Track 1
Limitless cities and urban futures: planning for scale

Evaluating the Urban Form of a Mountainous City from the Perspective of Compactness Characteristics: Kigali, Rwanda

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Content

• Aim and objectives of the Research
  • Research case
  • Study and methodology
  • Discussions
  • Conclusions
Aim and objectives of research

• The aim of this study is to measure the urban form of Kigali city, Rwanda through various characteristics of compact form as a sustainable form.

• Objectives are to explore trends of urban form expansion and to analyse and evaluate the existing urban form through spatial organization and population distribution measurements and find out whether Kigali city expansion trend is generating a compact form.
Research case

• This study is focused on Kigali, the capital and main city of Rwanda

• Created in 1907, it was declared capital in 1962 after the independence.

• In 2012, the city expanded to a total population of 1,135,428 living in an area of 730 km2 (NISR).

• Wetlands, water bodies, forests, hills with slopes greater than 20 % and other natural constraints to development cover about 50 % of Kigali’s area

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
<th>Population</th>
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<tr>
<td>1978</td>
<td>112</td>
<td>117,749</td>
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<tr>
<td>1990</td>
<td>112</td>
<td>235,664</td>
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<tr>
<td>1994</td>
<td>112</td>
<td>350,000</td>
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<tr>
<td>2000</td>
<td>349</td>
<td>605,000</td>
</tr>
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<td>2005</td>
<td>349</td>
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<td>2006</td>
<td>730</td>
<td>930,000</td>
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<tr>
<td>2010</td>
<td>730</td>
<td>1,000,000</td>
</tr>
<tr>
<td>2013</td>
<td>730</td>
<td>1,135,428</td>
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</table>
Research case

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Ivan R., Nobuo M./ Saga University/ rwampungu.y@gmail.com
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Research case

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Study and methodology

- GIS maps representing land use in various years were directly corrected from the urban planning department of the City of Kigali.
- This study is limited to year 2013 due to the availability of data.
- In this study, the analysis focused on the spatial organization and spatial distribution of the population.
Discussions: Spatial organization

• The city of Kigali was found to be predominantly a monocentric model with a dominant CBD and sub-centres.

• The CBD is located on the top of a hill with gentle slopes and surrounded by wetlands in the northern, eastern and southern sides.

• The CBD is located 6km in the western direction from the CG.

• The developable land should have a slope of less than 20 per cent (KMP, 2013).
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Discussions: Density

1. Built-up area density

- The expansion expanded in the eastern direction with many sub centres created along streets.
- The western part has steep slopes that hinder any type of development.
Discussions: Density

1. Built-up area density

- From 1990 to 2000, the density was primary supported by the densification around the CBD while between 2000 and 2010, however the city area was expanding, the city continued to showcase some more compactness due to a high rate of urban migration compared to settlements.
- In 2010, the city become more sprawled as the urban density started decreasing.
Discussions: Density

2. Density vs distance to CBD

- In 2013, the high densities can be noticed near the CBD as they tumble down when going far of the CBD.
- Within 2km radius of the CBD, the densities are nearly 100 people by hectare. After 5km, the densities are less than 20 people by hectare and remain almost constant.
- This is mostly due to the fact that Kigali has no large industrial zone.

![Density with distance from CBD](image-url)
Discussions: Density

3. Land use split

• In 1990, only 2.9% of the total current area of the city was built-up.
• The built-up area recorded a 341.7% increase over 23 years since 1990.
• In 2013, the built-up area composed 13% of the total area and 18% of the total developable area (not steep slopes or wetlands).
• Public urban open spaces such as squares or parks are almost non-existent in the city. Spaces like green roundabouts are sometimes used as public open space.

<table>
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<tr>
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<tr>
<td>Agriculture</td>
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<td>52905</td>
<td>49986</td>
<td>47755</td>
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<td>132</td>
<td>285</td>
<td>283</td>
<td>0.0</td>
<td>115.9</td>
<td>-0.7</td>
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<td>Infrastructure</td>
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<td>1238</td>
<td>2434</td>
<td>2915</td>
<td>166.2</td>
<td>96.6</td>
<td>19.8</td>
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<tr>
<td>Natural areas</td>
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<td>11526</td>
<td>10975</td>
<td>12658</td>
<td>-17.4</td>
<td>-4.8</td>
<td>15.4</td>
<td>-9.5</td>
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</table>

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Conclusions

• Kigali population is growing on a rate 4% per annum (2000-2013) and the population is expected to double in 2025 (KCMP, 2013).

• The topography of the city is a challenge with large settlements in risky zones.

• Since 2010, the built-up densities started decreasing, thus leading to a sprawl tendency.

• Kigali city has limited mixed land. Only 19 hectares, representing almost zero percent of built up land, were classified as mixed land use.

• Kigali is dominated by a monocentric compact form which grow in a polycentric dispersing form
Conclusions

• It is necessary to increase density in new sub centres to sustain a more compact form

• To achieve a more compact city form, infrastructure upgrade and provision of more amenities and other facilities such as recreational parks, together with transport network is very necessary.

• better urban management, administration and strict regulations are necessary to achieve a more compact form with its benefits.

• Inclusive planning with more involvement and participation of people in the planning and implementation processes is extremely important

• There is a need to avail more land for recreational purposes and mixed land uses development promotion.
Thank you for your attention