



Graduation Thesis

MSc Management in the Built Environment

TU Delft

POTENTIAL ECONOMIES

using big-data to analyse urban competitiveness of new urban communities; a case study on socio-economic indicators in Egypt

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Yawei Chen

Case Advisor:

Amr Abdel Kawi

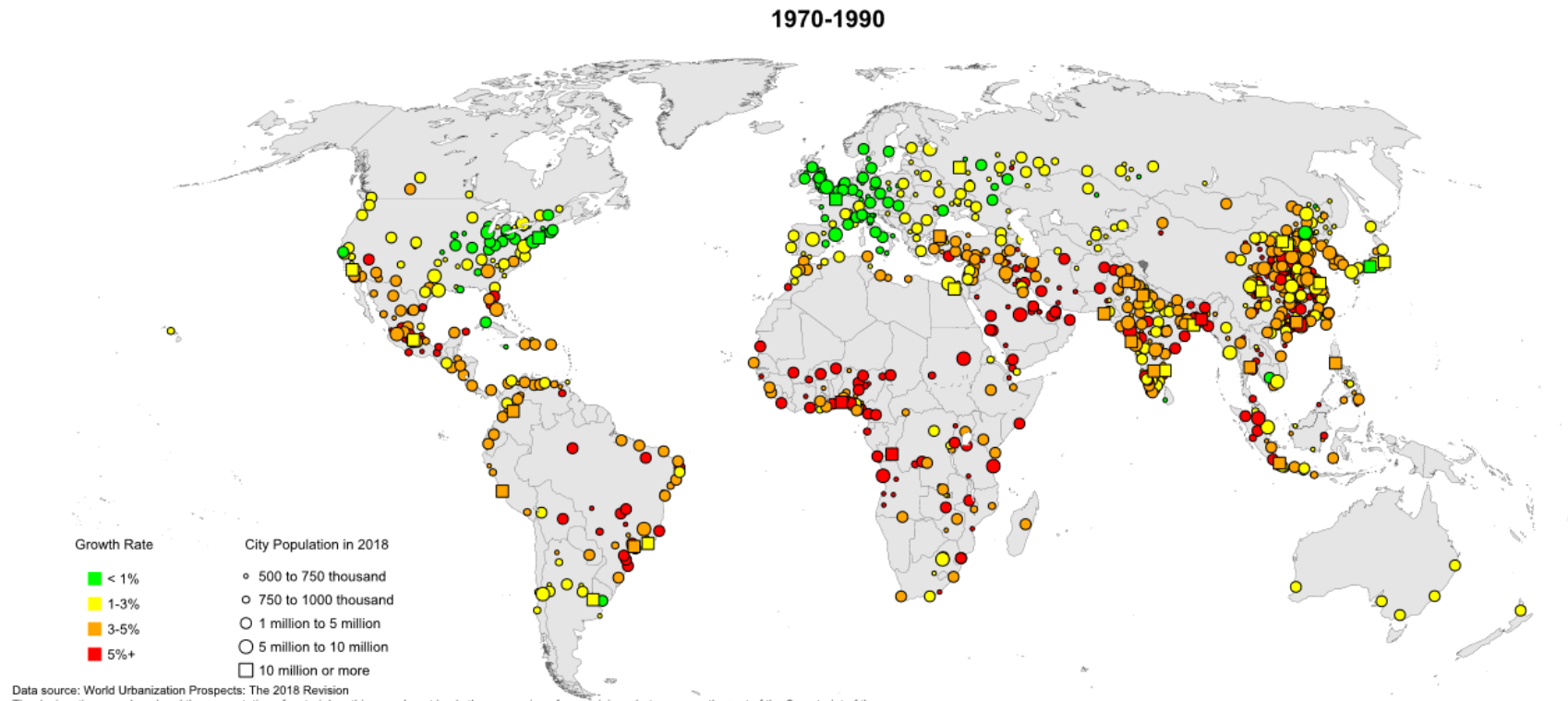
CONTENT

1. Problem Overview
2. Literature Review
3. Research Question
4. Methodology
5. Empirical Data
6. Synthesis
7. Reflection
8. Acknowledgments

1

PROBLEM OVERVIEW

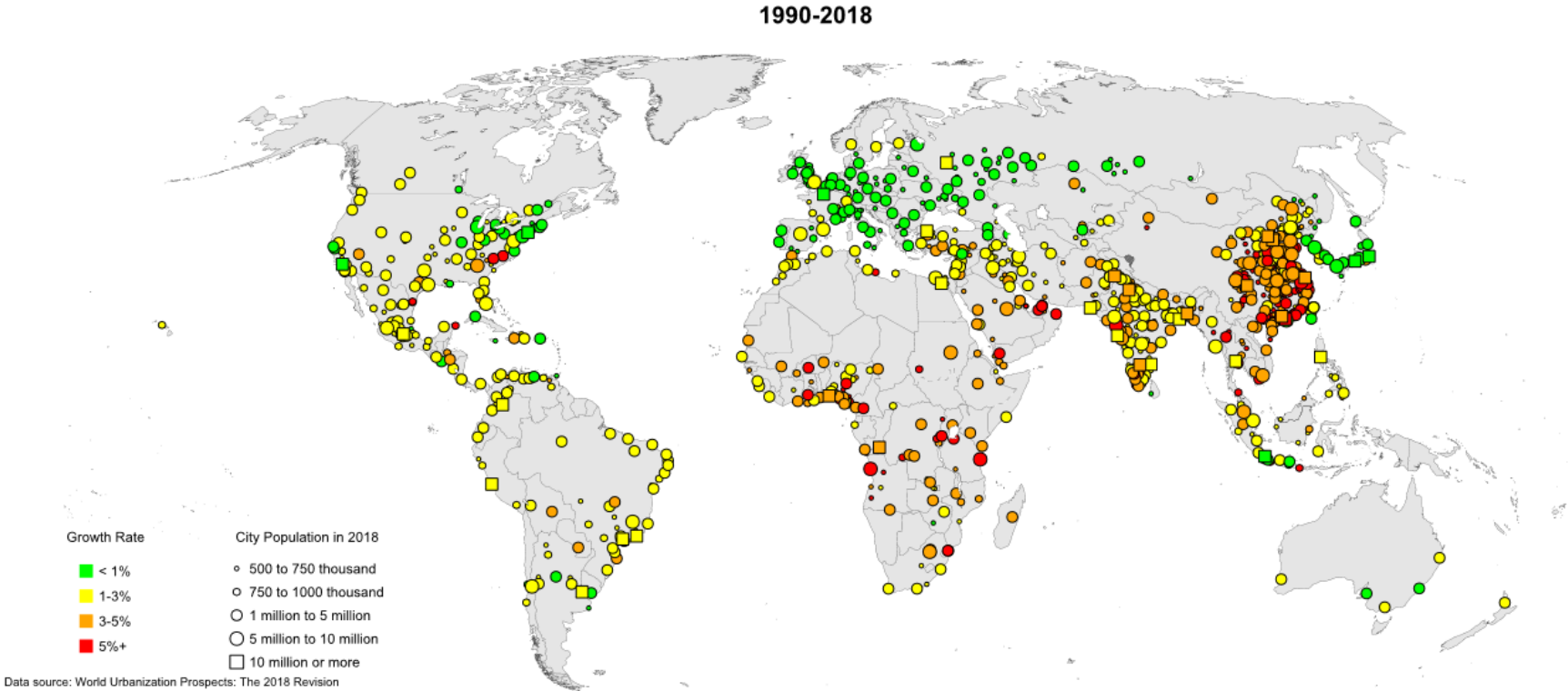
Continuous Urbanization





PROBLEM OVERVIEW

Continuous Urbanization

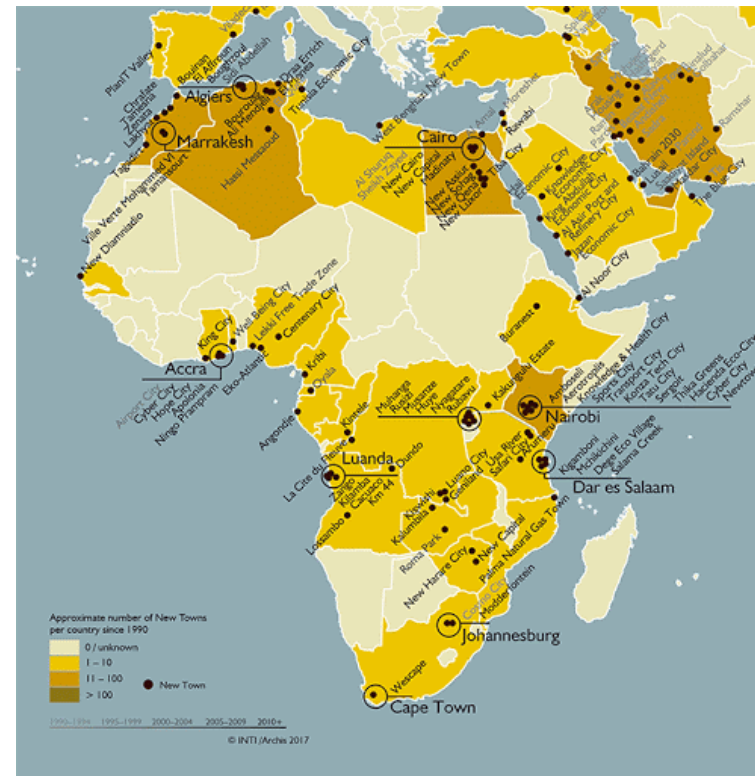


PROBLEM OVERVIEW

Satellite Developments

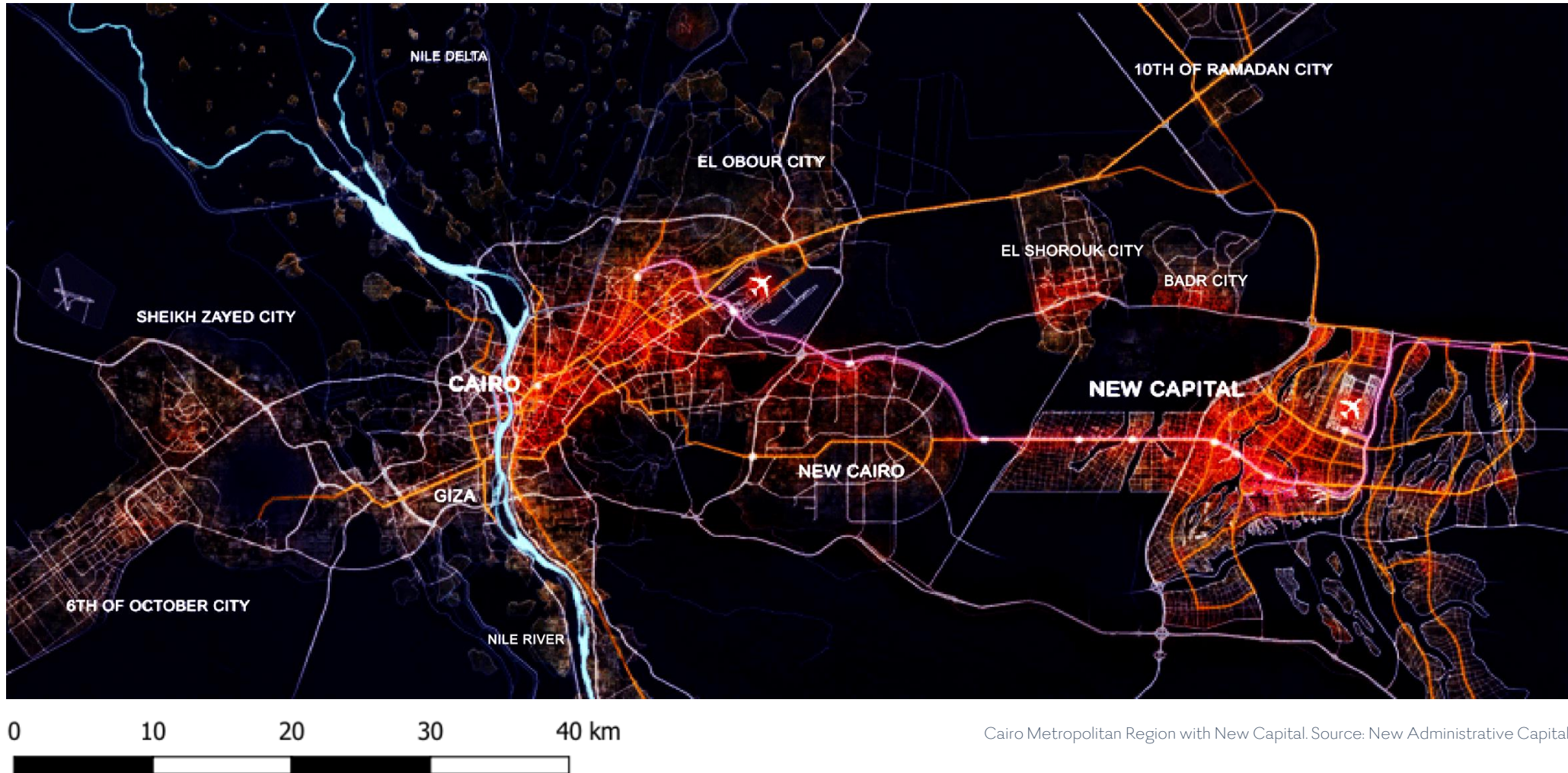
150 new towns in Africa

Egypt comes 3rd with 41 new towns and a new Capital



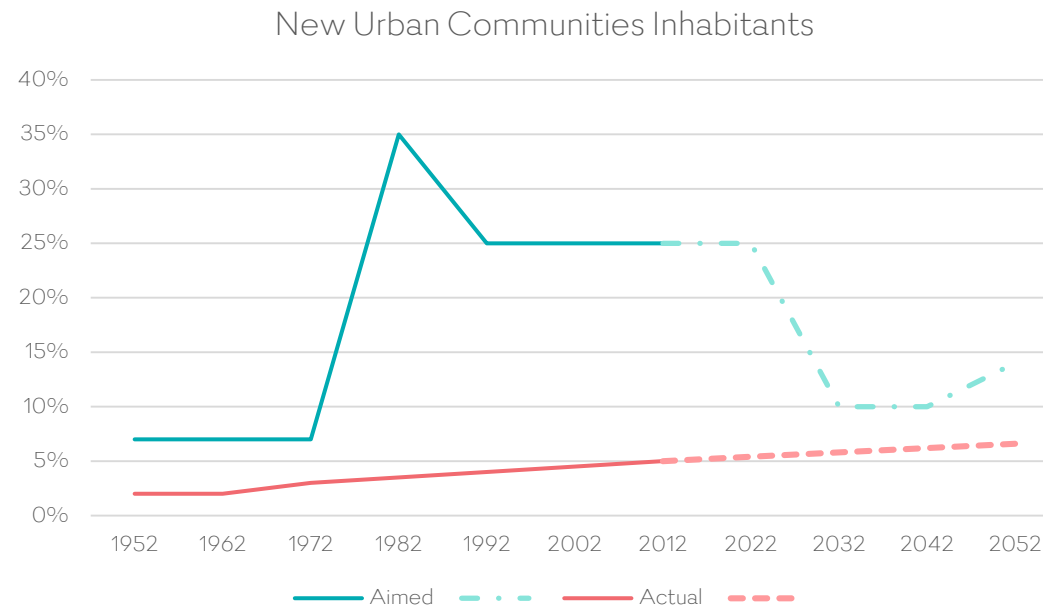
New Towns Developments in Africa. Source: New Towns Institute

Case of Cairo



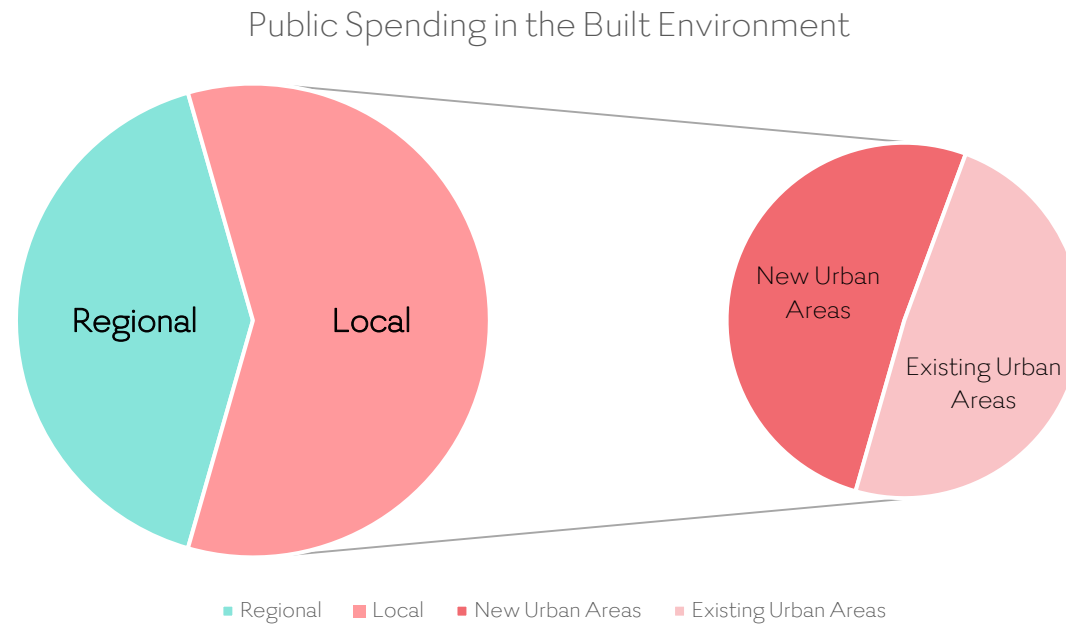
PROBLEM ANALYSIS

1/ Failure to Capture Strategic Goals



PROBLEM ANALYSIS

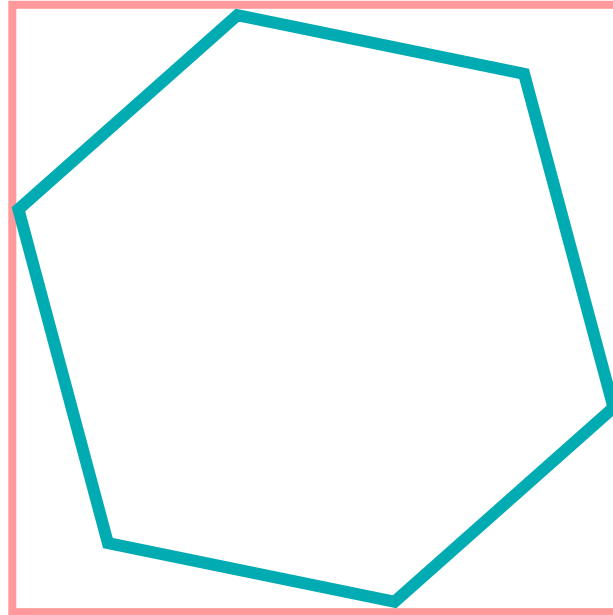
2/ Public Spending on New Urban Communities



Public Spending on urban areas (existing vs. new). Source: Marsad Omran

PROBLEM ANALYSIS

3/ Mismatch between supply & demand



PROBLEM ANALYSIS

4/ The ecosystem of economic activity



Cairo's Ghost Towns- Source: CNN

PROBLEM OVERVIEW

Research Focus



2

LITERATURE REVIEW

What to look for?

Theory

Base of Urban Life
Urban Growth
Urban Economics
Systems of Cities
Agglomeration

Practice

Urban Competitiveness

How to look for it?

Theory

Spatial Structure of Regional Economy
Urban Regions Classification
Mapping Approaches

Practice

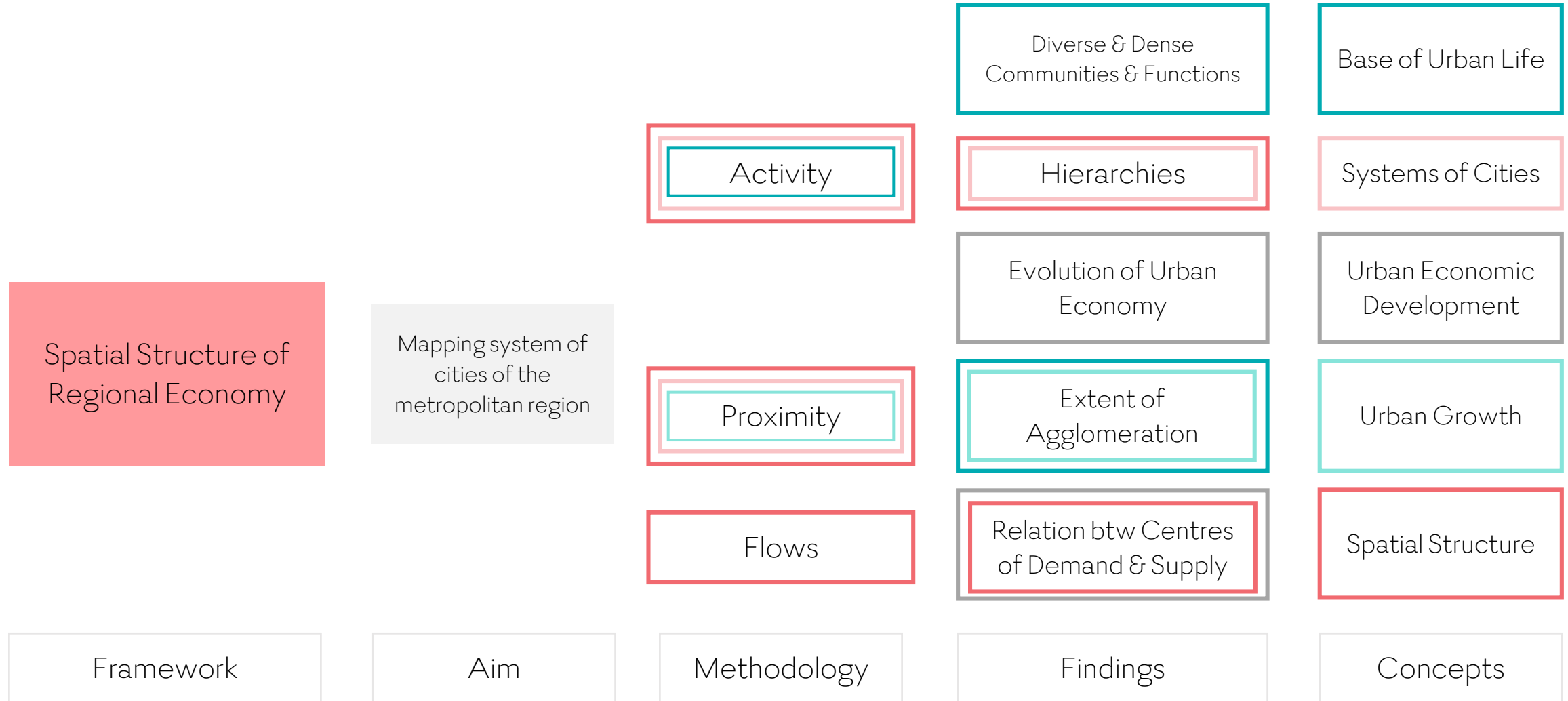
Exploratory Spatial Data Analytics

Based on Theory

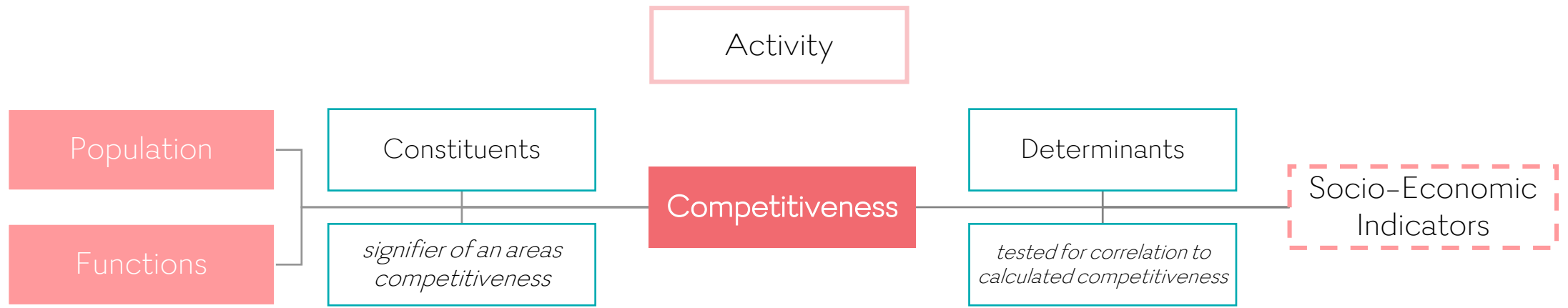
Data Driven

Context Specific

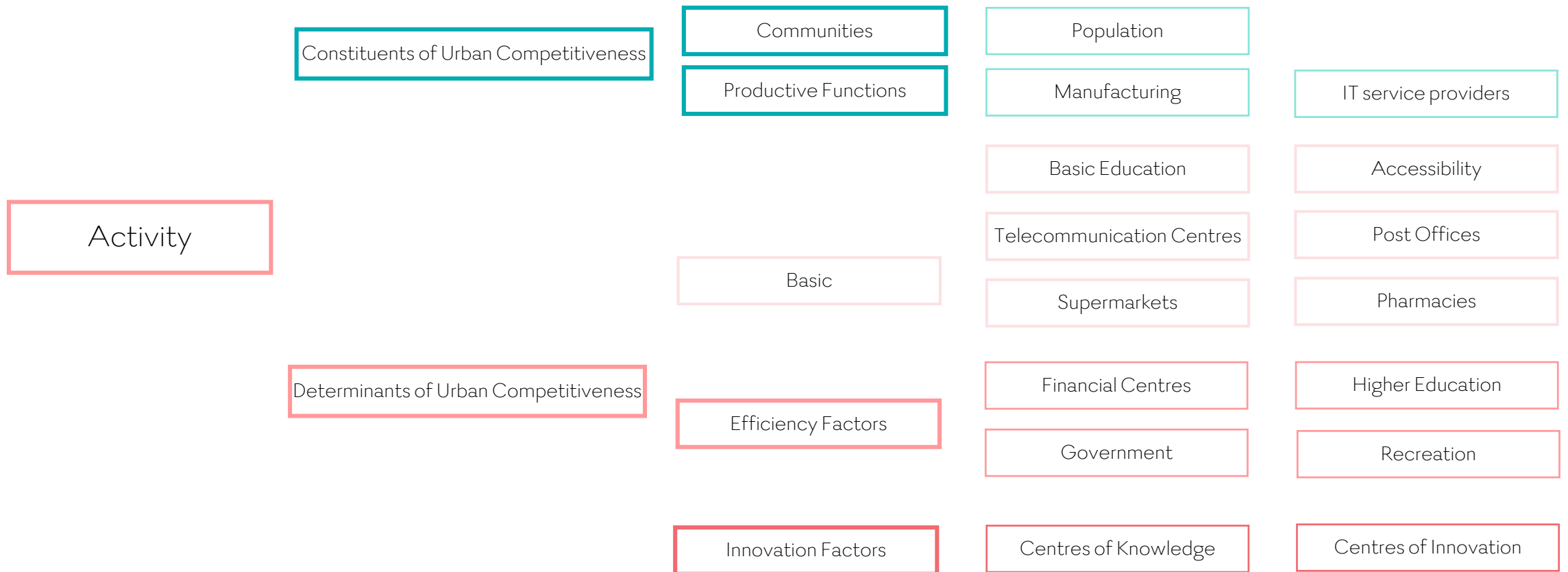
Theoretical Framework



Theoretical Framework



Theoretical Framework



3

RESEARCH QUESTION

How can attributes of urban competitiveness contribute to the development of sub-centres in new urban communities of emerging economies?”

1. What are **socio-economic indicators** of urban competitiveness in the context of Cairo?
2. What's the **role of new urban communities** and their sub-centres in the metropolitan region's economy?
3. How to use **open-source data** to compute and analyse factors of urban competitiveness of NUCs?
4. How can **policies** be employed by public entities and private sectors to attract, retain and grow various economic activities within these sub-centres?

4

RESEARCH METHODOLOGY

Geospatial
Mapping

Exploratory
Spatial Data
Analysis

Synthesis

Policy
Recommendations

Research Methodology

- Open-source Data Scrapping

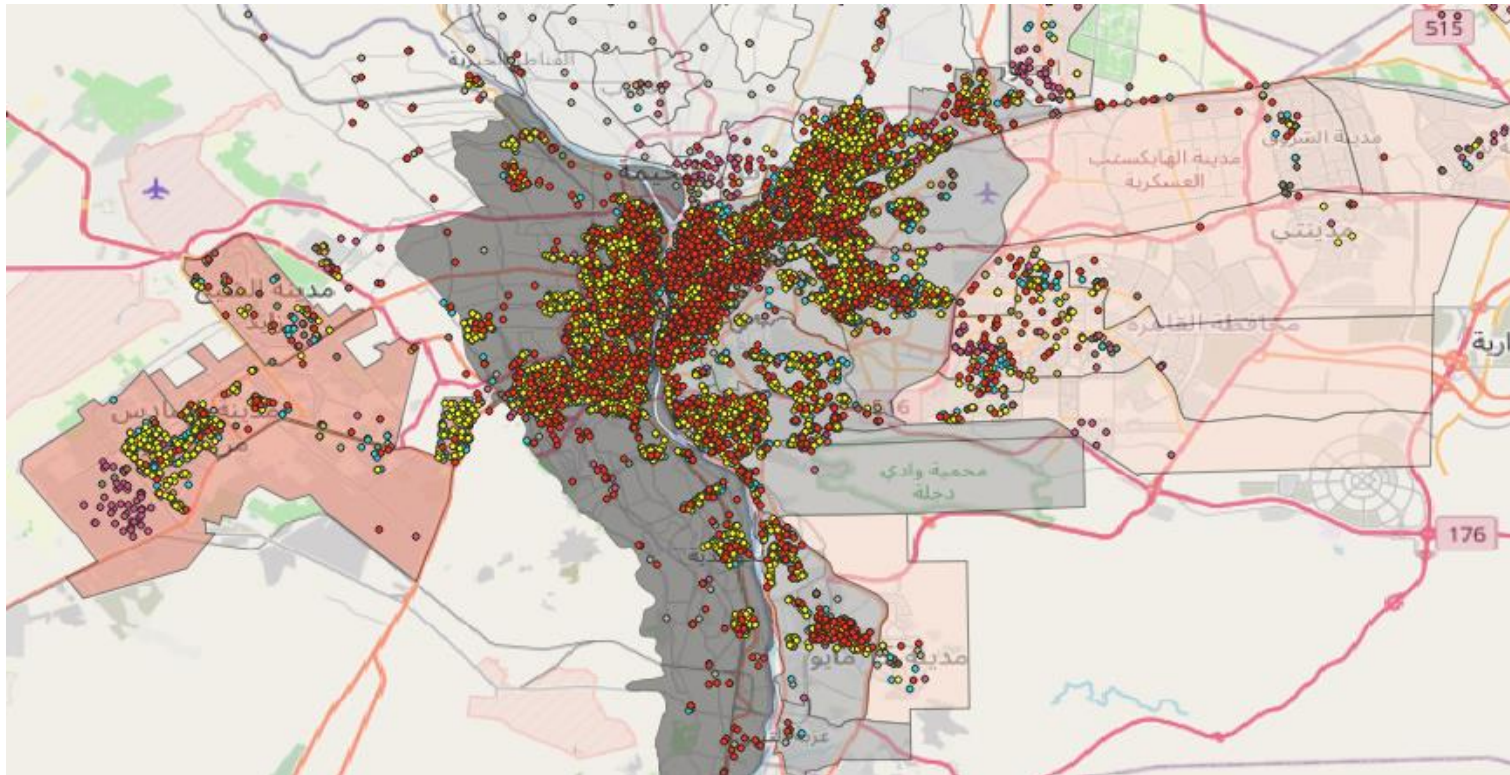
The screenshot shows a web browser window displaying the Yellow Pages website (yp.eg) with a list of business categories. Overlaid on the right is a code editor window titled 'Yellow Pages Scrap' containing a JavaScript script for data scraping. The script uses jQuery to select elements and extract company names, addresses, and coordinates (longitude and latitude) from the page. The code is as follows:

```
1 copy(`${#collapseExample ~ *}`).reduce((acc, ^
2 const name = curr.querySelector('.company
3 const address = curr.querySelector('.comp
4 const lng = curr.querySelector('[data-lng
5 const lat = curr.querySelector('[data-lat
6
7 if (!(name && address && lat && lat)) ret
8
9 acc.push({
10   name: name.textContent.trim() || '',
11   address: address.textContent.trim() ||
12   lng: lng.dataset.lng.trim() || '',
13   lat: lat.dataset.lat.trim() || '',
14 })
15
16 return acc
17
```



Research Methodology

- Geo-spatial Mapping

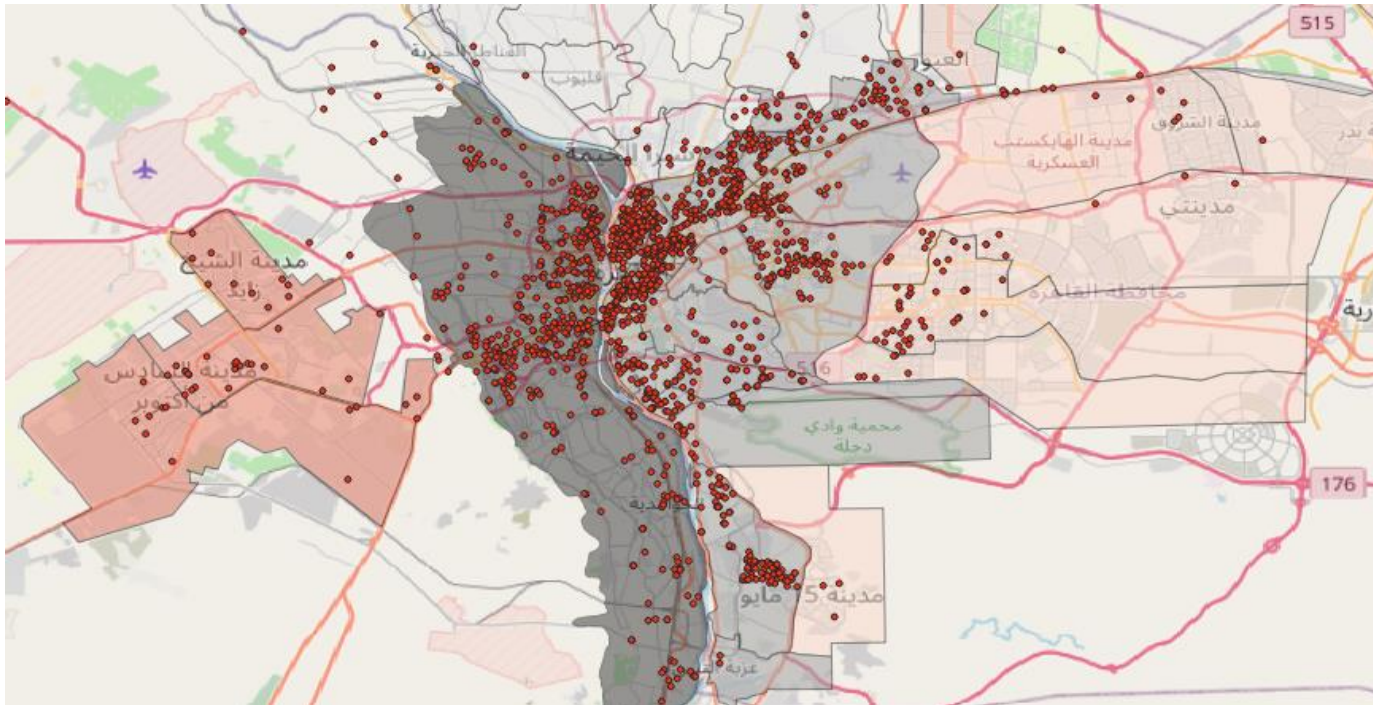


Geospatial
Mapping

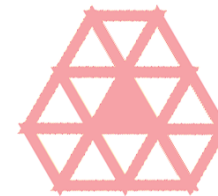
18,816.

Research Methodology

- Aggregate Data



Exploratory
Spatial Data
Analysis



12 neighbors
3 wall- neighbors



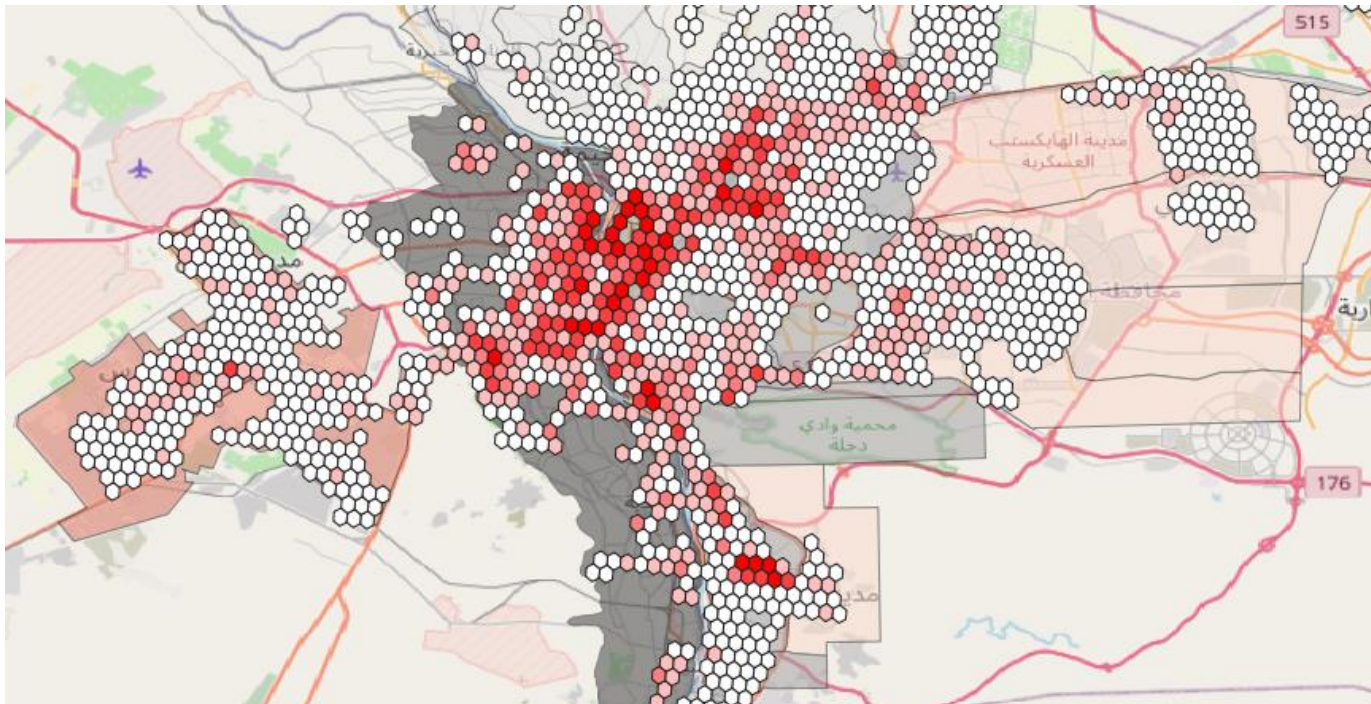
8 neighbors
4 wall- neighbors



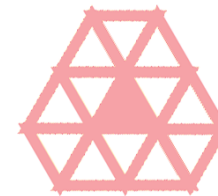
6 neighbors
6 wall- neighbors

Research Methodology

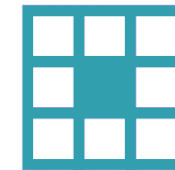
- Aggregate Data



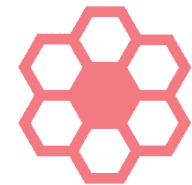
Exploratory
Spatial Data
Analysis



12 neighbors
3 wall- neighbors



8 neighbors
4 wall- neighbors



6 neighbors
6 wall- neighbors

5

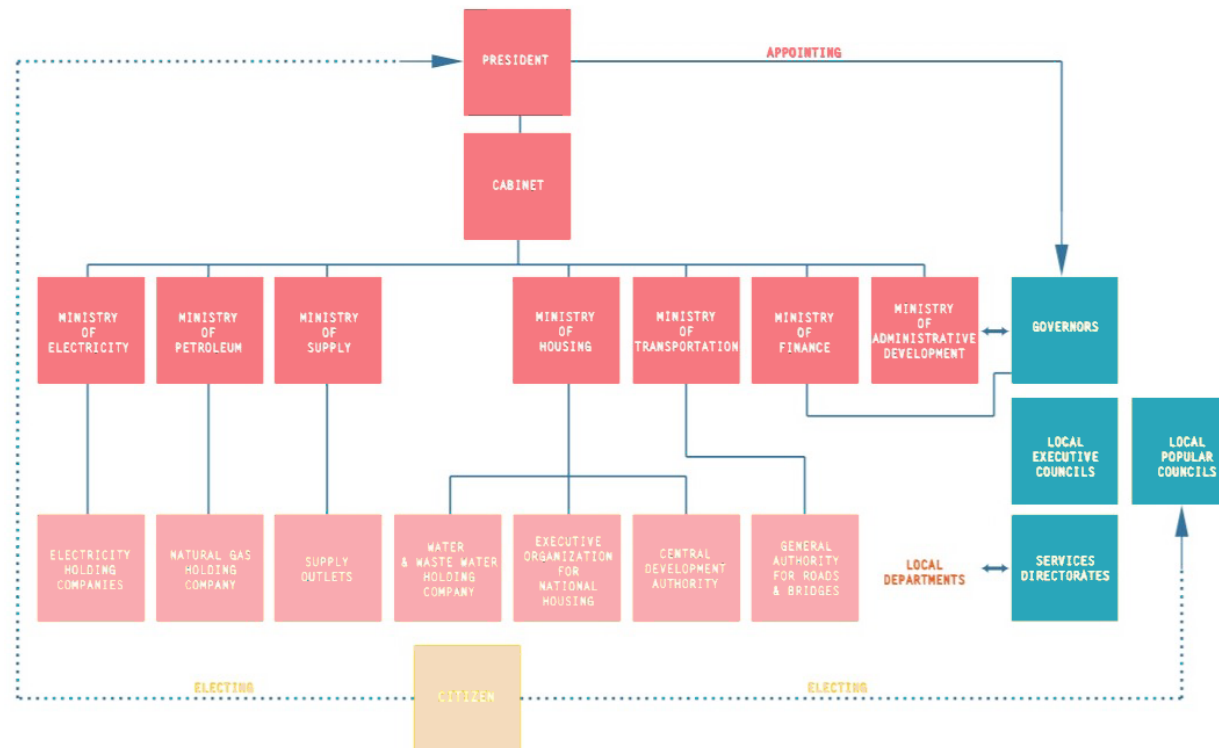
EMPIRICAL DATA

Genesis of NUCs



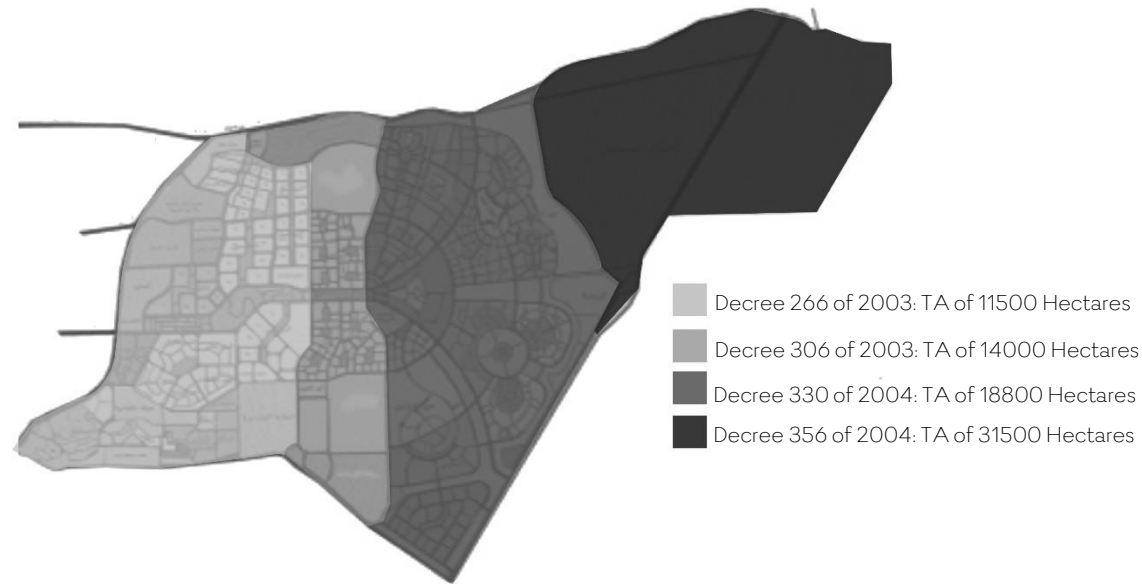
Case Study Background

Management of Built Environment



Case Study Background

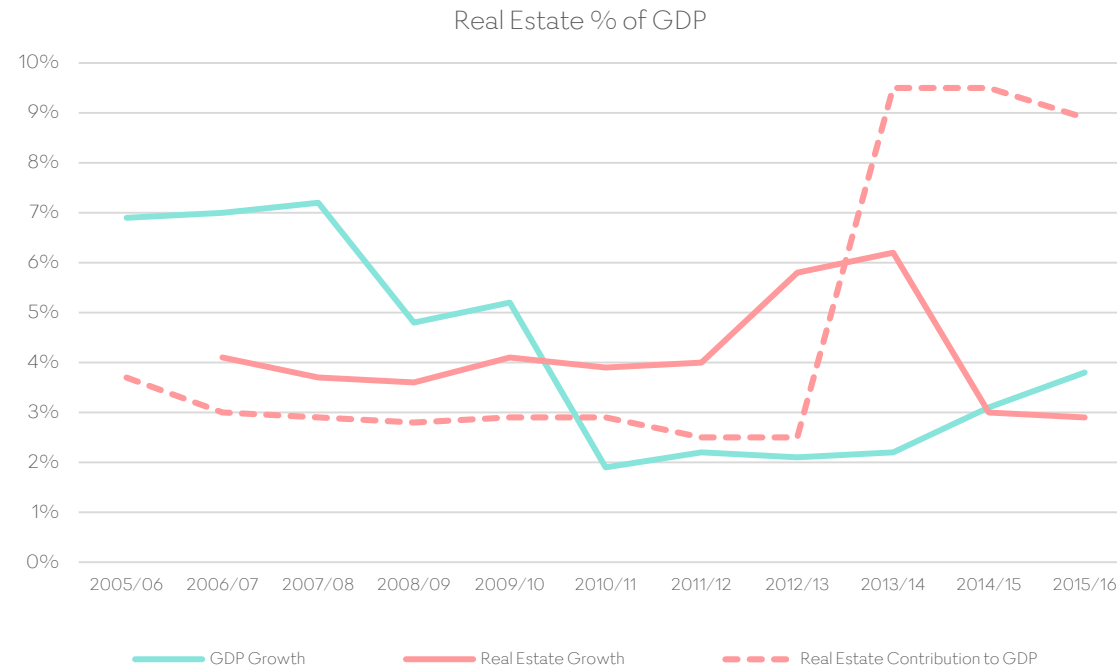
Planning of NUCs



New Cairo Development extents according to Presidential Decrees (Source: Based on NextArch Lab, 2018)

Case Study Background

Economics of NUCs

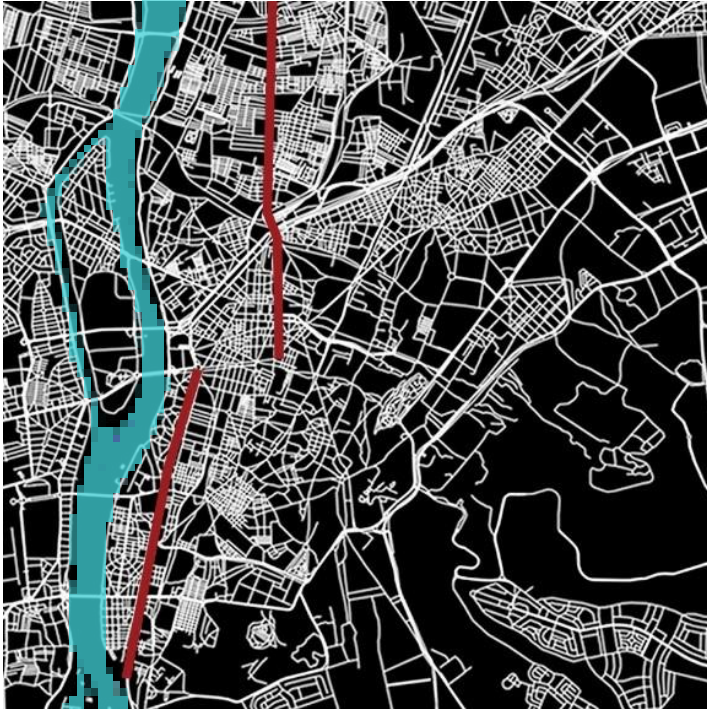


The Real Estate Sector role in Egyptian Economy (Based on Central Bank of Egypt)

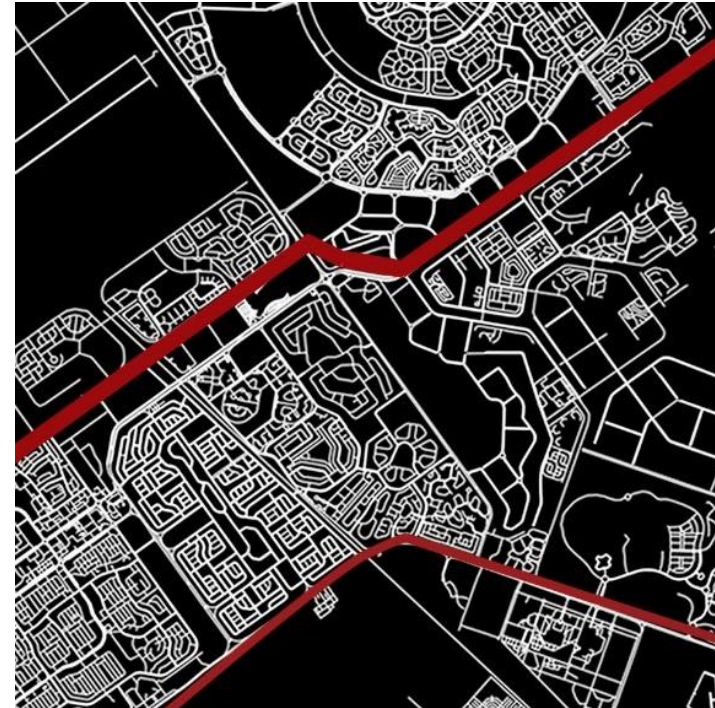
Case Study Background

Urban form of NUCs

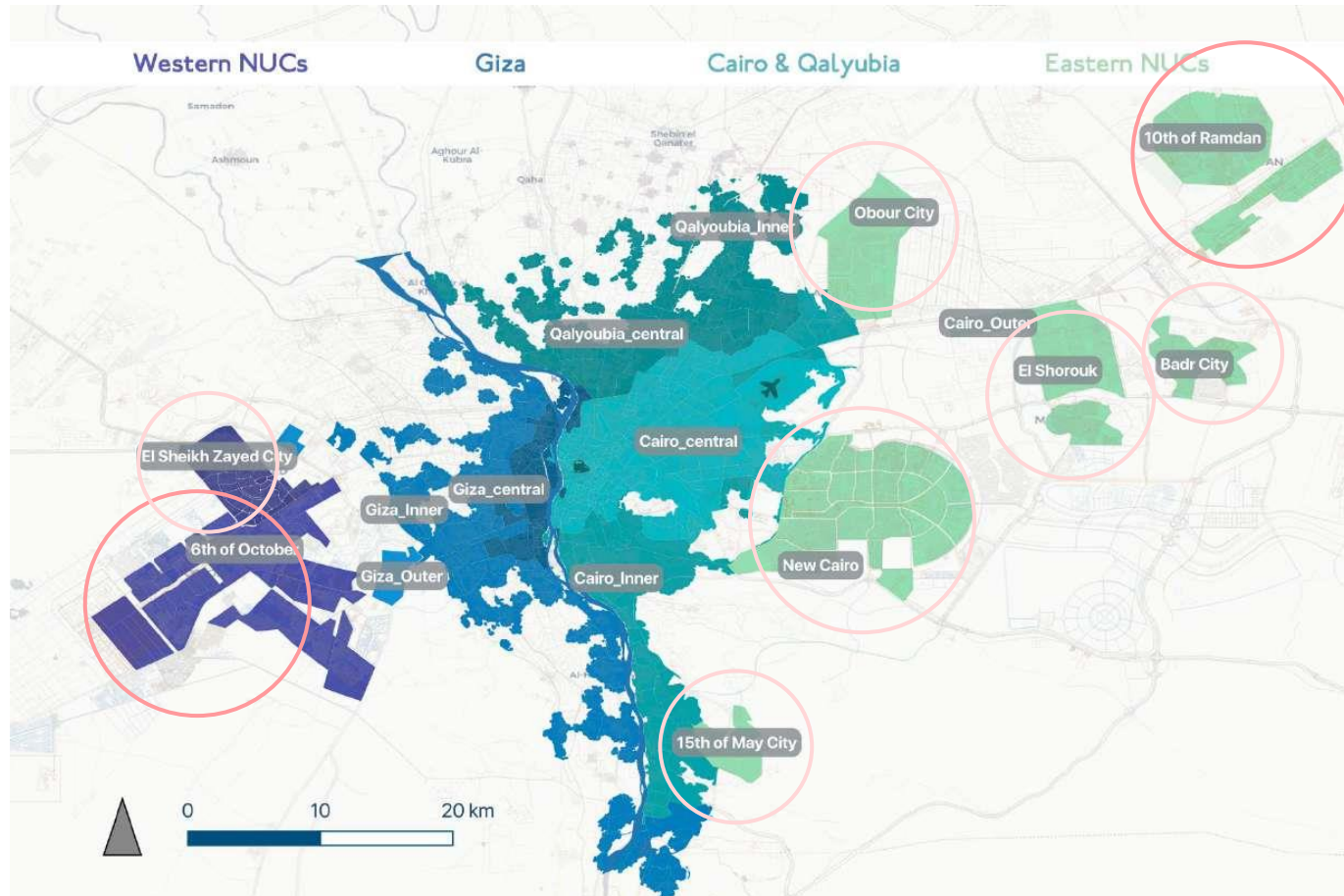
Central Cairo



New Urban Communities

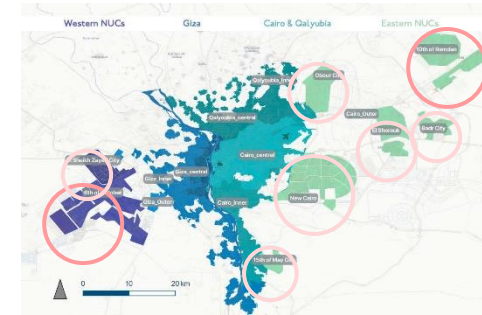


Case Study Selection



Case Study Selection

- First Generation
- Economic Base [industrial]
- Target Population

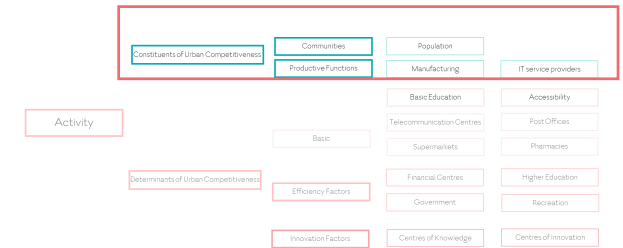


Name	Established	Foundation	Pop (2019)	Current Target Population	First Target Population
Tenth of Ramadan	1977	Manufacturing	234,770	2,000,000	500,000
Sadat	1978	Manufacturing		1,500,000	500,000
Fifteenth of May	1978	Manufacturing	96,522	260,000	250,000
Sixth of October	1979	Manufacturing	360,549	5,000,000	500,000
Al- 'Ubur	1982	Sleeping town	135,312	600,000	250,000
Badr	1982	Manufacturing	32,278	450,000	250,000
Sheikh Zayed	1995	Sleeping town	93,742	675,000	
Shorouq	1995	Sleeping town	90,033	500,000	
New Cairo	(1995) -2005	Sleeping town	306,767	6,000,000	

Empirical Data

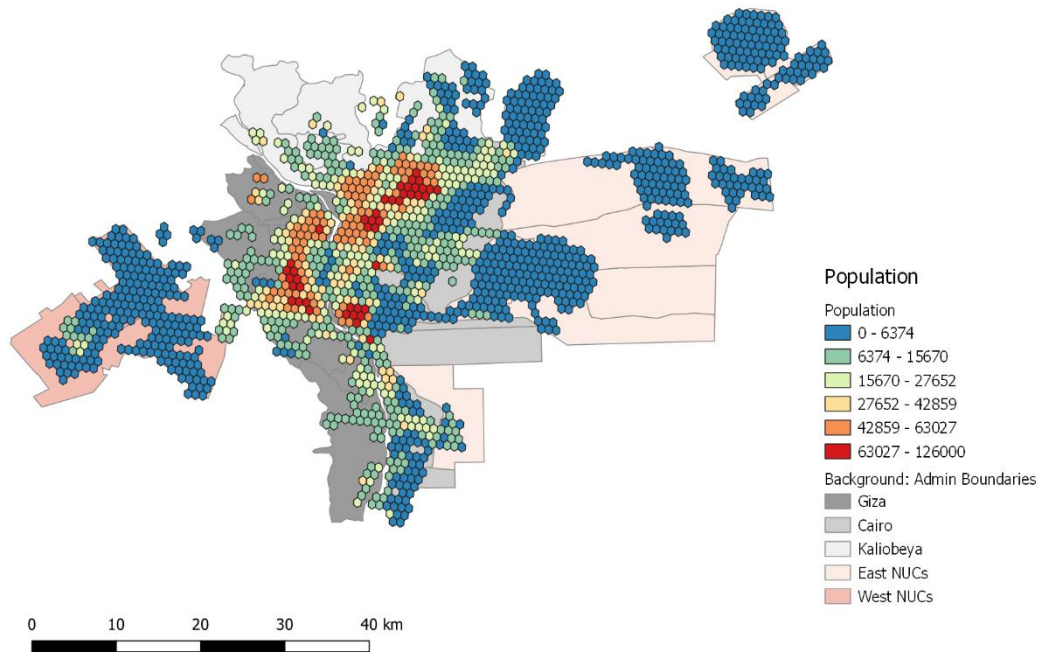
First: Computing Competitiveness

Urban Competitiveness Index = Δ Population
+ Δ Jobs
+ Δ Factories
+ Δ IT offices



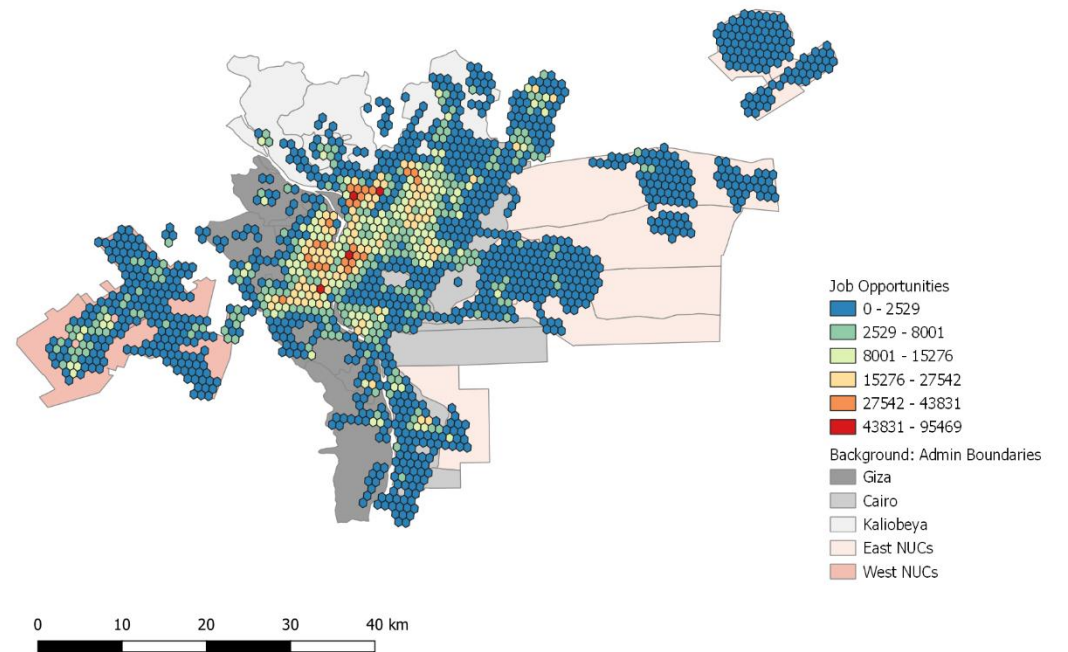
Empirical Data; Constituents of competitiveness

Population



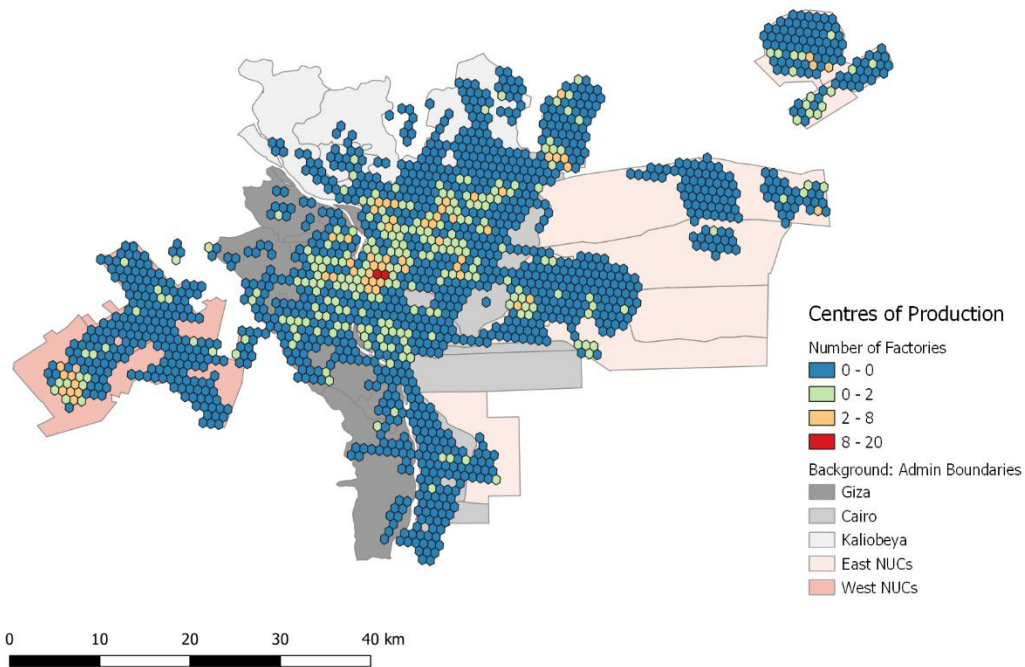
Job Opportunities

Source: TFC, 2019

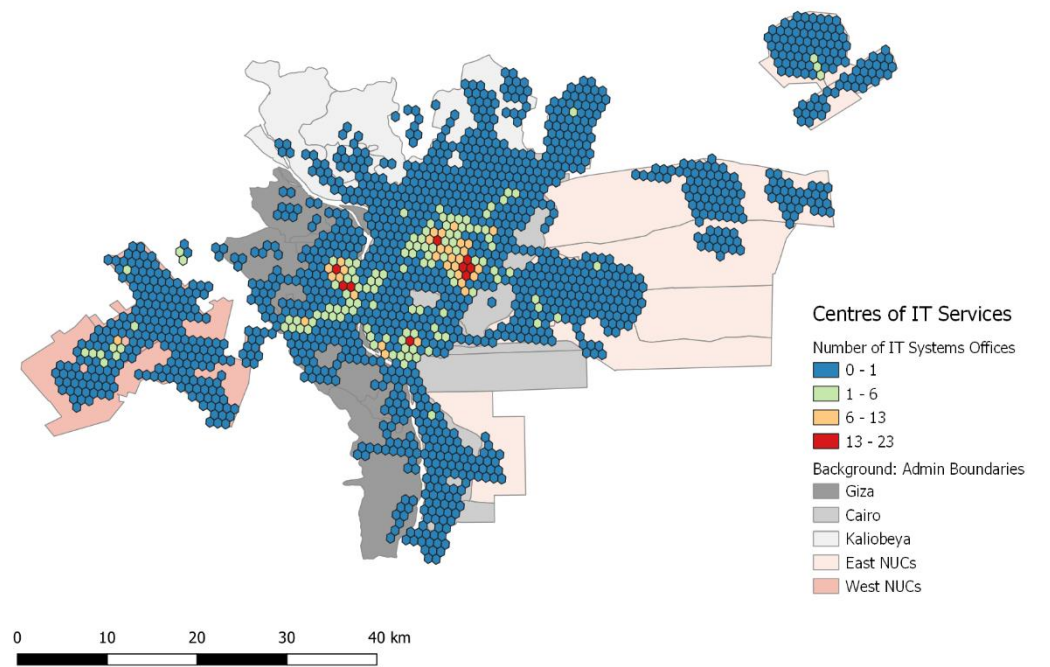


Empirical Data; Constituents of competitiveness

Manufacturing

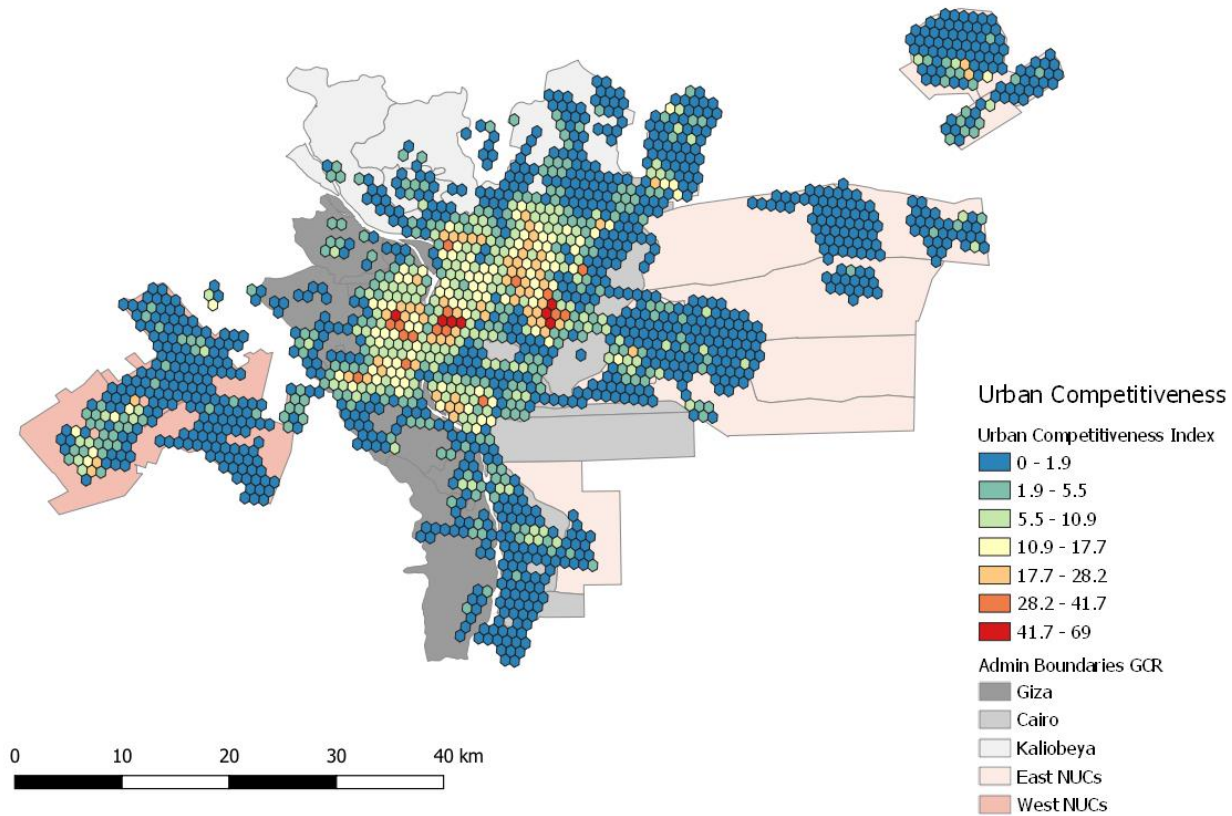


IT Service Providers

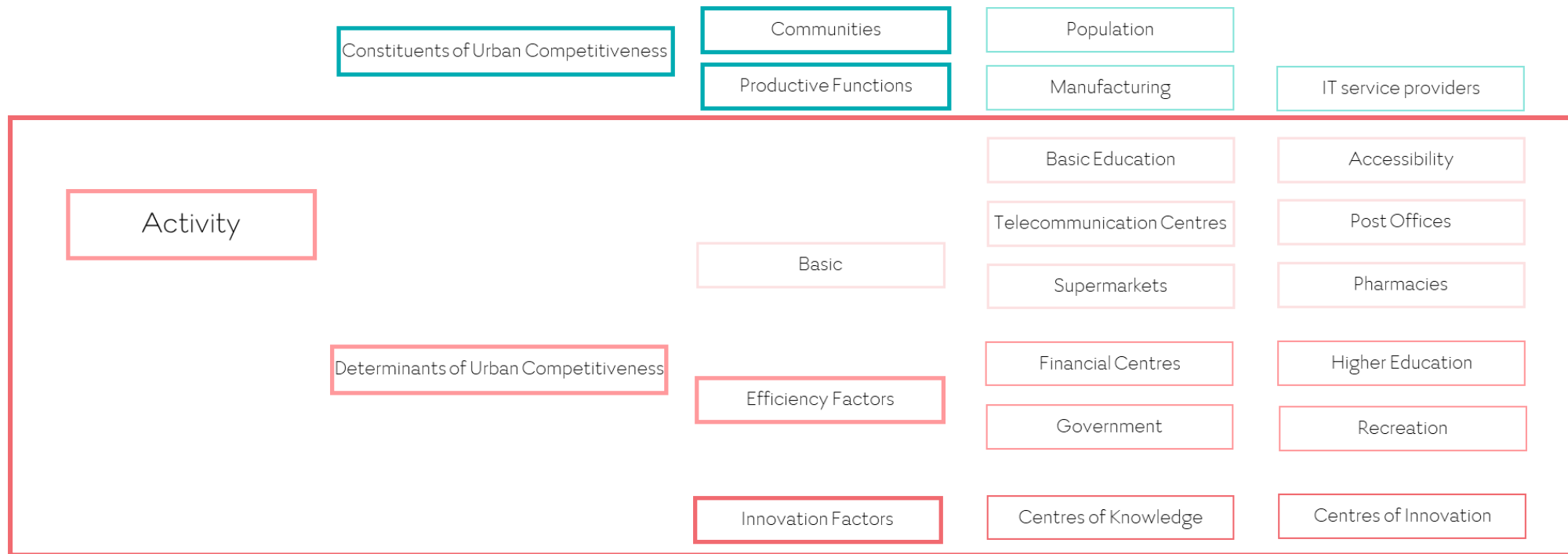


Empirical Data

Urban Competitiveness

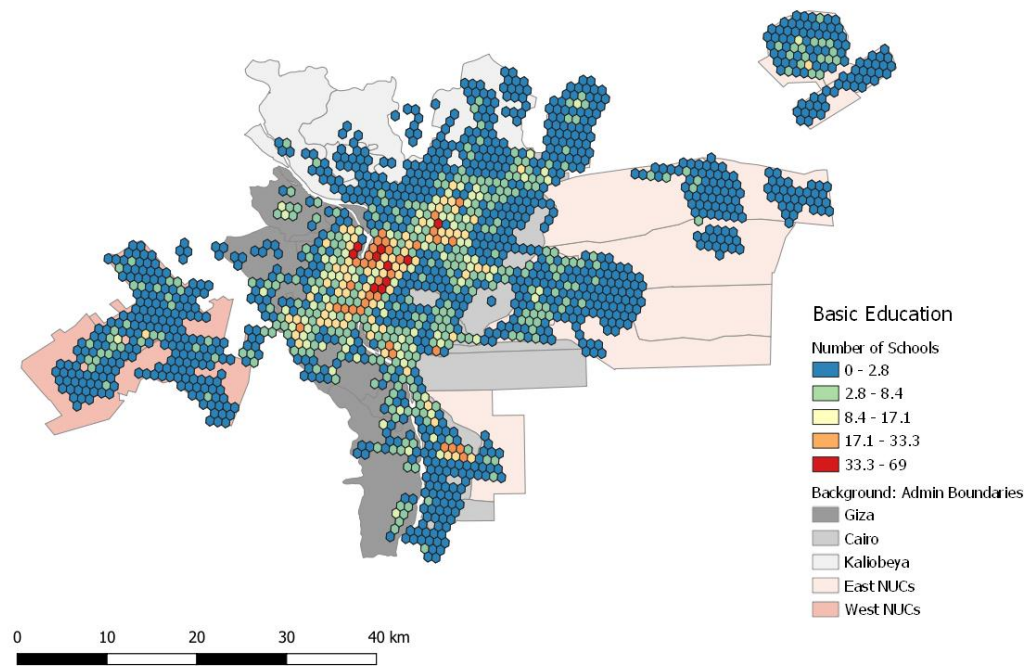


Empirical Data; Determinants of competitiveness

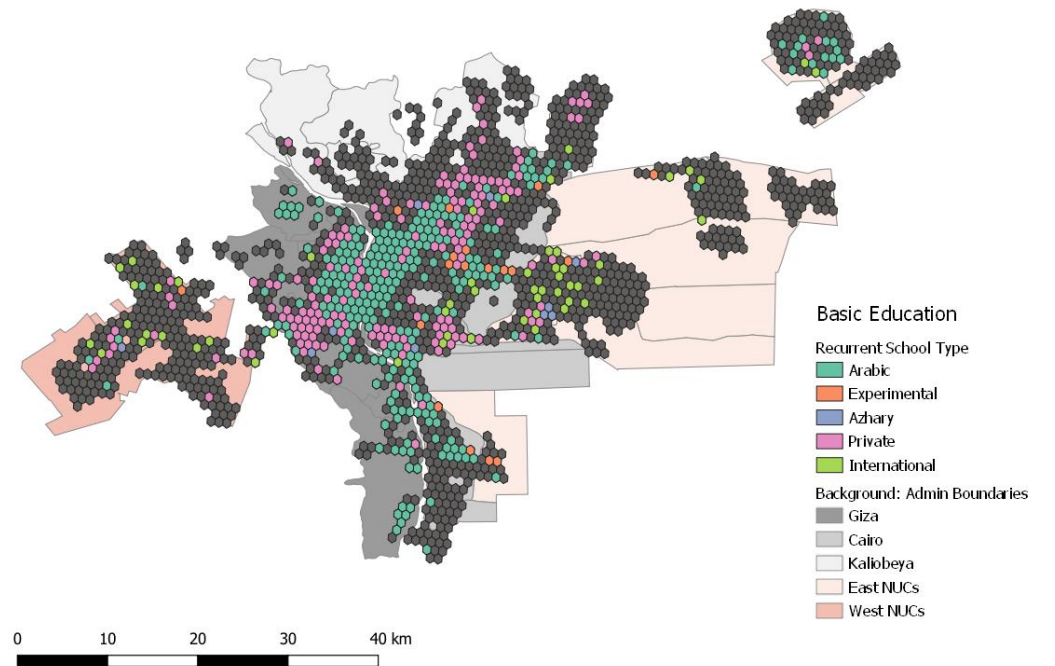


Empirical Data; Determinants of competitiveness

Basic Education

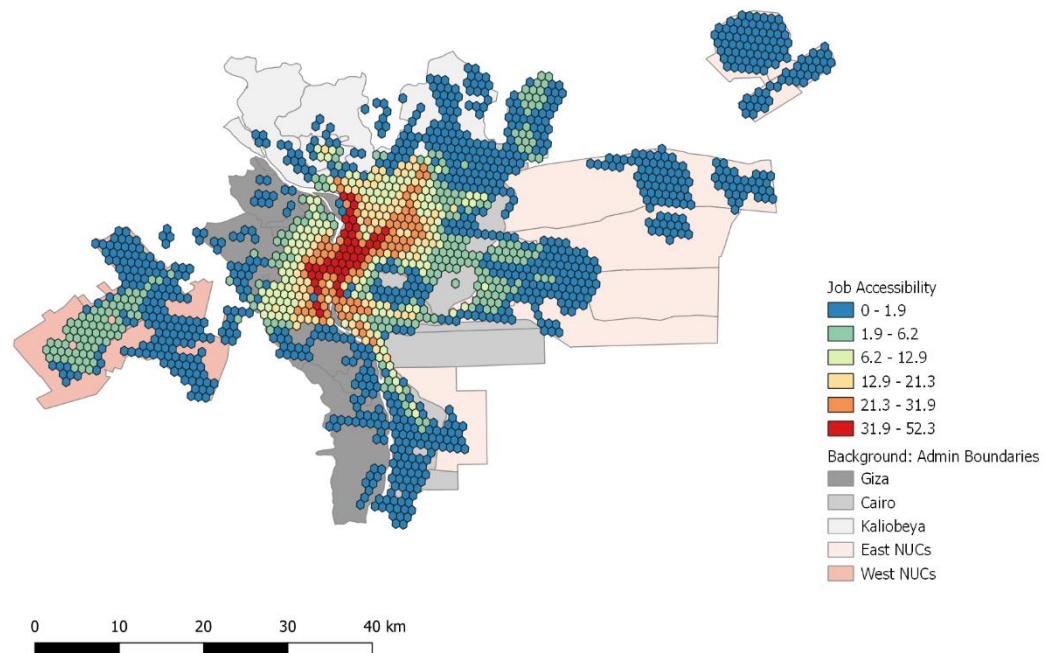


Type of Education



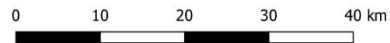
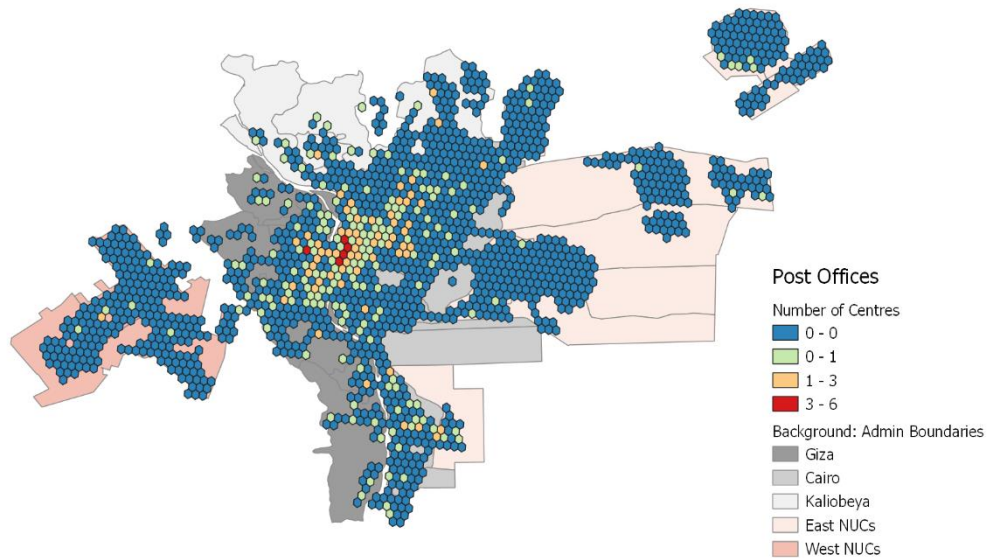
Empirical Data; Determinants of competitiveness

Accessibility Source: TFC, 2019

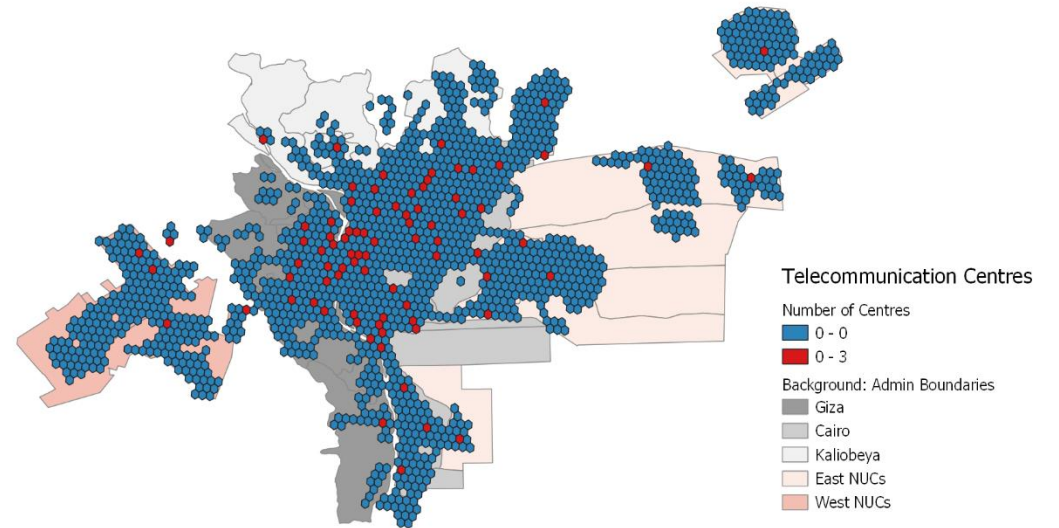


Empirical Data; Determinants of competitiveness

Post Offices

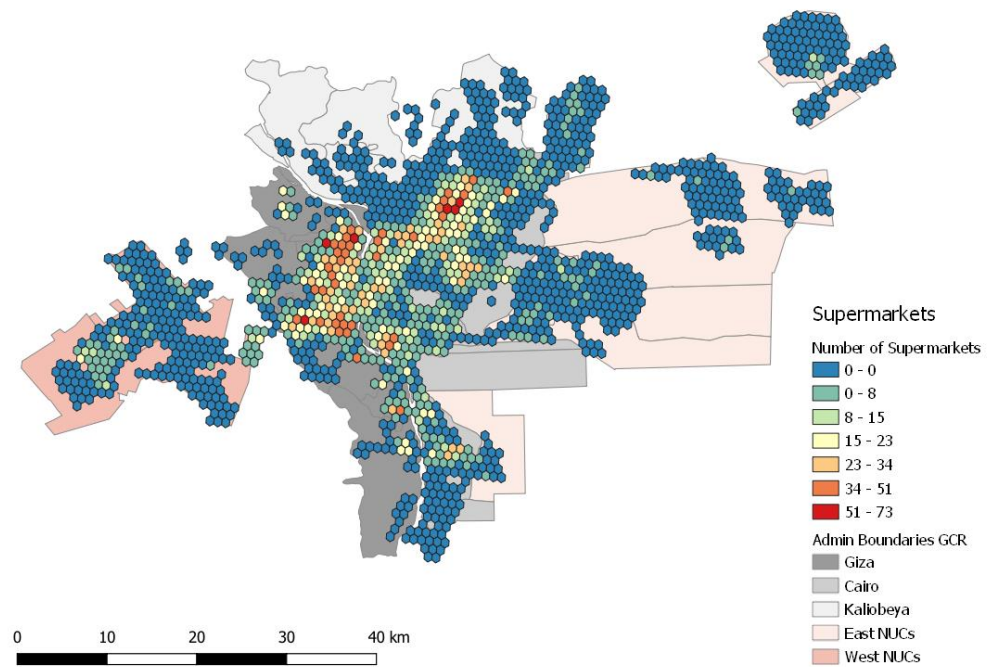


Telecommunication Centres

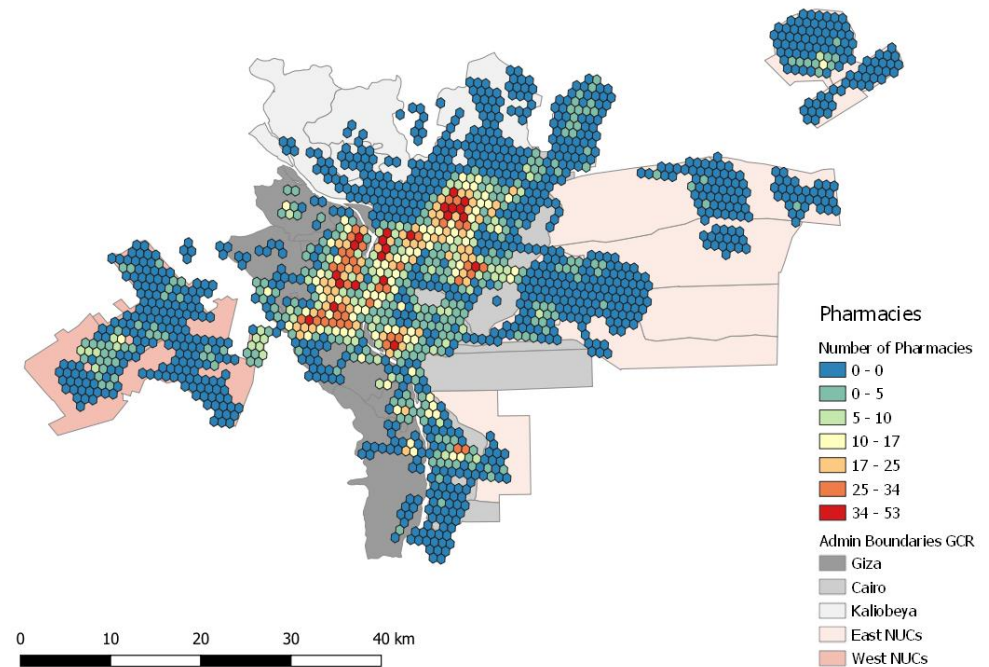


Empirical Data; Determinants of competitiveness

Supermarkets

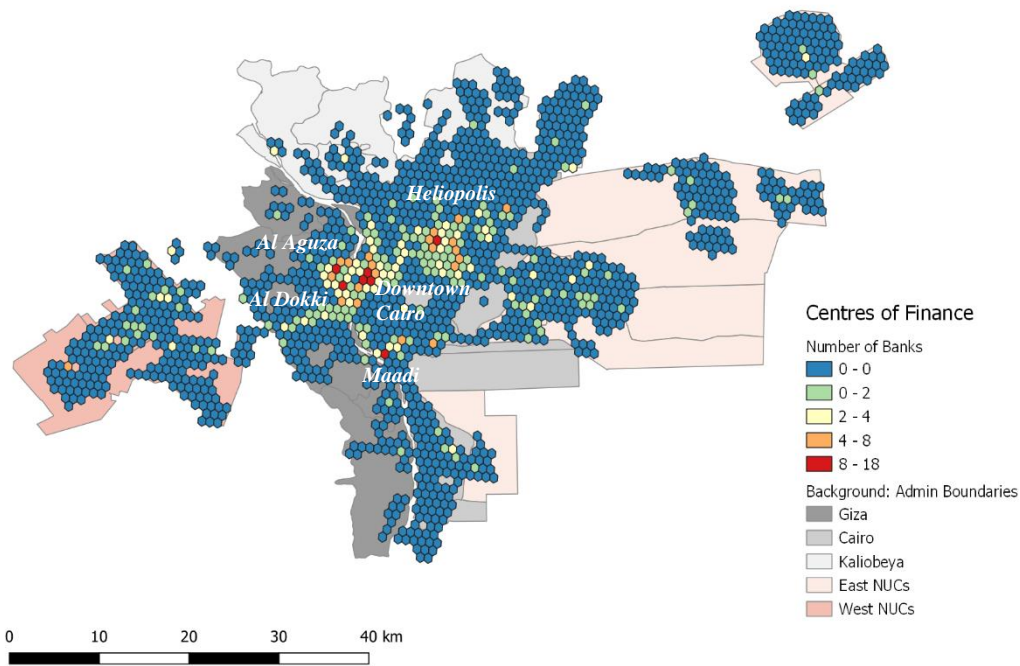


Pharmacies

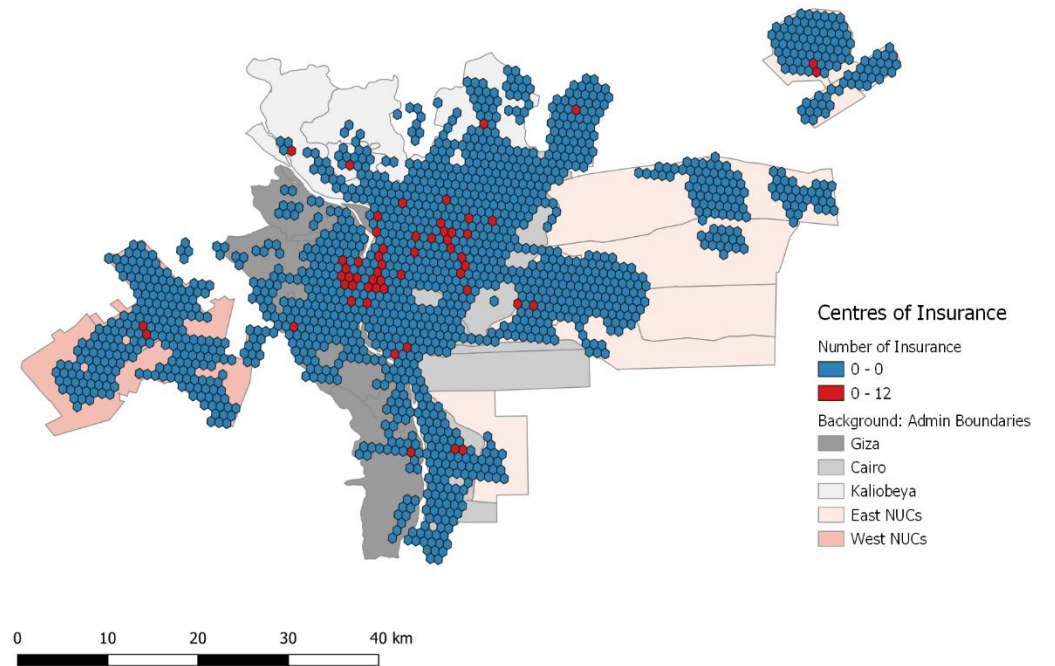


Empirical Data; Determinants of competitiveness

Finance

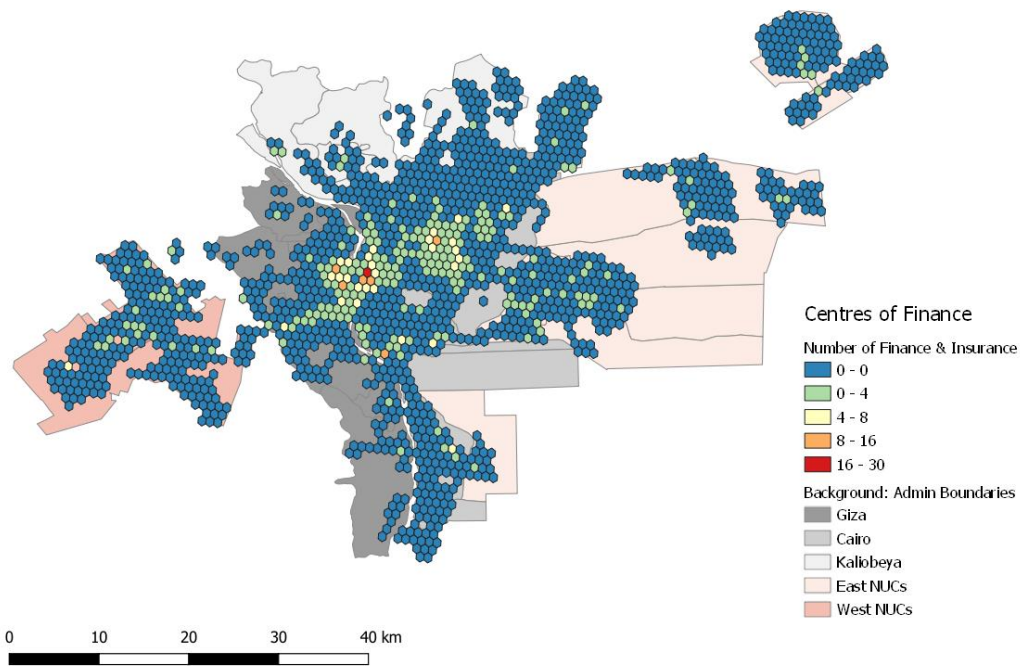


Insurance

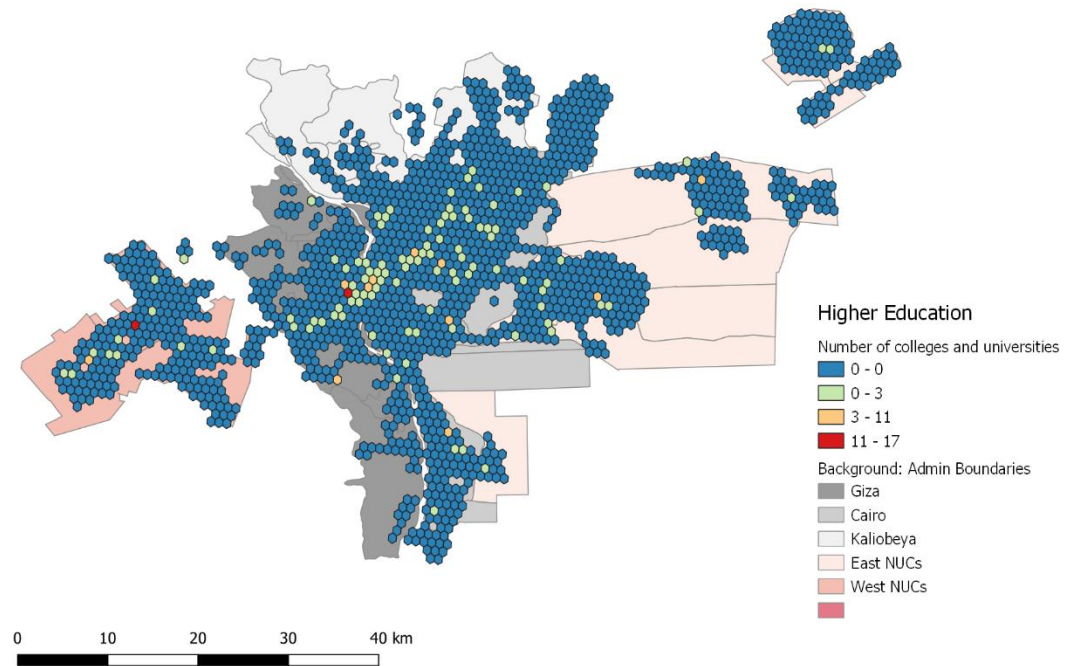


Empirical Data; Determinants of competitiveness

Financial Centres

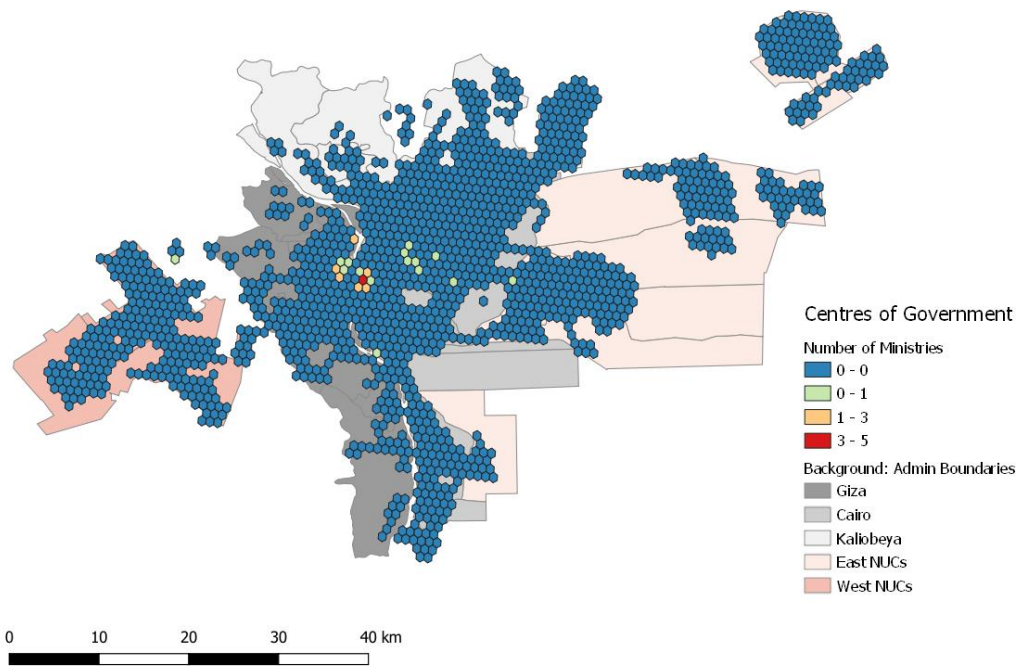


Higher Education

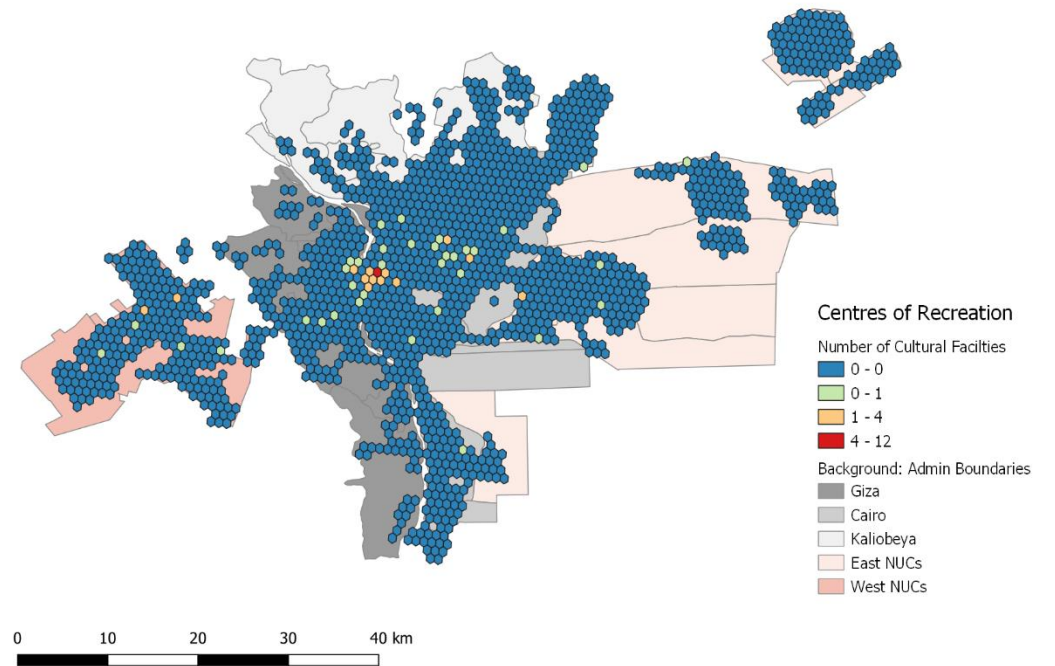


Empirical Data; Determinants of competitiveness

Government

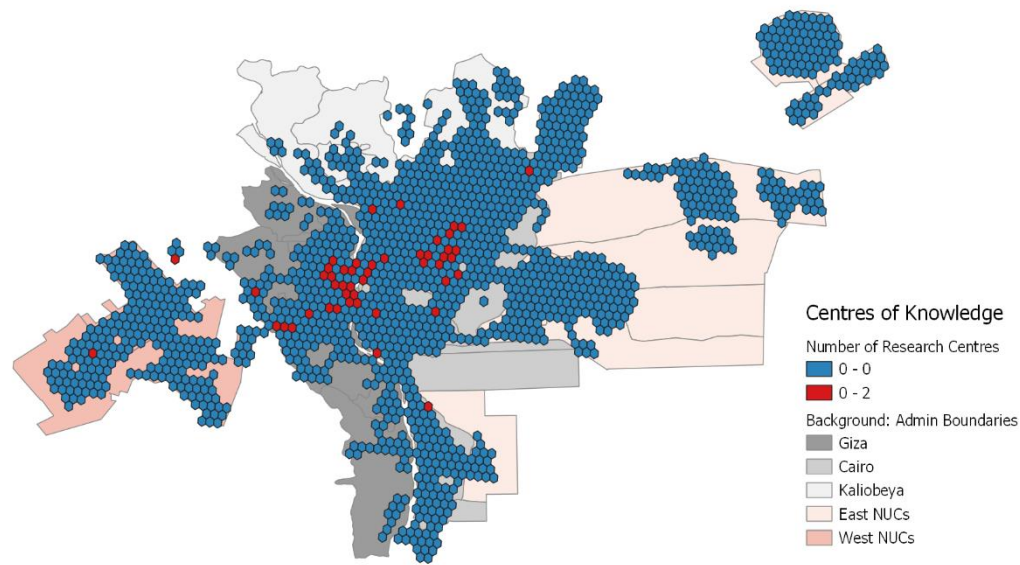


Recreation

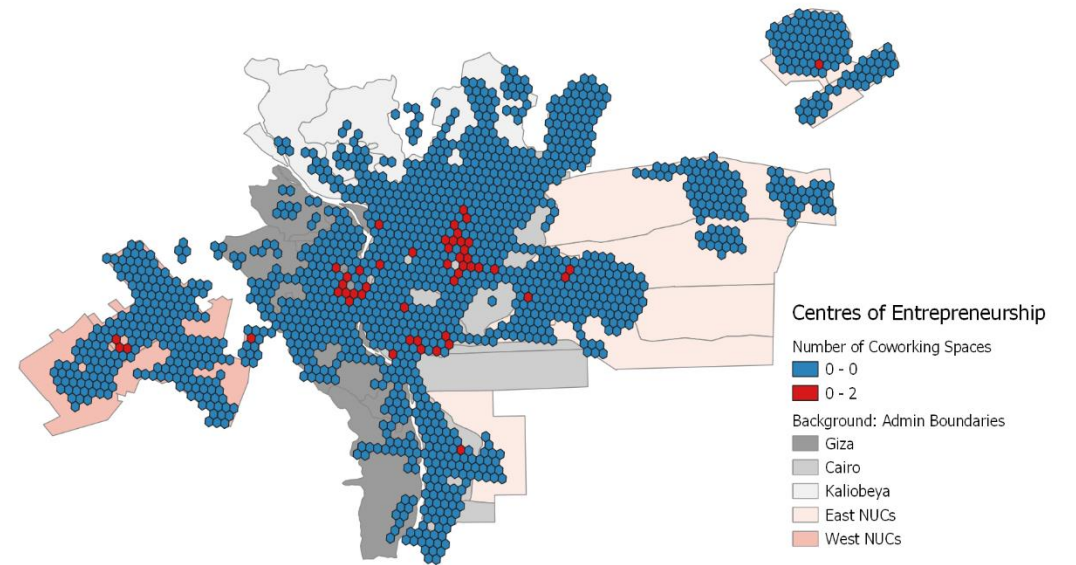


Empirical Data; Determinants of competitiveness

Centres of Knowledge

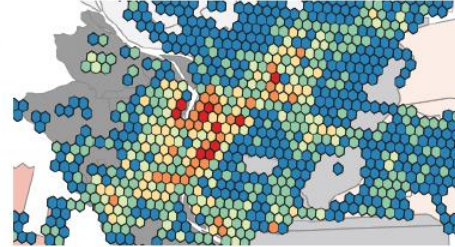
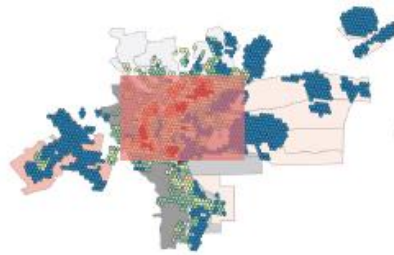


Centres of Entrepreneurship

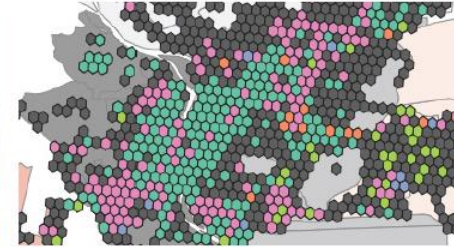


Empirical Data

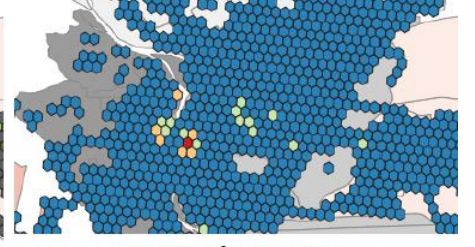
Micro-maps Central City



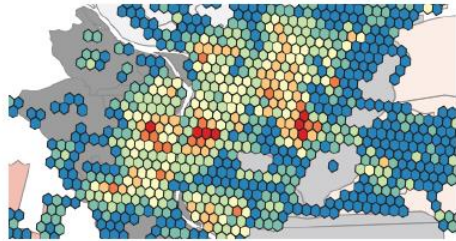
Basic Education



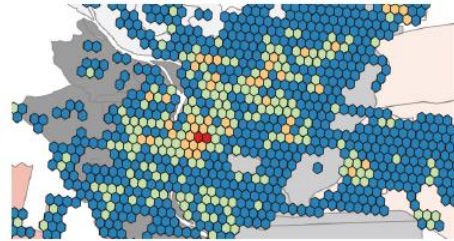
Type of Education



Centres of Government



Urban Competitiveness Index



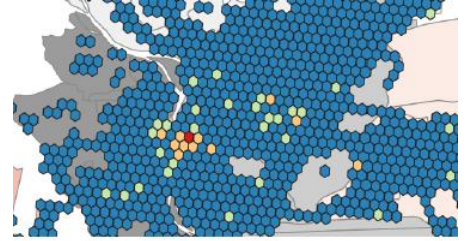
Centres of Manufacturing Production



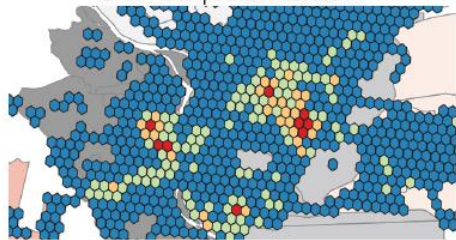
Supermarkets



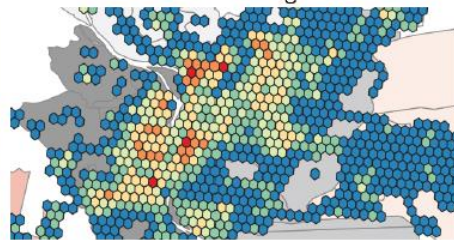
Pharmacies



Centres of Recreation



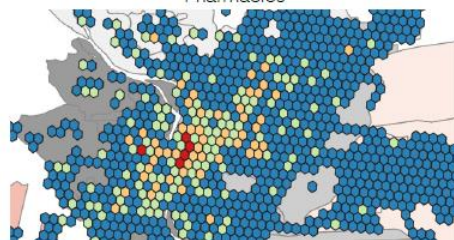
Centres of IT Service



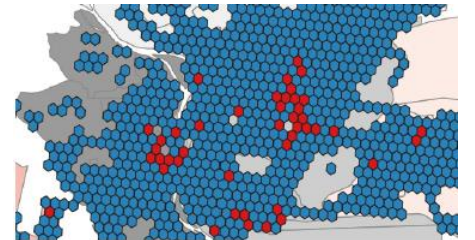
Job Opportunities



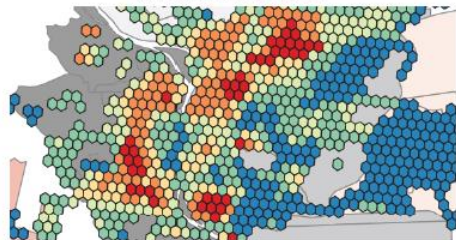
Communication Centre



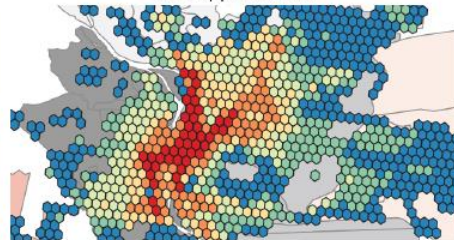
Post Offices



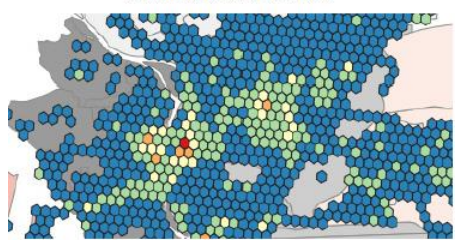
Centres of Innovation



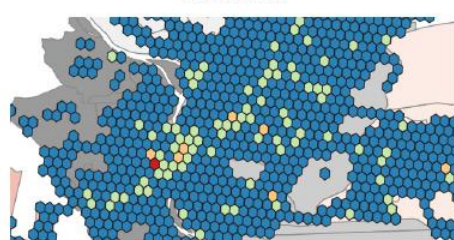
Population Density



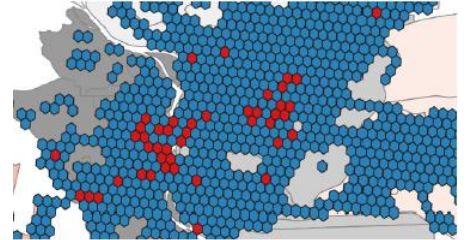
Accessibility



Centres of Finance & Insurance



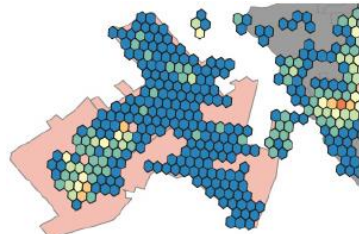
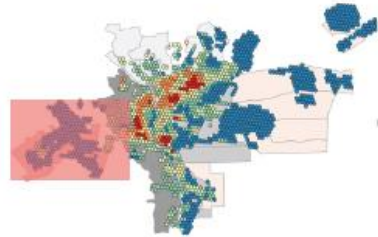
Higher Education & Training



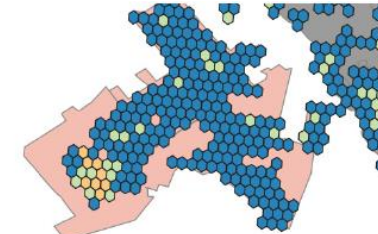
Centres of Entrepreneurship

Empirical Data

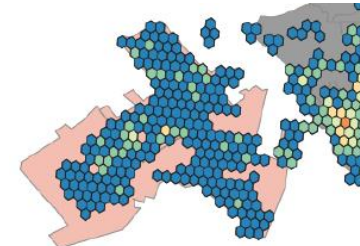
Micro-maps
6th of October



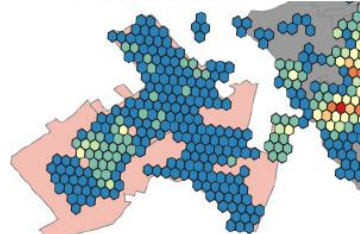
Urban Competitiveness Index



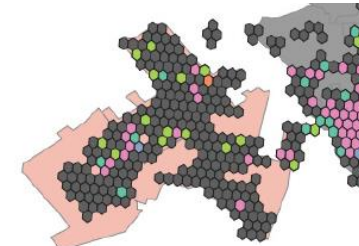
Centres of Manufacturing Production



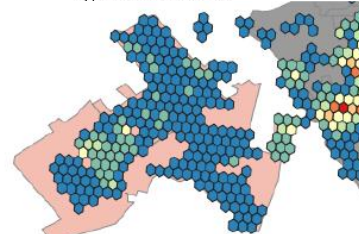
Basic Education



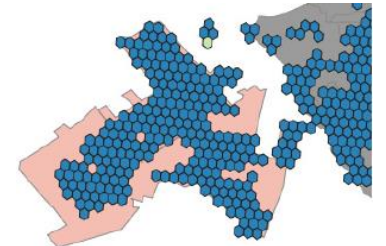
Supermarkets



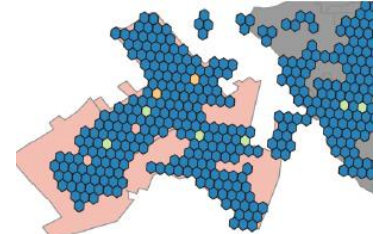
Type of Education



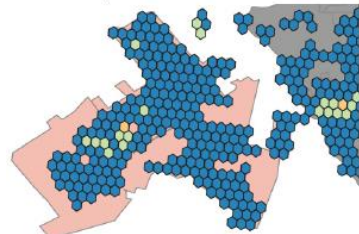
Pharmacies



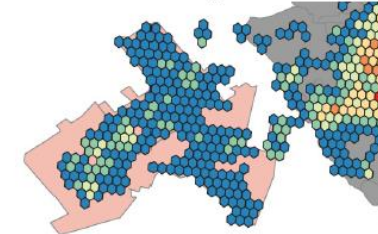
Centres of Government



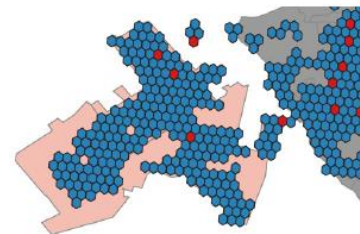
Centres of Recreation



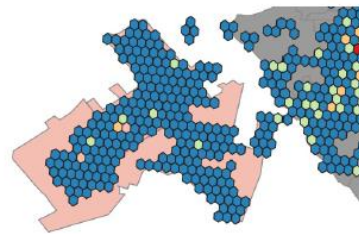
Centres of IT Service



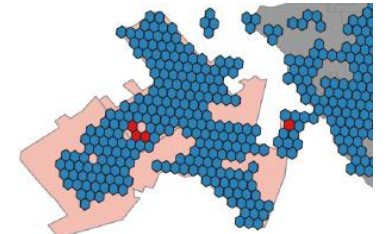
Job Opportunities



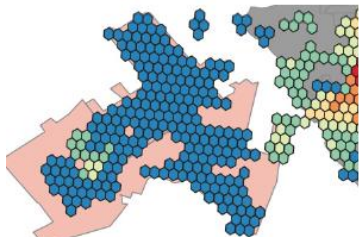
Communication Centre



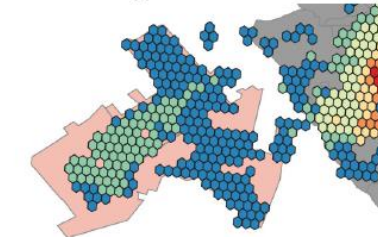
Post Offices



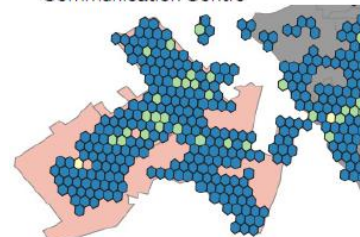
Centres of Innovation



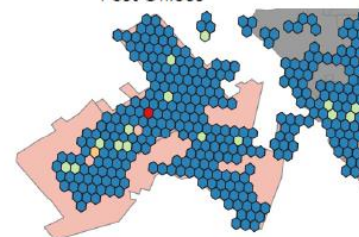
Population Density



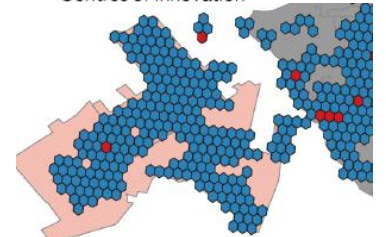
Accessibility



Centres of Finance & Insurance



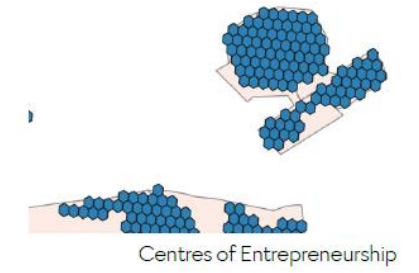
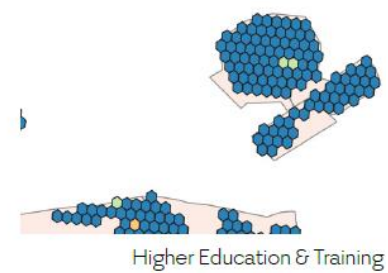
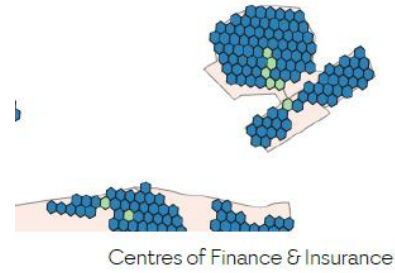
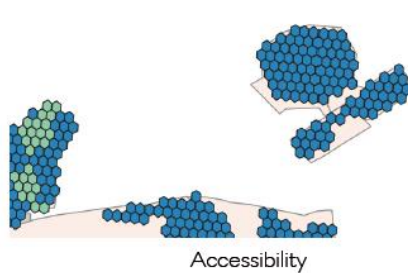
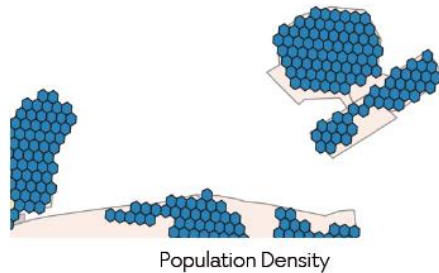
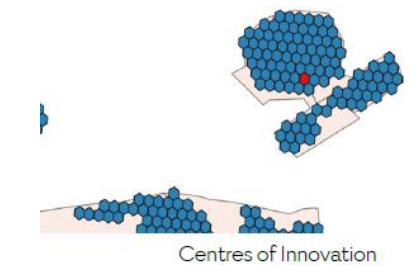
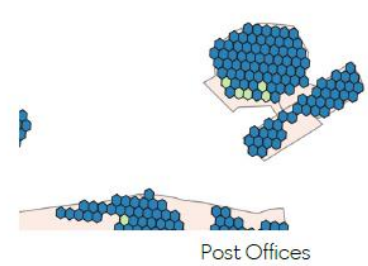
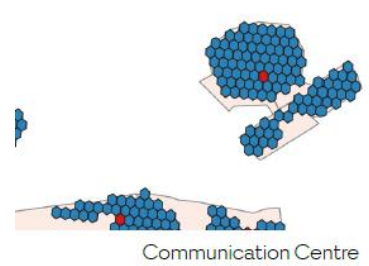
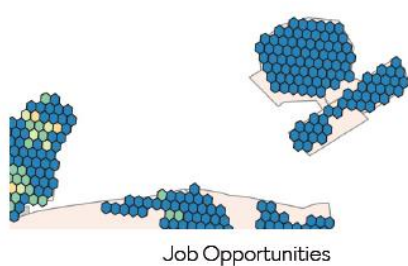
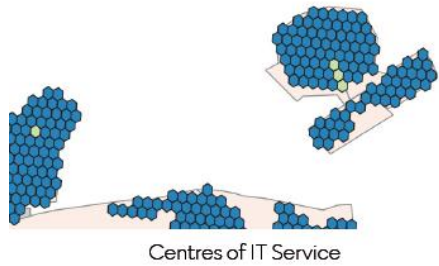
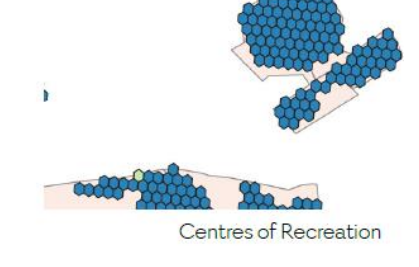
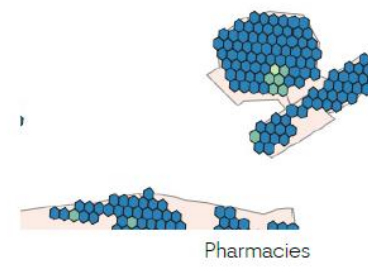
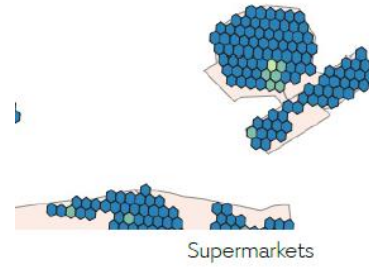
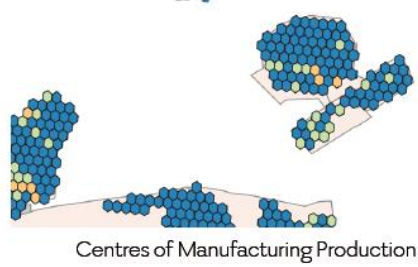
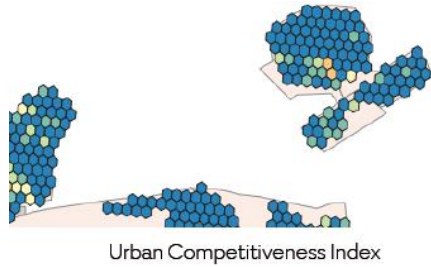
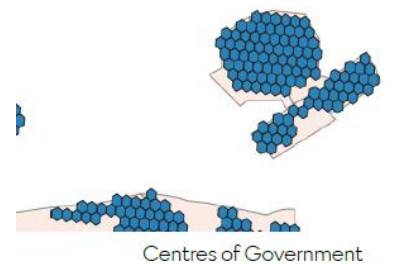
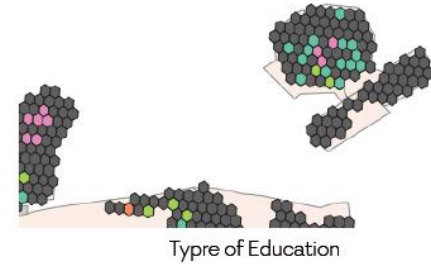
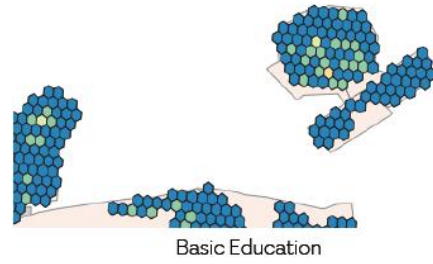
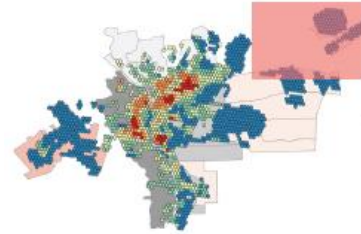
Higher Education & Training



Centres of Entrepreneurship

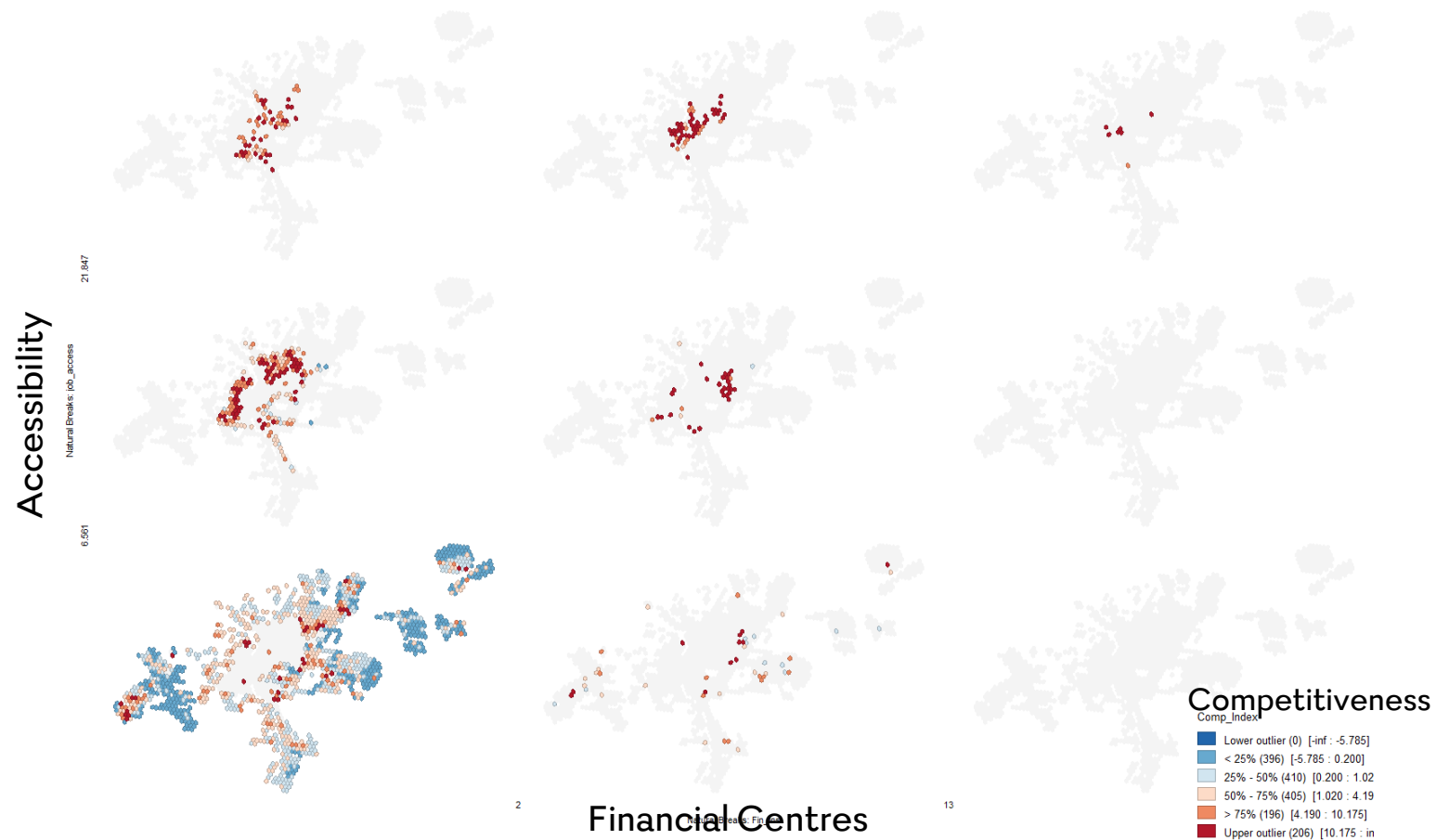
Empirical Data

Micro-maps 10th of Ramadan



Empirical Data

Conditional Mapping

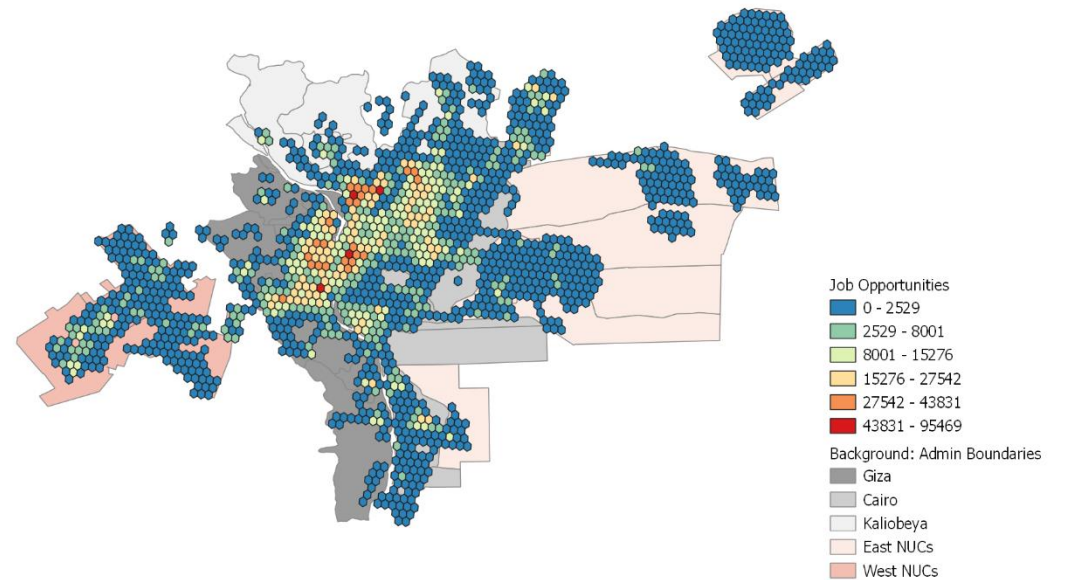
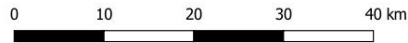
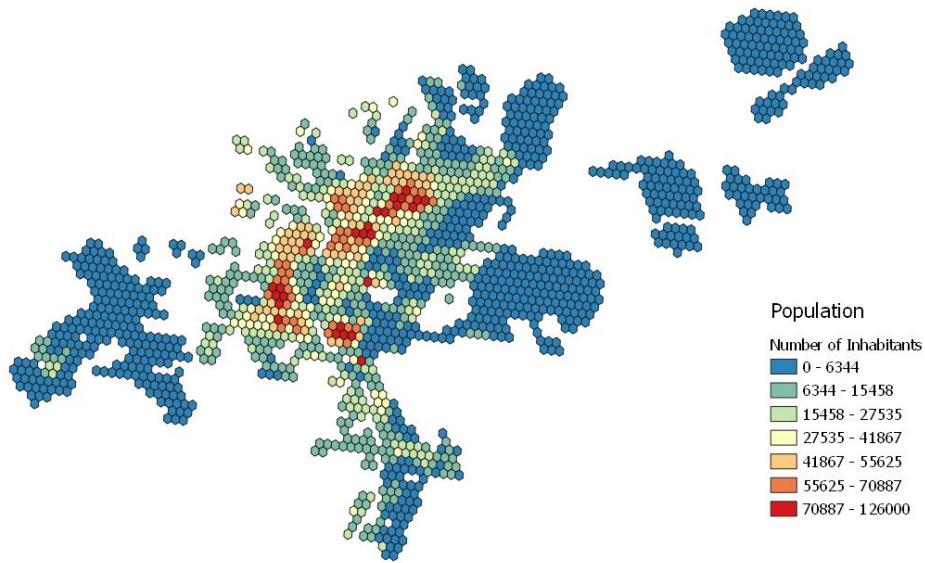
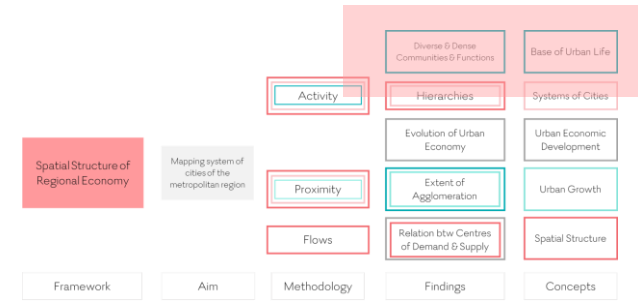


6

Synthesis

General Findings

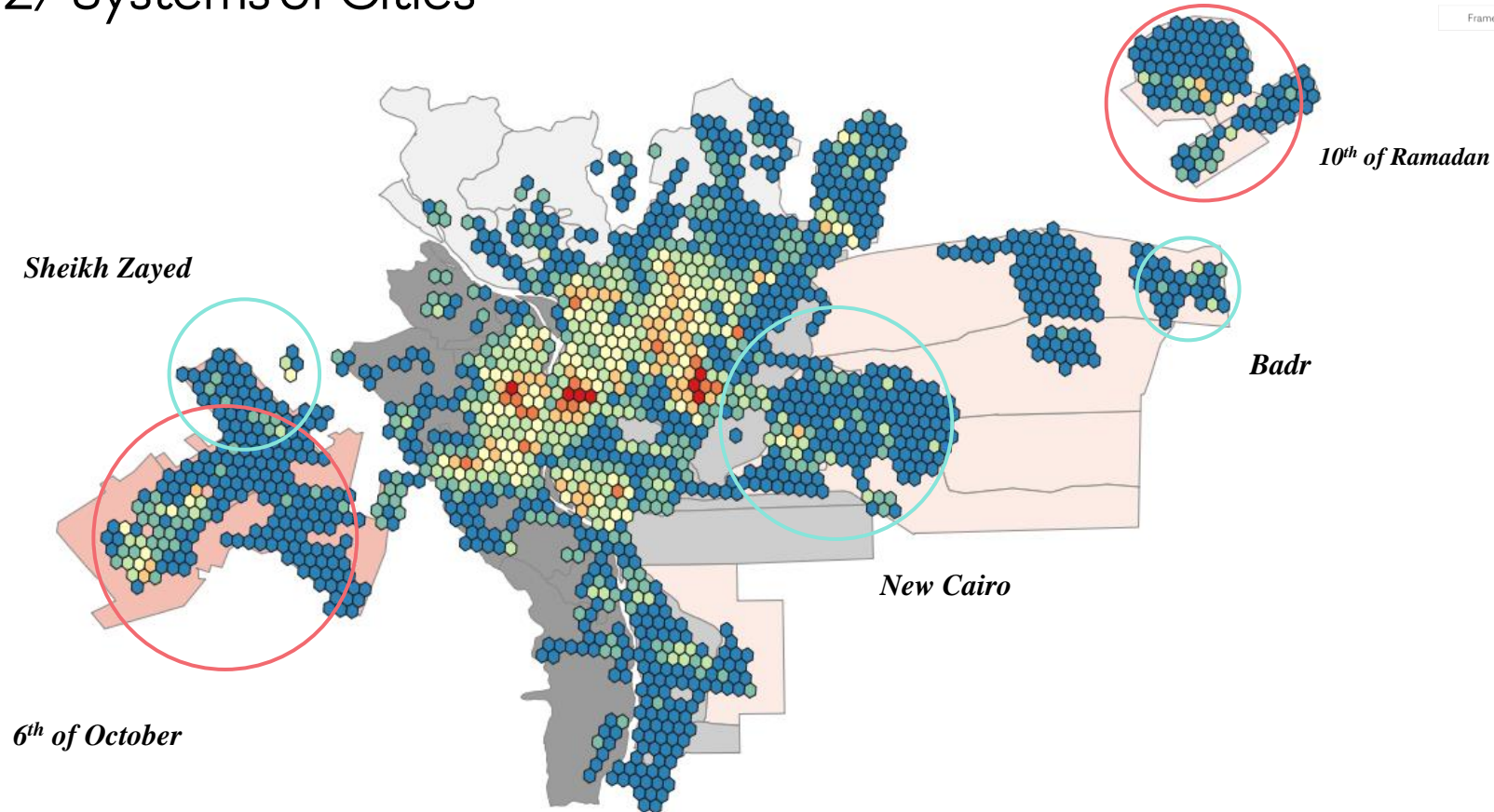
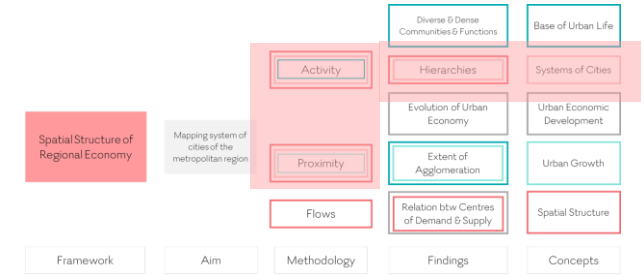
1/ Base of Urban Life



Synthesis

General Findings

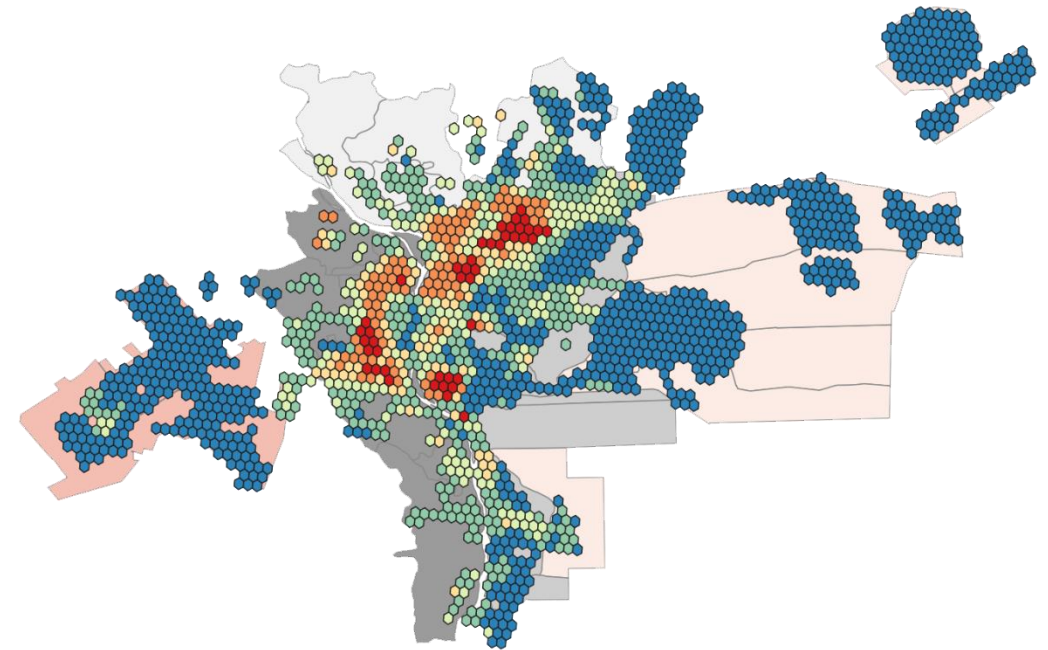
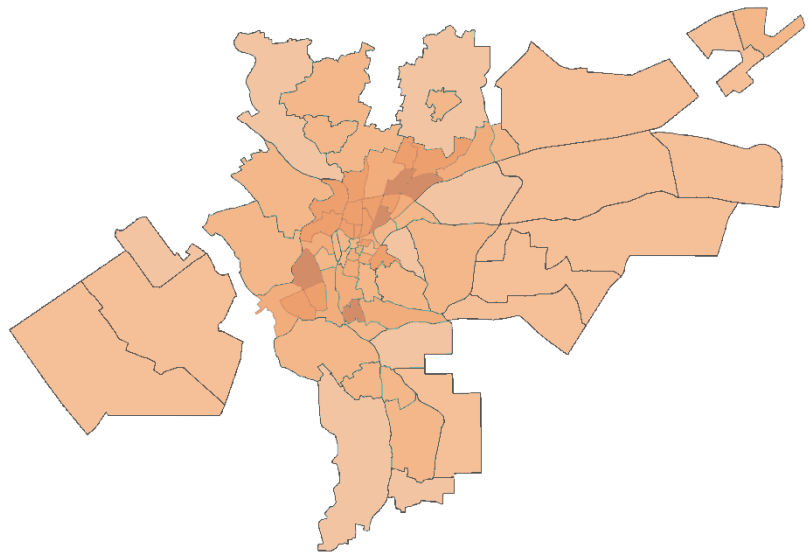
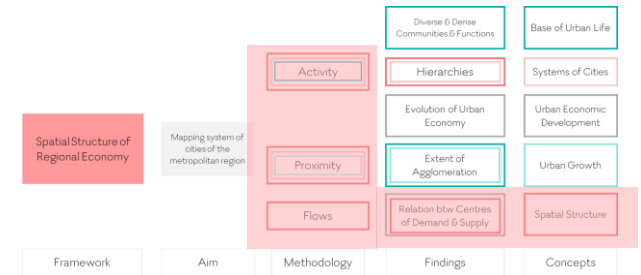
2/ Systems of Cities



Synthesis

General Findings

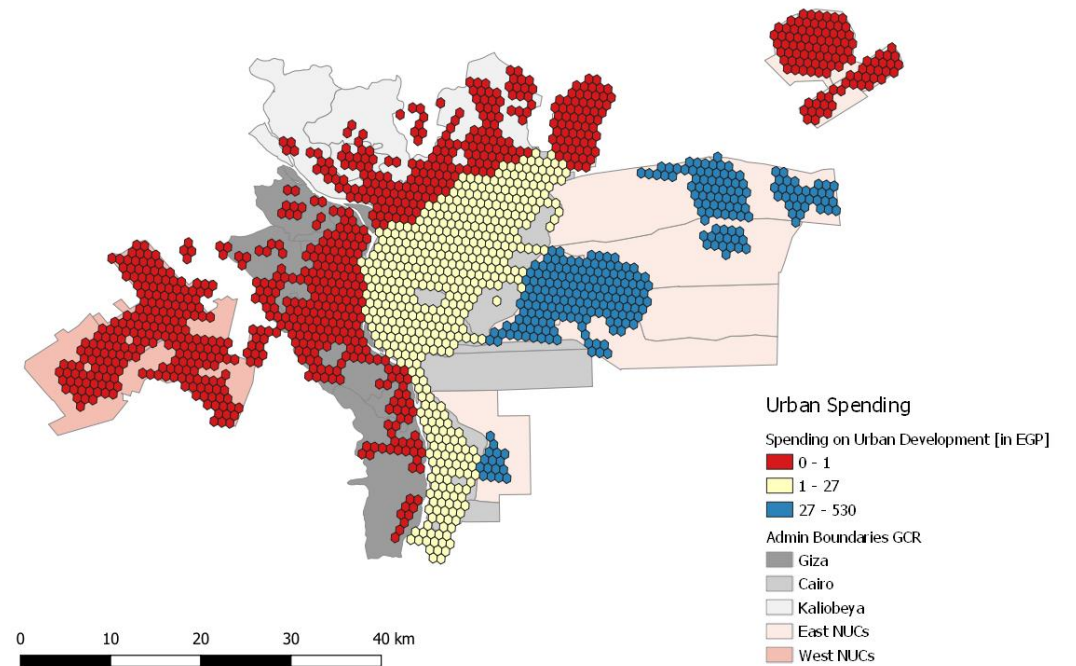
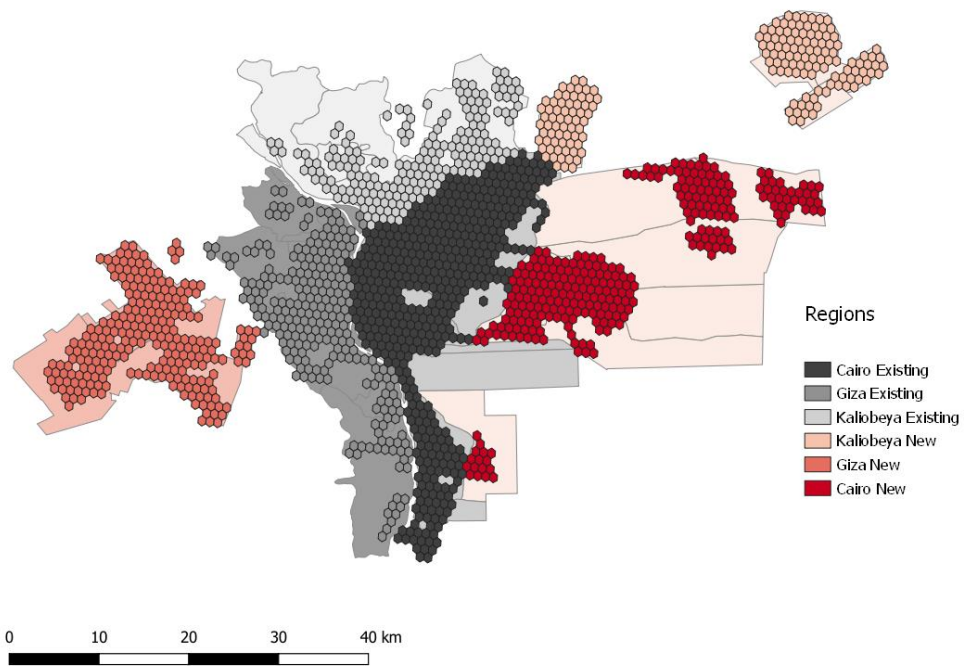
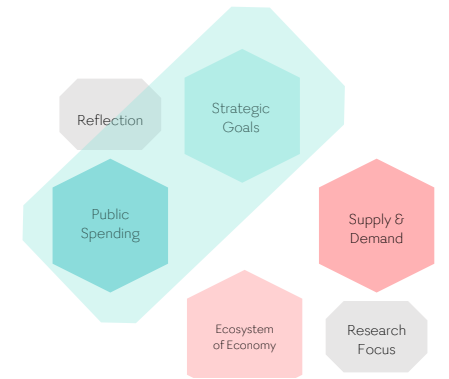
3/ Spatial Structure



Synthesis

General Findings

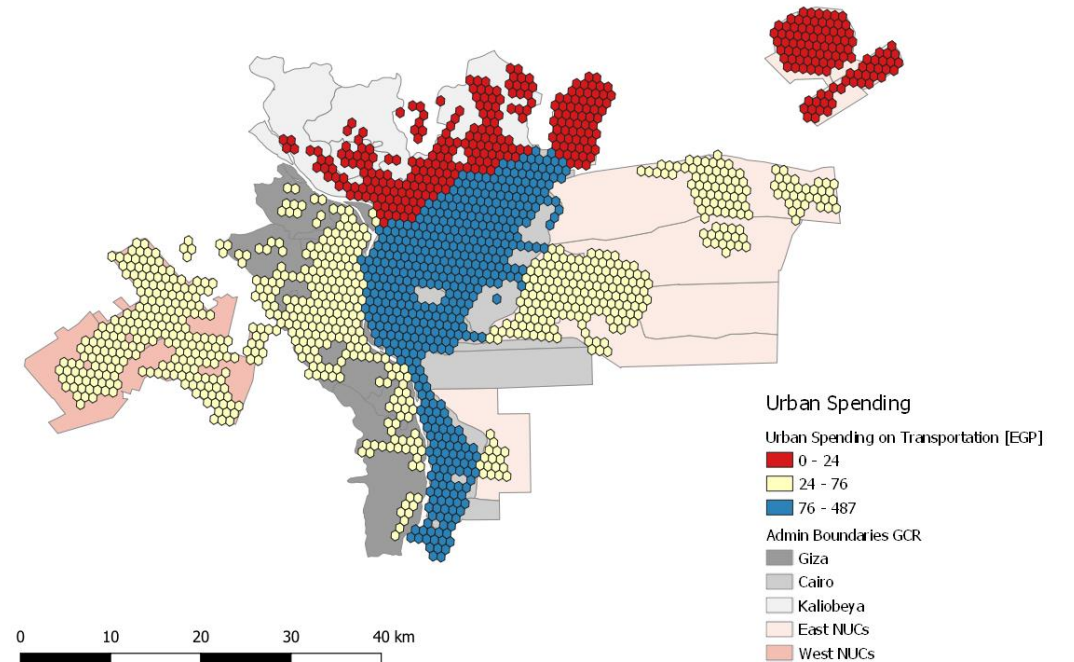
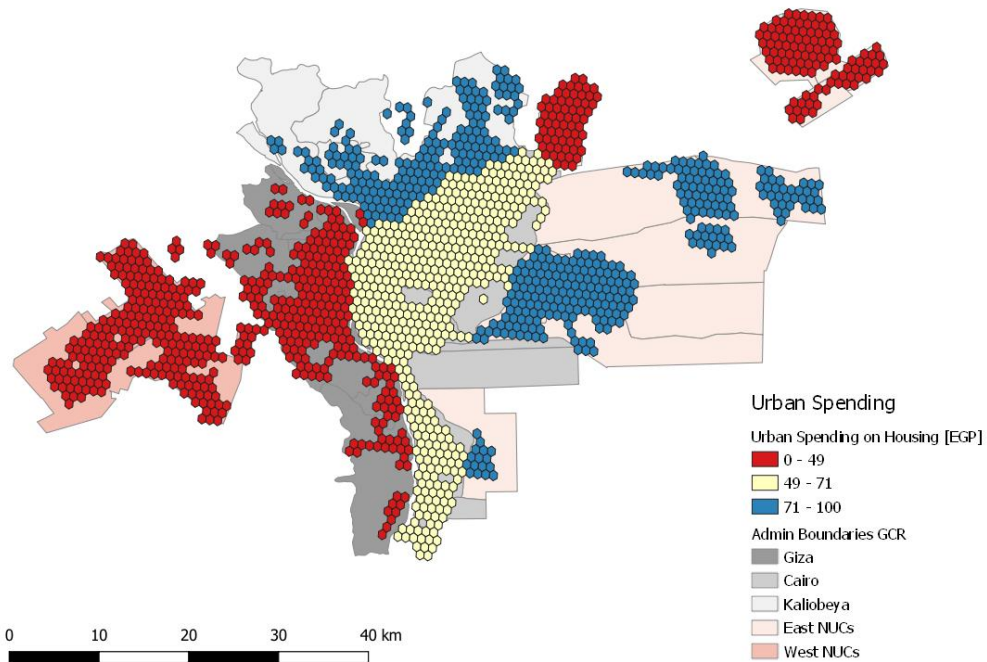
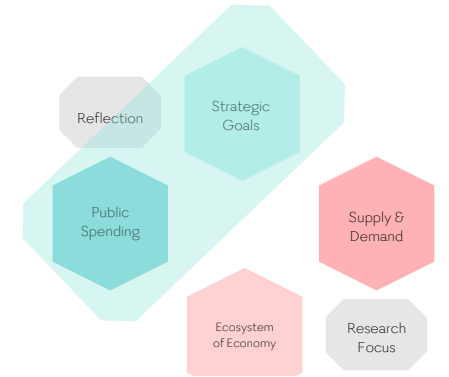
4/ Reflecting on Problem Analysis



Synthesis

General Findings

4/ Reflecting on Problem Analysis

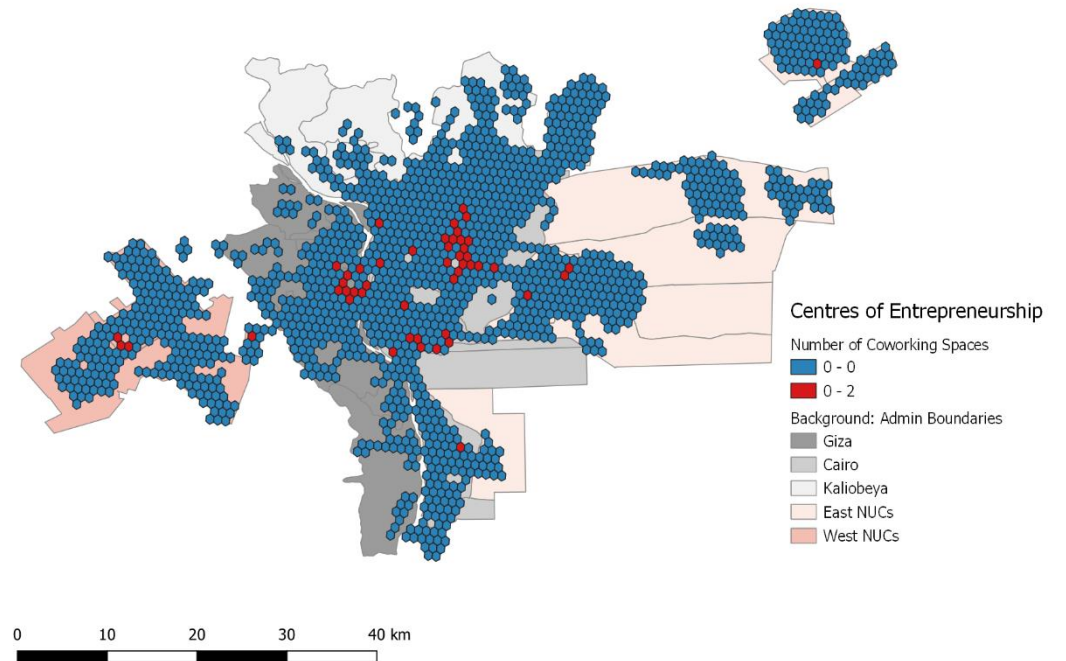


Synthesis

Socio-economic indicators

Reflection on each attribute

- Education as a signifier to diversity
- Accessibility as a pre-requisite to urban competitiveness and economic activity
- The market versus the government's ability to identify urban centres of demand
- Financial centres footloose and relation to high-end neighborhoods
- The success of relocating the government, again?
- Centres of recreation and their addition to the quality of life
- Centres of higher education, knowledge and entrepreneurship



Synthesis

Policy Recommendations

- Management of NUCs
- Management of metropolitan region
- Within NUCs, zoning for diverse versus dense urban areas
- Production functions & SMEs
- Public spending on transportation
 - Type of transportation infrastructure
- Use of open-source data & market indicators
- Higher Education, innovation & production
- Arts & culture policies within NUCs





Reflection

Conclusion

- Study of Metropolitan Region
- Policy Recommendations
- Theory Gap
- Data Availability

Recommendations

- Autonomous Management of NUCs
 - Data-led planning

Further work

- Informing urban strategies
- Overlaying this research with urban analysis
- Mapping urban flows to falsify findings

Acknowledgments

Partners



Assistance

- Ahmed El Gabri- web development
- Abdelrahman Hegazy- *Transport for Cairo*



Thank you

Any Questions?