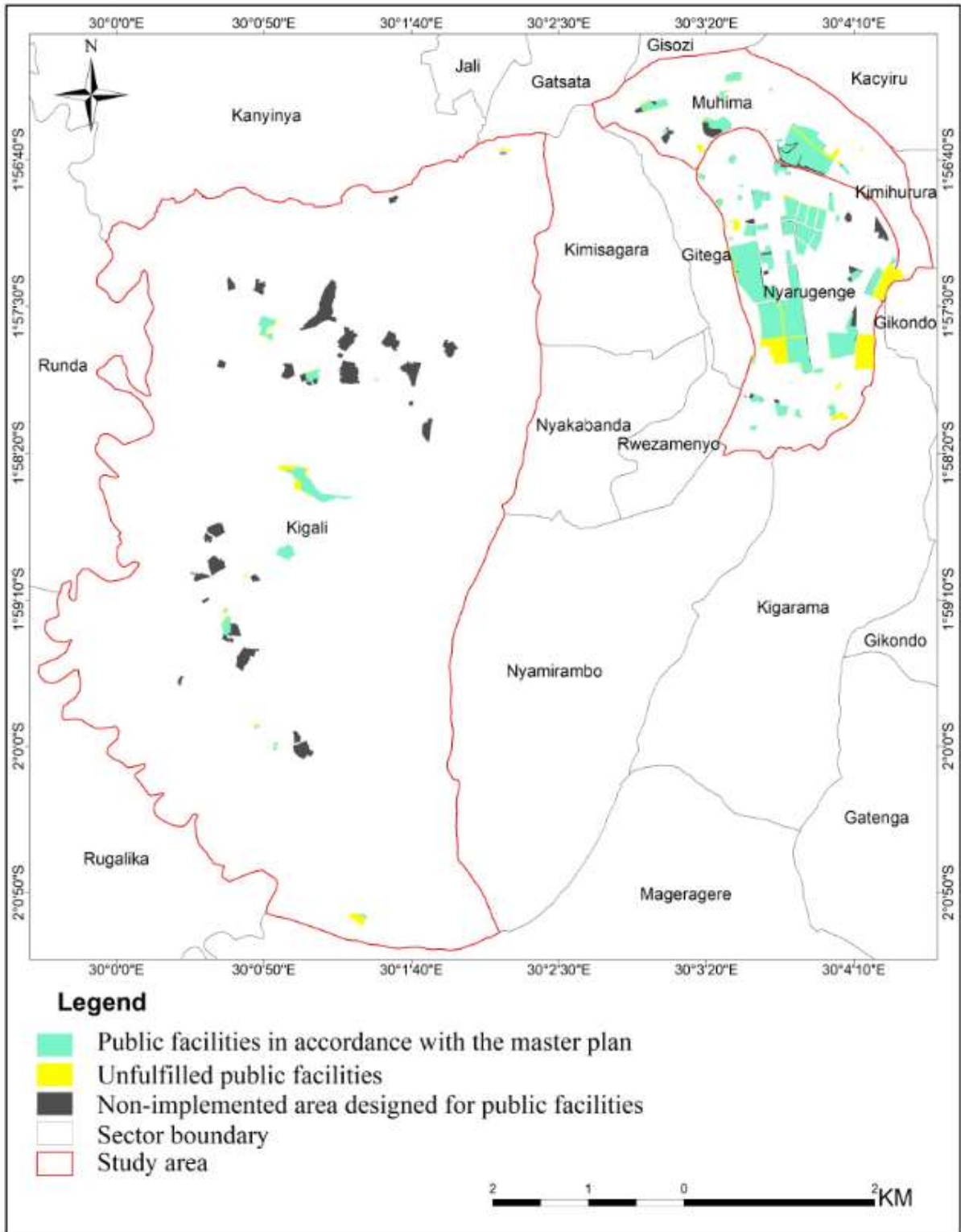
Map 5: The Levels of conformance for Public facilities

The map above illustrates the level of conformance between the actual land occupied by public facilities and the land proposed for public facilities. The map shows the three indicators of the degree of conformity as well as the proposed land for public facilities in which other land uses

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than public facilities are being applied. In fact, it is identified that 80.4% (Table 3) of the total existing area for public facilities is in accordance with the master plan. This accordance level is high in Nyarugenge sector where it occupies 56% of the total existing area for public facilities. In Muhima and Kigali sectors, the accordance level for public facilities corresponds to 15% and 9.4% of the total area proposed for public facilities respectively. However, 19.6% of the total area currently occupied by public facilities was used for public facilities before the adoption of the master plan but it was supposed to change its use. This is termed as the level of unfulfillment.

The level of unfulfillment is high in Nyarugenge sector where 13% of the total existing area for public facilities occupies part of the land designed for commercial, another part of the land proposed for open space and the other planned for natural area. The rest of unfulfillment is in Muhima sector. However, there is no any deviation regarding public facilities. Meaning that after the adoption of the master plan no new public facilities were constructed contradictory with the master plan. Below is a figure that illustrates on a chart the level of conformance for public facilities.
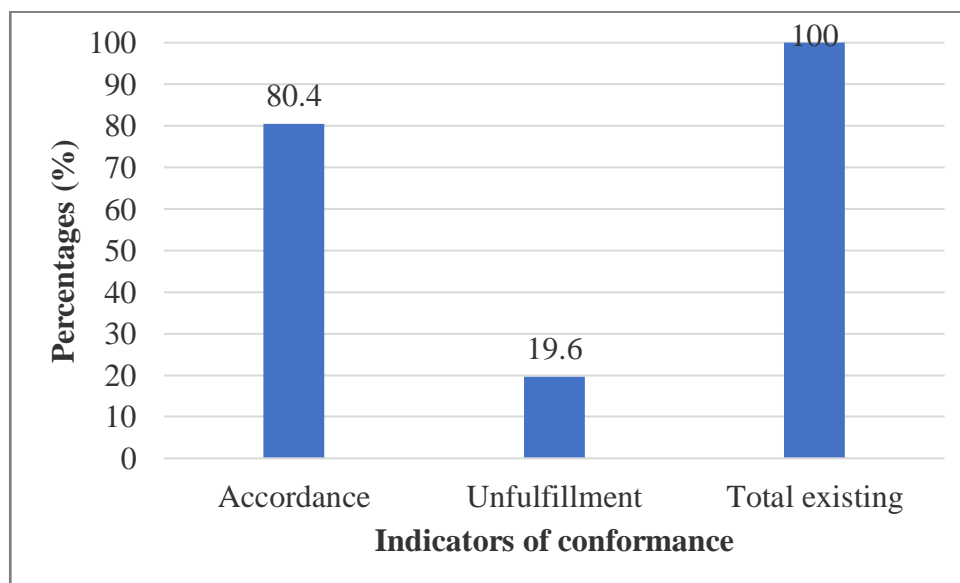
Figure 7: Level of conformance for public facilities

The level of conformance between the actual public facilities and the master plan is considerably high since the accordance level is high with low unfulfillment and low deviation. By considering the total area proposed for public facilities, the analysis showed that the accordance corresponds to 68.9% (Table 4) of the total area proposed for public facilities. Therefore, 31.1% of the total area proposed for public facilities is being used contradictory with the master plan. For instance, 21.5% and 5.5% of the total area proposed for public facilities are used for agricultural and residential respectively especially in Kigali sector.

4.2.4. Nature Area

This study revealed that most of the nature area is located in accordance with the master plan in the study area. This is illustrated by the map below whereby each indicators of the degree of conformity is shown.
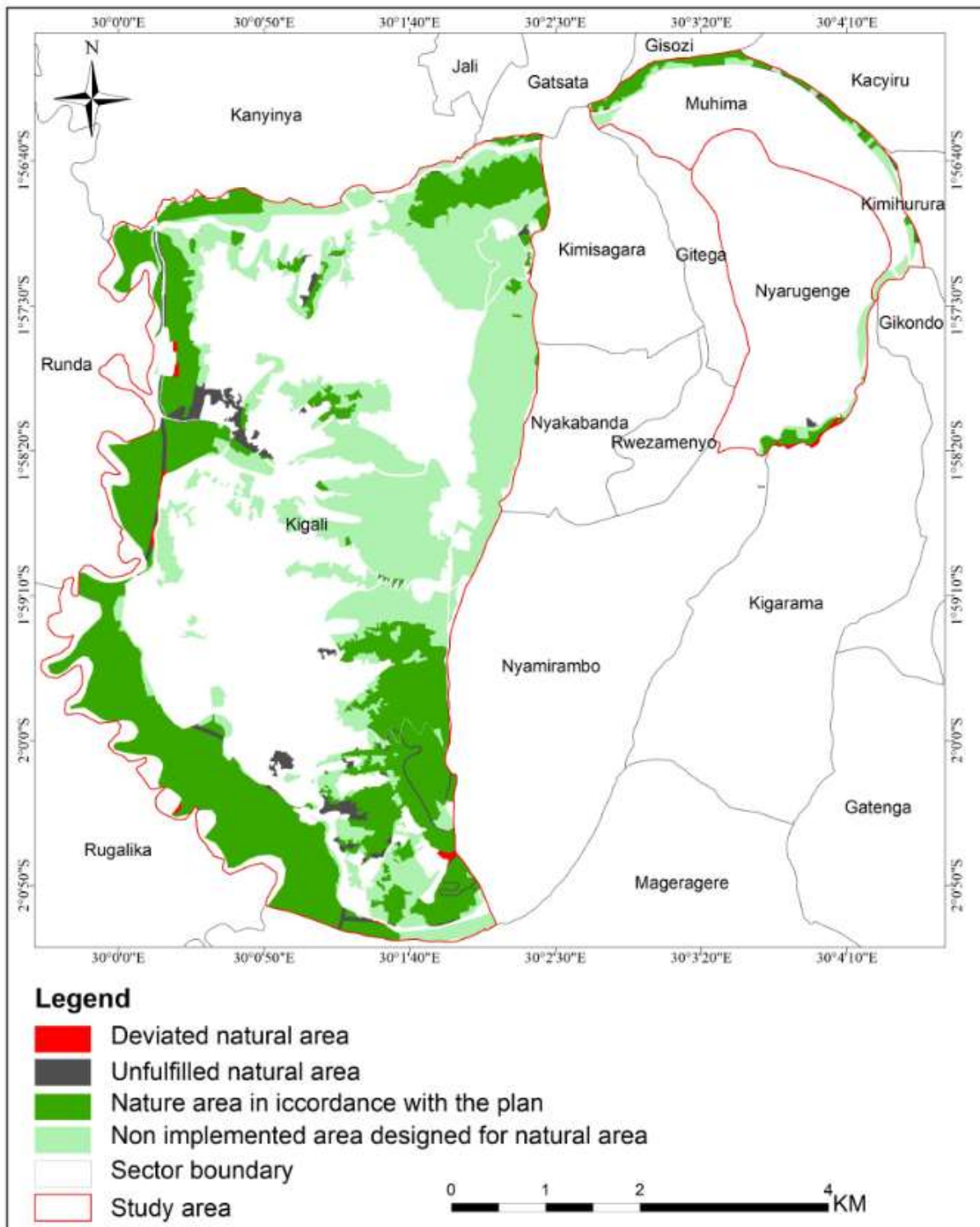
Map 6: Level of conformance for natural area

The map above illustrates the level of conformance between the actual land for natural area and the master plan. It shows the three indicators of the degree of conformity as well as the proposed land for natural area in which non- natural area uses are being applied. Firstly, the overlay of the three data sets namely 2010 ELU, 2018 ELU and the 2010 MP showed that 92.4% (Table 3) of the existing natural area is in accordance with the master plan. Secondly, the overlay showed that 6.8% (Table 3) of the actual natural area has been used as natural area even before the adoption of the master plan, while according to the master plan this area was proposed to change the use. This case of non-conformance is termed as the level of unfulfillment. In addition, the analysis identified that about 0.8% (Table 3) of the current existing natural area deviated from the master plan. The following figure illustrates clearly the level of conformance for natural area.
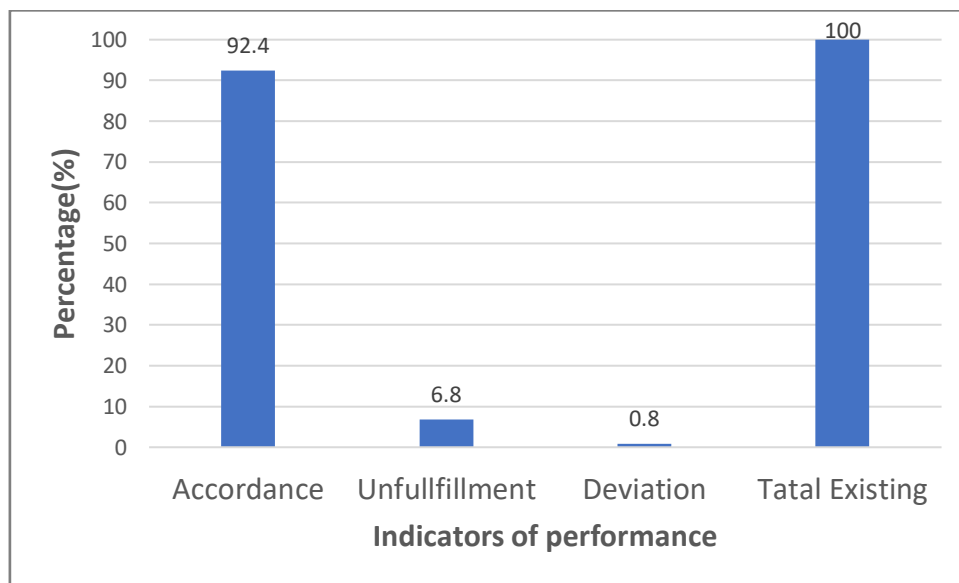
Figure 8: Level of conformance for natural area

Although the accordance level is **92.4%** of the existing natural area, it corresponds only to **49.5% (Table 4)** of the total area proposed for natural area. This means that **50.5%** of the land proposed for natural area is not being used as proposed. Instead, it is currently occupied by other uses. This is because there are people who practice agricultural, livestock and commercial activities in wetlands while those wetlands are supposed to be conserved as natural area. This was especially identified in Kigali Sector where is an area of land that is supposed to be conserved as natural area, but people are using this land as farm land for their cattle. Thus, the level of master plan implementation is not yet sufficiently achieved for the conservation of natural areas.

4.2.5. Infrastructure

The analysis has shown that most of the existing infrastructures are located in accordance with the master plan. However, by considering the total area proposed for infrastructures, it was identified that there are areas where infrastructures are still missing. The following map is an illustration of the level of conformance for infrastructures.
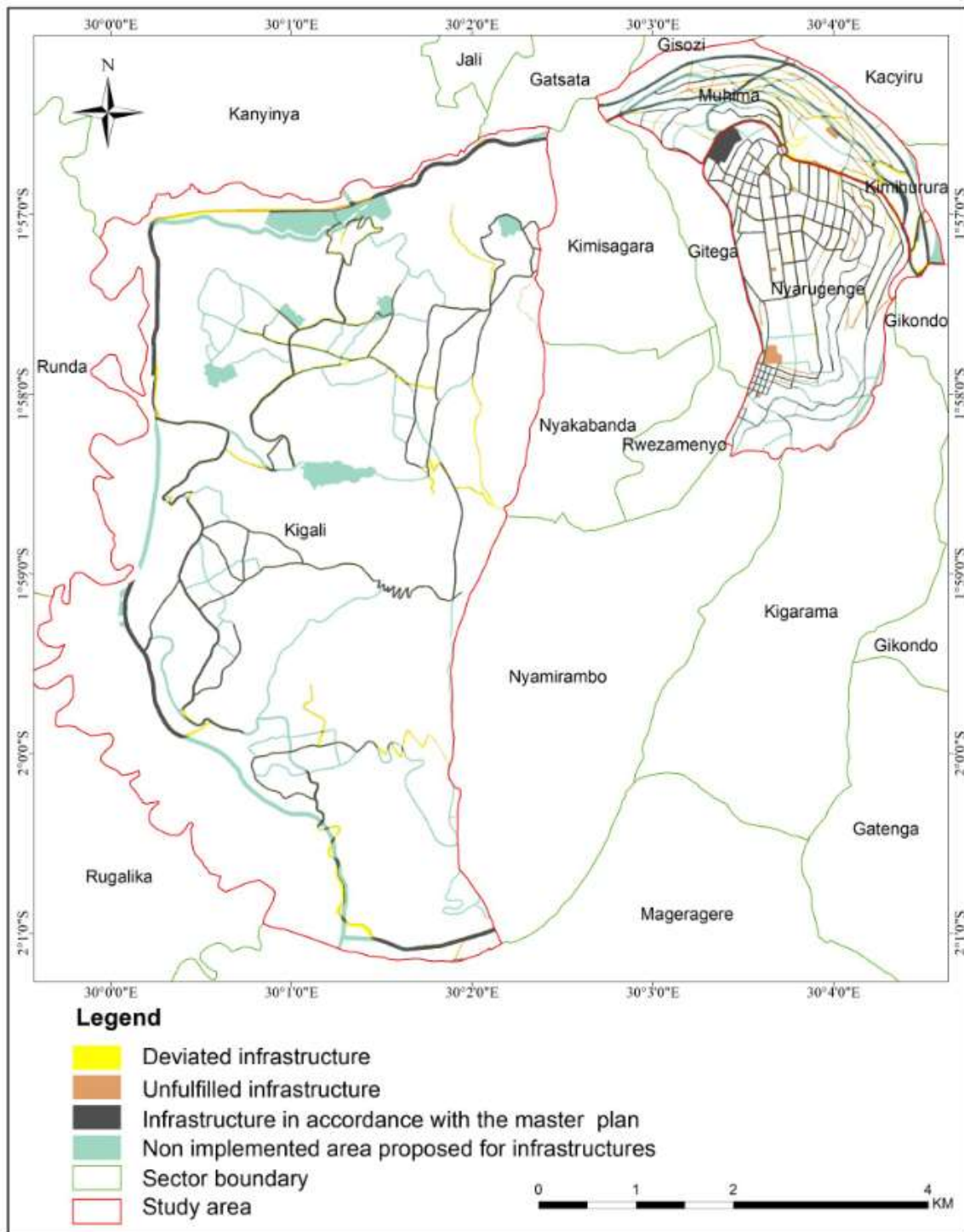
Map 7: Level of conformance for infrastructures

The map above is an illustration of the level of conformance between the actual land for infrastructures and the master plan. It shows the three indicators of the degree of conformity and the proposed land for infrastructure development, in which non-infrastructural uses are being applied. The result from the overlay analysis showed that 72.2% (Table 3) of the total area currently occupied by infrastructures is in accordance with the master plan. This accordance corresponds to 48.6% (Table) of the total area proposed for infrastructures in the study area. It means that 51.4% of the total area proposed for infrastructures does not contain any infrastructure.

On the above map, this area is named a non-implemented proposed area for infrastructures. In addition, 12.9% (Table 3) of the actual area occupied by infrastructures was supposed to change use according to the master plan. However, it did not change its use. This area is called an unfulfilled area. Furthermore, 14.9% (Table 3) of the current existing area for infrastructures deviated from the master plan. Those are for instance, streets that were constructed after the adoption of the master plan in areas not planned for infrastructure. Below is a figure demonstrating clearly the level of conformance by showing the corresponding percentages of the indicators of the degree of conformity.
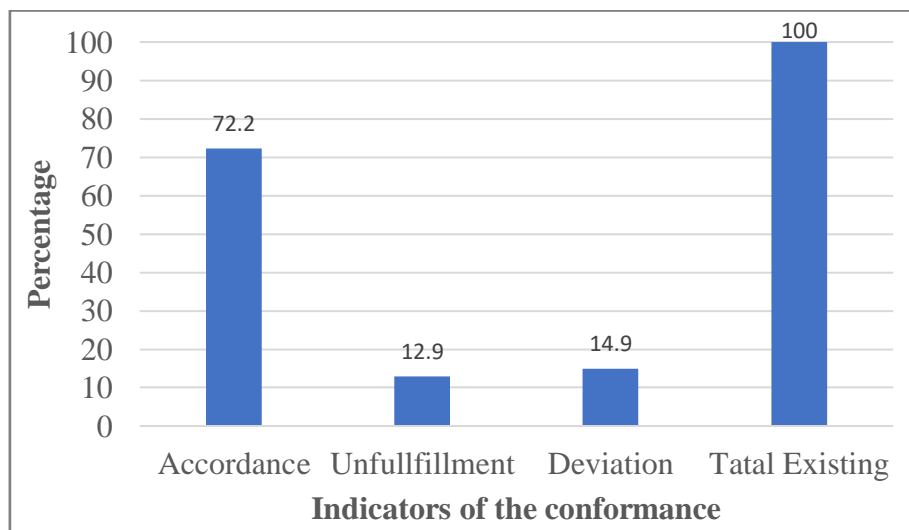
Figure 9: Level of conformance for infrastructures

Considering the total existing area for infrastructures, the conformance level is high since the accordance is high with low unfulfillment and low deviation. However, considering the total area proposed for infrastructures, the level of implementation of the master plan is low since about 51.4% of the total area proposed for infrastructures does not contain the proposed infrastructures. This level of non-implementation is highly observed in Kigali Sector where 36.5% of the total area proposed for infrastructures is occupied by other uses especially agricultural.

4.2.6. Agriculture

This study revealed that it was planned to change most of the existing agriculture land into other uses in the study area, but people are still undertaking agricultural activities in those areas. For this reason, the unfulfillment level for agriculture is high. However, almost everywhere proposed for agriculture is occupied by agriculture. Below is a map that shows area in accordance, area in unfulfillment and a non-implemented area proposed for agriculture.
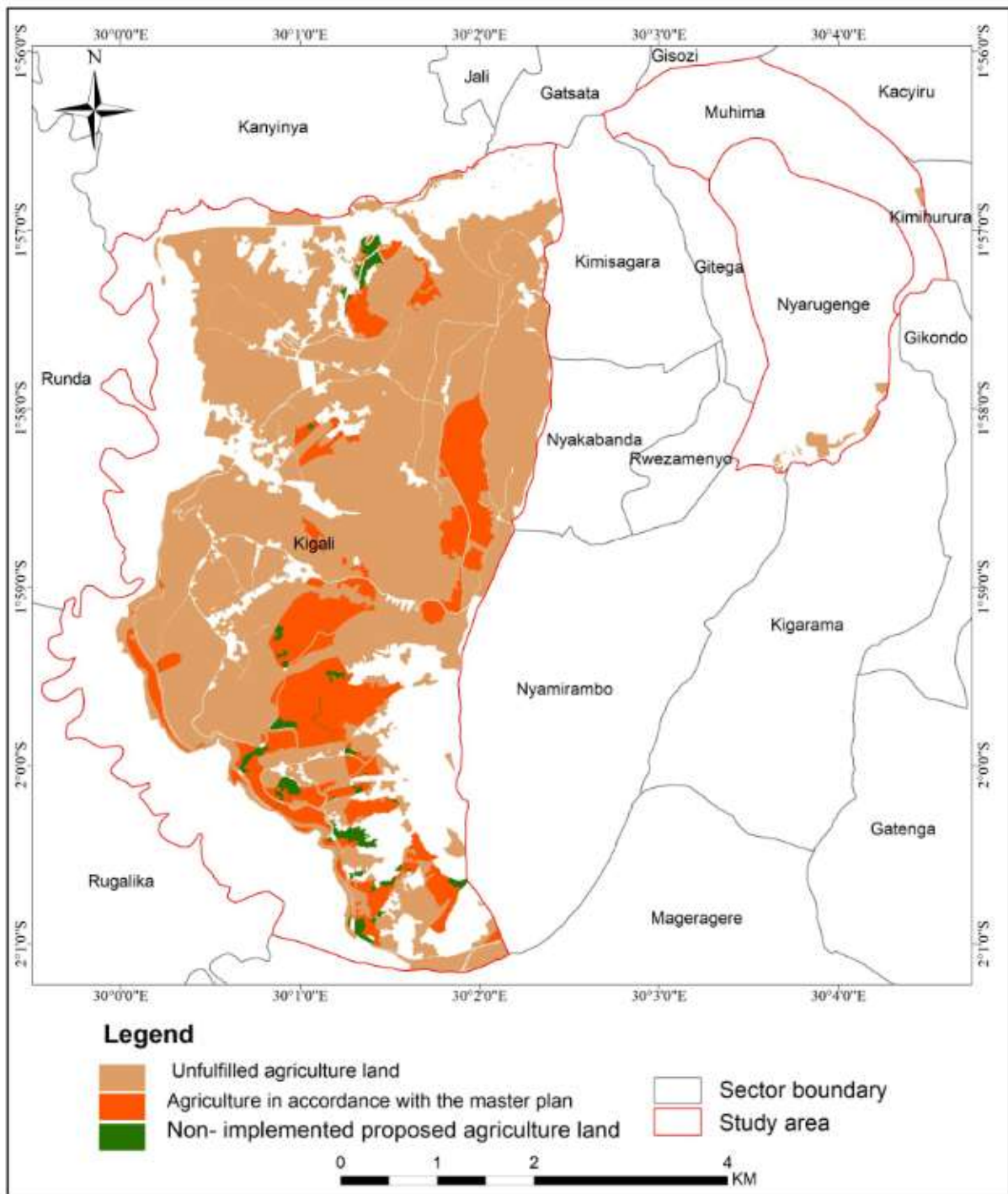
Map 8: Level of conformance for agriculture

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The map above is an illustration of the level of conformance between the actual land for agriculture and the master plan. It shows two indicators of the degree of conformity and the proposed agriculture land in which non-agriculture uses are taking place. Among the total area of the current existing agriculture land, only 16.9% (Table 3) is in accordance with the master plan. The accordance level is very little since most of the current existing agriculture land is proposed to be transformed into other uses than agriculture. Consequently, the level of unfulfillment is very high corresponding to 83.1% (Table 3) of the actual agriculture land. The level of unfulfillment is high at Kigali Sector since this sector is a rural area which is being transformed in urban area. However, there is no deviation regarding agricultural area since due to the regulations of implementing the master plan, people are limited to undertake new activities which are contradictory with the master plan. Below is a figure that illustrates the corresponding percentages of the indicators of the degree of conformity for agricultural use.
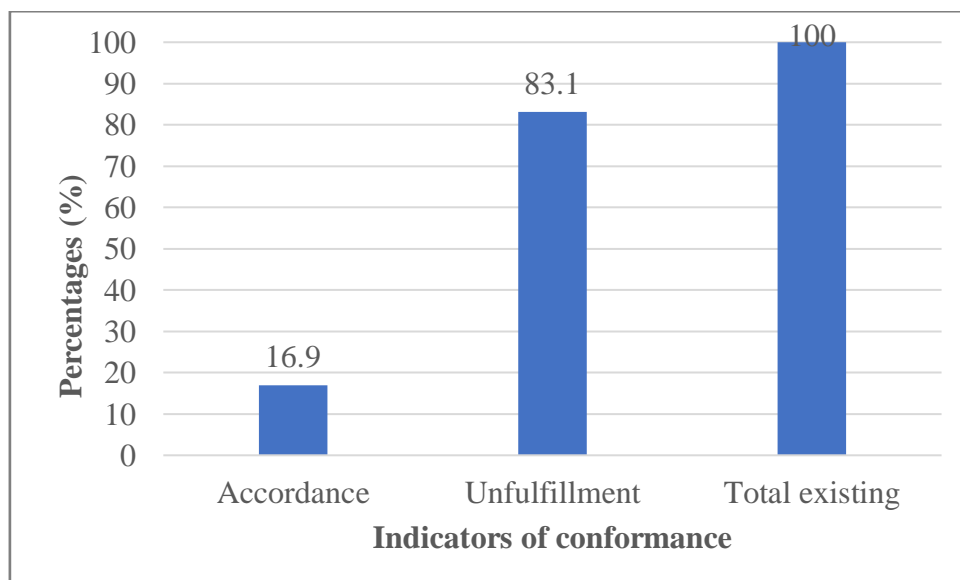
Figure 10: Level of conformance for agriculture

The analysis identifies that the level of conformance between the actual agriculture land and the master plan is considerably low since the accordance level is low with high level of unfulfillment. Even if the accordance level is very little, it corresponds to 90.7% (Table 4) of the total area proposed for agriculture. This is because, almost everywhere proposed for agriculture is occupied by agriculture.

4.2.7. Industries

This study identified that the level of conformance between the current existing area occupied by industries and the area proposed for industries is low. The following map shows this level of conformance by illustrating the location for accordance, unfulfillment and deviation as well as a non- implemented area proposed for industries.
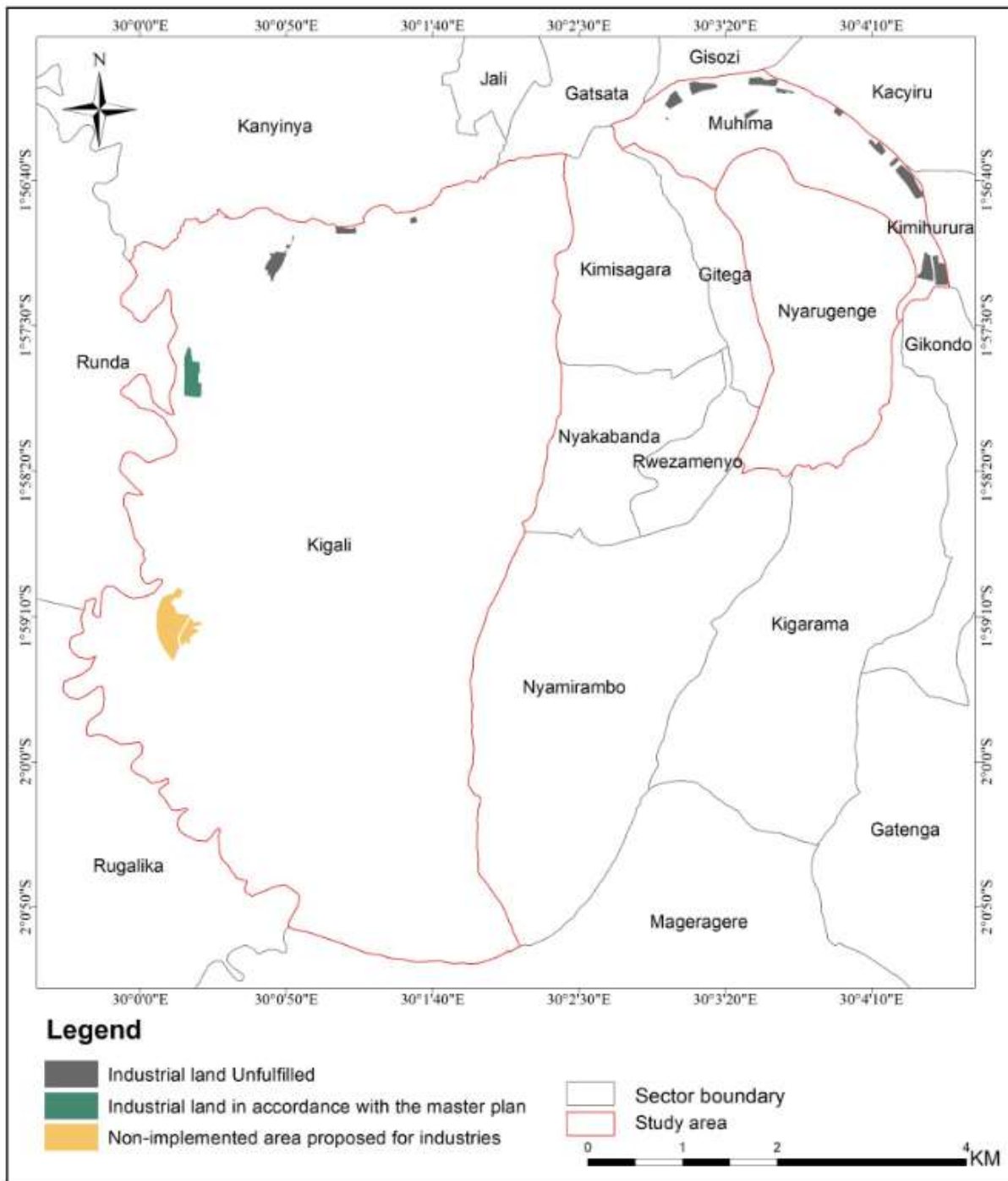
Map 9: Level of conformance for industrial developments

The figure above is an illustration of the level of conformance between the actual industrial area and the master plan. It shows the indicators of the degree of conformity as well as the proposed industrial area in which non-industrial uses are being applied. Among the current existing industrial areas, only 20.9% (Table 3) is consistent with the master plan. This level of accordance corresponds to 29.0% (Table 4) of the total area proposed for industries in the study area. The accordance level is low, and it is only observed in Kigali sector.

In addition, the level of unfulfillment is high with 79.1% (Table 3) of the total existing industrial area. This is because most of the current existing industries located close to either commercial or residential area are supposed to be relocated. The purpose of relocating them is to avoid industrial noise pollution in commercial and residential areas.   The level of unfulfillment is high in Muhima sector whereby 62% of the total existing area for industries is supposed to be relocated. Following this 17% of the total existing area for industries is located in hazardous area close to the wetland in Kigali sector and it is supposed to be relocated. However, there are no new industries that were constructed in the study area after the adoption of the master plan. Thus, the deviation level of conformance for industries in the study area is null. Below is a figure that illustrates the corresponding percentages of the indicators of the degree of conformity for industrial land.
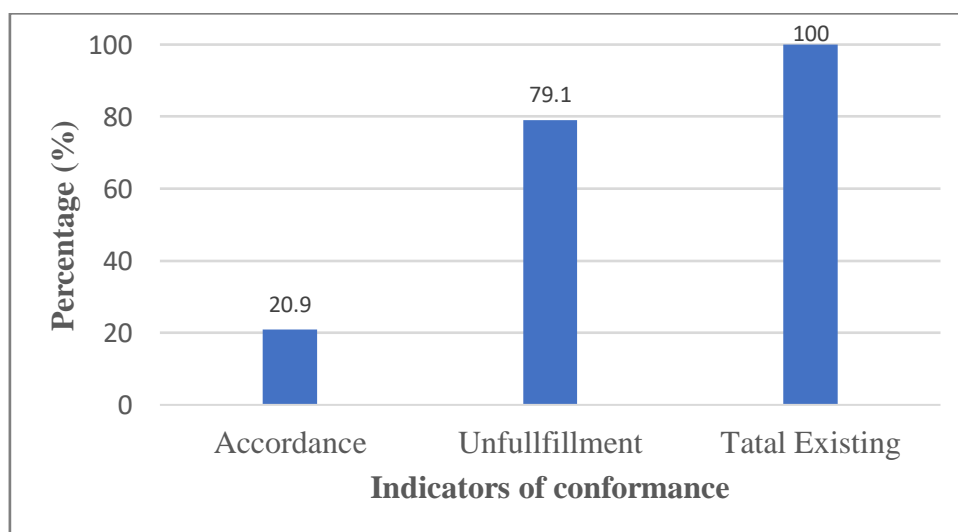
Figure 11: Level of conformance for industrial developments

The total area currently occupied by industries is greater than the total area proposed for industries in the study area since all industries located in Muhima sector area supposed to be relocated to Gasabo District in indutrial zone. Therefore, the level of conformance is low with high level of unfullfillment but no deviation.

4.2.8. Open space

This study revealed that the level of conformance for open spaces is low in the study area. The following map is an illustration of such level of conformance by showing the corresponding locations for indicators of the degree of conformity.
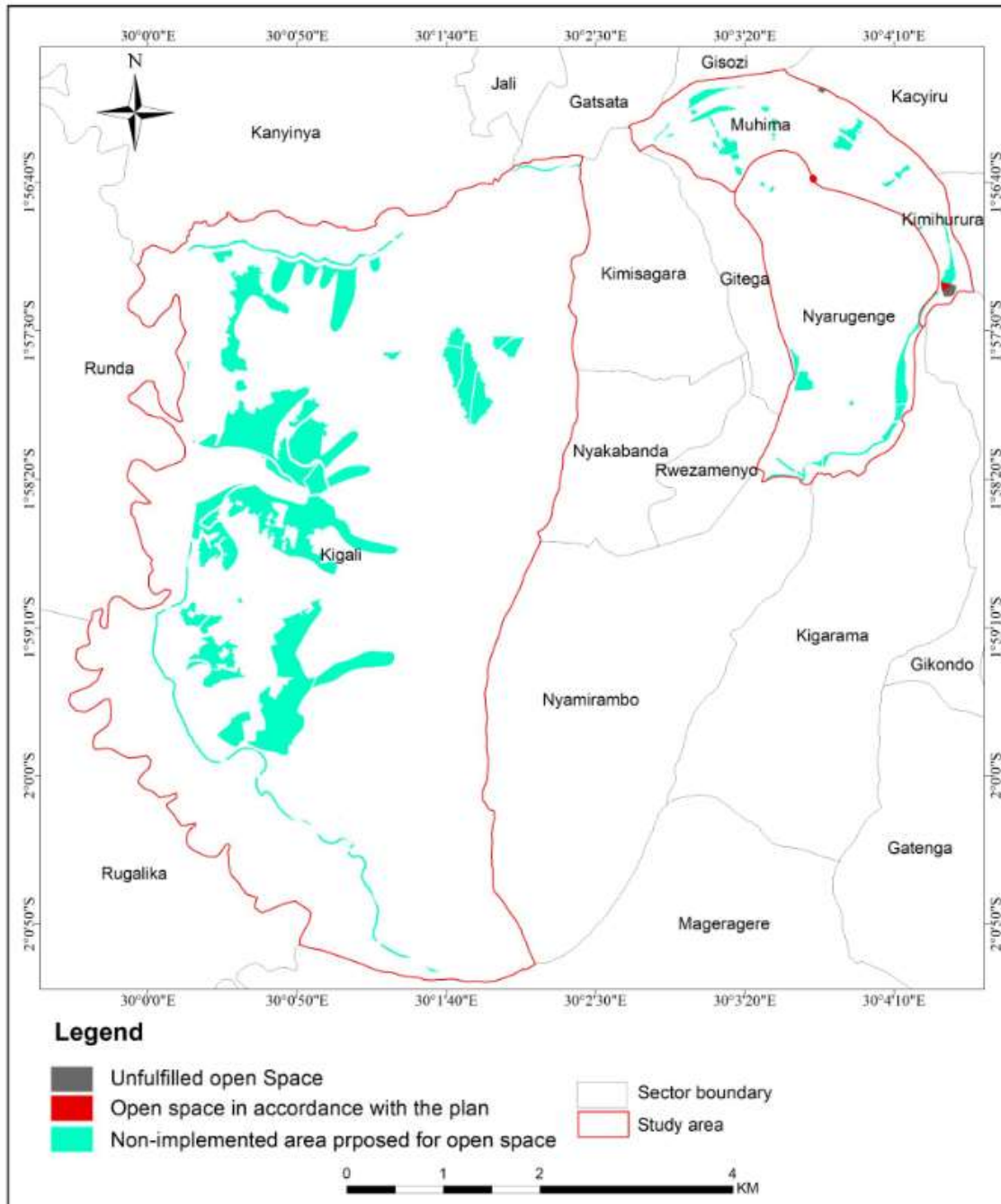
Map 10: Level of conformance for open spaces

The above figure illustrates the level of conformance between the actual open spaces and the master plan. The overlay showed that 40.9% (Table 3) of the total existing area for open spaces

is consistent with the master plan, while 59.1% (Table 3) is inconsistent. This inconsistence is an area of land which was used as open space before the adoption of the master plan, and that is still being used as open space while the master plan proposed to change the use. However, the deviation level is null. Meaning that no newly developed open space in contradictory with the master plan in the study area.

Instead, about 99.7% of the total area proposed for open space is not yet implemented as proposed. This is because the accordance level corresponds only to 0.3% (Table 4) of the total area proposed for open spaces. In fact, most of the land proposed for open spaces is currently used for other purposes, such as the following among others: agriculture and residential which occupy 79.1% and 8.4% of the total area proposed for open space respectively. In addition, there are wetlands which were proposed to be developed as open spaces, but they are not yet developed. Those are for instance the wetlands along *Boulevard de l'OUA*, north of Muhima and the wetland at Kigali Sector. Those wetlands were proposed to be developed into wetland park that offer recreational facilities. However, they are not yet developed while they were among the prioritized area whose implementation was supposed to be completed by 2020. The project of developing these wetlands into open spaces is still under preparation (B. Rukundo, personal communication, October 23, 2018). The following figure is an illustration of the previously discussed indicators of the degree of conformity between the actual land for open spaces and the master plan.
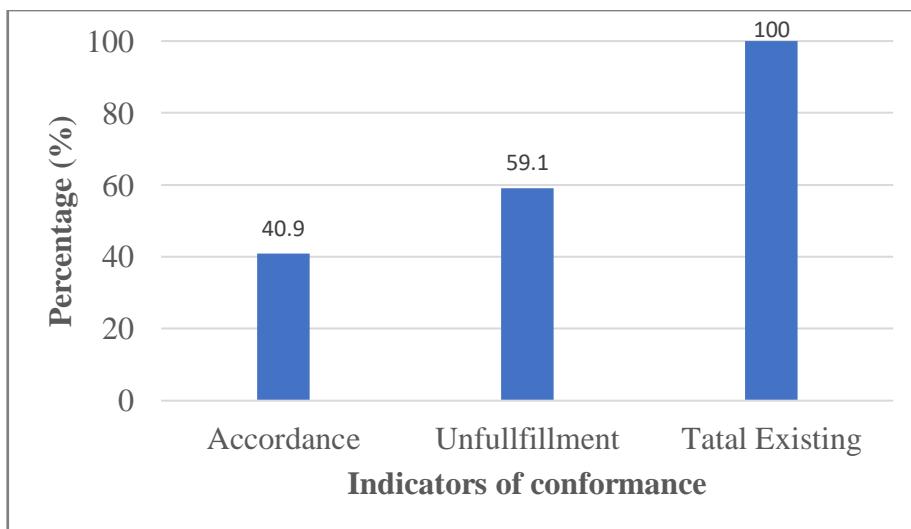
Figure 12: Level of conformance for open spaces

Having low accordance and high level of unfulfillment, the level of conformance for open spaces is also low with 99.7% of the total area proposed for open space being not yet implemented as proposed in the master plan.

4.2.9. Summary on level of conformance for all selected land uses

As it was previously mentioned, this study revealed that among eight major land uses, public facility is the highest land use that conforms to the master plan with a high level of conformance. Commercial, natural area and infrastructures have a medium level of conformance since more than a half of each of them is located in accordance with the master plan. However, these three land uses are not significantly sufficient where they are proposed to be located. None of them occupies more than a half of the total area proposed. The level of master plan implementation for agriculture and industries is very little. Most of the existing agriculture activities need to be replaced by residential and the majority of industries need to be relocated from the study area. The level of master plan implementation for residential is also low since the required buildings to be constructed are not affordable by the majority of people. The level of master plan implementation for open spaces is also low since the wetlands that were proposed to be developed as recreational areas are not yet developed. And most of the land proposed for open spaces is currently occupied by other uses such as agriculture and residential among others.

By comparing the result from this study with that of other scholars, it is identified that there are some similarities and dissimilarities between the status of Kigali City master plan implementation and that of other cities. For instance, according to the findings from this study, the level of Kigali City master plan implementation is different from that of Iskandar Malaysia considering the industries, open spaces and public facilities. The study conducted by Johar, et al., (2013) showed that the level of conformance in Iskandar Malaysia was relatively high for industry and open space while low for public facilities. However, there is a similarity regarding the implementation for residential because in Iskandar Malaysia the level of conformance was also relatively low for residential, which is similar to the findings from this study for Kigali City Master plan. In addition, Tian & Shen, (2011) evaluated the implementation of Guangzhou Urban Master Plan in China. Their findings showed that several main road infrastructures in Guangzhou were built as planned. Similarly, this study of Kigali City master plan implementation revealed that most of the infrastructures in the study area are constructed in their proper location although they are not sufficiently implemented. In fact, the level of Kigali City Master Plan implementation is low with only high implementation level for public facilities, medium implementation for commercial, natural area and infrastructure and a very low implementation for agriculture, residential, industrial areas and open spaces. The following section presents the challenges that are mostly encountered during the implementation of Kigali City Master Plan.

4.3. Challenges of implementing Kigali City master plan

During the implementation of Kigali City Master Plan, different challenges were encountered. The following table discusses these challenges and how they should be overcome.

Table 5: Challenges of implementing Kigali City Master Plan

S/N	Challenges	Description of the challenge	How to overcome the challenges	Source
1	Lack of coordinating body for planning and urban development	There are different national and City level agencies that are responsible for development of housing, planning and infrastructure provisions. However, there isn't an inter-ministerial City Planning Committee in Kigali. This leads to the uncoordinated development of those activities in some cases whereby planning and implementation work independently.	Establishment of additional institutions responsible to realize the Master Plan and Capacity building in order to be able to handle any type of urban project	(The City of Kigali, 2013b)
2	Limited Institutional Capacities	The existing institutions dealing with infrastructure and urban development are relatively small (in size) and low in capacity. Most of the staffs are young and need experience to handle large-scale urban projects.		
3	Limited public-owned land	Majority of land in Kigali is owned by private parties and the public land is very limited. Meanwhile there is a great demand of land for infrastructure, affordable housing and public facilities.	- Integrated Strategy for - Land Consolidation	Interview with City urban planner
4	Budget limited for the Government	The implementation of Kigali city master plan is challenged by the limited City funding whereby there is large funding requirement to acquire the private land for public use, and to	- Capital Improvement,	

S/N	Challenges	Description of the challenge	How to overcome the challenges	Source
		provide public infrastructure, as well as affordable public housing for the lower and medium income group.	- Projects and Catalytic Projects	
5	Low capacity of the citizens to do what is planned for their lands	Some of the hindrances that occurred in the implementation of the master plan are the low capacity of the citizens to do what is planned for their lands. In this case, it requires relocating the residents from their properties while many people are not willing to be relocated.	An integrated strategy is required to consolidate land for implementing the key projects and the Master Plan.	Interview with City urban planner
6	Lack of citizens participation during the planning process	The grassroots community have very little information about the Master Plan. They have not been given time to share their suggestions on how the Master Plan should look so as not to be surprised during the implementation stage.	Review of the master plan and allow citizen participation	(Rwanda Housing Authority, 2018).
7	Issues of the perceptions of the people	Since the master plan is new in the minds of Rwanda's peoples, their perceptions on its implementation are not commons. Some citizens think that they are not concerned with the implementation of the master plan. In addition, there are some people who think that the master plan is meant to favour riches and exclude the poor.	Public awareness: Let the public be aware of what a master plan is and its role.	Interview with City urban planner

As it is seen in the above table, the implementation of the master plan faces lot of challenges. Those include among others the lack of coordinating body for planning and urban development, the limited institutional capacities, limited public-owned land for the government to construct infrastructures and public facilities, budget limited, participatory issues, low capacity of the citizens to comply with zoning regulations and issues of the perceptions of the people. Based on these challenges, the City of Kigali is working toward overcoming them and the master plan is expected to be reviewed (CNBC Africa, 2018). The following section presents descriptive

statistics of the surveyed respondents on master plan implementation and its impact on the living condition of urban dwellers in Nyarugenge District

4.4. Descriptive statistics of the surveyed respondents

As already discussed, this study aims to explore the level of master plan implementation and its impact on the living condition of urban dwellers in Nyarugenge District, specifically in Nyarugenge, Muhima and Kigali sectors. In achieving these aims, this section illustrates and discusses the descriptive statistics of the findings from household survey. The section presents the respondents' identification (age), respondents' knowledge about Kigali City Master Plan, respondents' views on the role played by master plan implementation, respondents' knowledge on proposed zoning category and the level of respondents' satisfaction with the zoning category proposed in their neighbourhoods.

4.4.1. Identification (age) of respondents

According Kirtiraj (as cited in Oringo 2016), age of respondents is one of the most important characteristics in understanding their views on a particular problem. Large age indicates the level of maturity of individuals. Therefore, age becomes more important to examine the responses. In this study, the identification (age) of respondents is shown in Table 6 and it indicates that 40.33% of the sampled households were aged above 45 years, while 21.82% were aged between 36-45 years, and 37.85% were aged between 20-35 years. For this study, the respondents' ages started from 18 years old since according to Rwanda law N° 27/2001 of 28/04/2001 relating to rights and protection of the child against violence, everyone under 18 years old is considered as a Child (Government of Rwanda, 2001). Therefore, to get better responses it is necessary to ask mature people. In addition, it is identified that the total number of those who were aged above 45 years was greater than other categories. This is because most of the respondents were heads of the family.

Table 6: Respondents' age

Age in years	Respondent distribution	
	Frequency	**Percentages**
18-35	137	37.8
36-45	79	21.8
More than 45	146	40.3
Total	362	100

Source: Author (2018)

4.4.2. Respondents' knowledge about Kigali City Master Plan

Results presented in Table 7 pertained to respondents' knowledge about Kigali City Master Plan. The summary of descriptive statistics shows that about 92.3% of the total respondents knows what a master plan is, while 7.7% did not. In addtion the same table indicated that 80.5% of the respondents from the three sectors (Nyarugenge, Muhima and Kigali) know the type of zoning proposed for their neighborhood. Mean while their counter parts of 19.5% did not know.

Table 7: Respondents' knowledge about Kigali City Master Plan

Variables	Observation	Mean	Std. Deviation
People who knows what a master plan is	362	0.9227	0.26751
People who knows if there is a master plan designed for their neighbourhood	338	0.8047	0.39699
People who knows the type of zoning proposed for their neighbourhood	362	0.8895	0.31394

Source: Author (2018)

4.4.3. The role played by Kigali City master plan implementation

In order to find out whether Kigali City Master Plan implementation plays role on the living condition of dwellers, people were asked to talk about their views on the role played by Kigali City Master Plan implementation on their living condition. 64% (Table 8) of the total people surveyed agreed that the implementation of the master plan plays role in the improvement of their living condition. However, 36% (Table 8) of respondents disagreed. consequently, the result presented in table 8 shows that apart from 36% of respondents who said that the master plan does not play any role on their living condition, the rest 50.2%, 8%, 3% and 2.8% of respondents agreed that the master plan implementation helps them to access the basic infrastructures, to live in a clean environment, to access affordable housing and to get employment opportunities respectively.

Table 8: Role played by Kigali City Master Plan implementation

Role played by master plan implementation	Respondent distribution	
	Frequency	Percent
Access to basic infrastructures	182	50.2
Living in a clean environment	29	8
Access to affordable housing	11	3
Access to employment opportunities	10	2.8
No role	130	36
Total	362	100

Source: Author (2018).

4.4.4. Zoning category Proposed .

Table 9 indicated that 14.91% of respondents lives in area proposed for single family residential, 25.16% lives in an area proposed for low rise residential, and 46.89% live in area proposed for medium rise residential and 13.04 lives in area proposed for mixed use commercial.

Table 9: Proposed zoning category

Proposed zoning category	Respondent distribution	
	Frequency.	Percent
Single family residential	48	14.91
Low rise residential	81	25.16
Medium rise residential	151	46.89
Mixed-use commercial	42	13.04
Total	322	100.00

Source: Author (2018)

4.4.5. Level of satisfaction with the zoning category proposed

Respondents were also asked to mention their level of satisfaction with such zoning categories proposed in their needihoods. The results show that only 2.5% of respondents is very satisfied with their type of zoning proposed for their neighbourhood. Similarly, 24.06% is likely satisfied. However, 38.13% and 35.31% of respondents are respectively unlikely satisfied and definitely not satisfied with the type of zoning proposed in their neighbourhoods. On the average, people are unlikely satisfied with the zoning categories proposed for their neighbourhood.

Table 10: Level of satisfaction with the zoning category proposed

Level of satisfaction	Respondents distribution	
	Frequency	**Percentage**
Definitely not satisfied	113	35.31
Unlikely satisfied	122	38.13
Likely satisfied	77	24.06
Very satisfied	8	2.50
Total	320	100.00

Source: Author (2018)

In fact, most of the zoning categories proposed in Kigali City require high cost to perform them. Therefore, low income people are unable to fulfil the requirements. Consequently, they are relocated from their properties. As stated by Harney (2009), the fundamental problem with zoning regulations has been apparently excluding urban low-income communities by imposing housing standards out of their reach.

4.5. Impact of master plan implementation on the living condition of urban dwellers

Based on the objectives of the detailed master plan for Nyarugenge District mentioned in Table 1, the selected indicators of urban quality of life which are relate to these objectives were analysed. The purpose was to identify whether the implementation of the master plan plays role in the improvement of the living condition of the dwellers in the study area. By comparing the current availability of these indicators with their availability before the adoption of the master plan, this research has identified that an improvement was done. However, not all the selected indicators were improved. The paired samples t-test analysis showed that there are statistically significant differences between the current level of availability and accessibility and that of before the adoption of the master plan for some indicators. However, others do not show any statistically significant difference between the two situations. This means that the implementation of the master plan has partly impacted on the living conditions of the dwellers by improving the level of availability and accessibility of elements of quality of life in the dwellers' neighbourhoods. The following table is an illustration of the level to which these indicators of urban quality of life are accessible to the dwellers compared to their accessibility before the adoption of the master plan.

Table 11: Level of availability and accessibility of urban quality of life indicators

S/N	Indicator	Level of availability/accessibility		Mean difference	Std. Deviation	t	df	Sig. (2-tailed)
		Current	Before 2010					
1	Pedestrian infrastructures	0.671	0.323	0.348	0.477	13.9	361	0.000
2	Streets	0.834	0.696	0.138	0.353	7.4	361	0.000
3	Traffic lights	0.053	0.047	0.006	0.074	1.4	361	**0.158**
4	Bus stops	0.450	0.262	0.188	0.391	9.1	361	0.000
5	System of garbage collection	0.583	0.406	0.177	0.382	8.805	361	0.000
6	Nursery schools	0.735	0.682	0.052	0.235	4.2	361	0.000
7	Primary school	0.865	0.796	0.069	0.265	5.0	361	0.000
8	Health facilities	0.843	0.779	0.064	0.255	4.7	361	0.000
9	Clean water	0.978	0.517	0.461	0.499	17.6	361	0.000
10	Power of electricity	0.978	0.586	0.392	0.489	15.3	361	0.000
11	Sewage system	0.481	0.362	0.119	0.324	7.0	361	0.000
12	Affordable housing	0.218	0.456	**-0.238**	0.445	-10.2	361	0.000
13	Recreational area	0.227	0.218	0.008	0.190	0.8	361	**0.406**
14	Governmental administrative offices	0.923	0.812	0.111	0.314	6.7	361	0.000
15	Employment opportunities	0.080	0.069	0.011	0.128	1.6	361	**0.103**

Source: Author (2018)

The above table illustrates the result obtained from the paired samples t-test analysis concerning the availability/accessibility of the selected indicators of urban quality of life. Each indicator is discussed in the follow secti

4.5.1. Accessibility of pedestrian infrastructures

By comparing the current accessibility of pedestrian infrastructures with their accessibility before the adoption of the master plan, the result from the paired sampled t-test analysis showed that the number of people who access pedestrian infrastructures, has increased from 32.3% to 67.1% (Table 11) of the total people surveyed. This is because new pedestrian infrastructures have been constructed after the adoption of the master plan as agreed by 58.8% of the total people surveyed.

This indicates that the Government of Rwanda is following its public transport policy since two of the key principals of this policy are to design transportation systems that protect and serve the pedestrian first and to introduce pedestrian walkway everywhere possible on both side of roads (Ministry of Infrastructure, 2012). Consequently, 31.5% of the people surveyed said that the available pedestrian infrastructures help them in the reduction of road traffic accidents and 35.6% of the surveyed people said that the available pedestrian infrastructures help them to walk safely when they are walking on feet. In addition, the analysis shows that respondents are likely satisfied with how they are accessing pedestrian infrastructures (Table 14). Therefore, the implementation of the master plan plays role in the provision of pedestrian infrastructures.

This is an achievement to acknowledge for Kigali City since there are other cities which lack enough pedestrian infrastructures. For instance, in Jakarta, the capital and largest City of Indonesia, pedestrian infrastructures are very limited with 50% as the level of availability, having poor quality, no amenities, and many obstructions (Leather et al., 2011). Compared to Hong Kong in China, the availability of pedestrian infrastructures is 80% with the best walkability rating of 72.78% (ibid). Below is a table which shows a comparison between the current time taken and the time taken before the adoption of the master plan to reach elements of urban quality of life.

Table 12: Time taken before and after the adoption of the master plan

S/N	Variables	Mean (min)	Mean difference (min)	Std. Deviation	t	df	Sign
1	Current time taken to reach the nearest bus stop	18	-4	7	-9	361	0.000
	Time taken to reach the nearest bus stop before the adoption of the master plan	21					
2	Current time taken to reach the nearest nursery school Currently	12	-2	12	-4	361	0.000
	Time were taken to reach the nearest nursery schools before the adoption of the master plan	14					
3	Current time taken to reach the nearest primary school	12	-3	6	-9	361	0.000
	Time were taken to reach the nearest primary schools before the adoption of the master plan	15					
4	Time taken to reach the nearest health facility currently	15	-8	9	-16	361	0.000
	Time were taken to reach the nearest health facility before the adoption of the master plan	23					
5	Time taken to reach the nearest water tap currently for people whose houses are not connected to the water supply line	2	-5	6	-17	361	0.000
	Time were taken to reach the nearest water tap before the adoption of the master plan	7					

Source: Author (2018)

4.5.2. Accessibility of streets in the neighbourhood

The result from the comparison between the current accessibility of streets and their accessibility before the adoption of the master plan is as follow: The number of people who have access to streets has increased from 69.6% (Table 11) before the adoption of the master plan to 83.4% (Table) currently. Therefore, 13.80% of the people surveyed got streets constructed in their neighbourhoods after the adoption of the master plan. Moreover, the analysis showed that people are likely satisfied with the accessibility of streets in their neighbourhoods (Table 13). Furthermore, the respondents said that the available streets facilitate transportation and serve as connections for enhancing friendship among dwellers between neighbourhoods. Thus, the master plan implementation plays role in the accessibility of streets in the study area. Below is a table that shows the average levels of satisfaction of dwellers with the availability/accessibility of elements of urban quality of life in their neighbourhoods.

Table 13: Level of dwellers' satisfaction with availability/accessibility of indicators of urban quality of life

S/N	Variables	Mean satisfaction	Std.
1	Availability and accessibility of pedestrian infrastructure	3	1
2	Availability and accessibility of Streets	3	1
3	Availability of traffic lights	2	1
4	Availability, accessibility and the quality of bus stops	3	2
5	The system of garbage collection	3	2
6	Availability and accessibility of nursery schools	3	1
7	Availability and accessibility of primary schools	4	1
8	Availability and accessibility of health facilities	3	6
9	Availability and accessibility of clear water	4	1
10	Availability of the power of electricity	4	1
11	Availability and accessibility of sewage system	2	1
12	Availability and accessibility of affordable housing	2	1
13	Availability and accessibility of recreational facilities	2	1
14	Availability and quality of administrative offices	4	1
15	Availability of employment opportunities	2	1
16	Availability and accessibility of pedestrian infrastructure	3	1

1=Definitely not satisfied, 2=Unlikely satisfied, 3=Likely satisfied, 4=Very satisfied, 5=Excellently satisfied

Source: Author (2018)

4.5.3. Availability of traffic lights

Whereas, traffic lights play an integral role in road safety by coordinating the flow of traffic in intersections and preventing collision of cars coming from various directions (Felicio et al., 2015), this study revealed that there is a shortage of traffic lights in Nyarugenge District. The analysis revealed that traffic lights were not statistically significantly available before the adoption of the master plan, and even currently they are not. In fact, only 4.7% (Table 11) of the surveyed people agreed that traffic lights existed before the adoption of the master plan while 5.3% (Table 11) of the surveyed people agreed that traffic lights are currently available. Hence, there is an increase of only 0.6% (Table 11). This means that no significant improvement has been done regarding the availability of traffic rights. Therefore, the implementation of master plan did not play a statistically significant role in the availability of the traffic light. The study also identified that most of the dwellers in the study area are unlikely satisfied with the level of availability of traffic lights (Table 13).

4.5.4. Accessibility of bus stops

When the distance to and from public transport service is large; it ceases to be useful to the people who want to use it (Niyonsenga, 2018). However, the analysis from this study showed that the average time taken by dwellers of Nyarugenge, Muhima and Kigali sectors to reach the nearest bus stop by walk is up to 18 minutes (Table 12). Again, only 45.0% (Table 11) of the respondents can easily access the bus stops.

Nevertheless, this level of accessibility of bus stops has increased compared to their level of accessibility before the adoption of the master plan. In fact, among the people who were surveyed, only 26.2% (Table 11) agreed that they could access bus stops easily before the adoption of the master plan. On the average, the time taken by citizens to reach the nearest bus stop was 21 minutes (Table 12) before the adoption of the master plan. This shows that, whereas the level of accessibility seems to be insufficient, it has increased since the accessibility has increased, and the average time taken to reach the nearest by stop has decreased.

Some of the surveyed people stated that the available bus stops help passengers to board or alight from a bus and safeguard passengers from rain and sun. For this reason, dwellers are likely satisfied with the current availability of bus stops. In addition, the study conducted by Niyonsenga, (2018) revealed that 54% of the total population in Kigali City is provided acceptable access distance to public transport in Kigali City based on the 500 meter standard. The improvement of bus stops in Kigali City was among the activities proposed to be implemented by the City of Kigali (Ministry of Infrastructure, 2012).

4.5.5. Availability of solid waste collection system

The analysis from this study identified that, the number of people whose garbage is properly collected, has increased from 40.6% (Table 11) before the adoption of the master plan to 58.3% (Table 11) currently. Meaning that the system of garbage collection is being improved. This helps in the improvement of hygiene at home as said by some of the surveyed dwellers. Normally, there is a company that collect garbage once in a week and transport garbage to the landfill in Gasabo District. This system of garbage collection helps in the mitigation of diseases caused by the lack of cleanness. However, within the study area, the company works only in Nyarugenge and Muhima Sectors but not in Kigali Sector. On average, dwellers are likely satisfied (Table 10) with the current existing system of garbage collection. According to Barr et al., (2017), some areas of Kigali have high levels of enrolment in household solid waste collection and transport whereby the level of enrolment in Nyarugenge is on average 97%, followed by Kicukiro and Gasabo, with 88% and 84% respectively

By comparing the system of waste management in Kigali City with that of other African cities, it is identified that Kigali City is one of the cleanest cities in Africa. The success on the achievement of cleanness is due to leadership and innovative way of privatization of the solid waste management (Twagira, 2017). According to Oteng-ababio & Melara (2013), waste collection in the Accra Metropolitan Assembly (AMA) in Ghana is almost fully privatized, with approximately 8 contractors operating within the City. However, study by The World Bank (2010), revealed that 70% of respondents in Ghanaian Cities were unsatisfied with quality of waste management service.

4.5.6. The accessibility of nursery schools

The pre-school education is the foundation of basic education and plays a cornerstone role for children's development (Han, Zhang, & Yang, 2016). For this reason, this study analysed the role master plan has played on the availability and accessibility of nursery schools. The paired sample t-test analysis that was used to compare the current accessibility of nursery schools with their accessibility before the adoption of the master plan identified the result as follow: the number of people who accessed nursery schools before the adoption of the master plan was 68.2% (Table 11) of the total people surveyed, those who access nursery schools currently correspond to 73.5% (Table 11) of the total people surveyed. This is because new nursery schools have been constructed as agreed by 55% of the total people surveyed. Consequently, the average time taken to reach the nearest nursery school by walk has reduced from 14 minutes to 12 minutes (Table 12). Therefore, due to the implementation of the master plan, educational facilities are being provided in the study area.

Although there is no other study that has been conducted in Nyarugenge, Muhima and Kigali Sector on nursery school accessibility, the study conducted by United Nations Children's Fund (2014), in 20 different sites selected from 10 Districts of Rwanda revealed dissimilar result from those gotten from Nyarugenge, Muhima and Kigali sectors. These sites were selected based on their rural location and high levels of poverty, and the result from that study identified that on average, households with children who attend nursery correspond to 27.4% of the total people that were surveyed (United Nations Children's Fund, 2014).

4.5.7. Accessibility of primary schools

By comparing the accessibility of primary schools before the adoption of the master plan and the current situation, the analysis showed that the number of people who have access to primary schools is 86.5% (Table 11) of the total people surveyed, while those who accessed primary schools before the adoption of the master plan are 79.6% (Table 11) of the total people surveyed. Therefore, there is an increase of 6.9% of the level of accessibility to primary schools. Consequently, the average time taken by most of citizens to the nearest primary school has reduced from 15 minutes before the adoption of the master plan to 12 minutes currently (Table 12) by walk. In addition, the analysis showed that most of the people in the study area are very satisfied with the level of accessibility to primary school (Table 13).

4.5.8. Availability of health facilities

The analysis shows that the proportion of people who had access to health facilities before the adoption of the master plan corresponds to 77.9% (Table 11) of the people surveyed. However, 84.3% (Table 11) of the people surveyed have access to health facilities currently. By comparing the two levels of accessibility, it is identified that the level of accessibility of health facilities has increased with only 6.4% (Table 11). This means that new health facilities have been constructed in the study area after the adoption of the master plan. The average time taken to reach the nearest health facilities has reduced from 22.6 minutes (Table 12) before the adoption of the master plan to 14.9 min (Table 12) currently. Consequently, this accessibility helps in getting basic medical services easily and improving the living condition of the dwellers. For this reason, dwellers are likely satisfied with the availability and accessibility of health facilities in the study area (Table 13).

4.5.9. Availability of clean water in the neighbourhoods

The analysis identifies that after the adoption of the master plan; most of the people in the study area are currently able to access water tap of clean water easily. The level of accessibility has increased in the way that people who have access to water tap of clean water in their neighbourhoods correspond to 97.8% (Table 11) of the total people surveyed. However, those who assessed water tap before the adoption of the master plan correspond only to 51.7% (Table 11) of the people surveyed. Consequently, the average time taken to reach the nearest water tap has reduced from 7.4 minutes (Table 12) before the adoption of the master plan to 2 minutes currently (Table 12). This helps the dwellers to get clean water that they use in different activities easily. Therefore, the implementation of the master plan has played role in the easy access to clean water. Comparatively, the study conducted by Kartas & Jütersonke, (2012) revealed that about 87% of the population in Kigali City currently has access to water. The same study revealed that on average, 61% of those who do not have water tap at their house, they have access of water tap within 500 metres.

4.5.10. Accessibility of the power of electricity

When comparing the situation of before the adoption of the master plan with the current situation, the analysis shows that the level of accessibility to the power of electricity has increased. Normally, the number of people who access the power of electricity in their houses corresponds to 91.4% (Table 11) of the total people surveyed. However, the number of people who were able to access the electricity before the adoption of the master plan corresponds to

65.7% (Table 11) of the total people that were surveyed. This shows an increase of 25.7% of the total people surveyed. This helps dwellers in different ways such as lighting rooms, charging electrical devices, cooking and ironing among others. Consequently, dwellers are very satisfied with the current availability of the power of electricity (Table 13).

4.5.11. Availability of sewage system

Regarding the availability of sewage system, the analysis shows that sewage system is not sufficiently available in the study area. In fact, only 48.1% (Table 11) of the total people surveyed said that the sewage systems are currently available in their neighbourhood. In addition, 36.2% (Table) of the total people surveyed said that sewage systems were available before the adoption of the master plan. Therefore, there is an increase of 11.7% (Table 11) of the total people surveyed. Although the difference is statistically significant, well-constructed sewages are not sufficient in the study area. For this reason, the majority of people are unlikely satisfied with the current availability of sewage system (Table 13). Hence, the implementation of the master plan has played role in the improvement of the sewage system, but this improvement is not sufficient for dwellers.

4.5.12. Availability of affordable housing

Regarding the availability of affordable housing, the analysis shows that there is a problem of getting affordable housing in the study area. In fact, up to 78.2% confirmed that affordable housings are not available in their neighbourhoods. This is justified by that most of the tenant who were surveyed said that they are unlikely satisfied with their monthly income to pay the rental cost (Table 13). However, 54.4% (Table 11) of the total people surveyed said that houses were affordable before the adoption of the master plan. The result in Table 11 shows that there is a statistically significant negative difference between the current availability of affordable housing and its availability before the adoption of the master plan. The negative difference means that the availability of affordable housing currently is worse than how housing was available before the adoption of the master plan. Therefore, although one of the objectives of the master plan is the provision of affordable housing for all groups of people, the analysis identified that the implementation of the master plan did not play a statistically significant role in the provision of affordable housing in the study area.

Different study that were conducted in Kigali City also revealed the almost similar finding regarding the issue of affordable housing. The study conducted by Nkubito, (2016) revealed that there is a discrepancy between master plan's assumptions and existing social and economic conditions, which as a result implies a huge cost implication on housing. With more than 73 %

of the City's households earns as less than RWF 300,000, while such monthly revenue would not afford a housing required in Kigali City. Without subsidies there is nowhere in Kigali such amount can build a house (ibid). In addition, the study conducted by Kartas & Jütersonke, (2012) revealed that 40% to 80% of the inhabitants in Kigali City are tenants with an average per capita income of 30-50 USD per month. And such monthly income is not sufficient to accommodate all basic needs including housing rent. Normally, Kigali City considers strict land use regulation as a viable solution against spontaneous urban growth and for efficient use of land. However, enforcement of the master plan and zoning is regarded as a major factor to the shortages of affordable housing (Nkubito, 2016). Generally, as stated by other scholars, zoning may affect affordability by imposing compliances standards relating to height, density and amenities that make the overall building costs too high or alternatively leading to higher prices of finished houses (Mayer & Somerville, 2000)

4.5.13. Availability of recreational

Regarding the availability of recreational areas, when comparing the current situation with the situation before the adoption of the master plan, the analysis shows that the results seem to be the same in these two situations. In fact, only **21.3%** (Table 11) of the total people surveyed could access recreational areas before the adoption of the master plan, while **23.8% (Table 11)** are the only people who can access recreation areas currently**.** This means that there is a shortage of recreational areas in the study. Therefore, the implementation of the master plan did not improve the level of availability of recreational areas and dwellers are unlikely satisfied with the current availability and accessibility of recreational areas (Table 13).

4.5.14. Accessibility of governmental administrative offices

By comparing the level of accessibility of governmental administrative offices before and after the adoption of the master plan, it is identified that governmental administrative offices were accessible and are still accessible to the majority of the dwellers. Normally, 81.2% (Table 11) of respondents confirmed that they have been accessing governmental administrative offices even before the adoption of the master plan. However, 11.1% of the people surveyed could not access governmental administrative offices easily before the adoption of the master plan, but they are currently accessing them easily in their neighbourhoods. A total of 92.3% (Table 11) of the respondents can currently access governmental administrative offices in their neighbourhoods. This means that some new governmental administrative offices have been constructed. For this, the analysis showed that dwellers are very satisfied with the current availability of governmental administrative offices (Table 13).

4.5.15. Availability of employment opportunities

The analysis showed that only 6.9% (Table 11) of the people surveyed were employed before the adoption of the master plan. An only 8.0% (Table 11) of the total people surveyed are currently employed. It is identified that the master plan implementation didn't significantly impact on the availability of employment opportunities in the study area. Thus, dwellers are unlikely satisfied with the current availability of employment opportunities (Table 13).

4.6.   Conclusion

This chapter presented a detailed description and discussion of the results revealed by this study through GIS overlay analysis of geodata sets, literature review, interviews and the paired sample t-test analysis of the data from household survey. The analysis of geodata sets showed that among eight selected land use types, public facilities are highly in conformance with the master plan, commercial, natural area and infrastructures seems to be also high, since more than a half of each of the existing three land use types is located in accordance with the master plan. However, none of these three land use types occupies more than a half of the total area proposed for each of them. For agriculture and industries their levels of implementation are very low. Most of the existing agricultural area is supposed to change the use and most of the existing industries need to be relocated from the study area. The level of master plan implementation for residential use is also low since the required buildings to be constructed are not affordable by the majority of people. The level of master plan implementation for open spaces is also very low for several reasons. Firstly, the wetlands that were proposed to be developed into recreational use are not yet developed. Secondary, most of the land proposed for open spaces is currently occupied by other uses such as agriculture and residential among others.

The findings from literature review and interviews with authorities revealed that the implementation of Kigali City Master Plan is challenged by different factors. Those are among others the lack of coordinating body for planning and urban development, limited institutional capacities, limited budget for the Government, low capacity of the citizens to comply with the zoning regulations and lack of citizen's participation. To overcome these challenges, different measures were taken by the City of Kigali and the most important thing is the review of the master plan which is going to be undertaken.

Regarding the result from the paired sample t-test analysis, this study revealed that the master plan implementation has partly played role in the improvement of the dwellers' living condition

whereby the level of availability and accessibility of some elements of urban quality of life was improved in dwellers' neighbourhoods. These elements which show an improvement are pedestrian infrastructures, streets, bus stops, system of garbage collection, nursery schools, primary schools, health facilities, clean water, electricity and offices. However, the implementation of the master plan did not play a significant role on the availability /accessibility of the following elements: traffic lights, affordable housing, recreational area, and employment opportunities. Therefore, the implementation of master plan has partly impacted on the living condition of urban dwellers in the study area. The next chapter is a general conclusion for all finds of this study.

Chapter five: General conclusion and recommendations

5.1.   Introduction

This chapter discusses the general conclusion and recommendations based on research process and research findings. Firstly, it relates the research findings with the research objectives and their corresponding research questions. Secondary, it suggests recommendations for achieving strategic interventions for sustainable implementation of Kigali City Master Plan, for enhancing the living condition of the inhabitants and for further researches relating to the implementation of the master plan and its impact on urban dwellers.

5.2.   General conclusion

The main objective of this research was to evaluate the status of Kigali City Master Plan implementation in Nyarugenge District and to assess how such implementation is impacting on the living condition of the urban dwellers. Six sub-objectives and their corresponding research questions were formulated to achieve the main objective.

These research questions were (i) What are the development priorities that should be completed by 2020 for Nyarugenge, Muhima and Kigali sectors? (ii) What are the completed ones among those prioritized developments? (iii) To what extent do the current land uses conform to the master plan of Nyarugenge District? (iv) What are the challenges that affect the implementation of Kigali City master plan? (v) How is the implementation of the master plan of Nyarugenge District impacting on the living conditions of the urban dwellers? (vi) What are the recommendations on strategic interventions for sustainable implementation of Kigali City Master Plan?

To respond to these questions, different data were collected from different sources and different methods were applied in data collection, data processing and data analysis. The collected data include primary and secondary data. The primary data were collected through field observation, structured interview with urban planner and local leaders and household survey. Two categories of secondary data well also collected. The fist category comprises the published and non-published documents as well as the government reports. Those well reviewed to acquire the need information. The second category comprises geodata sets that were collected from the office of Kigali City. The data were processed and analysed using different method and tools depending on the type of the data and on the issue to be investigated. The primary data was analysed using statistical analysis tools such as the descriptive statistics and the paired sample

t-test analysis by SPSS. Geodata sets were processed and analysed using the GIS overlay tools by Arc GIS.10.6.

The research questions were answered as follow: chapter two answered the first question, chapter four answered the second, the third, the four and the fifth questions, and then chapter five answered the last question. Below are the answers of the research questions as they were answered in the previous chapters.

Question 1: What are the development priorities that should be completed by 2020 for Nyarugenge, Muhima and Kigali sectors?

To respond to this question, a review of literature and the interview with urban planner and local leaders were conducted. It was identified that the key development proposed in Nyarugenge Sector include the Centre Ville Roundabout Redevelopment, Nyarugenge commercial and Heritage Village redevelopment, and the Upper Kiyovu Residential Development. The key developments proposed for Muhima sector include Kigali CBD Phase 1 development as the new CBD which envisioned to house a mix of high-end retail and office spaces, the Nyabugogo Transport Hub and Market redevelopment into an integrated transportation with complementary commercial and office facilities, and the Kigali CBD Wetland development as a wetland park that offers a range of recreational, educational and critical environmental benefits. The key developments proposed in the Land Use Plan for Kigali Sector include the development of a high-density medium rise residential township on top of the hill, the development of single-family residential neighbourhoods as part of the township development, the development of recreational venues along the wetlands, the development of public facilities and commercial facilities that support the residential growth and the provision of sufficient land for industries.

Question 2: What are the completed ones among those prioritized developments?

To respond to this question, a vision observation, interviews and overlay analysis were conducted. It was identified that the Centre Ville Roundabout Redevelopment is not yet completed however, it is under development. Some of the informal houses are being demolished, people were compensated, and expropriated, and private bodies are developing the area into modern building that hold commercial activities and offices. Roads were improved and pedestrian infrastructures around the roundabout were constructed. Nyarugenge commercial and Heritage Village is under development, this is a commercial centre named quartier commercial and quartier Mateus. This area is being improved with row and medium

rise buildings for commercial and offices as well as mixed use. Upper Kiyovu Residential is also under development people who were not able to comply with the master plan were compensated and expropriated. There are also those who were given new house in Batsinda as compensation instead of monetary compensation. Kigali CBD Phase 1 is also still under development. Small shops are being replaced by modern and comprehensive building for high-end retail and office. Nyabugogo Transport Hub and Market is under development. The Nyabugogo tax park is completely developed. New offices around the tax park were constructed and some new commercial buildings were completed, while there are others under construction. However, still undeveloped houses for those who are not able to construct the require building category. They cannot renew their houses and they are afraid of being relocated in the future. In addition, the wetlands are not yet developed. The plans for developing these wetlands are still under preparation. The high-density medium rise residential township that was proposed to be on top of the hill is not yet developed since this zoning category is not affordable by the majority of people. The single-family residential neighbourhoods are under development in Kigali sector. The recreational venues along the wetlands in Kigali sector are not yet developed. Public facilities are under development since new nursery, primary schools were constructed and there are others under construction. Commercial facilities are still missing in Kigali sector.

Question 3: To what extent do the current land uses conform to the master plan of Nyarugenge District?

To respond to this question, an overlay analysis was applied. It was revealed that among the eight major land uses that were analysed, only public facilities highly conform to the master plan. Commercial, natural area and infrastructures have a medium level of conformance since more than a half of each of them is located in accordance with the master plan. However, these three land uses are not significantly sufficient in the area they were proposed to be. None of them occupies more than a half of the total area proposed. The level of master plan implementation for agriculture and industries is too low. Most of the existing agriculture activities need to be replaced by residential and the majority of industries need to be relocated from the study area. The level of master plan implementation for residential use is also low since the required buildings to be constructed are not affordable by the majority of people. For open spaces, the level of their implementation is too low because the wetlands that were proposed to be developed as recreational areas are not yet developed.

Question 4: What are the challenges that affect the implementation of Kigali City master plan?

To respond to this question, a literature review and interviews were conducted. It was identified that the implementation of the master plan faces many challenges. Among them include the lack of coordinating body for planning and urban development, the limited institutional capacities, limited public-owned land for the government to construct infrastructures and public facilities, budget limited, participatory issues, low capacity of the citizens to comply with zoning regulations and the issues of the peoples' perceptions.

Question 5: How is the implementation of the master plan of Nyarugenge District impacting on the living conditions of the urban dwellers?

To answer to this question a paired sample t-test analysis was applied. The current availability/accessibility of the selected elements of urban quality of life was compared with their availability/accessibility before the adoption of the master plan. The results revealed that the master plan implementation has played role in the improvement of the dwellers' living condition whereby the level of availability and accessibility of the elements of urban quality of life was improved in dwellers' neighbourhoods. These elements which show an improvement are pedestrian infrastructures, streets, bus stops, system of garbage collection, nursery schools, primary schools, health facilities, clean water, electricity and offices. However, the implementation of the master plan did not play a significant role on the availability /accessibility of the following elements: traffic lights, affordable housing, recreational area, and employment opportunities. Therefore, the implementation of master plan has partly impacted on the living condition of urban dwellers in the study area.

Question 5: What are the recommendations on strategic interventions for sustainable implementation of Kigali City Master Plan?

To respond to this question, the interviews and literature review were applied. The purpose was to identify first the challenges related to the implementation of the master plan and the ways to overcome these challenges. From these identified challenges, recommendations on strategic interventions for sustainable implementation of Kigali City Master Plan were suggested. These suggestions are presented in the second part of this chapter which is hereafter presented.

5.3. Recommendations

Since the soul of a master plan lies in its implementation framework, different strategies and measures are required to attain the implementation of the master plan. As this study has identified challenges that affect the implementation of the Kigali City master plan and their corresponding ways of overcoming these challenges, this study suggests recommendations on strategic interventions for sustainable implementation of Kigali City Master plan. In addition, based on the findings from the household survey about how the implementation of Kigali City Mater Plan is impacting on the living condition of urban dwellers, this study suggests recommendation on how the dwellers' living condition should be well improved through the implementation of the master plan. Moreover, considering the gaps of this research, recommendations for furthers researches are also presented.

❖ **Toward sustainable implementation of Kigali City master plan.**

It has identified that during the preparation of Kigali City Master plan, citizens' participation was not sufficiently considered. This resulted in the adoption of zoning categories and regulations which are not feasible by the citizens who are classified in low-income group. Therefore, they do not have capacity to comply with the proposed zoning regulations. For this reason, it is needed to review the master plan and its implementation tools and allow citizens' participation before the approval of it. This may help in preparing a master plan which consider all categories of people including the low, medium and high-income groups. This may be useful in the implementation since citizens will be able to comply with the master plan regulation. It was also identified that some citizens do not know what a master plan is and its role on living condition of urban dwellers. It is therefore needed for the City of Kigali, to help the public knowing deeply what a master plan is and how it impacts on their living condition. This may be done through among others the public meetings, broadcasting news and *umuganda* (community works).

Since the implementation of Kigali City master plan encounters the challenge of lacking coordinating body for planning and urban development. The City of Kigali needs to establish an additional institution that is responsible for coordinating all activities relating to urban planning and plan implementation. In addition, due to problem of limited institutional capacities, where the existing institutions dealing with infrastructure and urban development are relatively small and with low in capacity, the City of Kigali needs to increase the number of staffs and look for international trainers for staffs' capacity building. This may enable them to handle any issue relating to urban planning and implementation.

This study has revealed that among the prioritized developments that should be implemented by 2020, none of them is yet complemented and limited budget is classified among the identified challenges. It is therefore needed for the City of Kigali to work in partnership with private financial institutions and NGO, and to prioritize developments based on the available capital. This may help in realizing the planned projects within the due date.

❖ **Need for urban planners toward achieving better implementation of the master plan**

This study has revealed that the level of master plan implementation is highly low in Kigali Sector, it is therefore needed for the City of Kigali to put much effort in the implementation of the master plan in Kigali sector. In addition, among the analysed land uses, agriculture and residential have the low levels of implementation because zoning regulations require unaffordable developments for the majority of citizens. For this reason, those regulation needed to be revised and the low-income groups need to be given financial or technical support to complying with the master plan. This study has identified that master plan implementation for open spaces is also low. Wetlands that were proposed to be developed into recreational areas were not developed. It is therefore needed to put much effort in developing these wetlands for creation of recreation areas.

❖ **Provision of elements of urban quality of life where they are deficient**

This study has identified that some elements of urban quality of life that are missing in the study area. Those are traffic lights, affordable housing, recreational area, and employment opportunities. It is therefore needed for Kigali City to put much effort in providing these elements, since they are among the most important elements in the improvement of living conditions of urban dwellers.

❖ **Suggestions for further researches**

This research did not cover the negative impact of master plan implementation on the living condition of urban dwellers. It is therefore recommended for further researches to not only evaluate the side positive of the master plan implementation but also its negative side.

References

Ahmed, S. (2009). *Methods in Sample Surveys Simple Random Sampling Systematic Sampling*. The Johns Hopkins University.

Alexander, E. R., & Faludi, A. (1989). Planning and plan implementation: notes on evaluation criteria. *Environment and Planning B: Planning and Design*, *16*(2), 127–140.

Ali, A., Sharafi, H. A., & Ghazanfarpour, H. (2014). Analysis urban life quality , case study residents of Rostamabad City. *American Journal of Engineering Research (AJER)*, *3*(3), 322–329.

Azorín, J. M., & Cameron, R. (2010). The application of mixed methods in organisational research: A literature review. *Electronic Journal of Business Research Methods*, *8*(2), 95–105.

Barr, J., Lund, G., Services, F. I., Kironde, E., & Apindi, E. (2017). *Rwanda State of Environment and Outlook Report 2017: Achieving Sustainable Urbanization*. Kigali, Rwanda.

Berke, P., Backhurst, M., Day, M., Ericksen, N., Laurian, L., Crawford, J., & Dixon, J. (2006). What makes plan implementation successful? An evaluation of local plans and implementation practices in New Zealand. *Environment and Planning B: Planning and Design*.

Chandler, M. (2000). Ten Steps in Preparing a Comprehensive Plan. *the planning commission at work*, (39), 9–11.

Chetty, P. (2016). Importance of research approach in a research. *Research Design Strategy*.

CNBC Africa. (2018). Kigali City master plan under review. Rwanda.

Creswell, J. W. (2014). *Research design : qualitative, quantitative, and mixed methods approaches*. SAGE.

Czapiński, J. (2013). *The quality of life in Poland - winners and losers. Social diagnosis 2013 objective and subjective quality of life in Poland*.

Dukale, Y. (2012). *Assessment of urban plan and design implementation and management in Ethiopian secondary towns: The Case of Dilla*. Addis Ababa University.

Faludi, A. (2000). The performance of spatial planning. *Planning Practice and Research*, *15*(4), 299–318.

Geraldine, P., FelicioLorelie, C., GrepoVincent, F., ReyesLancelot, C., & Yupingkun. (2015). Traffic Light Displays and Driver Behaviors, 3266–3273.

Feneri, A. m, Vagiona, D., & Karanikolas, N. (2013). Measuring quality of life (QOL) in urban environment : An integrated approach, (September).

Garau, C., & Pavan, V. M. (2018). Evaluating Urban Quality: Indicators and Assessment Tools for Smart Sustainable Cities. *Sustainability*.

Georgiou, J. (2009). Quality of Life Indicators : The Objective-Subjective Interrelationship

That Exists within One ' s ' Place of Residence ' in Old Age, 3–20.

Gilhooly, M., & Gilhooly, K. (2005). Quality of Life : Meaning , Measurement , and Models.

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research, *8*(4), 597–606.

Goodfellow, T. (2014). Rwanda's urban transition and the RPF political settlement: Expropriation, construction and taxation in Kigali. *Journal of Eastern African Studies*, *8*(2), 311–329.

Government of Rwanda. Law No . 27 / 2001 Relating to Rights and Protection of the Child Against Violence (2001). Rwanda.

Gwaleba, M. J. (2016). *Improving Tenure Security of Informal Settlements Through Participatory Land Use Planning (PLUP)*. Technical University of Munich.

Hameed, R., & Nadeem, O. (2008). Challenges of Implementing Urban Master Plans: The Lahore Experience. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *2*(12), 1297–1304.

Han, Y., Zhang, Y., & Yang, X. (2016). Analysis on the Differences of Pre-School Education Development in Western China from the Perspective of Balanced Urban and Rural Areas Development. *Open Journal of Social Sciences*, *4*, 115–121.

Harney, B. (2009). The economics of exclusionary zoning and affordable housing. *Stetson Law Review*, *38*(91), 489.

Johar, F., Sabri, S., & Yunos, F. (2013). Implementation of the physical development strategy in Iskandar. *Paper Presented in Track E (Development, Policy, and Control) at the 2ndInternational Conference on Regional Development, Semarang (Indonesia)*.

Kartas, M., & Jütersonke, O. (2012). Urban Resilience in Situations of Chronic Violence Case Study of Kigali , Rwanda, (May), 1–39.

Khaef, S., & Zebardast, E. (2016). Assessing Quality of Life Dimensions in Deteriorated Inner Areas: A case from Javadieh Neighborhood in Tehran Metropolis. *Social Indicators Research*, *127*(2), 761–775.]

Kothari, C. . (2004). *Research Methodology: Methods & Techniques*. New Age International (P) Ltd.

Lani, J. (2010). Paired Sample T-Test. In *Statistics Solutions*.

Laurian, L., Day, M., Berke, P., Ericksen, N., Backhurst, M., Crawford, J., & Dixon, J. (2004). Evaluating plan implementation: A conformance-based methodology. *Journal of the American Planning Association*, *70*(4), 471–480.

Leather, J., Fabian, H., Gota, S., & Mejia, A. (2011). Walkability and Pedestrian Facilities in Asian Cities State and Issues Walkability and Pedestrian Facilities in Asian Cities. *ADB Sustainable Development Working Paper Series*, (17).

Loh, C. G. (2011). Assessing and Interpreting Non-conformance in Land-use Planning

Implementation. *Planning Practice & Research*, *3*(26), 271–287.

Mabaso, A., Shekede, M., Chirisa, I., Zanamwe, L., Gwitira, I., & Bandauko, E. (2015). Urban physical development and master planning in Zimbabwe: An assessment of conformance in the City of Mutare. *University of Namibia, Journal for Studies in Humanities and Social Sciences*, *4*(1 & 2), 72–88.

Mayer, C. J., & Somerville, C. T. (2000). Land use regulation and new construction. *Regional and Urban Economics*.

McGready, J. (2006). *The Paired t-test and Hypothesis Testing*. The Johns Hopkins University and John McGready.

Ministry of Infrastructure. (2012). *Public transport policy and strategy for Rwanda*. Government of Rwanda.

Mishra, A. K. (2012). Urban master plans in Rajasthan, India: the case of Alwar, *4*(1), 31–44.

Mugisha, J. (2016). Compensation for Land Expropriation in Rwanda: The Need for Conventional Approaches to Valuation. *Journal of Land Administration in Eastern Africa*, *3*(1), 296–306.

Myers, D. (2016). Building Knowledge about Quality of Life for Urban Planning.

Niyonsenga, D. (2018). *Assessing public transport supply for Kigali, Rwanda*. University of Twente.

Nkubito, F. (2016). *Impact of zoning-based planning systems on housing affordability for the urban poor: The case of Kigali city, Rwanda*. University of Manchester.

Nováková, B., & Šoltés, V. (2016). Quality of life research: material living conditions in the Visegrad group countries. *Economics and Sociology*, *9*(1), 282–294.

Oringo, J. O. (2016). Constraints on research productivity in Kenyan universities: Case study of university of Nairobi, Kenya. *International Journal of Recent Advances in Multidisciplinary Research*, *3*(8), 1785–1794.

Oteng-ababio, M., & Melara Ernesto, J. (2013). Solid waste management in African cities : Sorting the facts from the fads in Accra , Ghana, (April 2018).

Pätsch, C. (2017). *The capacity of institutional innovation following the diffusion of urban plans : Explorations of the impact of an urban master plan in Kigali , Rwanda*.

Pinson, G. (2010). Urban and regional planning, *2*, 1005–1007.

Rose, H., Mugisha, F., Kananga, A., & Clay, D. (2016). The implementation of Rwanda's expropriation law and its outcomes on the population. In *Paper prepared for presentation at the "2016 World bank conference on land and poverty."* Washington DC: The World Bank.

Rwanda Environment Management Authority. (2017). *State of Environment and Outlook Report*. Kigali, Rwanda.

Rwanda Housing Authority. (2018). City of Kigali seeks public engagement in updating

Master Plan. Retrieved December 7, 2018, from
http://www.rha.gov.rw/index.php?id=177&tx_ttnews%5Btt_news%5D=214&cHash=e0
627e2353f86dc647e2d765911dbb7a

Serag, H., Din, E., Shalaby, A., & Elsayed, H. (2015). Principles of urban quality of life for a neighborhood. *HBRC Journal*, *9*(1), 86–92.

Shapiro, J. (2001). Overview of Planning Overview of Planning, 1–52.

Shier, R. (2004). Paired t-tests. In *Statistics*.

Shoeibi, M., Amraii, I., Mafakheri, A., Karimi, A., & Alahdinivandi, A. (2015). Analysis of Subjective Indicators of Quality of Life in Urban Areas of Iran (Case Study : Sonqor City), *3*(3), 39–46.

Silva, C. N. (2015). Urban planning in Sub-Saharan Africa: colonial and post-colonial planning cultures. Routledge.

Stein, P. (2001). *urbact project results*. European Union.

Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and qualitative approaches in the social and bihavioral sciences*.

Teddlie, C., & Yu, F. (2007). Journal of Mixed Methods Research: Mixed Methods Sampling: A Typology With Examples.

The City of Kigali. (2010a). *Detailed Master Plan and Urban Design Report for CBD1, CBD2 and Kimicanga*. Kigali, Rwanda.

The City of Kigali. (2010b). *Detailed Master Plan Report for Nyarugenge District*. Kigali, Rwanda.

The City of Kigali. (2013a). *Detailed District Physical Plans: Nyarugenge District Zoning Plan Report*. Kigali, Rwanda: City of Kigali.

The City of Kigali. (2013b). *Kigali City analysis, benchmarking & vision report*. *Detailed district physical plans for Kicukiro & Gasabo*. Kigali, Rwanda.

The City of Kigali. (2013c). *Kigali City Master Plan Report*. Kigali, Rwanda.

The World Bank. (2010). *City of Accra, Ghana consultative citizens' report card*. Washington, DC.

Tian, L., & Shen, T. (2011). Evaluation of plan implementation in the transitional China: A case of Guangzhou city master plan. *Cities*, *28*(1), 11–27.

Tiwary, A. N. (2015). Master Plan Approach in Urban Development : A Case Study of Mirzapur City.

Twagira, E. (2017). PERSPECTIVE OF SOLID WASTE COLLECTION IN THE CITY OF KIGALI. In *Africa Engineering Conference (AEC) 2017*.

UBC Environment and Sustainable Development. (2011). *Planning Together for Better Quality of Life – Guide for Integrated Management of Urban Rural Interaction*. Turku, Finland.: UBC Environment and Sustainable Development Secretariat.

UNHabitat. (2004). *Urban Indicators Guidelines Monitoring the Habitat Agenda and the Millennium Development Goal*.

United Nations Children's Fund. (2014). *Early Childhood Development and Family Services Baseline Evaluation in 20 Sites in Rwanda*. Kigali, Rwanda.

Watson, V. (2009). The planned city sweeps the poor away : Urban planning and 21st century urbanisation. *Progress in Planning*, *72*, 151–193.

Williams, C. (2007). Research Methods. *Journal of Business & Economic Research*, *5*(3), 65–72.

Appendix A: Research compatibility matrix

Research specific objectives	Research questions	Data requirements	Data sources	Methods and Techniques	Expected outcomes
1. To identify development priorities whose implementation is expected to be completed by 2020,	What are the development priorities in the master plan of Nyarugenge District that should be completed by 2020?	- Master plan reports of Nyarugenge district - Responses from structured interviews	- The City of Kigali	- Literature Review - Structured Interviews	The development priorities whose implementation is expected to be completed by 2020
2. To identify the completed developments with respect to those proposed to be completed by 2020,	What are the completed developments with respect to those planned?	-Responses from interviews - Physical appearance on the field	-The City of Kigali -Sector office	- Structed interview - Visual observation	The completed developments that were planned to be completed by 2020
3. To assess the level of conformance of master plan of Nyarugenge District to the current situation on the ground,	To which extent do the current land uses conform to the master plan for Nyarugenge District?	-Existing land use of 2010 -Existing land use of 2018 -Master plan of Nyarugenge District of 2010	-The city of Kigali	Overlay analysis using ArcGIS10.6	The level of conformance between the actual spatial development and the master plan of Nyarugenge District

Research specific objectives	Research questions	Data requirements	Data sources	Methods and Techniques	Expected outcomes
4. To determine challenges of master plan implementation within Nyarugenge District,	What are the challenges that affect the implementation of Kigali City master plan?	Responses from interviews.	- Kigali City - Sector office	- Interviews - Review of literature	Challenges that affect the implementation of Kigali city master plan in Nyarugenge District.
5. To determine how the implementation of master plan of Nyarugenge District is impacting on the living condition of the dwellers,	How is the implementation of the master plan of Nyarugenge District impacting on the living conditions of the urban dwellers?	Responses from household survey	Sampled households	- Household survey - Visual observation - Paired sample t test analysis - Descriptive statistics	The improvement of the living conditions of urban dwellers in the study area, due to the implementation of the master plan of Nyarugenge District
6. To recommend strategic interventions for sustainable implementation of Kigali City Master Plan	What are the recommendations on strategic interventions for sustainable implementation of Kigali City Master Plan?	- Responses from structured interviews - Physical appearance on the field - Responses from household survey	- The City of Kigali - Sector office - Sampled households	- Household survey - Visual observation - Paired sample t test analysis - Descriptive statistics	Strategic intervention for better implementation of the master plan and improving the living condition of urban dwellers

Source: Author (2018)

Appendix B: Zoning categories proposed for Nyarugenge District

Zoning categories	Sub-categories	Description
Residential District	Single Family Residential District (R1)	The R1 is intended for high-end villa housing and complementary public facilities as needed. The minimum lot areas in the R1 are larger to distinguish the R1 as a low-density good class residential neighbourhood with a spacious character.
	Mixed Single-Family Residential District (R1A)	The R1A is a residential district for mixed single family and low-rise developments. It is intended to offer low-rise housing and complementary public facilities as needed. The minimum lot areas in the R1A are smaller than that found in R1.
	Rural Residential District (R1B)	The R1B is a residential district that offers single-family low-rise developments in the rural areas. It is intended to offer low rise housing as part of the farming community and complementary public facilities as needed.
	Medium Rise Residential District (R3)	The R3 is established to create well planned medium rise housing and apartment complexes with sufficient open spaces. Minimum lot sizes R3 are higher than the R2.
	High Rise Residential District (R4)	The R4 is a district established in the CBD of Kigali, and adjacent areas, to provide high-quality, high density living for those who desire an urban lifestyle with easy access to regional goods and services.

Zoning categories	Sub-categories	Description
Commercial District	Mixed Use Commercial District (C1)	The C1 is a district established to create housing development with commercial development at the ground level to ensure continuity in the ground level commercial activities. The district offers spaces for goods and services as well as living quarters to create a vibrant mixed-use commercial district.
	Neighbourhood Level Commercial District (C2)	The C2 creates attractive small mixed-use establishments. it allows for compact mixed-use developments with a commercial frontage.
	City Level Commercial District (C3)	The C3 is a district established to meet most of the retail, commercial and services needs for the larger community, and may include offices and entertainment activities. The minimum plot size is set at 1,000 m^2 to allow for well-designed commercial buildings and to ensure that each development will be able to comply with C3 parking requirements.
	City Level Commercial District (C3B)	The C3B is a special district established to create a medium rise commercial district. This allows existing small parcels to redevelop and at the same time retained the vibrant character at ground floor of these areas.
	Regional Level Commercial District (C4)	The C4 is established as the CBD Core, the prime office area and the regional financial hub in Kigali. The development in C4 should therefore be outstanding, tall and of high-quality material and finishes.
	Regional Level Commercial District (C4A)	The C4A is established as the transitional district between the CBD Core areas of the Muhima and Gasabo Planning Area to serve as commercial and financial hub. High quality office and retail developments are envisioned to take place in this zoning district.

Zoning categories	Sub-categories	Description
Industrial District	Light Industrial District (I1)	The I1 is specialized land areas carefully located close to residential area with easy vehicular access to offer residents proximity to a range of non-polluting industrial services.
	General Industrial District (I2)	The I2 is an area of land specialized located close to expressways for easy access for heavy vehicles. As it is a district that can generate noise, traffic and pollutants, therefore, it is kept away from residential areas.
Parks and Open Spaces	Passive Recreational District (P1)	The P1 are districts established to provide recreational and leisure facilities and activities in selected areas that have unique features (including visual corridors, environmentally sensitive areas, buffer areas, or along significant routes).
	Active Recreational District (P2)	The P2 is established to provide parks that offer active recreational and sporting activities. The general character of P2 should remain as green and recreational.
	Protected Area (P4)	The P4 is established to conserve and protect the steep slopes, environmentally sensitive areas, nature, wildlife habitat and non-developable lands for other strategic purposes

Source: (The City of Kigali, 2013a)

Appendix C: Questionnaire for household survey

Dear respondent,

I am Nyiransabimana Marie Jeanne, a master's student in Germany at Technical University of Munich, in the program of land management and land tenure. As part of my academic requirement, I am undertaking a research on the implementation of the Master plan of Kigali City and its impacts on the living conditions of the urban dwellers: Case of Nyarugenge District. I would like to request you to provide the answers to the proposed questions and all your views will be used strictly for research purpose.

Identification of respondent

1. Names: ………………………………………………...
2. Job or employment status: …………………………………………
3. Sector: ………………………………………………………….
4. Cell……………………………………………………………………………….
5. Village:
6. The period since which you have you been in this sector ....
7. Origin: ………………………………………………………….
8. Tel number…………………………………………
9. Age………………………………………………………………
10. Sex: Male ☐   Female ☐
11. Marital status
    Single ☐   Married ☐   Divorced ☐   Widow ☐
12. Education level:

Level of Education	illiteracy	Primary	Technical (post Primary)	Secondary	University	Other
Tick the correct option						

Instructions: Use a tick (✓) to choose the appropriate answer or write your answer where it is required depending on the type of the question asked

1. Questions about Kigali city master plan

a) Do you know what a master plan is?

Yes ☐　　　　　No ☐

b) If yes for the previous question, what is a master plan?

………………………………………………………………………………………

c) Do you know if there is a master plan designed for your neighbourhood?

Yes ☐　　　　　No ☐

d) If the previous answer is yes, which type of zoning proposed for your neighbourhood?

………………………………………………………………………………………

e) Do you think that Kigali City master plan plays a role in the improvement of your living condition?　Yes ☐　　No ☐

f) If the previous answer is yes, please, indicate the role of master plan on your living condition?

....

g) If the master plan does not play any role on your living condition, please explain why it doesn't.

....

h) How satisfied are you with the zoning category proposed for your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

2. Pedestrian availability and accessibility

a) Are there in your neighborhood pedestrian infrastructures currently available?

Yes ☐　　　　　No ☐

b) If yes for the previous question, from when those pedestrian infrastructures were existed? Choose the true answer:

　　i.　Before 2010 ☐

　　ii.　After 2010 ☐

c) If they were constructed before 2010, is there an improvement done after the adoption of master plan in 2010?　　　Yes ☐　　　　　No ☐

d) If they were improved, briefly explain how they were improved.

……………………………………………………………………………..............

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e) If they were constructed or improved after 2010, what are their impact on your living condition?

……………………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of pedestrian infrastructures in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1= Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

3. Streets availability and accessibility

a) Were in your neighborhood availability of streets before the adoption of master plan?

Yes ☐   No ☐

b) If the streets were available before the adoption of the master plan, is there any improvement done for the implementation of that master plan?

Yes ☐   No ☐

c) If the previous answer is yes, please, explain the type of improvement done (for example asphalted streets or widening the streets).

……………………………………………………………………………………………

d) If no streets were available in your neighborhood, are there new streets constructed after the adoption of the master plan?   Yes ☐   No ☐

e) If there is any improvement done or new streets that were constructed after the adoption of the master plan, what is their impact on your living condition?

……………………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of streets in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

4. **Traffic lights availability**
   a. Do you have traffic rights around the roads in your neighbourhoods?

   Yes ☐   No ☐

   b. If yes for the previous question, since when do you have these traffic rights? Tick the correct answer among the following proposed answers

       i.   Before the adoption of the master plan   ☐

       ii.   After the adoption of the master plan   ☐

   c. If the traffic lights are available, what is the impact of those traffic lights on your living conditions?

   ....

   d. How satisfied are you with the current situation regarding the availability of traffic lights in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):
   1=Definitely not satisfied,
   2= Unlikely satisfied,
   3= Likely satisfied (50/50),
   4= Very satisfied,
   5=Excellently satisfied (100%).

5. **Quality, availability and accessibility of bus stops**
   a) Were in this area the bus stops available Before the adoption of the master plan?

   Yes ☐   No ☐

   b) If yes for the previous question, please estimate the time you took to reach to the bus stop by walk.

   …………………………………………………………………………………………

   c) If no bus stops were availaible before the adoption of master plan of Nyarugenge District , are they currently available? Yes ☐ No ☐

   d) If yes for the previous question, please estimate the time taken to reach the nearest bus stop by walk. ....

   e) Do these new bus stops have shelters? Yes ☐   No ☐

   f) Are there seat(s) where these new bus stops are located   Yes ☐   No ☐

   g) If there are bus stops constructed after the adoption of the master plan, what is their impact on your living conditions?

   …………………………………………………………………………………………

h) How satisfied are you with the current situation regarding the availability, accessibility and the quality of bus stops in this area? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

6. System of garbage collection

a) Is there a company that oversees garbage collection in your neighbourhood?

Yes ☐   No ☐

b) If yes for the previous question, since when do you have that system of garbage collection?

    i.   Before the adoption of the master plan ☐

    ii.   After the adoption of the master plan ☐

c) If they existed a company that oversees garbage collection before the adoption of the master plan, did that system worked well? Yes ☐   No ☐

d) If not for the previous question, is there any improvement done after the adoption of the master plan? Yes ☐   No ☐

e) If the company of garbage collection started working after the adoption of the master plan, or if it has been improved, please describe how it works by choosing Yes or No.

    i.   Garbages are collected once in a week . Yes ☐   No ☐
    ii.   Garbages are rarely collected.   Yes ☐   No ☐

f) What is the possible impact of the adopted system of solid waste/garbage collection on your living condition?

…………………………………………………………………………………………

g) How satisfied are you with the current situation regarding the system of garbage collection in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5= Excellently satisfied (100%).

7. Availability and accessibility of nursery school

a) Were in your neighbourhood nursery school(s) available before the adoption of the master plan? Yes ☐   No ☐

b) If the previous answer is yes, please, estimate the average time taken to reach to the nearest nursery school by walk before the adoption of the master plan.
…………………………………………………………………………………….

c) Are there new nursery school(s) that have been constructed/after the adoption of the master plan? Yes ☐   No ☐

d) Please, estimate the average time currently taken to reach to the nearest nursery school by walk.
……………………………………………………………………………………..

e) If there are nursery school(s) in your neighbourhood, what is their possible impacts on your living condition?
……………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of nursery school in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

8. Availability and accessibility of primary school

a) Were in your neighbourhood primary school(s) available before the adoption of the master plan of Nyarugenge District? Yes ☐   No ☐

b) If the previous answer is yes, please, estimate the average time take to reach the nearest primary school by walk before the adoption of the master plan.

…………………………………………………………………………………..

c) Are there new primary school(s) that have been constructed after the adoption of the master plan of Nyarugenge District? Yes ☐   No ☐

d) Please, estimate the average time currently taken to reach the nearest primary school by walk

…………………………………………………………………………………

e) If there are primary school(s) available and accessible in your neighbourhood, what is their possible impact on the living condition of the city dwellers?

…………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of primary schools in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):
1=Definitely not satisfied,
2= Unlikely satisfied,
3= Likely satisfied (50/50),
4= Very satisfied,
5=Excellently satisfied (100%).

9. Availability and accessibility of health facilities

a) Were in your neighbourhood health facilities available before the adoption of the master plan? Yes ☐   No ☐

b) If the previous answer is yes, please, estimate the average time were taken to reach the nearest health facility by walk before the adoption of the master plan.

…………………………………………………………………………………

c) Are there new health facilities that have been constructed in this area after the adoption of the master plan for Nyarugenge District?   Yes ☐   No ☐

d) Please estimate the average time currently taken to reach the nearest health facility by walk……………………………………………………………………………………

e) If there are health facilities in your neighbourhood, what is their possible impact on your living condition?

……………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of health facilities in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

10. Availability and accessibility of clear water.

a) Do you have the water supply line in your neighbourhood? Yes ☐   No ☐

b) If yes for the previous question, since when the water supply line was provided to this neighbourhood?

    i.   Before the adoption of the master plan ☐

    ii.   After the adoption of the master plan ☐

c) If the water supply line were provided in this area after the adoption of the master plan, is your house/building connected to water supply line? Yes ☐   No ☐

d) If your house in not connected to water supply, what is the average distance between your house and the nearest source of drinking water?

……………………………………………………………………………………

e) If there is any clean water supply line in your neighbourhood, what is its possible impact on your living condition?

……………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and accessibility of clear water in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

11. Availability of electricity lines

a) Do you have the electricity lines in your neignohoods? Yes ☐　　　No ☐

b) If the pervious answer is yes, since when the electricity lines were provided to this neighbourhood?
- i.　Before the adoption of the master plan　☐
- ii.　After the adoption of the master plan　☐

c) Was your house/building connected to the electricity line before the adoption of the master plan?　Yes ☐　　　No ☐

d) Is your house/building currently connected to the electricity line?
Yes ☐　　　No ☐

e) If there are electricity lines in your neighbourhood, what is its possible impact on the living conditions of the city dwellers of this area?
………………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability of electricity lines in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):
1=Definitely not satisfied,
2= Unlikely satisfied,
3= Likely satisfied (50/50),
4= Very satisfied,
5=Excellently satisfied (100%).

12. Availability of sewage system

a) Do you have the sewerage system in this neignohoods?
Yes ☐　　　No ☐

b) If the previous answer is yes, when this sewerage system was constructed?
- i.　Before the adoption of the master plan　☐
- ii.　After the adoption of the master plan　☐

c) If these sewerage systems were constructed before the adoption of the master plan, is there any improvement done in line with the implementation of the master plan plan?
Yes ☐　　　No ☐

d) If there are sewage systems, what is their possible impact on your living conditions?
………………………………………………………………………………………

e) How satisfied are you with the current situation regarding the availability of sewage system in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

13. Availability of affordable housing

a) How much was the price of a parcel of 15mx20m in this area before the adoption of the master plan?

…………………………………………………………………………………………

b) Currently, what is the price of a similar parcel in this area?

…………………………………………………………………………………………

c) Are you a tenant or the owner of this house?

   i. A tenant ☐

   ii. The owner ☐

d) If you are a tenant, what is the monthly rental cost of this house?

…………………………………………………………………………………………

e) What is your monthly income?

…………………………………………………………………………………………

f) Is your monthly income enough for the payment of the current monthly rental cost?

   Yes ☐   No ☐

g) If you know, were affordable houses available before the adoption of the master plan?

   Yes ☐   No ☐   I don't know ☐

h) Are affordable houses currently available in this area?

   Yes ☐   No ☐   I don't know ☐

i) If currently affordable houses are not available, what are the causes of being expensive?

....

j) If affordable houses are available, what do you think are the causes?

…………………………………………………………………………………………

k) How satisfied are you with the current situation regarding the availability of affordable housing in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

14. Availability and accessibility of recreational facilities

a) Were in this area, recreational facilities such as parks, playground or other green spaces available before the adoption of the master plan?

Yes ☐　　　　No ☐

b) Are there currently recreational facilities available in this area?

Yes ☐　　　　No ☐

c) If they are currently available, are they accessible for free of charge?

Yes ☐　　　　No ☐

d) If they are not accessible for free, what are your opinions regarding its accessibility?

....

e) How satisfied are you with the current situation regarding the availability and accessibility of recreational facilities in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

15. Availability and quality of administrative offices

a) Were in your neighbourhood, administrative offices before the adoption of the master plan? Yes ☐　　　　No ☐

b) If Yes for the previous question, were those offices of good quality (in terms of clearness and novelty)? Yes ☐ No ☐

c) If they were not of good quality, is there any improvement done after the adoption of the master plan? Yes ☐   No ☐

d) If there were no administrative offices, are there now available?

Yes ☐   No ☐

e) If administrative offices are currently available and accessible, what is their impact on your living condition?

……………………………………………………………………………………………

f) How satisfied are you with the current situation regarding the availability and quality of administrative offices in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1=Definitely not satisfied,

2= Unlikely satisfied,

3= Likely satisfied (50/50),

4= Very satisfied,

5=Excellently satisfied (100%).

16. Availability of employment opportunities

a) What was your occupational status before 2010?

……………………………………………………………………………………………

b) What was your monthly income before the adoption of the master plan?

……………………………………………………………………………………………

c) Do you know if the implementation of the master plan plays role in the availability of your jobs? Yes ☐   No ☐

d) If yes or no for the previous question, briefly explain how?

……………………………………………………………………………………………

e) How satisfied are you with the current situation regarding the availability of employment opportunities in your neighbourhood? Score the degree of your satisfaction using one of the following scales (1-5):

1= definitely not satisfied,

2= Unlikely satisfied,

3= likely satisfied (50/50),

4= Very satisfied,

5=excellently satisfied (100%).

Thank you for your time and cooperation

Appendix D: Questionnaire that was used in interview with urban planner at Kigali City

Dear respondent,

I am Nyiransabimana Marie Jeanne, a master's student in Germany at Technical University of Munich, in the program of land management and land tenure. As part of my academic requirement, I am undertaking a research entitled the impact of Kigali City Master Plan implementation on living conditions of urban dwellers: Case of Nyarugenge District. I would like to request you to provide the answers to the proposed questions and all your views will be used strictly for research purpose.

Identification of the Interviewee

Name**: ………………………………………………………………….**

Organization**: …………………………………………………………**

Position held**: …………………………………………………………**

Phone number/ Telephone**: ………………………**

Email**: …………………………………………….**

Questions on Master plan implementation

1. Are the local community involved in the planning process?

2. If Yes, how are they involved in the planning process? / If No, why are they not involved.

3. What are different strategies do the local community adopt if they cannot comply with the planned spatial development in their properties?

4. How is the implementation of the master plan of Kigali City impacting on the living conditions of the urban dwellers?

5. What are the development priorities in the master plan of Kigali City that should be completed by 2020 Specifically in Nyarugenge, Muhima and Kigali Sectors of Nyarugenge District?

6. Were those development priorities implemented as they have been planned?

7. If no for the previous question, which ones have been implemented among those planned in Nyarugenge, Muhima and Kigali Sectors?

8. If there are development priorities whose implementation is not yet done while it was expected to be done in a short term, why they have been not implemented within the expected period?

9.   What are the achieved ones for Nyarugenge, Muhima and Kigali Sectors?
10. What are the challenges which affect the implementation of Kigali city master plan especially in Nyarugenge District?
11. How those challenges can be handled?

Thank you very much for your time and cooperation

Thank you for your time and cooperation

Appendix E: Questionnaire that was used in interview with local authorities

Dear respondent,

I am Nyiransabimana Marie Jeanne, a master's student in Germany at Technical University of Munich, in the program of land management and land tenure. As part of my academic requirement, I am undertaking a research on the implementation of the Master plan of Kigali City and its impacts on the living conditions of the urban dwellers: Case of Nyarugenge District. I would like to request you to provide the answers to the proposed questions and all your views will be used strictly for research purpose.

Identification of the Interviewee

Name**: …………………………………………………………………………….**

Organization**: …………………………………………………………………………**

Position held**: …………………………………………………………………………**

Phone number/ Telephone**: ………………………**

 Email**: ……………………………………….**

Questions on master plan implementation

1. What are the development priorities in the master plan of Kigali City that should be completed by 2020 in of your sector?

 …………………………………………………………………………………………………
1. Were those development priorities achieved as they have been planned?
 …………………………………………………………………………………………
2. What was planned regarding the public transportation and safe traffic accessibility in your sectors?
 …………………………………………………………………………………………
3. Was that plan achieved?
 …………………..
4. What was planned regarding the availability and accessibility of public facilities in your sector?
 …………………………………………………………………………………………..
5. Was that plan achieved?
 ………………………………………………………………………………………….
6. What was planned regarding the availability of affordable housing in your sector?

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………………………………………………………………………………………………..

7. Was that plan achieved?

………………………………………………………………………………………………..

8. Is currently affordable housing available in your sector? If yes how? If no why?

…………………………………………………………………………………………………

9. What was planned regarding the availability of employments opportunities in your sector?

…………………………………………………………………………………………………

10. Was this plan achieved?

…………………………………………………………………………………………………

11. What are the challenges which affect the implementation of Kigali city master plan in your Sectors?

…………………………………………………………………………………………………

12. How those challenges can be handled?

…………………………………………………………………………………………………

13. Are the community satisfied with the zoning regulation proposed in your sector? If yes or no, Why?

…………………………………………………………………………………………………

14. Did they (local communities) involved in the preparation of the master plan?

…………………………………………………………………………………………………

15. If Yes How did they involved, if no, Why?

…………………………………………………………………………………………………

16. Is there an impact of master plan implementation on the living condition of urban dwellers in your sector? If yes which one? if no, why?

Thank you for your time and cooperation

Appendix F: Acceptance letter to conduct research in Nyarugenge District

REPUBLIC OF RWANDA

Kigali, 26./.09/2018

Réf n°47.93.../01.01/08

KIGALI CITY

NYARUGENGE DISTRICT

TO: NYIRANSABIMANA Marie Jeanne

TEL:+250781162684

E-MAIL:nyiransabimanm@gmail.com

RE: Acceptance to conduct research in Nyarugenge District

This comes to inform you that you have been accepted to conduct research in Nyarugenge District as requested in your application letter. You will be collecting data in Nyarugenge District on your project entitled: **"The implementation of the master plan of Kigali city and its impacts on the living conditions of the urban dwellers, case study of Nyarugenge District."**

You will be expected to have Maximum co-operation with the Employees as requested and to return the copy of your research to the District.

Yours sincerely,

HATEGEKIMANA Fred

Executive secretary of Nyarugenge District.

B.p1092Kigali E-mail: info@nyarugengedistrict.gov.rw, web-site: www.nyarugenge.gov.rw

Appendix G: Letter to RLMUA requesting secondary data

NYIRANSABIMANA Marie Jeanne   Kigali, 18th September 2018
Nyarugenge District
Gitega Sector
Gitwa Cell
TEL: +250781162684
E-MAIL: nyiransabimanam@gmail.com

The Director General,
Rwanda Land Management and Use Authority,
Kigali.

Dear Madam,

RE: Request for spatial data for conducting a research for academic purposes

I hereby come to you for the above request. I am a student who is pursuing a master's program in land management and land tenure at Technical University of Munich in Germany. As part of my academic requirements, I am conducting a research entitled "the implementation of the Master plan of Kigali City and its impacts on the living conditions of the urban dwellers: Case of Nyarugenge District".

In fact, for evaluating the implementation of the Master plan of Kigali City in Nyarugenge District, this research will require to collect spatial data on **land uses and zoning** of before the adoption of the master plan and those of after the adoption of the master plan, the **master plan** for Nyarugenge District and **the implementation reports**. Therefore, I would like to kindly request you those datasets.

Kindly find enclosed documents for clarification: the recommendation letter from the Technical university of Munich authorities and a copy of my ID card.

I will be very grateful if you put my request under your highest consideration and I am looking forward to hearing from you.

Best Regards,

Nyiransabimana Marie Jeanne

Appendix H: Letter to Kigali City requesting secondary data

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NYIRANSABIMANA Marie Jeanne   Kigali, 17ᵗʰ September 2018
Nyarugenge District
Gitega Sector
Gitwa Cell
TEL: +250781162684
E-MAIL: nyiransabimanam@gmail.com

The Mayor of Kigali City

Dear Sir/Madam,

RE: Request for access to the spatial data for conducting a research

I hereby come to you for the above request. I am a student who is pursuing a master's program in land management and land tenure at Technical University of Munich in Germany. As part of my academic requirements, I am conducting a research entitled "the implementation of the Master plan of Kigali City and its impacts on the living conditions of the urban dwellers: Case of Nyarugenge District".

In fact, for evaluating the implementation of the Master plan of Kigali City in Nyarugenge District, this research will require to collect spatial data on **land uses and zoning** shapefiles for Nyarugenge District. Therefore, I would like to request you that you authorize my access to those datasets, I wish those of before the adoption of the master plan and those of after the adoption of the master plan if they are available in your institution as well as the master plan its self.

Kindly find enclosed documents for clarification: the recommendation letter from the Technical university of Munich authorities and a copy of my ID card.

I will be very grateful if you put my request under your highest consideration and I am waiting for hearing from you.

Best Regards,

Nyiransabimana Marie Jeanne