Faculty of Engineering

Polycentricity as a Spatial Model for Regional Development

The Case of Ramallah Governorate

تطبيق مفهوم تعدد المراكز كأداة للتطوير المكاني في محافظة رام الله

Submitted by:

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September, 2014

Declaration of Authorship

I, Nadia Affouneh , confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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This thesis was developed under the supervision of Dr.Lubna Shaheen, and has been approved by all members of the examination committee.

Dr. Lubna Shaheen
(Supervisor) .....

Dr. Rassem Khamaisi
(Member) .....

Dr. Yasid Refai'
(Member) .....

Date of Defense:
June 21,2014

Dedication

To my parents; the first teachers ,,, I hope this achievement will be a part of your dream when you chose to give me the best education you could.....

Acknowledgements

I am deeply thankful for my supervisor, Dr. Lubna Shaheen for her enthusiasm and guidance, and for tireless work in creating this humble work, it was a great chance.

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Finally, my parents have been incredibly supportive throughout this work, and for this I am very grateful.

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Acronyms and Abbreviations

ARIJ	Applied Research Institution - Jerusalem
CAD	Computer Aided Design
CEU	Commission of the European Union
ESDP	European Spatial Development Perspective
ESPON	European Spatial Planning Observation Network
FUA	Functional Urban Areas
GIS	Geographic Information System
MDLF	Municipal Development and Lending Fund
MEGA	Metropolitan European Growth Area
MOLG	Ministry of Local Government
MOP	Ministry of Planning
MOPIC	Ministry of Planning and International Corporation
NSP	National Spatial Plan
OECD	The Organization for Economic Co-operation and Development
PCBS	Palestinian Central Bureau of Statistics
PIA	Potential Polycentric Integrated Areas
PUSH	Potential Urban Strategic Horizon
UN	United Nations
WB	The World Bank

Abstract

The Palestinian urban fabric is characterized by dispersed and scattered pattern of configuration, this situation has led to an imbalanced distribution of population, jobs, services and economics between different agglomerations, and resulted in high concentration of development in specific large urban nodes, and the deprivation of the other smaller (rural) communities from the development opportunities.

Concurrently; the concept of polycentricity has appeared as an effective tool for increasing the competitiveness of regions and integrating dispersed and fragmented agglomerations, which impedes the quality of human and natural environment for the regions. Also, it seems to be an excellent way to increase regional cohesions, especially in regions with higher numbers of small and medium sized agglomerations. The concept of polycentric regional development is becoming increasingly popular and important as well, as it has found its way into key documents within the spatial planning agenda.

This research invokes the assumption that the application of polycentricity in the Palestinian context as a development tool will effectively contribute in more sustainable and balanced development. Consequently; an innovative methodology for the detailed analysis and application of polycentricity within the Palestinian context is developed for this thesis, in order to test the potential of the Palestinian regions to work as a polycentric region, through a developed theoretical analysis identifying polycentricity and relate this analysis to criteria.
The Analysis examines different scales and levels of polycentricity with the current scales of the urban agglomerations in the West Bank; and test whether it could be applied to a specific case study area (Ramallah Governorate), and then to be generalized for the other West Bank's regions.

Keywords: Polycentricity, Morphological Aspect, Functional Aspect, Ramallah Governorate.

Chapter One
Introduction

1.1 Background

Historically, the Palestinian territories were occupied by several nations, which affected the urban fabrics, due to the fact that planning decisions were implemented to serve military goals and colonies structures.

The complicated political circumstances, the limited available lands, the high population growth, and the current planning orientations, were contributed in creating the current urban fabric of the Palestinian territories, which is characterized by dispersed and scattered patterns of configuration. The West Bank contains more than 500 Palestinian agglomerations, with relatively small sized population numbers, which reflects a dispersed urban structure.

Moreover, the region of the West Bank has experienced different changes in terms of its geo-political situation; according to the Oslo II Interim Agreement signed in September 1995, the West Bank had been classified in to the three areas (A,B, and C), the configuration of lands according to this agreement isolated most of the Palestinian communities in fragmented zones and limiting their development. Also, in terms of the Israeli settlements there are about 300 Israeli settlements,(*PCBS, 2010*) that followed the policy of land grapping, this was in addition to the Israeli isolation wall; that has restricted and isolated many agglomerations, the result was two different urban structures, the Palestinian and the Israeli urban fabrics.

Many other factors and problems associated with the fragmented urban structure of the Palestinian Territories, like the economic conditions, the services and jobs distribution, such structure resulted in 'village to city' relations rather than 'village to village' networks (*Ghazi and Shuman, 2005*). This reflects inefficiently and inequity in the distribution and allocation of the development sectors, especially regarding to services, jobs and functions, and led to high concentration of development in the large urban cities of the West Bank. and prevented the smaller agglomerations from the development opportunities.

The continuation of the current planning and development tendencies will affect both the large and the small communities negatively; where the pressure on the large urban communities, and its infrastructure will be increased, while the small communities will suffer from more and more neglect.

1.2 Problem Statement

The analysis of the existing urban pattern of the Palestinian agglomerations reflects a dispersed and scattered pattern of configuration, as illustrated in (Map 1.1**)**. This urban structure faces many problems, these problems could be classified as factors in to; Spatial/physical, geopolitical and socio-economic factors.

Map 1.1 : Physical Built-up Area Pattern of the West Bank

Source: *MoPIC,1998 (edited)*

- **Spatial/Physical Factor**

There are (537) Palestinian agglomerations distributed on the total area of the West Bank's panhandle, and cover about (20 %) from its total area.(*PCBS,2012*). The average size of the in the West Bank's agglomerations, in terms of population, is less than (5,000) inhabitants per community, while the average gross land per community is about 10 square kilometers, Consequently, this indicates an urban fragmented structure.(*Saleh,2008*).

The highest percentage of population is concentrated in few urban centers (cities), whereas the rest population is distributed between large numbers of small rural communities (villages).

Statistics show that about (71%) of the Palestinian population in the West Bank lives in the biggest urban centers (mainly the centers of the governorates), while (23%) of the population inhabits the smaller rural communities. Despite the fact that these smaller rural communities cover about (85%) from the total area of the West Bank. Distinctly, this imbalanced situation of population distribution has led to high concentration of services and jobs in the larger urban communities.

- **Geo-political Factor**

The geo-political situation of the Palestinian context in general and in the West Bank in particular contributes in additional desperation between the Palestinian agglomerations. The classification of lands according to Oslo Agreement (areas A,B and C) prevented the Palestinian from the control on more than (60%) from their lands, this classification isolated most of the Palestine communities and stopped their expansion, and the majority of development projects within the areas classified as (C) are totally denied by the occupation authorities.

The Israeli settlements create further layer of the physical urban context. Factually; the existing of the Israeli settlements layer which are scattered between different Palestinian areas and creates magnificent accessibility difficulties between them, may comprise an incentive to create additional regional centers rather than the main center, to provide and facilitate the accessibility for the inhabits needs, within shorter distances.

Apartheid Wall also isolated (10%) of agricultural land in the West Bank, and (30) wells artesian, until the end of the year 2008, and more than 180 Palestinian communities have been affected negatively by this wall. Policies of the Israeli occupation of confiscation agricultural land and settlement building, detours construction, closures, checkpoints the wall and the control upon water sources, also contributed to more fragmentation of land.

- **Socio-economic Factor**

The imbalanced distribution of development between the main centers and the other smaller centers and localities could be strongly referred to the socio-economic factor.

Historically the main centers have been developed as commercial nodes, their economies were built on the trade and commerce mainly, while the economics of the rural areas based on agriculture.

After the Israeli occupation of the Palestinian lands, the Palestinian economy was linked to the Israeli economy, and thousands of Palestinian labors tended to work within the occupied areas in 1948 (Israel), and Israeli settlements, these jobs characterized by constant and high income compared to agricultural work.

After the Intifada the Israeli side closed for workers, and labors became unemployment, the poverty rates increased, according to the Palestinian Central Bureau of Statistics the percentage of unemployment in the West Bank exceeded (60%) in the year 2009.

After Oslo Agreement, the Palestinian Authority toke the control over the West Bank, whereby new functions have been appeared to support the Palestinian economy, like the governmental jobs. The main governmental buildings concentrated in the main centers, this planning trend affected the population distribution between urban and rural centers, and led to the internal migration for the cities, more services, more jobs, and more population concentrated in the main nodes. Accordingly, this enhanced the centricity of these centers, and decreased the opportunities of the other smaller center to be developed.

1.3 Questions

Based on the statement of problems elaborated in (section1.2), the key questions that will stimulate this research are divided into main and secondary questions, these questions could be summarized as follows:

Main Question

Can the polycentric model be applied in the Palestinian context in order to achieve more integrated and balanced development on the sub - regional and local levels?

Secondary Questions

- What is the methodology to implement the polycentricity model in the Palestinian context?
- What are the criteria needed for achieving polycentricity model in the study region?
- How could the different criteria of polycentricity as a global concept be modified to fit the Palestinian context?
- Can the results of the polycentricity model implementation in the study area be generalized to all of the West Bank's regions, and How?

1.4 Hypothesis

This thesis has been developed according to the hypothesis: '**Applying polycentricity within the Palestinian context will create more balanced and sustainable development**'. And the hypothesis: '**This research focuses on the development of the lower (sub-regional and local) levels of centers within the Palestinian context**'.

Based on the proposed scenario: "At all levels Polycentricity is about functional integration and co-operation between urban areas. Polycentricity could be achieved at all levels; when increased polycentricity at lower levels makes regions stronger, this can lead to more polycentric national system, at a higher levels", (*ESDP,2007*).

Accordingly, this thesis research will be designed to be applied within the lower level of urban scale (Sub-regional/ Local) scale. Moreover, the study region for this research is **Ramallah Governorate**.

1.5 The Main Goal and Objectives

Similar to the research question structure, the objectives of this research could be divided into main goal and other objectives as follows.

- **Main Goal**

This thesis is an excretion of efforts **to explore the feasibility of the implementation of the polycentric approach of planning within the Palestinian context to promote more developed, integrated and balanced development**.

- **Other Objectives**

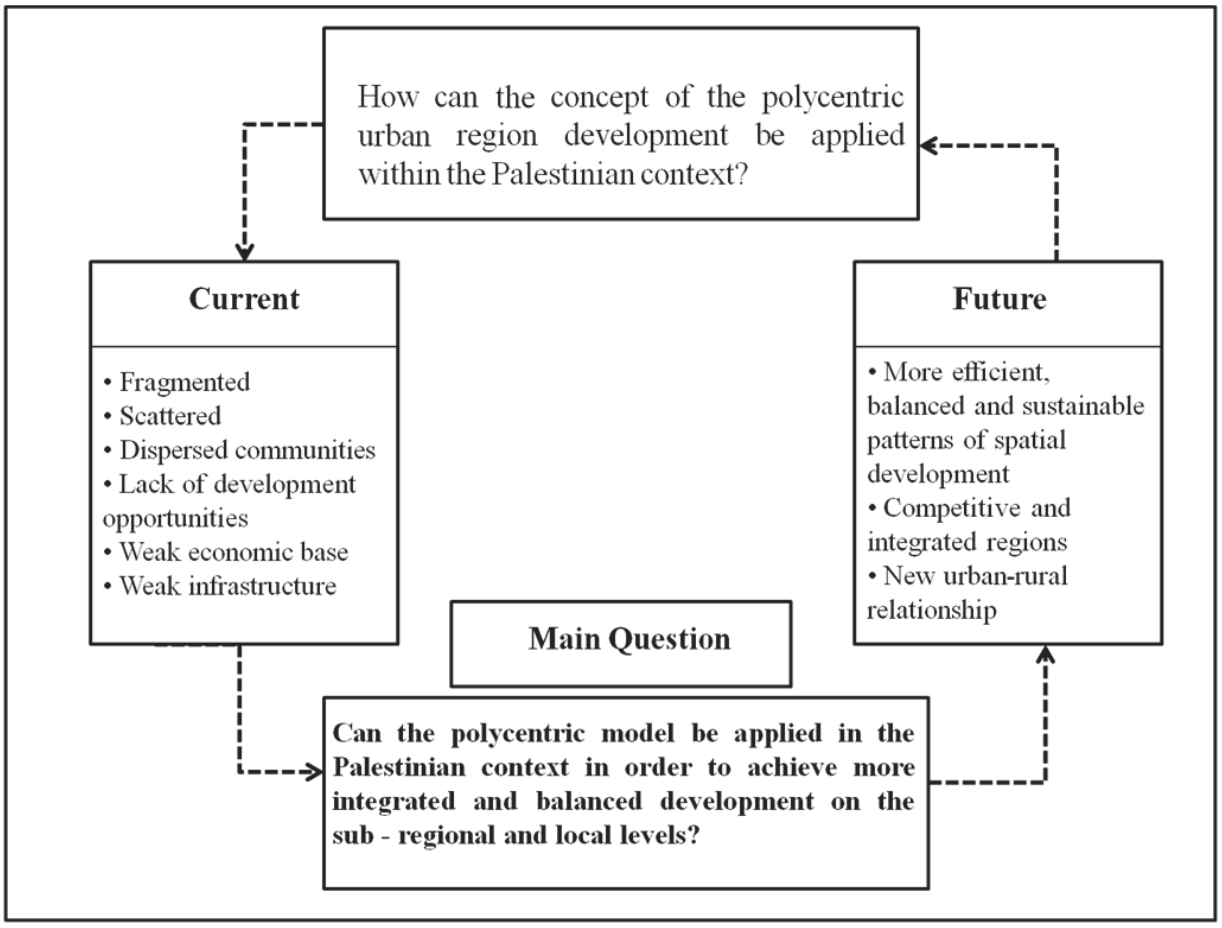
The following points present the other objectives of this research:

- To develop a model for the implementation the polycentricity within the Palestinian context;
- To review the theoretical analysis and literature identifying polycentricity and relate this analysis to criteria;
- To examine different scales and levels of polycentricity with the current scales of the urban agglomerations in the West Bank;
- To discuss the implications of the polycentricity model application in the Palestinian context within a specific study area (Ramallah Governorate), and then to consider whether it could be applied and generalized for all the West Bank's regions.

1.6 Methodology

The inception step in designing the research strategy was to set-up mind to what research methodology to be adopted in the investigation of the research questions, based on the statement of problems, and the proposed hypothesis in this research. (Figure 1.1) illustrates the designing chart of this research structure.

Figure 1.1 : Designing Chart for the Research Structure



Accordingly; the impetus of research methodology is a case study approach, whereby the urban area of Ramallah Governorate is used to investigate the possibility of promoting the concept of polycentricity as a tool to develop the physical and functional patterns and its related challenges that face the Palestinian context.

This approach of analysis has been selected to this research based on the current urban contextual challenges which are reflected in the entire area of the West Bank. Thus; a specific region (case study area) has been selected to be analyzed, while the results could be generalized to other regions. Furthermore; many previous studies were concerned with the generic-regional level of the West Bank, in terms of similar urban challenges which have been clarified in the statement of the problems. For this reason; the analysis of a specific and detailed study area within the sub-regional/local level will present the motivation of this research methodology.

To this end, the structure of the research is built on "Testing the capability of the **polycentric model** to be applied in the **case study area**". (Figure 1.2) illustrates the methodology of this research.

In particular; understanding the polycentricity concept levels creates a series of demands on the analytical tools of the Palestinian urban context. There are seven methodological approaches for polycentricity model application that this thesis addresses; these methodological approaches could be scantly summarized as follows:

1. Establishing of a framework of understanding for the Palestinian spatial and functional context, (*Chapter 2*).
2. Finding a logical breakdown for the polycentric model by analyzing its definitions, scales, components and concepts, (*Chapter 3*).
3. Setting of a group of testable factors (criteria list), which could be the measurement tools for the potential of the West Bank or it's certain regions to become polycentric. 'creating suitable criteria list of polycentricity', (*Chapter 3*).
4. Combining different scales and levels of polycentricity with the current scales of the urban agglomerations in the West Bank, (*Chapter 4*).
5. Defining polycentricity concepts and dimensions according to the elements of the Palestinian urban fabric, (*Chapter 4*).
6. Implementation of the adapted criteria lists to the study area, (*Chapter 5*).
7. Generalizing the results of the study area to other regions, (*Chapter 6*).

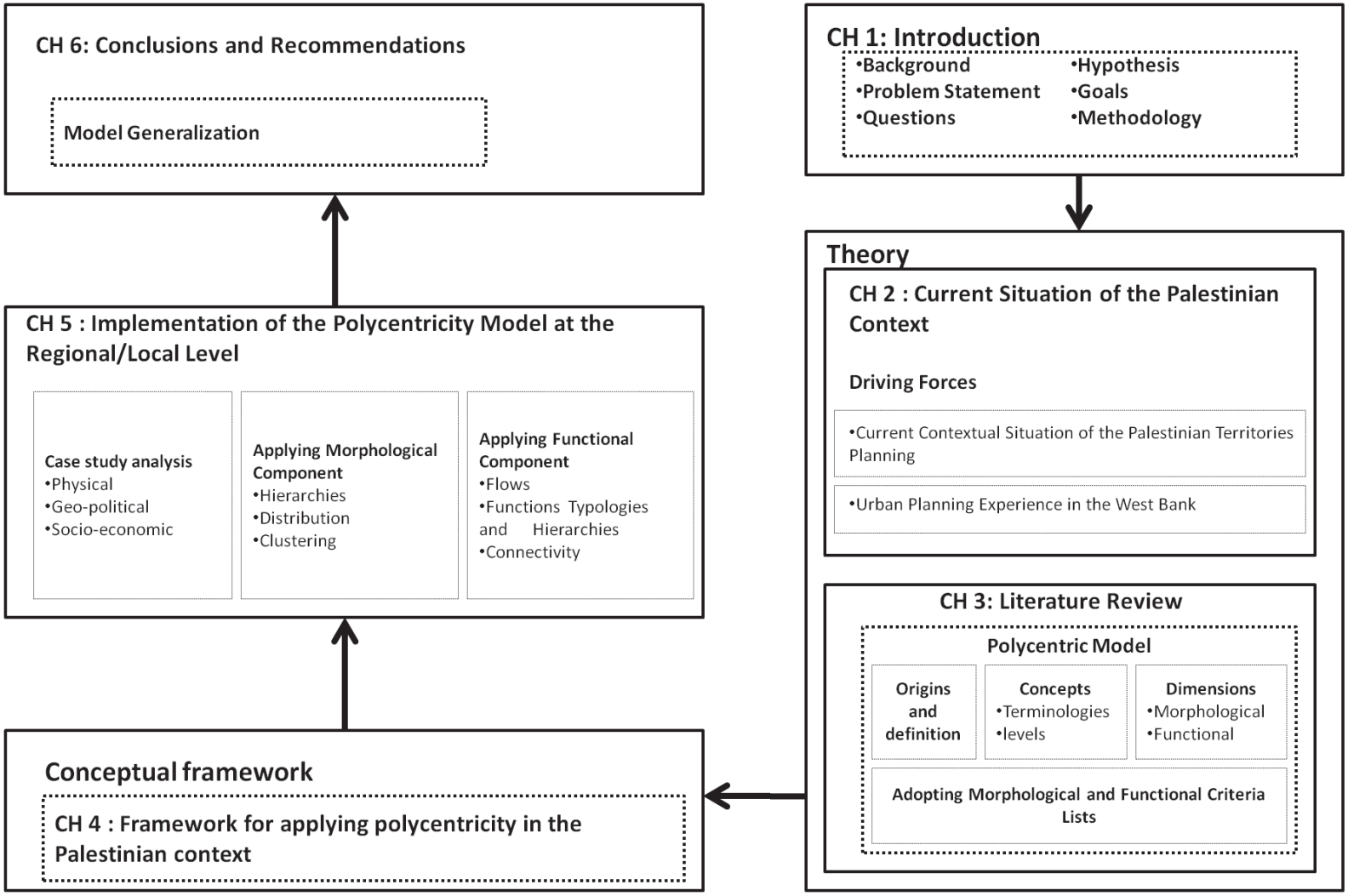
1.6.1 Data Collection Methodology

Two data sources have been identified for this research, namely; primary and secondary data resources.

The primary data are extracted mainly from the direct observations of the author from the Palestinian urban fabric. The primary data used are conceptual and provides visions for the future it is also informatics and helps to understand the current situation. Meanwhile; the secondary data are built through circulations of the available data in the forms of archived researches, literature reviews, published documents, mapping, interpretation using the GIS and the Auto CAD programs.

The base of the maps which have produced by the author is owned, operated and updated at the commandment of the MoP. Moreover; the attribute data in terms of statistical figures and socio-economic has been gathered by the author from other multi-secondary data sources, including PCBS, ARIJ, MoLG, NSP and MoP.

Figure 1.2 : Research Methodology



1.7 Thesis Structure

This research thesis consists of six chapters, by which the concept of the polycentricity model to be implemented in the Palestinian context will be tested.

- **Chapter One : Introduction**

  This chapter presents the precursory background that introduces for the following contents of the research; it recognizes the scope and level of intervention of the research. Moreover; it's clearly identifies the problem statements, the research hypothesis, goals, questions and methodology, and systematically itemized on research theme and context.

- **Chapter Two : Current Situation of the Palestinian Context**

  This chapter presents a background on the state of the Palestinian context, and provides an understanding framework for its current physical patterns, administrative structure, socio-economic situation, and geo-political situation. This chapter also demonstrates the urban planning experience in the West Bank.

- **Chapter Three : Theoretical Analysis - Polycentricity as a New Concept for Spatial Configuration**

  This chapter provides a survey of the existing literature about polycentricity, it discusses how the concept of polycentricity has evolved through urban planning epoch, it also discusses its definitions, levels, concepts, components, and measurements in order to create a reliable and complex set of determinants and condition of the development of polycentric regions. Finally, this chapter presents a proposed approach for adopting a group of testable factors (criteria) which could be applicable for the Palestinian context.

- **Chapter Four : Framework for Applying Polycentricity in the Palestinian Context**

  This chapter contains a test for applying polycentricity on the national level (Generic level of the West Bank), It also combines different scales and levels of polycentricity with the current scales of urban fabric of the West Bank. Moreover; it define polycentricity concepts and components according to the Palestinian urban context.

- **Chapter Five: Implementation of the Polycentricity Model at the Sub-Regional / Local Levels**

  This chapter attaches the adopted criteria lists of polycentricity (morphological and functional), and the generic framework of the model's application, in order to implement their results in the study area, and to prove or disprove the existence of the real conditions for polycentricity within the Palestinian context. This chapter is mainly three folds: the first analyze the study area (Ramallah Governorate) where the model will be applied, in terms of its physical characteristics and economic - functional situation. The second part examines the potential of the study area to work as a polycentric region by applying the polycentricity model through its two main components (morphological and functional components).

- **Chapter Six: Conclusions and Recommendations (Generalization of the Model)**

  The closing chapter briefly checks the ability of the research to answer its questions and achieve its goals. It also provides a general policy framework of strategies for promoting polycentricity in other governorates of the West Bank, by identifying the preconditions to initiate such development, by a brief discussion for the generalizations ideas and recommendations for policy making.

1.8 Limitations

Although this research has obtained its goals; some limitations and shortcomings were deter the progress of this research. these limitations are listed as follows:

- Time limit;
- Data accessibility;
- Large number of communities within the study area and;
- The special characteristics of the Palestinian geo-political context.

Chapter Two

Current Situation of the Palestinian Context

2.1 Introduction

This chapter presents a general view over the current situation of the Palestinian context, in order to develop better framework of understanding for the spatial and functional structures within the Palestinian territories.

There are two main parts of this chapter, the first part provides a general introduction to the current situation of the Palestinian urban structure, and the West Bank in particular, this includes it's physical pattern, administrative structure, socio-economic situation and the geo-political context. The second part introduces a general perspective for the Palestinian urban planning experience in the West Bank.

2.2 Current Context of the Palestinian Territories

2.2.1 Background

Palestinian urban system is unique, as a result of the long periods of mandates and occupation by several regimes, which contributed through history on the urban fabric of the Palestinian lands.
The Palestinian Territories including (the West Bank and the Gaza Strip) cover an area of (6,209 Km^2), (5,844 Km^2) for the West Bank and (365 Km^2) for Gaza Strip according to the Ministry of Planning publications, and this study will be confined in the West Bank region only.

2.2.2 Physical Pattern

Physical Pattern of the Wes Bank has been developed randomly, due to the absence of a planned development vision by regional or national plans, this was resulted in a scattered and dispersed pattern of built-up agglomerations, with small densities, lacking the required level of infrastructure networks.(*MoPIC,1998*).
The total population of the West Bank is (2,649,020 person) which are distributed between (537) agglomeration (*PCBS,2012*). (Map 1.1) shows the distribution of the built-up areas which forms the physical pattern of the West Bank.

2.2.3 Administrative Structure

This part of the study presents the administrative structure of the different agglomerations in the West Bank, based on the laws of organizing hierarchies of local bodies. The planning administrations in the Palestinian Authority, classified as stated by the Jordanian Law (No. 79)*[1] of 1966 into three levels, these levels are:

1. Higher Planning Council (HPC)

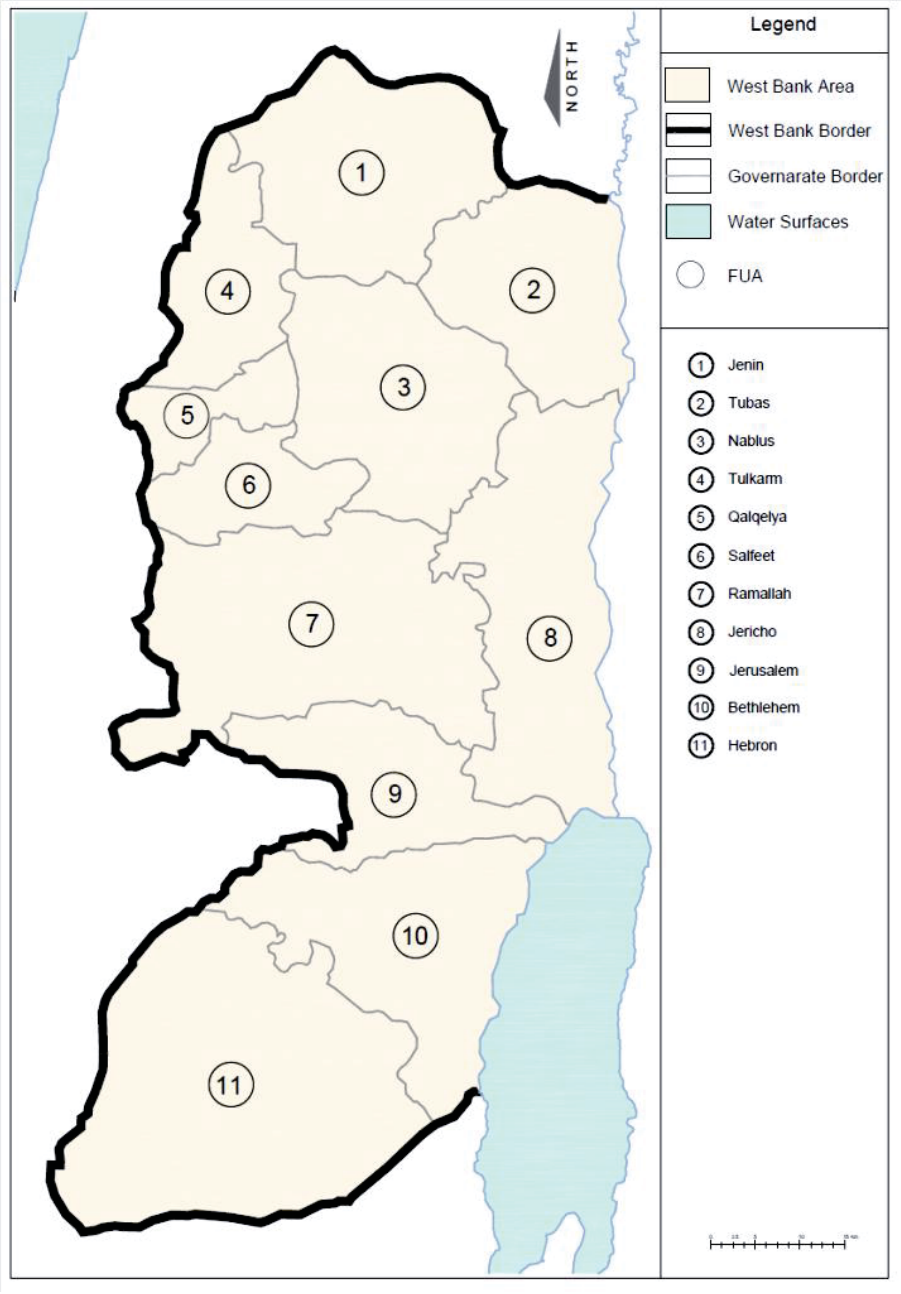
This level concerns with the national level of administration in the West Bank, that is subjected to the government responsibilities, and it is represented by the Ministry of local government. In general The HPC is responsible for the adoption of the spatial development and land-use plans and the provisions of the construction roles and land classification.

2. Regional Planning Committees (governorates level)

The administrative structure of the West Bank includes the allocation of the different agglomerations (local bodies) between 11 Governorates, each governorate in turn comprises one main city surrounded with smaller towns and villages. (Map 2.1**)** illustrates the distribution and the borders of these governorates. While (Table 2.1**)** shows the distribution of the population in the different West Bank's governorates.(*PCBS,2012*).

[1] Construction and regulation law - 1966.

Map 2.1 : Distribution of the West Bank's Governorates



Source: *MoP,2012- edited by the author*

Table 2.1 : Distribution of the Population in the West Bank Governorates - 2012

No.	Governorate	Population	Percentage (%)
1	Jenin	288,511	10.9
2	Tubas	58,586	2.2
3	Tulkarm	172,224	6.5
4	Nablus	356,129	13.4
5	Qalqiliya	102,649	3.9
6	Salfeet	66,119	2.5
7	Ramallah	319,418	12.1
8	Jericho (Ariha)	48,041	1.8
9	Jerusalem	396,710	15.0
10	Bethlehem	199,463	7.5
11	Hebron (Al Khalil)	641,170	24.2
Total		**2,649,020**	**100%**
Source: *PCBS,2012.*			

3. Local Government Unites

Each governorate contains other smaller units within the administrative hierarchy, the different Palestinian built-up areas are classified into municipalities, local councils, village councils, project committees, and refugee camps according to their population and resources. (*PCBS,2011*). (Table 2.2) shows the number of the different LUGs in the West Bank governorates.

Table 2.2 : Distribution of the different councils in the West Bank Governorates - 2012

Governorate	Municipalities	Local Councils	Villages Councils	project committees	Refugee Camps	Total
Jenin	13	0	45	22	1	81
Tubas	3	0	7	5	1	16
Tulkarm	12	0	11	1	2	26
Nablus	9	0	43	0	3	55
Qalqiliya	5	0	29	17	0	51
Ramallah	18	0	50	2	4	74
Salfeet	9	0	9	0	0	18
Jericho (Ariha)	1	2	7	0	2	12
Jerusalem	1	10	28	1	1	41
Bethlehem	10	0	22	3	3	38
Hebron (Al Khalil)	17	0	37	17	2	73
Total	**98**	**12**	**288**	**68**	**19**	**485**
Source*: PCBS,2012.*						

2.2.4 Socio-Economic Situation

The socio-economic situation is considered a powerful indicator for the effectiveness of the governmental policies. This part of the study presents a general over view of the West Bank's socio-economic situation, by analyzing the main indicators of its two key elements; Demography and Economy.

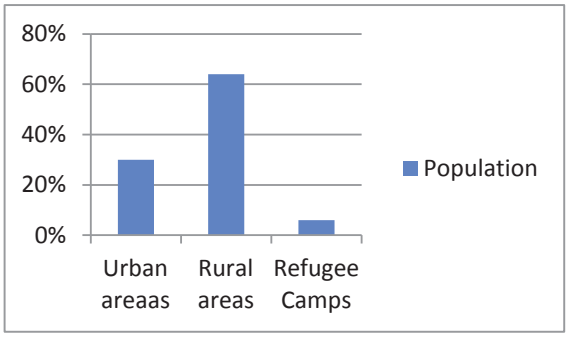
- **Demographic Situation**

The total population of the West Bank in 2012 according to the PCBS is estimated to be (2,649,020). with a natural population growth rate of (2.65%), and population density of (468 ppKm^2). The population pyramid of the West Bank reflects high rates of the young ages (that represent more than 40% from the total population). (*PCBS,2012*).

The geographic distribution of population has a direct effect on the poverty distribution, in the West Bank where the population is distributed between a huge number of agglomerations (542 agglomeration). Most of them (about 417 agglomeration) have small population size (less than 5,000 person). These small communities contain the concentrations of the poorest regions of the West Bank, furthermore the dispersion of the spatial distribution of the agglomerations leads to additional problematic issues like the provision of the public services for such small scattered areas. (*MoP, 2010*).

According to PCBS (2010), about (30%) of the West Bank population live in urban areas (cities - centers of the governorates), whereas (64%) live in rural areas, and (6%) live in refugee camps see (Figure 2.1). However, this reflects the living standards of population and the poverty distribution as well, since better quality and quantity of public services could be found in urban areas than in rural villages and refugee camps.

Figure 2.1 : Distribution of the West Bank's population according to place of living



- **Economic Situation**

The economic situation of the West Bank is weak, disassembled and unbalanced, this is caused basically by its dependency on the Israeli economy.(*Qumsan, 2005*). Accordingly, this economy is affected by the political situation in the Palestinian territories, (*ARIJ, 2010*).

In fact the Palestinian economic situation characterized by high unemployment rates on the one hand, and high poverty rates and low standards of living on the other hand. According to the PCBS (2012), the unemployment rate in the West Bank was (15.9%) between males, and (22.6%) between females, while the poverty rate was estimated to (18.3%) in 2010.

(Table 2.3) shows the main components of the economy (economic activities) in the West Bank, and the percentages of employment in these activities.

Table 2.3 : Employment percentages by economic activities

Economic activity	Percentage of employment
Agriculture	**11.9**
Industry	**11.8**
Construction	**13.9**
Commerce	**20.9**
Transportation	**6.1**
Services and other	**35.4**
Total	**100%**
Source: *PCBS, 2010*	

(Table 2.3) shows that the dominant economic activity is represented by the services sector, where more than (35%) of the employment rates. Public services sector include education, health, social, administrative, and other services.

2.2.5 Geo-Political Situation

The Palestinian Geo-Political context is characterized by being so complicated, this unique context has been shaped by several elements, agreements, and policies, that was a result of the Israeli occupation. This part of the study presents the main components of the Palestinian Geo-political context.

1. Oslo Agreement

According to the Oslo II Interim Agreement signed in September 1995, the West Bank had been classified in to the three areas (A,B, and C).

- **Area A** : areas that are subject to full Palestinian security and administrative control as well as the responsibility for planning and development issues in such areas, these lands represent (18.2%) of the total area of the West Bank.
- **Area B** : areas that are located where the responsibility for public order rests with the Palestinian Authority and Israel to keep full power and control on security matters, representing (21.8%) of the total area of the West Bank.
- **Area C** : areas that fall under the full control of the Israeli government, where the Palestinians neither have a political and security control nor having the responsibility for planning and development issues in these areas. These lands constitute (60%) of the total area of the West Bank.(*ARIJ, 2005*).

This classification of land has led to the fragmentation of the urban fabric in one hand and the limitation of urban expansion of the Palestinian agglomerations on the other hand. Therefore, fragmented urban forms could be observed in the West Bank, because the specified lands for future development are very restricted, as it is the case of many Palestinian agglomerations which their expansion is limited on lands of categories (A) and (B). (*World Bank, 2008*).

2. Israeli Settlements

Israel established about (150) settlements since 1967 in the West Bank and East Jerusalem, as well as (100) un-official settlements that were built by settlers without official permits, the total population of these settlements is (500,000). (*United Nations, 2012*).

Although the total built-up area of these settlements covers (3%) of the West Bank's total area, Palestinians are prevented from the rights of building, construction and sometimes the accessibility to (45%) of the West Bank, due to the confiscation orders and allocation of these lands for the settlement's local and regional councils.(*United Nations, 2012*).

The establishment of the Israeli settlements near the Palestinian agglomerations had impacted the development and expansion of these Palestinian communities and puts restrictions and impacts on the expansion of these settlements as well as confiscating their lands for the expansion of the colonies.(*Abdulhameed, 2009*).

The foundation of these settlements have accompanied with the creation of new layer of roads (by-pass roads), which make the distances longer between the different agglomeration, since these roads established mainly to serve Israeli settlements and create connections between them. Thus; the existence of these layers (both Israeli Settlements and roads) separates different Palestinian areas and creates difficulties of accessibility and connectivity between them.

2.3 Urban Planning Experience in the West Bank

In 1994 the Palestinian Authority took over the planning issues responsibilities, and started creating its own vision through its authorized institutions to reform and improve the planning situation in Palestine, and to facilitate local planning procedures and provide planning tools within the available legal framework, to raise the level of the Palestinian cities and towns and give local authorities greater powers in the field of local development planning.(*MoLG, 2010*). This section will review the most remarkable steps of the urban planning in the West Bank.

- **The Regional Plan for the West Bank Governorates**

Since the MoP has undertook its national and regional planning duties, it realized the insistent need for a regional plan to address the integration of future physical and functional development in the West Bank. Accordingly, the MOPIC had prepared a regional plan for the West Bank during (1994-1998). (*MoPIC, 1998*).

After the assessment of the current situation in the West Bank, the MOPIC proposed four different concepts (models for future distribution), and evaluated them to select the best model. Then the selected model was shaped through many layers, this was titled as "development within sectors", these sectors included : (Agriculture, industry, tourism, public services, housing, transportation, water, wastewater, solid waste, and energy sectors). The study also addressed the natural resources as a first step, as well as the urban structure of the West Bank.

In its attempt to describe the West Bank's physical pattern and functional relationships and to insure more balanced geographical distribution of the different agglomerations, the regional plan study classified the existing hierarchies of these agglomerations in to 4 levels, according to a proposed criteria list that based on their size, in terms of population, the functions they contain, the number of functions establishments, and the center's accessibility and connections with the main roads. The adopted criteria list resulting in the following four levels of centers, (See Table 2.4 and Map 2.2):

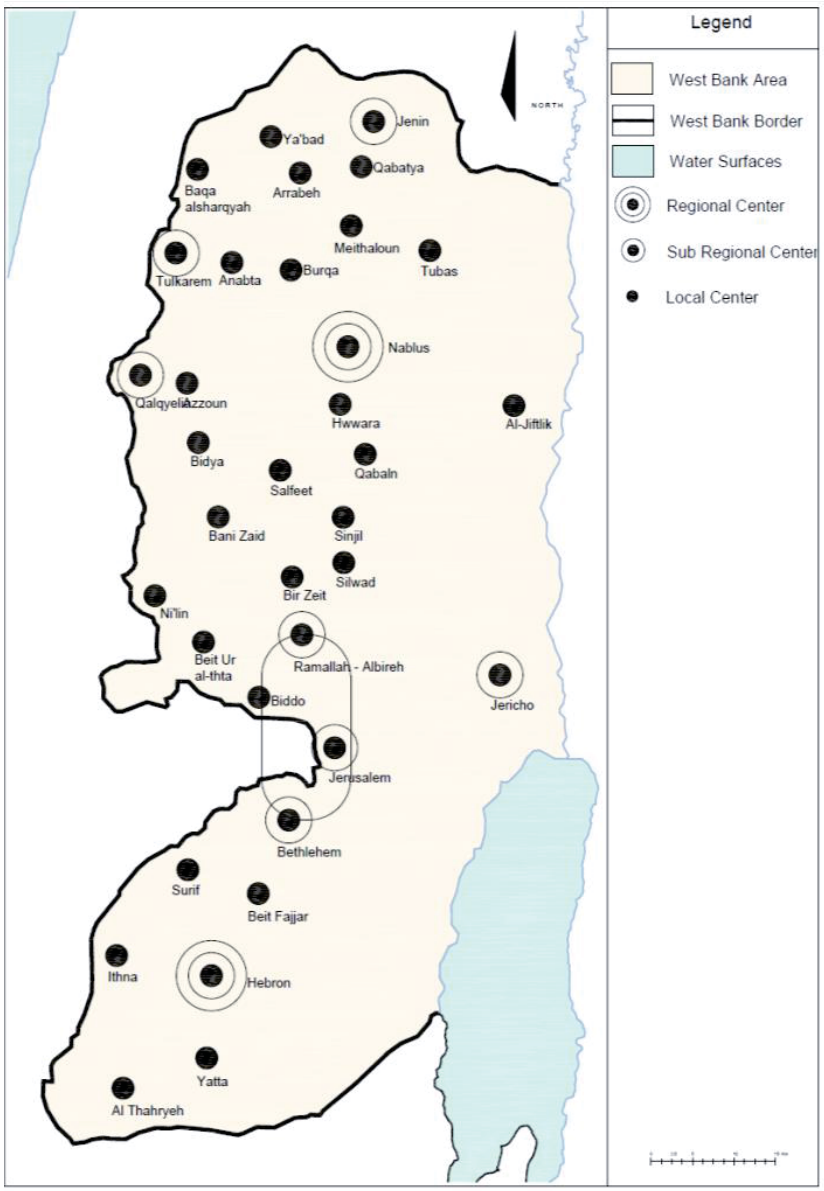
- Level One: Regional centers that serve the region, they are represented by (Nablus, Ramallah, and Hebron cities), each of these centers contain the upper order functions like Hospitals, Universities, central administrations.....etc.
- Level Two: Presented by middle size towns - regional centers- like (Jinein, Tulkarem, and Qalqeylia), these centers contain functions like higher education, medical clinics, local administrations....etc.
- Level Three: Presented by local level centers, such as (Salfeet, Yatta, Ni'lin), these centers contain the daily use functions, which serve localities and neighborhoods, like mosques, schools, daily living shops...etc.
- Level Four : Presented by the lowest level centers, the regional plan study called this level ' the neighborhood level'. Birzeit, Qabatya and Anabta are examples for this level of centers.

One of the main results of this analysis is that " relatively wide areas of the West Bank centers are within local order, and have undeveloped provision of several services categories". (*MoPIC, 1998:p78*).

Table 2.4 : Indicated hierarchy of centers according to levels of public services provision

Level 1 Regional center	**Level 2** District center	**Level 3** Local center	**Level 4** Neighborhood center
Nablus	Jenin Tulkarem Qalqiliye	Tubas Al-Jiftlik Baqa ash-sharqiye Slafeet	Qabatiya Arrabe Ya'bad Meithalun Burqa Anabta Azun Huwwara Qabalan Bidya
Jerusalem	Ramallah/Albireh Jericho Bethlehem	Sinjil Bani Zeid Beit Ur at-tahta Ni'lin	Silwad Bir Zeit Biddu
Herbon		Yatta Al-Thahryeh Ithna	Beit Fajjar Surif
Source*: MoPIC, 1998.*			

Map 2.2: Centers Levels in the Palestinian Regional Plan



Source : *MoPIC,1998- edited by the author*

MoPIC also proposed a hierarchical classification for the public services facilities within the different levels of centers in the West Bank. This classification has been proposed according to population size which is required to determine the demand for each facility.

As a first step, the study classified the facilities into 10 types; Education, health, religious, recreational, open spaces, cultural, government, transport, and communication. Then each type was divided into sub-division (i.e education is divided into universities, schools, kindergartens).

Thus; public facilities were classified according to the center hierarchies: (Regional Centers, District Centers, Local Centers and Neighborhood Centers). (Table 2.5) shows the minimum level of public services provision according to the centers hierarchies.

Table 2.5 : Minimum level of public services provision according to the centers hierarchies

Public facilities		Geographical Levels of Public Services Distribution			
		Regional center	**District Center**	**Local Center**	**Neighborhood Center**
Education	Kindergarten	X	X	X	X
	Essential school	X	X	X	X
	Secondary school	X	X	X	X
	University	X			
	Special school	According to needs	According to needs		
Health	Health clinic	X	X	X	X
	Health center	X	X	X	
	Comprehensive H.C	X	X	X	
	General hospital	X	X		
	Specialized hospital	X			
Religious	Mosque/church	X	X	X	X
	Graveyard	X	X	X	X
Recreational	Playground	X	X	X	X
	Play area	X	X	X	X
	Sport center	X	X		
	Youth center	X	X		
	Youth club	X	X	X	
	Stadium	X			
Open Space	Local park	X	X	X	X
	Public park	X	X	X	
Cultural	Cultural center	X	X	X	
	Social center	X	X	X	
	Women's center	X	X	X	
	Museum	X	X		
	Library	X	X	X	
Government	Local market	X	X	X	X
	Municipal office	X	X	X	X
	Police office	X	X	X	
	Fire station	X	X	X	
	Court	X	X		
	Central market	X	X	X	
Transport	Minor bus terminal	X	X	X	X
	Major bus terminal	X			
Communication	Local post office	X	X		
	Main post office	X	X		
Source*: MoPIC, 1998.*					

- **National Spatial Plan**

The efforts of the Ministry of Planning and Administrative Development (MoPAD) continued, and in 2010 a new experience of national planning started, when the MoP adopted the National Spatial Plan project, which still in its initial phases. This plan aims to create a tool for development planning, and to provide the foundations for the best utilization for potential resources.(*Saleh, 2010*).

Only the first phase of this plan has been approved, this approved phase is The protection plan for natural resources and archeological sites. The framework of the strategy of this plan will include several comprehensive components, on the national, regional, sub-regional, and local levels. These components will include for example the land use patterns, the locations of the main regional centers of services, natural and historical resources, transportation, and infrastructure utilities as well.(*Saleh ,2010*).

- **Joint Planning Areas**

Comparatively, the MoLG adopted many strategies and polices on the sub-regional and local levels. After the ministry adopted the local planning responsibilities it started the preparation of structural plans, and land use plans for different local councils, then, the MoLG started adopting new forms of joint planning.

The idea of the joint planning areas has been raised to overcome the previous separate trends of local planning. Several structural plans and land use plans were planned and approved for each individual local council, without taking into consideration the relations between the different neighboring agglomerations and its surroundings, specially where 'C' areas were classified. Moreover, these trends lead to more fragmentations and disconnected urban fabrics.(*MoLG,2010*).

For this reason, MoLG focused on the importance of the joint planning between adjacent local communities to insure the importance of the regional and sub-regional connections between these local communities. By this process, 4-6 local communities are usually selected to have one sub-regional plan, several Palestinian agglomerations have experienced this level of planning like Al-Itehad Municipality in Ramallah Governorate. (*MoLG, 2010*).

- **Merge Experience / for the Palestinian Rural Communities**

Merging of rural communities is another policy that has been implemented by the MoLG, based on the idea of integration of a group of rural communities (that are physically adjacent to each other), and clustering them in one unit, in which their councils are amalgamated into one municipality. By this policy the MoLG aims to promote acceptable decentralized, and democratic distribution for people, services, jobs...etc. The target group of these communities are basically the local communities with population (1000 - 3000). (*MoLG, 2012*).

This will be achieved through capacity building of the local administrations and through implementation of common infrastructure, social and cultural projects. Subsequently, the MoLG prepared a manual for the merge structure[2,] and for the stages of the merge that should be followed in any merge process for any municipality or village council. (*MDLF, 2009*).

Potentials of the merge experience are varied between raising efficient provision of services within acceptable costs, specially for these small villages with limited population base, and the strengthen of their economies and raise the wellbeing of their inhabitants as well. Moreover the merge policy could bring them the advantages of one large unit rather than disparate smaller communities, (*MoLG, 2012*).

Despite these advantages, many negative points accompanied this policy, which lead to several difficulties in many cases, which reflects that merger may neglect some aspects or sides that resulted in these problematic issues which sometimes means stopping the merge process or the withdrawal of one of the localities from the proposed group. Since the acceptance of the merger idea by the communities and village councils is by no means unanimous specially for the representation and the leadership of these communities. Furthermore, the extent and level of awareness about the legislative, legal, administrative, financial and operational procedures, mechanisms and implications of the amalgamation process have not been fully assessed. (*MDLF, 2009*).

While merger has been promoted to improve service delivery through economy of scale and more efficient administrative and management structures, the idea continues to meet some

[2] The guide for integrating rural communities,2009.

resistance from certain groups from community members who have their interests affected by the merger, or less eager with the geographically clustering the merged villages. (*MDLF, 2009*).

The level of awareness about the merging concept, and the extent of willingness to implement it among the communities and their elected representatives is one of the most fundamental stipulations for the merge process. Therefore, the MoLG aims to explore the possibilities of merging the village councils into one municipality, and assess the capacity of the village councils to carry out and manage the merging/transformation process, it also aims to investigate issues related to the merging of these communities, but not limited to: Socioeconomic, environmental, infrastructure and services. furthermore the MoLG seeks to design a full awareness campaign that focuses on the merging objectives and targets the different stakeholders including marginalized groups in the study area. (*MDLF, 2009*).

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Chapter Three

Theoretical Analysis : Polycentricity as a New Concept for Spatial Configuration

3.1 Introduction

This chapter introduces an approach for the concept of Polycentricity, the discussion presents reviews about polycentricity model, which include a general view about polycentricity as well as its origins, followed by the definition of the model, its concepts, levels, and dimensions through an analytical discussion for the different principles. Moreover, this chapter provides an approach for the application of the polycentricity model through an analysis for its dimensions, in order to adapt a convenient criteria list, that could be applicable within the Palestinian context.

3.2 General View

"Polycentricity in essence is a devious concept, and even it cannot be defined precisely; it includes strategies of territorial development, which describes the relations and interconnections that exists between different places." (*Shaw & Sykes, 2004*).

The notion of Polycentricity basically refers to the existence of a number of urban centers in a certain area. It derives its meaning however from the patterns and dynamics of functional interrelations and co-operation (versus competition) between these centers *(Romein,2004).*

Literature about polycentric urban region is still limited and obscure (*Bailey and Turok, 2001*). Consequently, diversity of definitions, approaches, and goals of this type of urban configuration is still in circulation (*Kloosterman & Musterd, 2001*).

One of the main aims of the policy's visions is the development of a balanced and polycentric system that defines new urban and rural relationships.

This means the creation of several “dynamic zones with economic integration”, which can help to avoid further exaggerated concentration of activities, in the current main core centers.(*Meijers & Romein,2002*).

3.3 Origins of the Polycentricity

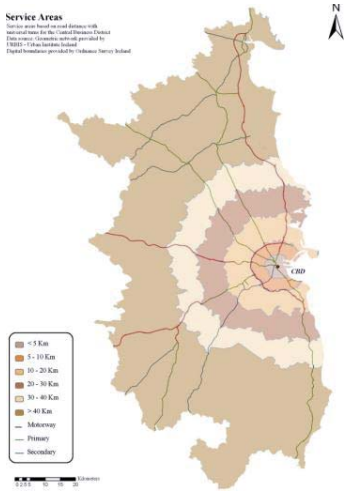
There are several physical configurations for communities that include various urban forms. Therefore, several concepts and models have been evolved to develop tools and policies to be compatible with these changes in urban forms. (*Smith, 2011*).

Early planning efforts have been attached with the economic benefits of urban concentrations, which formed a driving force for central growth, because of its role in comprising the potentials of efficient production through the close proximity to markets as well as labors, *(Fujita and Thisse ,1996)*. This leads to the emergence of the monocentric[3] orientation in spatial structure of urban settlements.

Monocentric city model was originated by William Alonso in 1964, this model has played significant role on the urban structure morphology for two decades at least, Monocentric city model was generalized to include transportation, housing, and production, *(Anas, 1998)* and *(Mori, 2006)*. By this urban configuration; different activities of production are supposed to take place within the central business district (CBD), see (Figure 3.1). *(McMillen, 2001).*
To reduce the cost of their daily commute; workers bid more for housing close to the city center. As a result, housing and land prices are predicted to fall with distance from the CBD, *(McMillen, 2001)*. (Figure 3.2) shows the flows of people, goods, works, services in the Monocentric model.

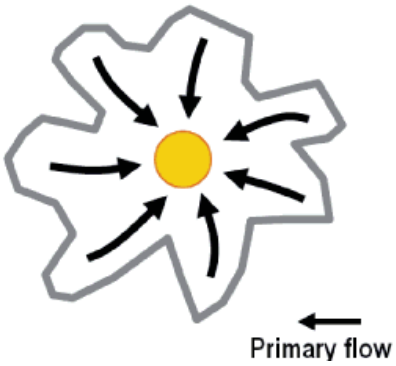
[3] Monocentricity defined by central export dominant nodes, where all employment opportunities are concentrated.

Figure 3.1 : Monocentric City Model



Source:http://www.sciencedirect.com/science/article/pii/S0965856408002103

Figure 3.2 : Flows in the Monocentric City Model



Source: http://people.hofstra.edu

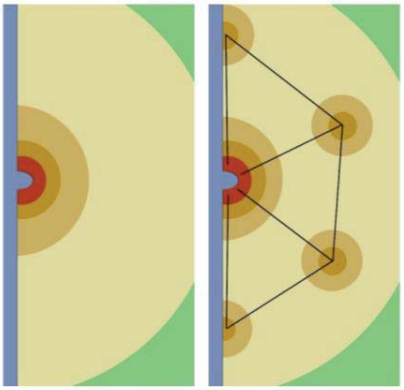
The evolution of transportation technology in the 20th century facilitated the regional accessibility, and enhanced the urban dispersion through more flexibility for longer distances trips,*(Smith, 2011).*

Changes that took place in the city form, the increasing numbers of population, the appearance of the suburbs and the growing phenomenon of urbanization (i.e. metropolitan areas have become increasingly decentralized), resulted in a change of the traditional CBDs, which became with much smaller proportion of jobs than in the past, and the need for other model that is capable to regulate such disparities has appeared, *(McMillen, 2001).*

It is not hard to discover the sub-centers phenomenon role in changing spatial employment or population data for most large cities. *(Anas, 1998),* Most jobs spread outside centers, and previous forms of monocentric cities have been changed. And trends in regional disparities have been a major issue in urban planning for many decades. Such disparities has great importance for regional policy-making. *(Sandberg & Meijers, 2006).*

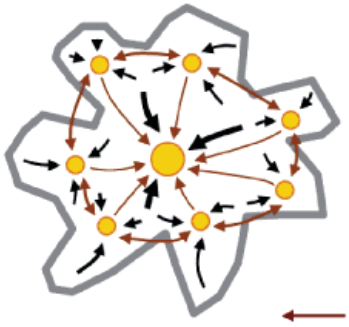
Recently, the theoretical and empirical researches in urban economics treats metropolitan areas as polycentric, that is, having multiple employment centers with varying degrees of influence on urban spatial patterns, see (Figure 3.3), as well as the relations between these centers, see (Figure 3.4).

Figure 3.3 : Monocentric City Model vs. Polycentric Model



Source: http://foodurbanist.blogspot.com

Figure 3.4 : Flows in the Polycentric Model



Source: http://people.hofstra.edu

The concept of the polycentric urban region first appeared at the European level, and has become popular since the 1980s, *(Houthum & Lagendijk, 2003).* Currently, it has gained widespread in debates of both academics (such as geographers and economists) and planning.*(Romein,2004).*

Going back, polycentricity originated as an empirical concept in the 1930s, with the development of central-place theory[4]. *(ESPON,2005).*

The actual theory of polycentricity was then further developed by several authors, mostly from Netherlands and United Kingdom (Kloosterman, Musterd, 2001, Hall, 1997, Beatley, 2000, Dieleman, Faludi, 2001, Bailey, Turok, 2001, Musterd, van Zelm 2000). These authors concentrated on creating the basic characteristics of polycentricity, make out its main positives and negatives as well and define the main set of factors which would enable the model to evolve, (*Mojezis, 2007*).

Modern Literature about polycentric forms shows diversity of concepts which are similar to the polycentric urban region like: 'city networks' (Camagni and Salone, 1993), 'multi core city-regions' (Westin and Östhol, 1994), 'network cities' (Batten, 1995) and 'poly nucleated metropolitan regions' (Dieleman and Faludi, 1998b). 'polycentric mega-city region' (Hall and Pain, 2006). *(Meijers, 2007).*

[4] Central place theory is a geographical theory that seeks to explain the number, size and location of human settlements in an urban system. It asserts that settlements simply functioned as 'central places' providing services to surrounding areas.

3.4 Definition

Polycentric development of regions has many dimensions, definitions and measurements. Literature available about polycentricity provides several definitions of polycentric region, this diversity is due to the complexity of this concept, involving multiple dimensions and various scales. *(Burgalassi, 2010).* Thus, multi definitions of the term 'Polycentricity' will be presented, in order to get one common definition.

- **Commission of the European Union Definition**

European policies have recognized that polycentric development in regions can be intended as mean to achieve multiple goals, namely more efficient, balanced and sustainable patterns of spatial development. *(Commission of the European Union, 1999).*

- **ESPON[5] Definition**

European Spatial Planning Observation Network defined polycentricity as a policy that aimed to more balance development, reduce regional disparities, increase competitiveness, integration of different regions, and sustainable development, to facilitate new urban - rural partnership. its opposed the term monocentricity where most services concentrated to a single center.*(ESPON, 2005).*

- **Kloosterman and Lambreget Definition**

The term polycentricity can be defined also as collections of historically distinct and both administratively and politically independent cities located in close proximity, well connected through infrastructure and lacking one dominating city in political, economic, cultural and other aspects.*(Kloosterman and Lambreget, 2001).*

Despite three different research for definitions for polycentricity, presented earlier in this section, many common and intersected aspects could be found among all of them, in this analytical part; these common features in all definitions will be discussed in order to find one general definition for polycentricity.

[5] ESPON: European Spatial Planning Observation Network.

The study of these definitions shows that each definition answered two main questions: "What is Polycentricity?", and "Why polycentricity?", (Table 3.1**)** shows the different answers.

Table 3.1: Intersected Aspects in all Definitions

Question	**Commission of the European Union**	**ESPON**	**Kloosterman and Lambreget**
What	Mean for spatial development	Policy for spatial development	Collection of Disparities
Why	▪ More efficient ▪ More balanced ▪ More sustainable	▪ To reduce regional disparities ▪ More balanced ▪ More sustainable ▪ Increase competitiveness	▪ Lacking one dominating city

Thus; the following points could be concluded through the analysis of (Table 3.1):

- Polycentricity represents a spatial development configuration.
- There are many common aims between these definitions, like (more efficient, balanced, and sustainable development).
- The first definition is more general than the other two definitions.
- The second definitions focused on regional nodes (rural - urban relations), than the third definition which deals with national nodes.

Consequently; Polycentricity could be defined as following:

A mean or policy, that aims to achieve more competitive and integrated regions, with more sustainable, balanced and efficient distribution by reducing regional disparities, and it could be defined among different levels of regional hierarchies.

3.5 Levels of Polycentricity

Polycentricity can be observed on various levels of scale ranging from the world-wide network(s) of global cities to the local intra-urban scale, *(Davoudi, 2003; Taylor, 2004).*

As the terms 'polycentric development' and 'polycentricity' are applied to a variety of scales, ranging from the National scale to the local scale of individual cities, the meaning of such terms differs between scales *(Kloosterman and Musterd, 2001; Davoudi, 2003).*

ESPON's reports have defined the concept of polycentricity by three levels: the global level (macro), the national and inter-regional level (meso) and the intra-regional (micro), with different operational definitions, following sections identifies these different levels.

- **Level One** : At the trans-national level (macro), polycentricity is seen as an alternative model to enhance regional development more evenly across the European territory. A polycentric Europe is seen as an attractive alternative to a European space dominated by the pentagon[6]: growth poles ("global economic integration zones") should thus be established outside the pentagon. *(ESPON,2004).*
- **Level Two** : At the interregional level (meso), urban complementarities are important. Two or more cities should complement each other functionally by offering the citizens and companies in their joined hinterlands access to the urban functions that would usually be offered only by higher-ranking cities. Rather than competing on building up the same urban functions, the ESDP recommends that cities should co-operate by joining existing assets, especially assets that are complementary. *(ESPON,2004).*
- **Level Three** : In the context of intra-regional development (micro), urban functional and economic complementarities are emphasized. An urban region can improve its economic performance through better co-operation and improved links within the region.*(ESPON,2004).*

Meredith (2006) also introduced these levels with the same configuration, he issued that polycentricity meaning is scale dependent, according to the following levels:

[6] Pentagon, the area delimitated by London, Hamburg, Munich, Milan and Paris

- Level one: Works at continental scale, and reflects relations between cities of peripheral countries.
- Level two: Works at national scale, and reflects relations between key cities in the country.
- Level three: Works at regional and sub-regional scale, at this level polycentricity suggests the integration between small towns, and the rural areas associated with these towns.

Building on the main problem of this research, as well as its goals, the attention of this elaboration will be focused on the regional / local levels. The required levels are representing by level three of Polycentricity.

Kloosterman and Musterd (2001) have undertaken an overview of the discussion on Polycentricity at the lowest level (regional / local level), that can be seen as a product of integrated and more dependent centers, Thus; four characteristics of regional/local Polycentricity can be defined:

1. Intra - Urban polycentric region does not have any common physical form. They characterized by different types of commuting, It contains urban zones and rural landscapes of various physical patterns and road networks.
2. Intra - Urban polycentric region considered to take place usually within one political entity (core city and its adjacent suburbs).
3. Functional division of labor is a critical characteristic at this level, as the larger labor function usually concentrated in one city, Intra- urban Polycentricity models provide solution to strengthen the functional distribution, where the main core contains the labor market, and the second cores contain the synergies of complementarities.
4. The final, and also another critical characteristic is the historically rooted identities of the former individual regions which must taken in consideration.

At all levels; Polycentricity is about functional integration and co-operation between urban areas, ESDP presented a scenario in which Polycentricity could be achieved at all levels; when increased Polycentricity at micro level makes regions stronger, this can lead to more polycentric national system (meso), at a higher level, these stronger (meso) functional areas can work together to produce a more polycentric Global (macro) level. *(ESDP, 2007).*

3.6 Main Concepts of Polycentricity

ESPON (2003) has presented one main concept in order to produce a basis for the description typologies of the urban networks, this concept is labeled as the Functional Urban Areas (FUAs).

1. Functional Urban Area (FUA)

The concept of the Functional Urban Areas refers to agglomerations of smaller local communities that are grouped together according to their functional orientation. FUAs have been identified in various manners as functional urban regions, travel-to-work-areas, districts, local labor market areas, daily urban systems, commuting zones and sub-regional units as well as others. (*Antikainen & Vartiainen, 2002*).

FUAs are highlighted by regionalisation. It aims to the branching out of population growth from the main centers to the surrounding rural areas. Initially, regionalisation referred to the growth of diverse large and medium-size urban regions and, intra-regions, In practice, economic activities and jobs were concentrated in the urban regions. Therefore, the centers of the urban region with their surrounding rural areas formed integrated and interactive functional region (*Antikainen & Vartiainen, 2002*).

ESPON (2004) divided the FUAs into three typologies of hierarchies:

- **Metropolitan European Growth Area (MEGA)**: The strongest FUAs have been defined as Metropolitan European Growth Areas (MEGAs).with the highest average score with regard to population, transport, manufacturing, knowledge and decision making. London, Paris, Munich, Frankfurt and Madrid represent examples for MEGA cities.
- **National FUAs :** For countries with more than 10 million inhabitants, a national FUA is defined as having an urban center of at least 15,000 inhabitants and over 50,000 in total population. For smaller countries a national FUA defined by having an urban center of at least 15,000 inhabitants and more than 0.5% of the total population of that nation.
- **Regional / Local FUAs:** Functional division is a critical characteristic at this level, as the larger functions usually concentrated in one city, Regional /local FUAs provide solution to strengthen the functional distribution, where the regional FUAs represent the labor market, and the local FUAs represent the synergies of complementarities.

ESPON (2005) have also been coined two additional concepts, to characterize the territorial context of cities and the potentials for polycentric integration based on morphological vicinity, these concepts are the Potential Urban Strategic Horizon (PUSH), and the Potential Polycentric Integration Area (PIA).

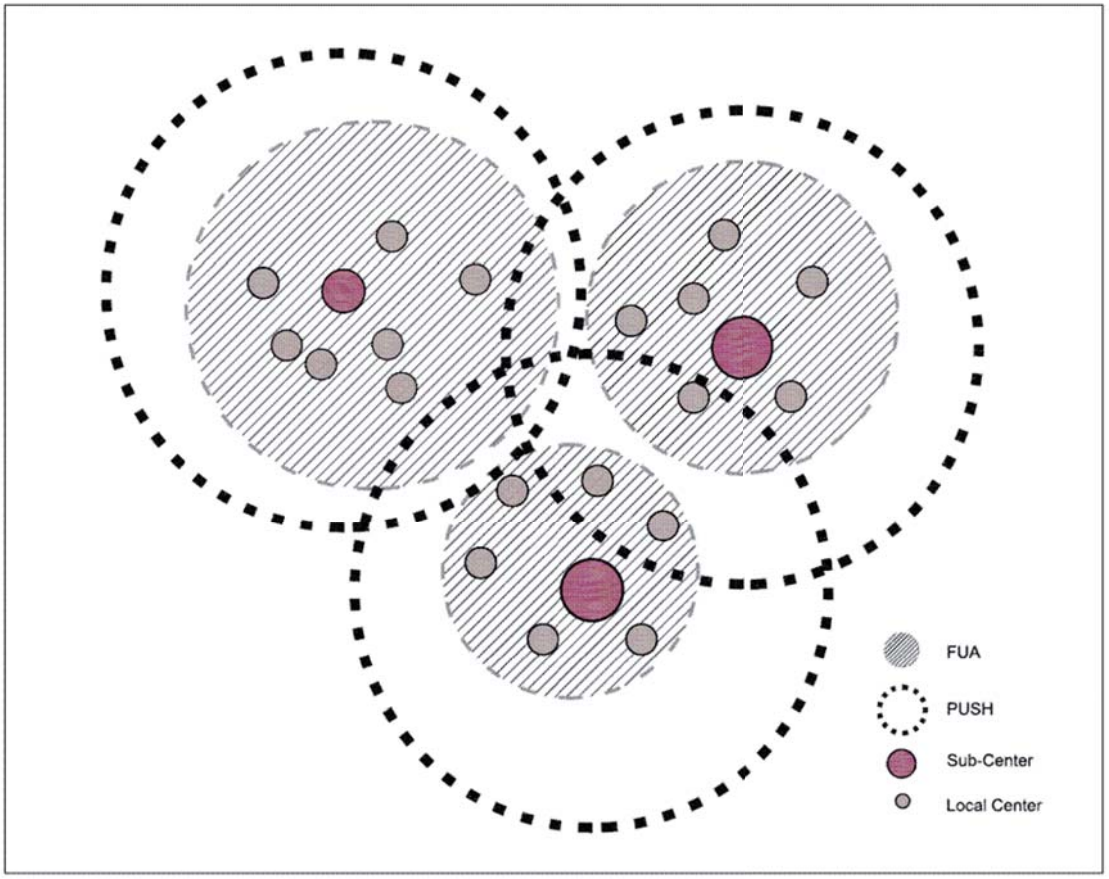
2. Potential Urban Strategic Horizon (PUSH)

ESPON (2005) assumed that each city has a "territorial horizon" within which it can design its spatial development strategy. In particular it determines the "territorial horizon" within 45 minutes from each FUA centre by car, and the resulted zone identifies areas contain the elements that could mostly contribute to its development.

These areas (resulted zones) represent 'potential' for interaction, They are 'strategic' because the main factors of economic development that the FUA centre requires for its development strategy will be located within them (e.g. population, trade, industrial activity or resources). Finally, the concept of 'Urban Horizon' refers to the areas that correspond to the territorial context of an urban center, where it should assure itself on the regional, national, and trans - national levels.

In particular, ESPON (2004) has defined the PUSH areas as areas that include all municipalities of which at least 10% of its area can be reached within 45 minutes from each FUA centre by car. There are as many PUSH areas as there are FUAs. Moreover, PUSH regions of neighboring FUAs can overlap. (Figure 3.5) illustrates the distribution of FUAs and PUSHs areas.

Figure 3.5 : Distribution of FUAs and PUSH Areas



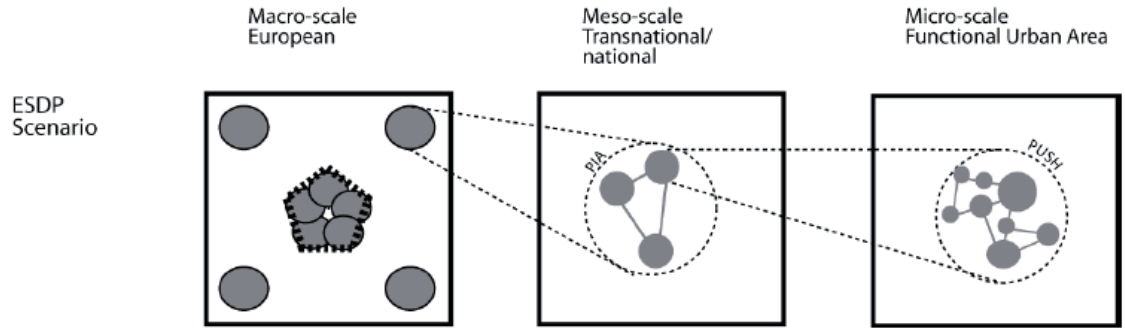
Source: *ESPON,2005 - edited.*

3. Potential Polycentric Integration Area (PIAs)

The notion of the Potential Polycentric Integration Areas (PIA) has been developed as a result of the overlaps of neighboring PUSH areas, based on the hypothesis that FUAs which share a significant proportion of their commuter area could also share many of their planning and spatial development challenges through integrated polycentric development policies. Furthermore, these neighboring FUAs will be able to build a common structure that has specific facilities and functional typologies, which will be established to strengthen the regional entity, (*ESPON, 2005*).

PIAs have been developed based on the hypothesis that' each FUA that shares at least 1/3 of its potential horizon zone with another larger FUA is merged with it'. Each PUSH area belongs to one PIA only, and neighboring PIAs can overlap,(*ESPON,2005*). (Figure 3.6) illustrates the relations between PUSHs and PIAs areas.

Figure 3.6 : Polycentricity Levels Defined by (PIA) and (PUSH) Concepts



Source : *ESPON,2003.*

3.7 Defining and Measuring Polycentric Regions

Literature about polycentricity is rich in different key characteristics (dimensions) that can be used to define the concept of Polycentricity in many regions, but in general all of them are agreed about specific main issues like spatial, demographic, functional, and other dimensions.

Mojzis (2007) identifies the key characteristics that constitute polycentric regions into five groups: Spatial characteristics, Economic space, Public administration, Demographic trends and Culture and identity.

Meanwhile; many other researches limited the definition of Polycentric regions in two dimensions; morphological urban areas structured around several urban nodes, and the existence of functional relations between the cities and the centers of such regions. (*OECD, 2001*).

Meijers and Romein (2002) merge the two dimensions in one term (Spatial-Functional Dimension), because of the clear relationship between the spatial - functional connections.

In this study the focus will be on investigation of the several dimensions involved in the definition of Polycentricity, focusing in particular on two aspects, namely the morphological and the functional Polycentricity (*Burgalassi, 2010*), that commensurate with the main problem for this search.

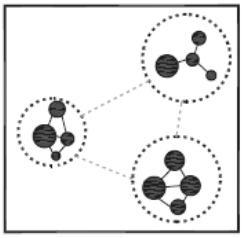
3.7.1 Morphological Dimension

Morphological dimensions means laying out the distribution of urban areas in a given territory,(*ESPON, 2005*).

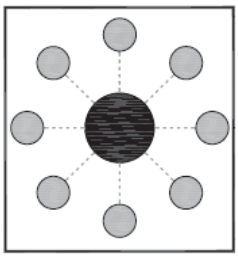
The main aspects involved in the morphological (spatial) dimension of Polycentricity can be summarized as the following:

- Mojzis (2007) used the term Spatial characteristics in order to define the morphological (spatial) dimension and he talked about (types, numbers and sizes of settlements, distances and connections between them, landscape – possibilities and obstacles) as morphological aspects..
- While ESPON (2005) classified (Hierarchy, Distribution, and Number of nodes) as the main aspects that defines the morphological Polycentricity. (*ESPON, 2005*).
- David Burgalassi (2010) has summarized the morphological aspects in three main aspects; clustering of separate centers, size and spacing of centers and size - distribution of centers, as clarified in the following pointes.

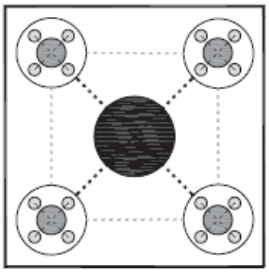
1. Clustering of separate centers, with lower and upper limits on centre separation; means that cities belonging to a polycentric region are relatively close, but physically separate, with open space (i.e. rural or natural landscape) in between them.



2. Size and spacing of centers; means that the spacing of cities across the region should be balanced: cities in an ideal polycentric region should have the same (physical or time) distance from each other.



3. Size - distribution of centers refers to the physical hierarchies in regions. According to this aspect, regions can be distinguished in mononuclear an polynuclear. The former are characterized by a strongly hierarchical structure, with one dominant city surrounded by peripheral/dependant cities, while the latter are characterized by cities equally sized.



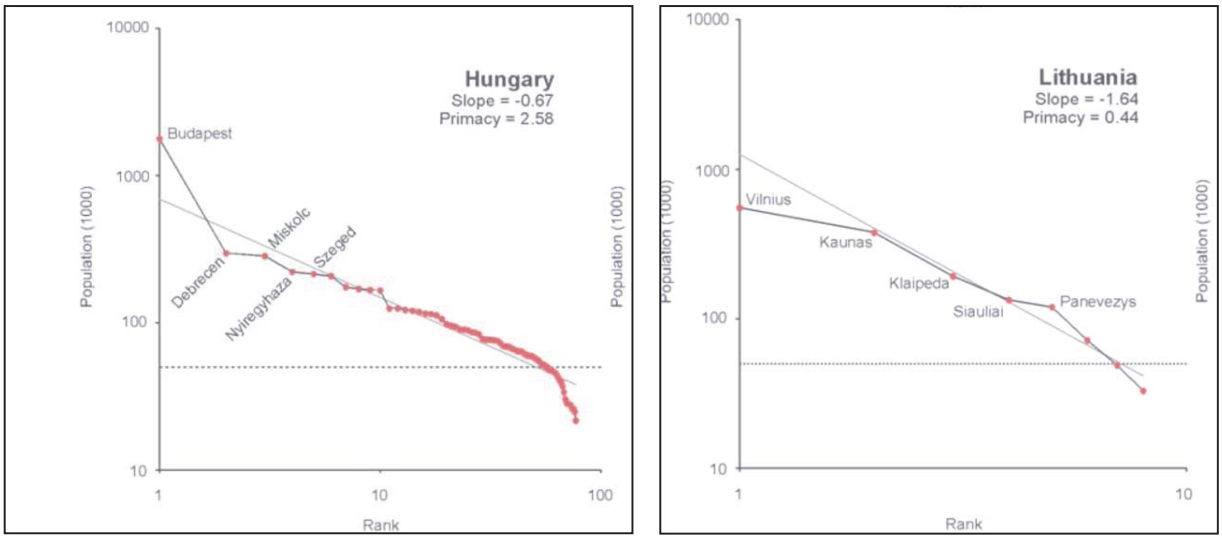
3.7.1.1 Measuring Morphological Polycentricity

According to ESPON (2005) two indicators can be used in order to measure the morphological dimension; Size Index and Location Index.

- **Size Index**

The first and most the straightforward precondition of morphological polycentricity is based on the fact that there is a distribution of large and small cities that define any territorial entity. Also polycentric urban system should not be dominated by one large city. To activate this, a sub-indicator of the Size Indicator was defined, it's the slope of the line of the rank-size distribution of population. And the ideal rank-size distribution in a territory is log linear. Moreover, a flat rank-size distribution is more polycentric than a steep one. (*ESPON, 2005*). (Figure 3.7) illustrates the application of the population size index in two different countries.

Figure 3.7 : Example of the Application of the Population Size Index



Source : *ESPON,2005.*

(Figure 3.7) presents two samples for rank-size distributions of population of FUAs. The first country is Hungary, which has the flattest size distribution of FUAs of all European countries, while the second diagram shows a country that performs poorly with respect to the sub-indicator; Lithuania which has the steepest rank-size distribution of all countries (note that the slope appears flatter because of the difference in horizontal scale).

- **Location Index**

The second prerequisite of morphological polycentricity is that its centers are equally spaced from each other. Therefore, a uniform distribution of centers across a territory is more appropriate for a polycentric urban system, see (Figure 3.8 & 3.9 B) than a highly monocentric one where all major cities are clustered in one part of the territory see (Figure 3.8 & 3.9 A).

A second step in the analysis of Polycentricity is therefore to analyze the distribution of cities over the territory. One possible approach is to subdivide the territory of each country into service areas that each point in the territory is allocated to the nearest centre that can be constructed by dividing the territory into raster cells of equal size and to associate each cell with the nearest urban centre. In this way the area served by each centre can be measured. (*ESPON, 2005*).

Figure 3.8 : Conceptual Example of the Different Location Distribution of Centers

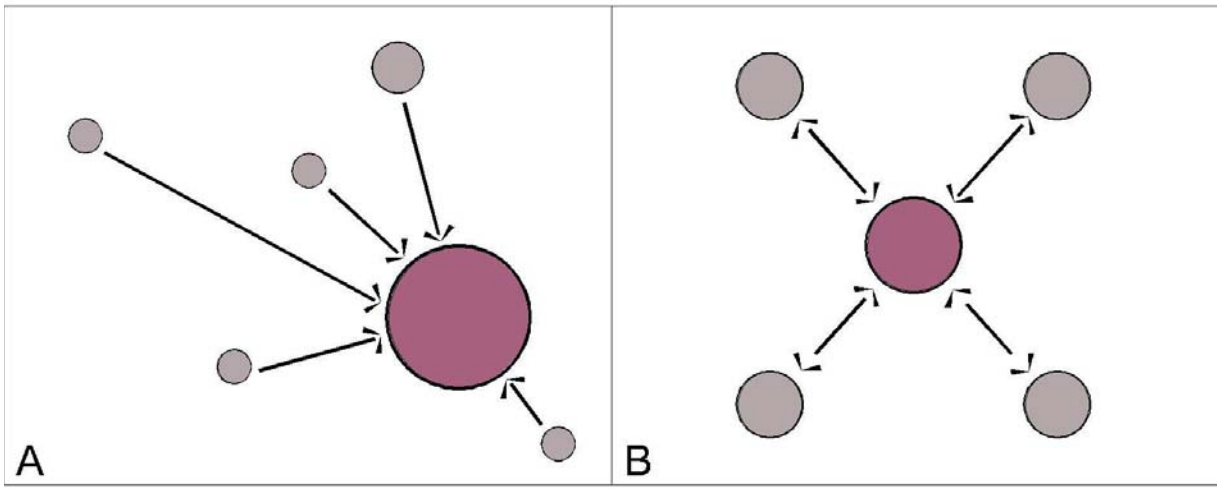
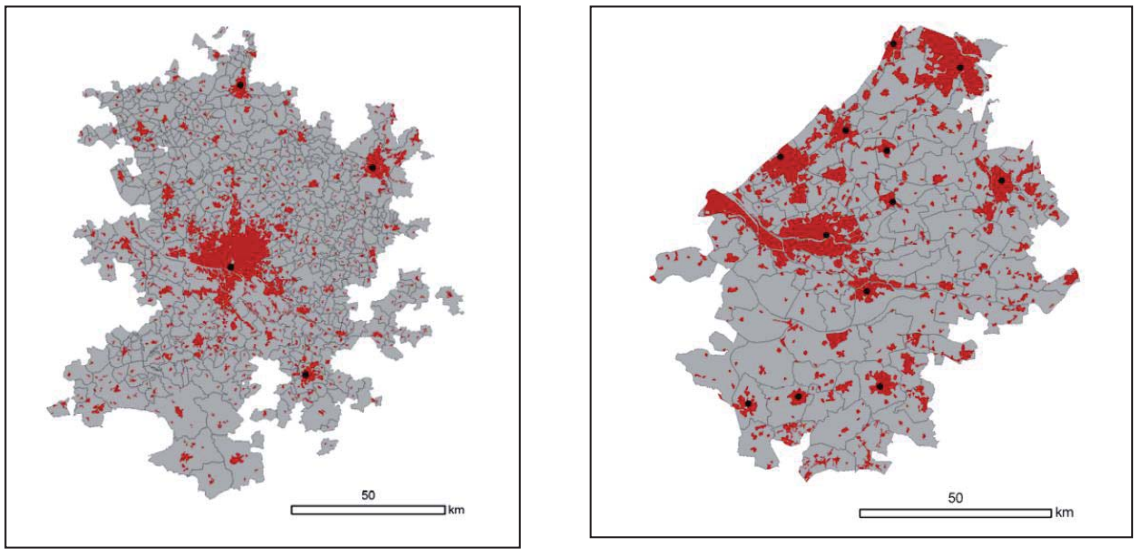


Figure 3.9 : Example of the Different Location Distribution of Centers



A. Hamburg

B. Rotterdam

Source : *ESPON, 2005*.

3.7.2 Functional Dimension

Overall, functional dimension integrates the morphological dimension. However, the expression of the functional relations between centers differs from the morphological (structural) relations. Morphological relations characterized by high degree of stability, while the functional relations characterized by great variety of flows.(*ESPON,2007*).

Functional or relational dimension means that Polycentric urban systems tend to be a horizon of multi-layered entities complexes of nodes, networks, flows and interactions of global, regional and local scales. these dynamics scopes and orientations differ considerably between types and levels of interactions. (*Albrechts, 2001*).

There are various types of relations that contain daily flows of people and daily urban systems (Van der Laan, 1998), such relations are market-based flows, people flows, and information flows. Furthermore, These relations are characterized by connectivity of networks rather than proximity (*ESPON,2005*).

According to Pumain (1999), Functional urban unit presents a concentration of people, activities, capital and buildings, constituted by markets with labor, retail, services, culture or housing. It is structured on networks elements like major roads, railroads and terminals and functions by flows of people, goods, energy, information and money..

According to (*Burgalassi, 2010*) The functional dimension involves at least two aspects:

1. The economic specialization of centers: polycentric regions appear to be the ideal ground for the arise of economies of variety. Thus, specialization of main centers refers to the structure of economic activities in cities. When the economic structure is characterized by specialization across urban areas, and leading to economic complementarities between cities, this system considered to be more polycentric. As a consequence, clustering and specialization of economic activities in centers refers to a region can be used as indicators of the degree of Polycentricity of its regional structure, (*Kloosterman and Lambregts, 2001*).
2. The interaction among the centers: The other functional aspect is the interaction between centers and mutual interdependencies among them. Cities are physically interconnected by infrastructures and by flows (e.g. flows of commuters, trade or information): the higher the intensity of these interrelationships the more polycentric the region is.

In a polycentric urban system the small and medium-sized towns and their inter-dependencies form important hubs and links. (*CEU,1999*). Moreover, flows in polycentric regions should be characterized by lower hierarchical restrictions, the result should be a uniform distribution of flows in polycentric regions.(i.e. there are no dominant centre attracting flows from all the others), (*Kloosterman and Lambregts, 2001*).

Based on the analysis of the aspects of the functional dimension, the functional dimension could be redefined through two main components, that could be developed as functional criteria to apply the polycentric mode, these two components are : Flows and functional relationships:

- **Flows**

Flows could be classified in by different ways; there are physical flows and non-physical flows. physical flows are related to housing, employment, education, resources and other functions, while the non-physical flows include the economic links between different centers like monetary flows and information flows, it is difficult to quantify these types of flows since many of them are intangible. (*ESPON,2007*).

Physical flows in terms could be divided in different ways; there are one way flows and two way flows, and to create more complementarities flows should be in-put and out-put for each center. some of these flows are daily such as work and education. while others can be weakly. (*ESPON,2007*).

- **Functions and Relationships**

Theory about the functional dimension of polycentricity identifies the related functions of the dimensions within various levels of hierarchies. This discussion will restrict these levels in two scales; the higher levels and the lower levels of polycentricity.

1. Functions within Higher levels of polycentricity

ESPON (2005) proposed seven different themes for the functions of the urban systems, which describes the functional specializations of the FUAs at the Continental (MEGAs), and national levels of polycentricity, (Table 3.2) shows these themes and the measured variables for each function.

Table 3.2 : Functions themes of the FUAs

Feature / Functions	Measured variable
Population (mass function)	Population
Transport function	Airport (passengers), ports (container traffic
Tourism function	Number of beds in hotels (and similar)
Industrial function	Gross 'value added' in industry
Knowledge functions	Location of university, number of students
Decision-making centre	Location of top 500 companies
Administrative functions	Administrative status of FUA
Source: *ESPON, 2005.*	

2. Functions within lower levels of polycentricity

Polycentric development is mainly about encouraging cities and towns to adopt more cooperative and integrated relations, over the past years many approaches have been integrated for developing the local areas. In order to achieve this; ESDP (2007) suggested the following policy directions :

- Maintenance of a basic supply of services and public transport in small rural towns, through infrastructure planning and services provision, (socially acceptable level of services).
- Improving more cooperative between towns and countryside and strengthen functional regions to provide access to services and employment.
- Integrated urban and rural planning through spatial strategies that could improve quality through the provision of amenities.
- Networking between rural and urban areas in order to exchange experiences and promoting more employment growth.

The Functional themes at lower levels of polycentricity (regional and local levels) which could most easily contributes to the regional development are characterized by less complexity than the higher levels functions. Nordregio (2000) proposed seven themes of functions at this level as shown in (Table 3.3).

Table 3.3: Proposed themes of functions within lower levels of polycentricity

Type	Keywords/key issues
Home-work functions	Employment, accessibility, housing, commuting, labour markets
Central place functions	Local amenities, education, training, commerce, health, cultural facilities
Network functions	Connections between cities through development corridors, conurbations, polycentricity
Consumption functions	Recreation, leisure, food production, waste disposal
Amenity functions	Landscape, open space
Infrastructure functions	Roads, railways, telecommunication, pipeline
Resource functions	Energy, water, aggregates
Source: *Nordregio, 2000*.	

Moreover, Bengs & Schmidt-Thome (2004) have classified the regional functions within different seven themes as shown in (Table 3.4).

Table 3.4: Proposed themes of functions within lower levels of polycentricity

Functions Themes
Population and migration
Education and training
Recreation, tourism and cultural activities
Food, water and other natural resources
Waste and pollution
Shopping and commerce
Work
Source : *Bengs & Schmidt-Thome, 2004.*

3.7.2.1 Measuring Morphological Polycentricity

According to ESPON (2005); there is one indicator that can be used in order to measure the Functional dimension; it is the 'Connectivity Index'. Connectivity Index is the third precondition of polycentricity (after size and location indexes - see *section 3.7.1.1*).

- **Connectivity Index**

The definition of the connectivity index is based on the fact that there are functional division of labors between cities, both between higher-level centers and the lower-level centers in their territories and between cities at equal levels in the urban hierarchy. An urban system with good connections between lower-level centers is more polycentric than one with mainly radial connections to the dominant capital. In polycentric urban systems lower level centers also have good accessibility.

This implies that the channels of interaction ideally produced between cities of equal size and rank. However the interaction between lower-level and higher-level cities, must be short and efficient.

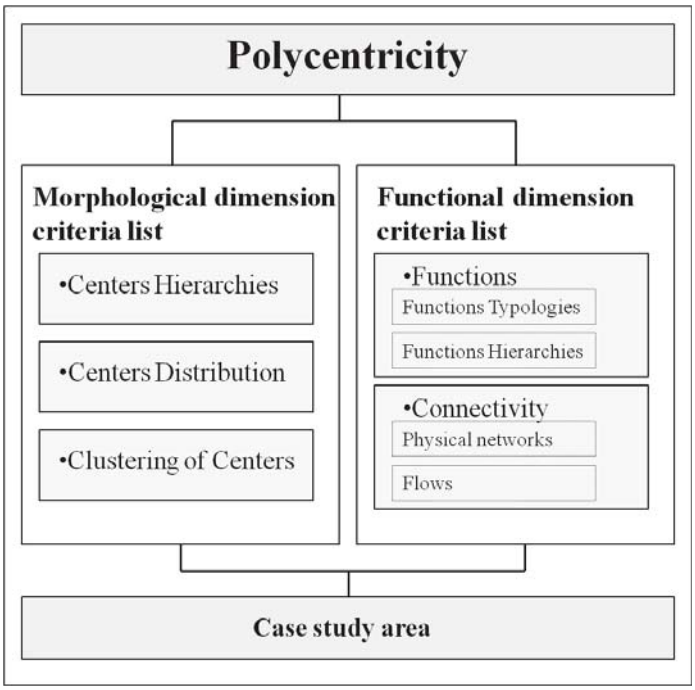
Principally, there are two ways to measure connectivity, the first one is to measure actual interactions. Appropriate indicators for such interactions would be flows of goods or services, travel flows or immaterial kinds of interactions, such as telephone calls or e-mails. The second possibility is to measure the potential for interactions. Measures of interaction potential could be infrastructure supply, i.e. the level of road connections (motorways, roads) or the level of service of rail (number of trains) or air (number of flights) connections. (*ESPON, 2005*).

3.8 Adopting Morphological and Functional Criteria Lists

This section introduces a preamble for the polycentricity model to be applied within the Palestinian context. It presents an analysis of the main components of the two dimensions of polycentricity (morphological and functional dimensions), to adopt a criteria list of polycentricity that is applicable within the Palestinian context, see (Figure 3.10).

Both morphological and functional dimensions cannot be separated from each other, but at this level the morphological dimension will be analyzed firstly, followed by the functional dimension, and there will still be common pointes between both dimensions that would be pointed through the discussion.

Figure 3.10 : Adoption of Criteria List of Polycentricity within the Palestinian Context



3.8.1 Adopting Morphological Criteria List

The purpose of this section is to find a common base for the components and criteria which form the morphological dimension of polycentricity in order to make the model more clear, systematic and able to fit the different urban and physical contexts.

Based on the literature reviewed about morphological dimension, the potential of any regional territory for balanced polycentric morphological development could be measured by three key factors; Centers hierarchies, centers distribution and centers clustering.

1. Centers Hierarchies

Hierarchical classification of centers implies various typologies of the center's sizes within a territory. Based on the definition for both size and location indexes, hierarchies could be identified based on two components ; population and services areas.

- Population: determination of the sizes of centers according to their population, where the more polycentric region could be defined with flat - rank distribution of its center's population.

- Services areas (zones): the second component of hierarchical distribution is the services areas of the territory, where the more uniform distribution of these services areas the more polycentric is the territory. This component is mutual between morphological and functional dimensions.

2. Centers Distribution

The notion of this criterion is based at the balanced spacing of centers, the spacing factor based on two main parts, time and physical distances, the more the balanced spacing between different centers, the more polycentric is the area.

According to Kloosterman (2001), polycentricity in the lower levels (regional and local levels) does not have any common physical form, they characterized by different types of commuting, It contains urban zones and rural landscapes of various physical patterns and road networks.

Thus, no standards are available about the spacing and distribution of the centers, but ESPON (2005) proposed an approach for this criterion, by dividing the territory into services areas (based on the results of the hierarchies), then the region could be divided into equal size grid of raster cells, whilst each cell could be associated to the nearest service center.

3. Centers Clustering

The clustering process can be performed according to results of the previous criterion (distribution of centers), taken in to consideration the spatial, physical, and functional circumstances of the study area. When applying these criteria on the Palestinian context the clustering process will take into account the following sub-divided criteria:

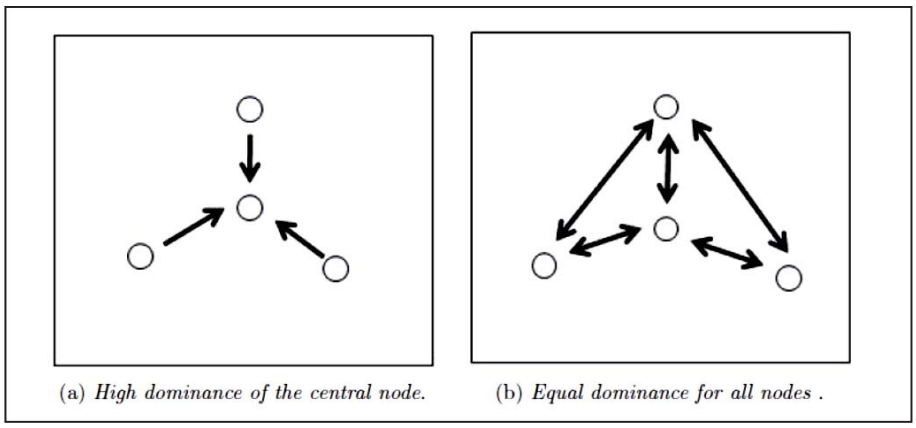
- Equal sized areas for different clusters.
- Balanced distribution for the locations for the services centers (FUAs centers) between different clusters.
- Roads network distribution.
- Israeli Settlements locations (since they constitute additional urban layer within the Palestinian context).

3.8.2 Adopting Functional Criteria List

Comparatively, functional relations will be structured in this section, in order to shape a base for the criteria that could be essential to adopt the functional dimension within the Palestinian territories.

The Polycentric functional dimension main goal, is to change the high dominance of central cities, where the biggest share of flows appears, into more balanced system of balanced dominances, for the purpose of enhancing commuting flows between different centers as illustrated in (Figure 3.11), (*Burgalassi, 2003*).

Figure 3.11 : Flows between Different Centers according to the Dominances



(a) *High dominance of the central node.* (b) *Equal dominance for all nodes .*

Source : *Burgalassi, 2010*.

Functional dimension differs between levels of polycentricity, this study is concerned in the (regional-local) level. Functional dimension within the low levels of polycentricity (Regional and local) refers to distinctive spatial patterns which could be achieved through creating extensive commuting zones surrounding the larger cities, and giving more attention for the significance of smaller towns in rural areas. This means creating new types of flows by creating new functional centers. (*Meredith,2006*).

The notion of creating functional dimension of polycentricity, based on the provision of a certain level of functions within a certain center, in addition to the accessibility between these centers, which in terms could guaranty the complementarily, connectivity relations, and flows between these centers. Accordingly, functional dimension can be achieved by two main factors: Functions and Connectivity, which present the functional criteria list that will be adopted within the Palestinian context.

1. Functions

This criterion refers to the minimum level of functions required to create function urban areas in different centers, there are two branched steps for this criterion; the functions typologies as well as the functions hierarchies.

- **Functions Typologies**

Based on the results of the theoretical analysis, different types of functions could be listed in three main categories, two of them are related to the flows of people (Public services functions and Work functions), while the third type is related to the flows of goods (Recourses and consumptions functions).

  - Public services functions
  - Work (employment) functions
  - Resource and consumption functions

- **Functions Hierarchies**

Similar to the morphological dimension, the functional dimension is built on the relations between different levels of hierarchies of centers. Basically, the classification of the centers hierarchies based on two aspects (the population and the Services areas within each center).

Distribution of the different functions (i.e. public services facilities) within different areas should be planned to obtain the most efficient way, Accordingly, the hierarchies distribution of the public services order should follow the population size that will be served by these facilities. Thus; smaller facilities (basic facilities like essential schools and clinics) which located within the lower hierarchy order of services, will apply the needs of smaller population size, while the higher level of facilities like universities and specialized hospitals which supposed to serve larger population base, should be concentrated in specific locations to provide appropriate levels of public facilities for surrounding local centers.

Hierarchical distribution of public services function should also follow a balanced way, in which the scope of each center and its servicers should be calculated in terms of the distances between the centers, in order to obtain the most efficient distribution for these services.

2. Connectivity and Relations

Connectivity interactions or relations between centers in a regional entity are the suppliant part of polycentricity in that region. Connectivity is produced by two aspects; the physical aspect (networks of infrastructures), and the non-physical aspect (flows of people and goods).the higher the intensity and connections of these two aspects the more the area is polycentric.

- **Networks**

Creating new functional zones depends on the provision of new types and levels of functions in that region, as well as the provision of accessibility to these functional zones. Physical networks are considered to be the very reason for the activation of these functions. At this stage accessibility would be discussed and analyzed through the networking structures.

Creating of networks layers, should be efficient, safe, and environmentally friendly, this could be obtained by reducing the needs for long trips movements, and reducing the economic drawbacks, through short distances. Therefore; the centers distribution pattern should be in such a way that contributes to lower traffics, and this matches the main goal of the polycentricity dimensions at this level, since the promotion of new regional functional centers surrounding the main center will shorten the distances between the regional and local centers and the main center,(*MOPIC,1998*). Physical networks differ between major roads, railways, terminals, airlines, as well as others.

- **Flows**

Flows illustrate how exchange networks between different centers contribute in the shaping of the spaces, flows is a tool that shows the degree of polycentricity through the capacity of centers to include multiple networks of relations.(*ESPON,2004*).

Flows are the non-physical aspect of connectivity, and they could be classified in to two types : flows of people and flows of goods.

- **Flows of people :** Flows of people include the commutes of persons for the public services and the employment functions. only the daily flows that contains the largest numbers of people will be analyzed.
- **Flows of Goods:** Flows of goods include the commutes of goods for the resource and consumption functions.

3.9 Conclusion

Chapter three presented the required discussions related to polycentricity. This chapter is considered the base chapter of this study, and its importance could be represented by the following points:

- It introduces for the polycentricity and creates a general view on its definition, concepts, levels..etc.
- It determines and restrict the extensive concepts that are related to polycentricity, in order to reduce the ambiguous aspects of the concept.
- It draws an obvious framework for the required approach of the implementation methodology within the Palestinian context. Concurrently; this framework cerates two main bases for the following chapters of this research;
    - The first base is related to the definition of the levels of polycentricity in the Palestinian context, as well as the concepts that could be defined in each level, the importance of this step refers to the ability of combining different scales and levels of polycentricity with the current scales of the urban fabric of the West Bank. In particular, this base introduces for chapter four and five, where the model will be applied in two different levels.
    - The second base refers to the required components of polycentricity to be applied in the study area, this base is directly associated to chapter five through two main folds:
        - ✓ The adopted criteria of the concept, namely its components and sub-components in order to fit the Palestinian context.
        - ✓ The methodology of the model's application.

Chapter Four

Framework for applying polycentricity in the Palestinian context

4.1 Introduction

Based on the theoretical discussion of the polycentricity, this chapter presents the first step of applying the polycentric model to the West Bank as whole.

Overall, there are two key aims of this chapter, the first is to provide an approach for the polycentricity model in the West Bank, by which a general framework of concepts, levels, and terminologies of the polycentricity could be designed. The second aim is to define polycentricity at the generic level of the West Bank, Since the definition of the higher levels (national level) will contribute in finding the approach of the polycentricity at lower levels (sub-regional/local levels).

This chapter combines different scales and levels of polycentricity with the current scales of urban fabric of the West Bank, and discusses the examining of the main strategic concepts of polycentricity to be applied in the West Bank, according to the hierarchical levels of these concepts as well as the hierarchal levels of the Palestinian agglomerations within the West Bank. Because of the broad scope of the polycentric model and the variety of its application fields, it will be necessary to limit its concepts and levels, and to match them with their proper situations within the Palestinian context.

The structure of this chapter is based on the redefinition of three main concepts of polycentricity within the generic regional scale of the West Bank, according to the status of the Palestine urban fabric and its characteristics and features. By which a general framework of the application of the polycentricity could be obtained, and introduce for the more detailed steps of the following chapters.

4.2 Concept, Components and Levels

As it has been illustrated in chapter 3, Three main prominent concepts were used to define polycentricity, these are: FUAs, PIAs, and PUSHs areas.

Each concept is defined by specific tools and criteria, at this stage of the study, the required criteria which have been used to define each concept will be modified to fit the immediate scale of the Palestinian agglomerations. Accordingly, some concepts will be excluded, while others will be reshaped, in order to set the proper levels of Polycentricity within its contextual frame.

4.2.1 Concept No. 1 : Functional Urban Areas (FUAs)

Defining the Functional Urban Areas (FUAs) presents the first step of the polycentricity definition process, and the other two concepts will be built upon the FUAs results. Theory about FUAs stated that the definition of Functional Urban Areas regionalizes the structural composition within regional entities. ESPON (2005) defined three levels of FUAs, according to their hierarchies; MEGAs, National FUAs, Sub-Regional and Local FUAs.

- **MEGAs**

MEGA concept will be excluded from this study, since it deals with large scale cities ' mega cities', in terms of its population, transportation, economy, and other components, while the cities of the West Bank are characterized by smaller levels of functions and cannot meet with the requirements of the MEGAs level.

MEGA concept represents the Trans-national level (level one) of polycentricity, which could be used to define the relations between the West Bank as one unit and other neighboring countries, [which is beyond the scope of this study].

- **National FUAs**

National FUAs represent the national level (level two) of polycentricity, according to the theory there are two criteria that have been used to define the FUA concept, one for large countries (with population more than 10 million inhabitants), and the other for smaller countries (with population less than 10 million inhabitants).

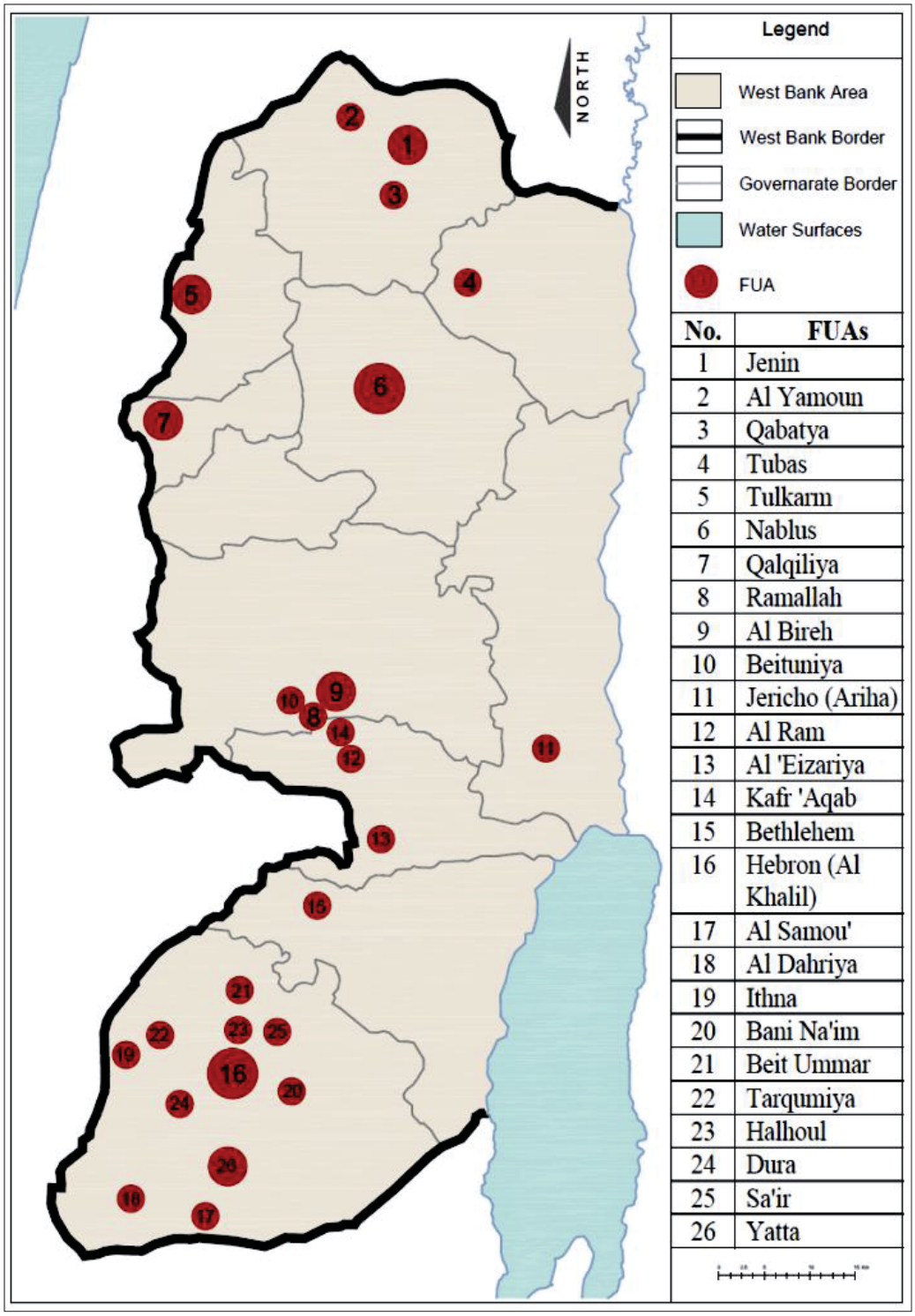
In the West Bank, where the population is about 3 millions (less than 10 millions), the second criterion will be used. Thus; the West Bank FUAs will be defined as " Areas having an urban

core of 15,000 inhabitants, and the surrounding areas and localities". (Table 4.1) shows the FUAs of the West Bank, while (Map 4.1) shows the locations of these FUAs, classified according to the governorate for which they related.

Table 4.1: National FUAs of the West Bank

Governorate	No.	FUAs of the West Bank	Population
Jenin	1	Jenin	41,866
	2	Al Yamoun	17,493
	3	Qabatya	20,497
Tubas	4	Tubas	18,504
Tulkarm	5	Tulkarm	54,258
Nablus	6	Nablus	133,714
Qalqiliya	7	Qalqiliya	44,593
Ramallah	8	Ramallah	41,147
	9	Al Bireh	29,581
	10	Beituniya	21,284
Jericho (Ariha)	11	Jericho (Ariha)	20,040
Jerusalem	12	Al Ram	21,317
	13	Al 'Eizariya	16,162
	14	Kafr 'Aqab	17,941
Bethlehem	15	Bethlehem	27,078
Hebron (Al Khalil)	16	Hebron (Al Khalil)	184,074
	17	Al Samou'	21,364
	18	Al Dahriya	31,288
	19	Ithna	20,672
	20	Bani Na'im	21,837
	21	Beit Ummar	15,005
	22	Tarqumiya	15,610
	23	Halhoul	24,060
	24	Dura	31,434
	25	Sa'ir	21,587
	26	Yatta	55,293
Source: *PCBS, 2012*			

Map 4.1: National FUAs of the West Bank



No.	FUAs
1	Jenin
2	Al Yamoun
3	Qabatya
4	Tubas
5	Tulkarm
6	Nablus
7	Qalqiliya
8	Ramallah
9	Al Bireh
10	Beituniya
11	Jericho (Ariha)
12	Al Ram
13	Al 'Eizariya
14	Kafr 'Aqab
15	Bethlehem
16	Hebron (Al Khalil)
17	Al Samou'
18	Al Dahriya
19	Ithna
20	Bani Na'im
21	Beit Ummar
22	Tarqumiya
23	Halhoul
24	Dura
25	Sa'ir
26	Yatta

Source : *MoP & PCBS, 2012 - edited by the author.*

- **Sub-Regional and Local FUAs**

Sub-Regional and local FUAs represent the sub-regional / local level (level three) of polycentricity. Moreover, two sub-divided levels of centers will be defined at this level of FUAs hierarchy; the sub-centers and the local centers. since level three of polycentricity suggests strengthen cooperation within two regional scales:

  - Small towns (Sub-Regional FUAs)
  - Rural areas associated with these towns (Local FUAs)

Literature about FUAs presented no criteria for the definition of these levels of FUAs, Accordingly, this level will be elaborated in more details when analyzing the study area in chapter 5 (which deals with the sub-regional and local levels of polycentricity).

4.2.2 Concept No. 2 : Potential Urban Strategic Horizon (PUSHs)

Potential Urban Strategic Horizon areas (PUSHs) are defined based on the definition of the FUAs. Subsequently PUSHs at the national level differ from the PUSHs at the sub- regional level. At this stage, only PUSHs at the national level will be defined and this intersects with the general framework that is supposed to be provided by this chapter.

However, definition of PUSHs on the sub-regional levels requires more detailed areas than the scale of the West Bank, this definition will include many PUSHs and also will deal with the local level of the communities (towns and villages). Because of that, the PUSHs areas at the sub-regional levels will not be presented for all of the West Bank, it will be defined in the case study area only (and this will be elaborated in details in chapter 5 - section 5.3.1).

As it has been illustrated in section 3.6, criteria for selection and determination of the national PUSHs areas (around national FUAs) includes all agglomerations (local Councils) that at least (10%) of its area could be reached within 45 minutes from each FUA by car. This criterion will be modified due to the relatively small total area of the West Bank (5,844 km^2), if it compared with the total areas of the nations where the criteria was originally tested and implemented. (Table 4.2) shows The total areas for random European nations, that have close numbers of national FUAs to that number in the West Bank (26 FUAs).

Table 4.2: Areas and Number of FUAs for Some European Nations

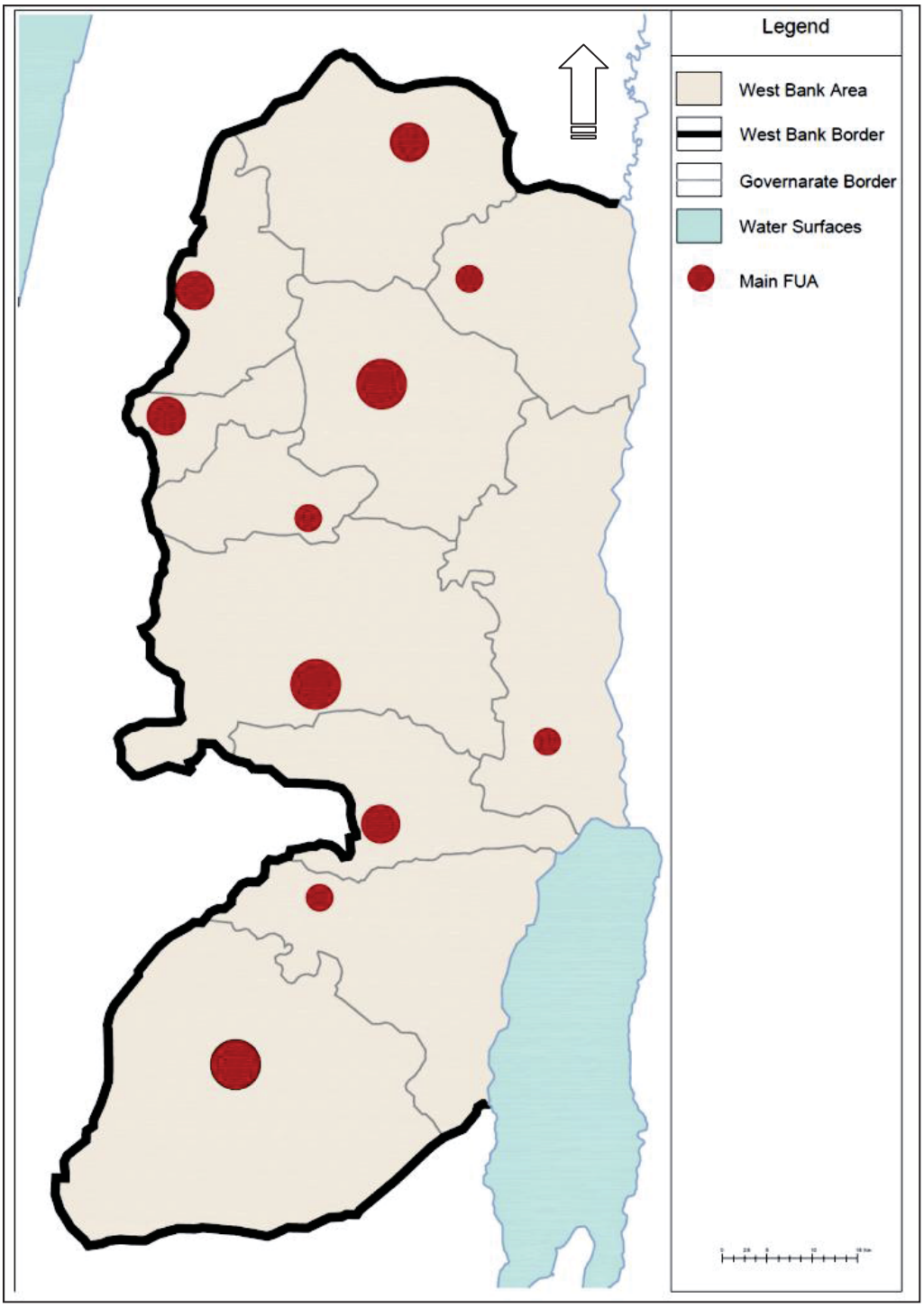
Nation	Number of FUAs	Total area (Km^2)
Austria	24	83,855
Belgium	21	30,528
Bulgaria	31	110,994
Slovakia	27	49,035
Source : *ESPON, 2005.*		

(Table 4.2) shows great difference between areas of the presented countries and the West Bank. Indeed, some of these areas are 20 times larger than the West Bank area. It does also reflect short distances between cities, (maximum distance between the West Bank main cities is 110 km). Because of this, and to reduce the possibility of the intersected PUSHs between different FUAs a new time - distance should be adopted to define PUSHs areas at this level of polycentricity (national level).

- **Defining the national PUSHs of the West Bank**

(Table 4.1) shows that the national FUAs centers are distributed between 10 governorates, only the main center of these governorates will be included in this process,(see Map 4.2).

Map 4.2 : Main FUA center in the West Bank's governorates



Source : *MoP & PCB, 2012 - edited by the author.*

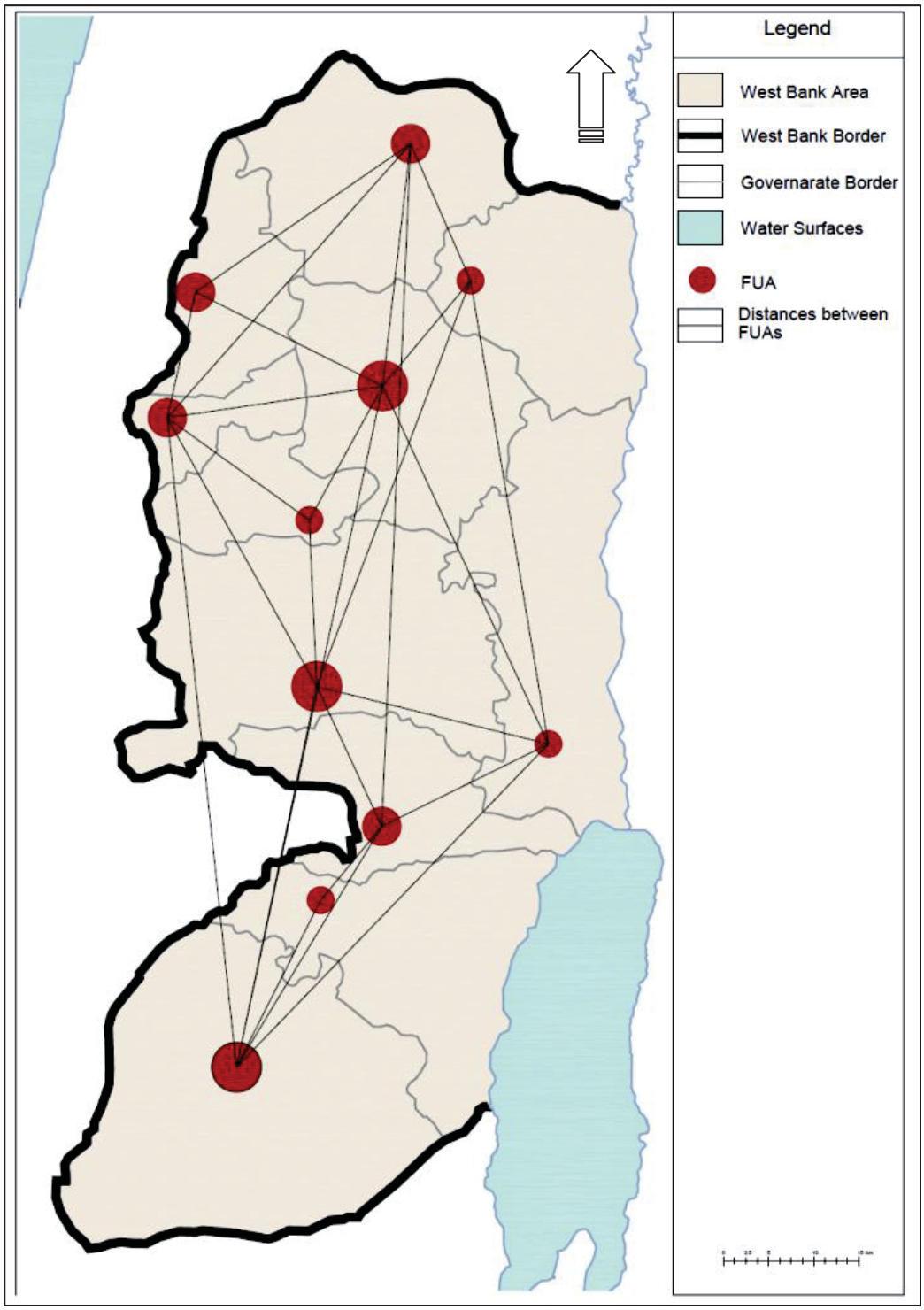
The first step of this process will be the conversion of the (45 minutes time-period), into distance (Km distance). If (80 Km/hour) is taken as an average speed of the car, then the resulted distance will be (60 Km), which represents the radius of the circle that defines the PUSH area.

The distance will be calculated by taking the average distances between each two adjacent FUAs centers, then the half of its value will be adopted as the radius of the circle around each FUA which form the PUSH border. (Table 4.3) shows that the average distances between each two adjacent national FUAs in the West Bank is (26.5 Km), thus the radius that defines each PUSH is about (13 km) from the FUA center. See (Map 4.3) that shows the PUSHs areas around each National FUA center.

Table 4.3: Average distances between each adjacent national FUAs in the West Bank

Governorate	Distance (Km)
Jenin - Tubas	18
Jenin - Tulkarm	31
Jenin - Nablus	27
Tubas - Nablus	15
Tubas - Jericho	52
Tulkarm - Qalqiliya	16
Nablus - Tulkarm	24
Nablus - Qalqiliya	27
Nablus - Jericho	45
Nablus - Ramallah	36
Qalqiliya - Ramallah	38
Jerusalem - Ramallah	14
Jerusalem - Jericho	25
Jerusalem - Bethlehem	9
Bethlehem - Hebron	21
Total	398
Average	26.5

Map 4.3: PUSHs Areas National FUA Center



Source : *MoP & PCBS, 2012 - edited by the author*.

4.2.3 Concept No. 3 : Potential Polycentric Integrated Areas (PIAs)

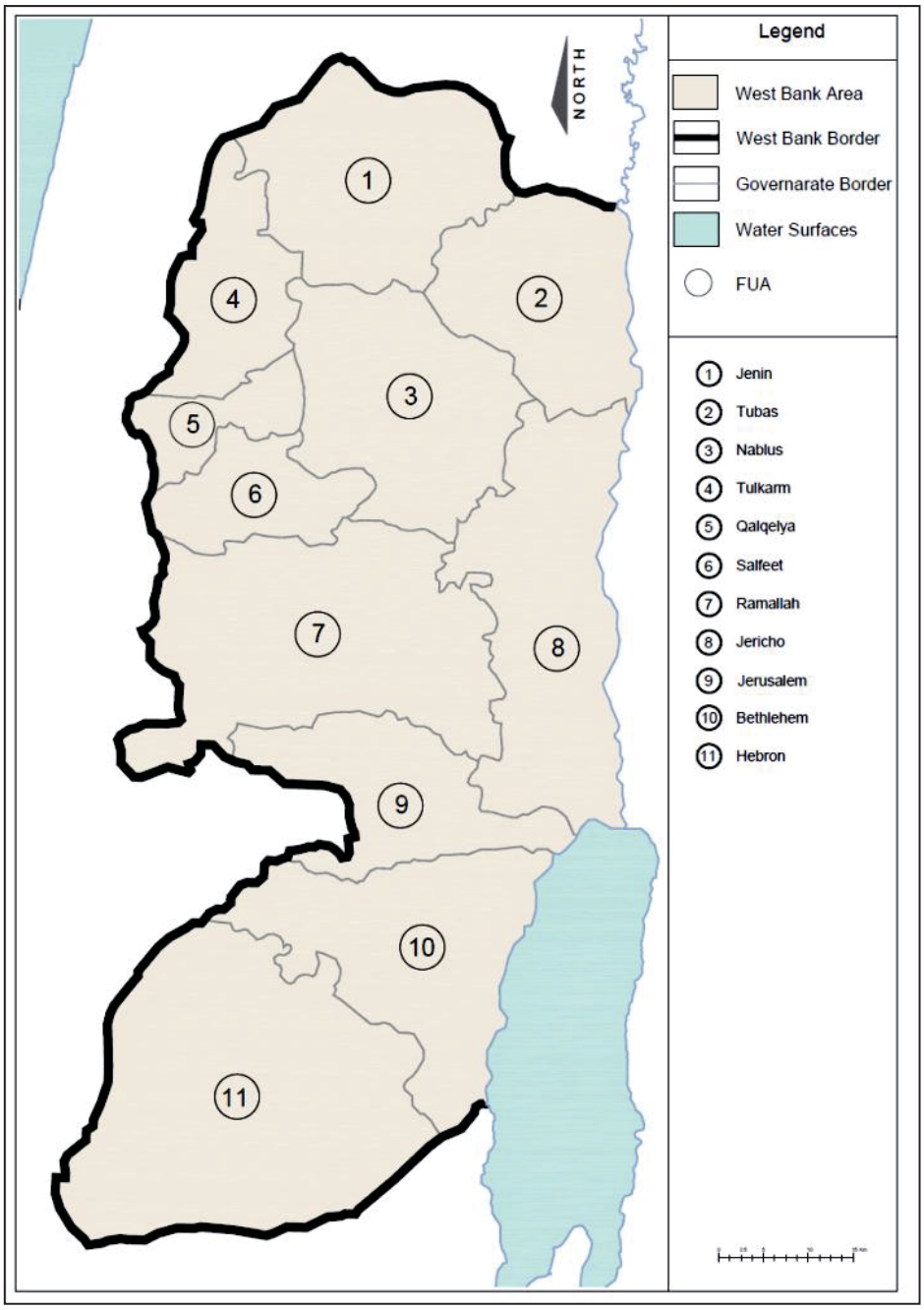
Potential Polycentric Integrated Areas (PIAs) will also be defined based on the definition of the FUAs as well as the PUSH areas according to the related theory.

As it has been illustrated in chapter 3 - section 3.6, the definition of the Potential Polycentric Integrated Areas (PIAs), is constructed by merging the PUSHs areas of neighboring cities, (FUA that shares at least 1/3 of its potential commuter catchment with another larger FUA). Moreover, the same criteria expressed that each PUSH area belongs to one PIA only, Accordingly, it could be stated that the concept of PIA can cover the FUA concept, and many FUAs could be related to one PIA.

At this stage of implementation, it could be difficult to evaluate the scope of each PIA, since the sub-regional and local FUAs and their PUSH areas are not defined yet, however, 'generalization' approach will be followed to adopt criteria for the PIAs definition in the West Bank.

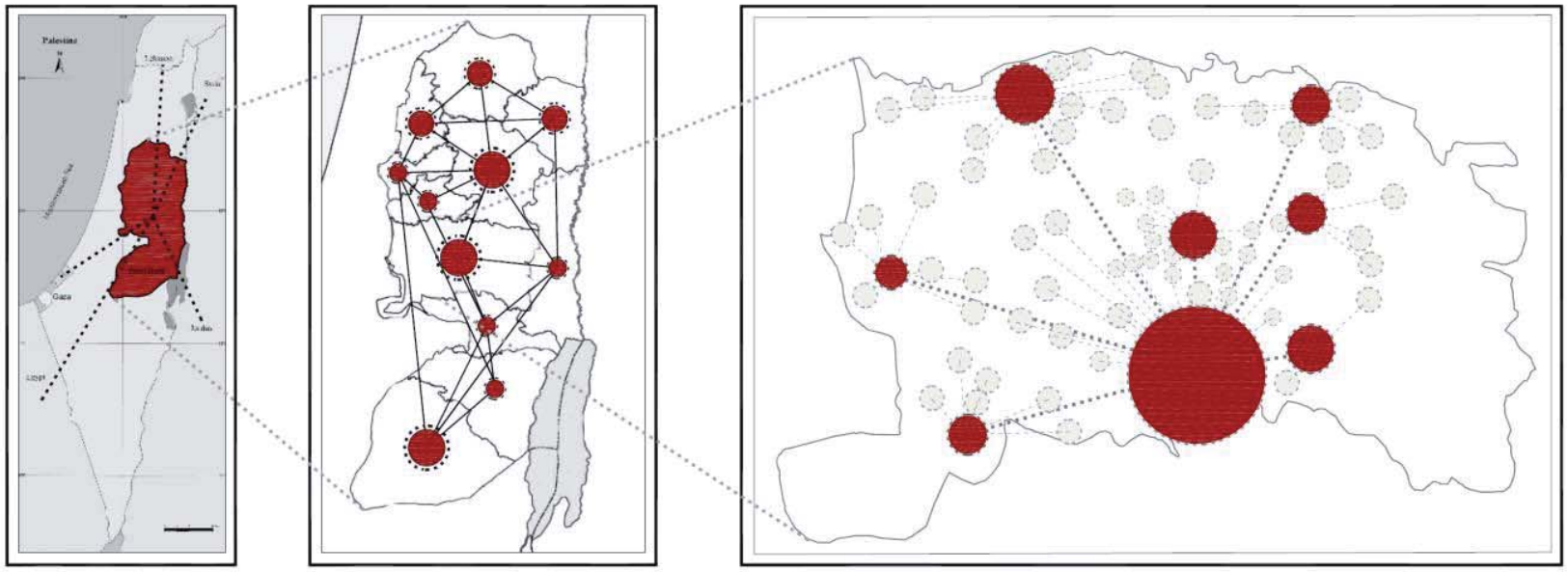
The existing physical - functional situation in the Palestinian context, consists of 11 defined administrative units called (Governorates), almost each governorate contains at least one national FUA center that shares commuters with another sub-regional and local FUAs (regardless the percentage of the commuters). Subsequently, and to simplify the definition of the PIA within the Palestinian context it will be a suitable idea if each governorate is defined as one PIA which in terms could contain more than FUA within their PUSH areas. (Map 4.4) shows the PIAs of the West Bank. (Figure 4.1) illustrates a conceptual perspective for the different scales and levels of polycentricity within the West Bank.

Map 4.4: PIAs of the West Bank



Source : *MoP & PCBS, 2012 - edited by the author*.

Figure 4.1: Conceptual Perspective for the different Scales and Levels of Polycentricity within the West Bank



MEGA Level **National FUA's Level** **PIA - Regional/local Level**

4.3 Conclusion

This chapter provided a preface for the implementation of the polycentricity within the Palestinian context. In practice it presents a framework for adopting the main concepts and levels of polycentricity in the West Bank.

Three strategic conceptual components of polycentricity have been illustrated, analyzed, and applied in the West Bank: FUAs, PIAs, and PUSHs. Furthermore, Polycentric urban patterns have been attached on three levels of scales; the first level (level one) or the trans-national level which was excluded from the study, as it doesn't represent the intent of this research.

The second level (level two) or the national level, which has been introduced in this chapter in order to create a threshold approach that will form a general framework of polycentricity in the West Bank. This approach has been produced through the adoption of the regional strategic conceptual components (FUA, PUSH, and PIA areas). Although this level doesn't represent the required level of this study, but it's definition was an indispensable step to create an integrated theme of understanding of the polycentricity in its proper situation.

The final level (level three) or the sub-regional level which is considered the target level of this research based on the main problem of this research. By taking into consideration the available options which offered by the polycentric model, it could be found that level three is the required level which matches and fits these sub-regional/local communities within the Palestinian urban context.

Level three of polycentricity divided into two regional scales: (between towns, and between towns and rural areas), consequently; the implementation of the model in the case study area will be also within two levels:

- Sub-Regional level : The level of different towns.
- Local level : That shows the relations between the towns and the rural communities (villages) around it.

Level three and be built using (Regions) that contains both towns and rural communities (villages) of various physical patterns. And this criteria could be found within the contextual configuration of the Palestinian Governorates, as each governorate consists mainly from one or two cities and/or towns, as well as other rural communities, and this matches the criteria of level three of polycentricity.

Therefore, the required case study area according to the criteria of the model's definition and levels is one of the West Bank's governorates, which represents one PIA, and performs the Sub-Regional/local levels of hierarchy, which will be analyzed in details in chapter five.

Chapter Five

Implementation of the Polycentricity Model at the Sub-Regional/Local Level

5.1 Introduction

This chapter presents the implementation attempts for the polycentricity at the sub-regional/local scale of the West Bank. Building on the results of chapter four, where the general concepts and levels of polycentricity have been defined.

Theoretical discussions of chapter three explained that polycentricity could be defined in any regional scale by two dimensions; morphological and functional dimensions. Furthermore, the theoretical discussion chapter (chapter three) introduced for the two dimensions within the Palestinian context by adapting criteria lists for both dimensions, in order to be followed during the implementation of the model in the study region.

Overall, there are two key aims of this chapter; the first is to define and analyze the regional case study area. While the second is to test the ability of the polycentric model implementation in the study area, by applying both morphological and functional dimensions.

5.2 Case Study Area

This section of the study introduces the case study area; where the polycentricity model will be implement at its sub-regional/local levels. The selected area according to the results from the previous chapter is one of the West Bank's governorates.

Ramallah Governorate has been selected as a case study to be studied for the polycentricity model implementation, Ramallah Governorate was selected for the following reasons:

- Ramallah City the most challenges center of the polycentricity concept, due to the centralization trends occurred in the city since Oslo agreement. Thus, if the concept works in Ramallah Governorate, it would be generalized on the other West Bank's Governorates.
- Ramallah Governorate contains large number of dispersed agglomerations, (75 agglomerations), and this total exceeds most of the other Governorates agglomerations.
- The purposes of easiness of the data accessibility for the researcher.

At this stage of the study; the analysis of the study area will be focused on the fields that refer to the two dimensions; the physical - structural (morphological), as well as the functional dimension.

5.2.1 Physical Characteristics

This section discusses the physical - structural context of Ramallah Governorate, this includes its location, settlements structure, population, communities hierarchies, merged communities, and the geo-political context of the governorate.

- **Location**

Ramallah Governorate is located in the central part of the West Bank in the central mountains chain in Palestine, it extends from Jerusalem governorate in the south to Nablus and Salfeet governorates in the north and Jericho governorate in the east. It has an area of about (848.828Km^2) - about 15% of West Bank total area. (*ARIJ,2010*).

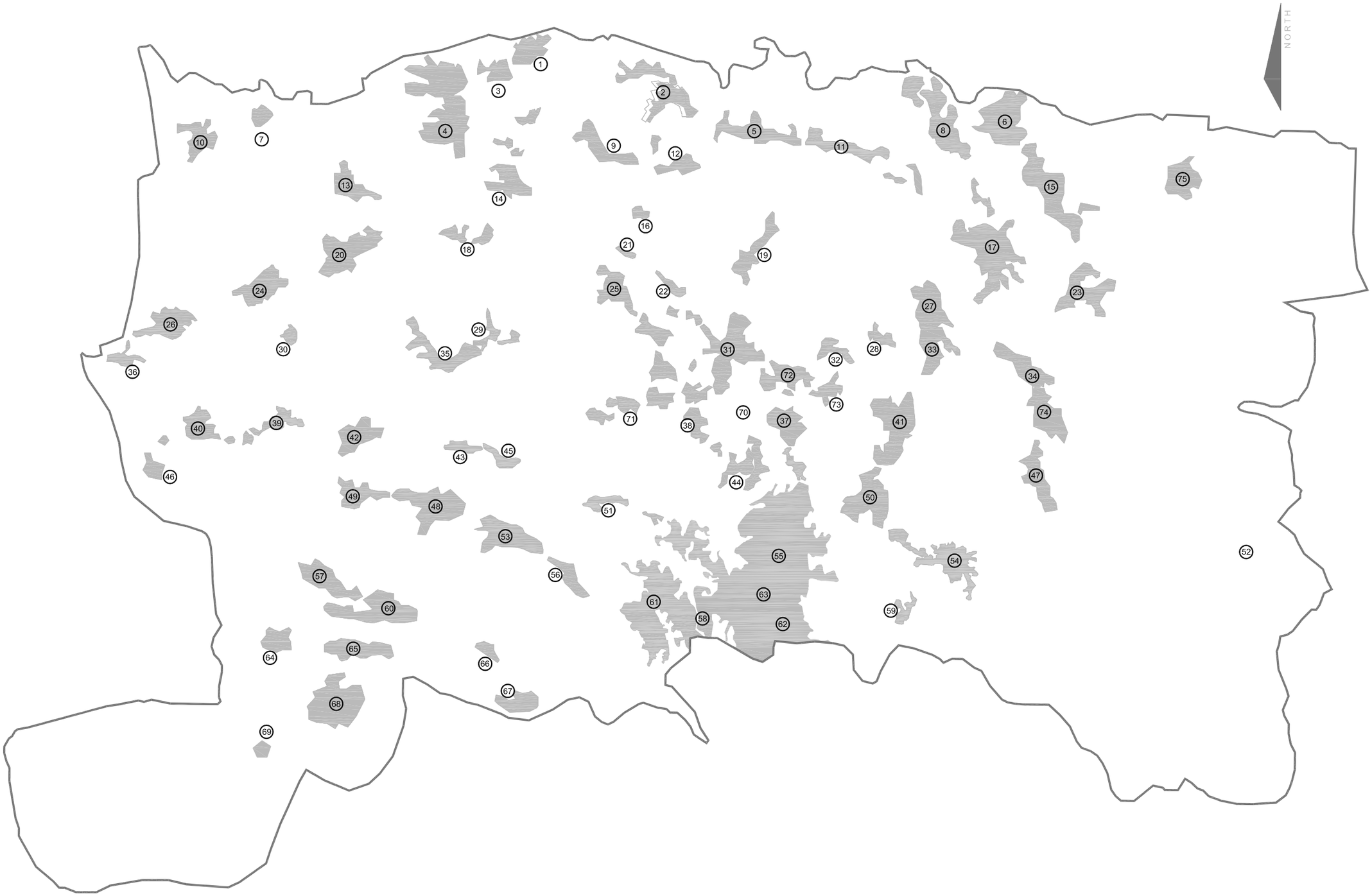
The governorate is 16 kilometers far from Jerusalem city, and 67 kilometers far from the Mediterranean, and 52 kilometers from the Dead Sea. The governorate enjoys a moderate climate and is known as the summer resort of Palestine. *(GIZ,2011)*, (Map 5.1) illustrates the location of Ramallah governorate.

Map 5.1 : Location of Ramallah Governorate

Source : *ARIJ Database, 2006*.

- **Settlements Structure**

Ramallah governorate contains 75 communities; 5 communities classified as refugee camps, while the other 70 communities varied between (municipalities, villages Councils and project committees) according to the administrative classification of the Palestinian territories, (see section 2.2.3). (Map 5.2) shows the settlements structure of Ramallah governorate. *(PCBS, 2010).*



Legend

No.	Agglomeration
1	Qarawat Bani Zeid
2	Bani Zeid ash Sharqiya
3	Kafr 'Ein
4	Bani Zeid
5	Abwein
6	Turmus'ayya
7	Al Lubban al Gharbi
8	Sinjil
9	Deir as Sudan
10	Rantis
11	Jiljiliya
12	Ajjul
13	Abud
14	An Nabi Salih
15	Khirbet Abu Falah
16	Umm Sa'a
17	Al Mazra'a ash Sharqiya
18	Deir Nidham
19	Atara
20	Deir Abu Mash'al
21	Jibiya
22	Burham
23	Kafr Malik
24	Shuqba
25	Kobar
26	Obya
27	Silwad
28	Yabrud
29	AL-Ittihad
30	Shabtin
31	Bir Zeit
32	Ein Siniya
33	Silwad Camp
34	Deir Jarir
35	Deir 'Ammar Camp
36	Budrus
37	Al Jalazun Camp
38	Abu Qash
39	Deir Qaddis
40	Ni'lin
41	Ein Yabrud
42	Kharbatha Bani Harith
43	Ras Karkar
44	Surda
45	Al Janiya
46	Al Midya
47	Rammun
48	Kafr Ni'ma
49	Bil'in
50	Betin
51	Ein Qiniya
52	Badiw al Mu'arrajat
53	Deir Ibzi'
54	Deir Dibwan
55	Al Bireh
56	Ein 'Arik
57	Saffa
58	Ramallah
59	Burqa
60	Beit 'Ur at Tahta
61	Bekuniya
62	Al Am'ari Camp
63	Qaddura Camp
64	Beit Sira
65	Kharbatha al Misbah
66	Beit 'Ur al Fauqa
67	At Tira
68	Beit Liqya
69	Beit Nuba
70	AL-Doha
71	AL-Zaytouneh
72	Jifna
73	Dura al Qar'
74	At Tayba
75	Al Mughayyir

Ramallah PIA Border

Map No.

5.2

Map Title

Urban Context of Ramallah Governorate

Source : NSP,2010 - Edited by the Author

- **Population**

The final population census of 2007 shows that the total number of the population in Ramallah governorate was (297,730). In mid - 2012, the population of Ramallah governorate reached (319,418) inhabits. (*PCBS, 2012*). (Table 5.1) shows the increase in the population of Ramallah Governorate between the years (1997 - 2012).

Table 5.1: Population Growth in Ramallah Governorate Between (1997 - 2012)

Year	**1997**	**2007**	**2012**
Population	202,759	275,981	319,418
Source: PCBS, 2012.			

Compared to 1997, the population in Ramallah governorate has witnessed a sharp increase estimated at (44.3) percent in 2009 due mostly to internal migration from other governorates. In fact, Ramallah governorate has become a central attraction to Palestinians from all over the West Bank. Such increase in the population far exceeds the average population growth in the West Bank during the same period which was estimated at (3%) percent between 1997 and 2009. Population density in Ramallah governorate in 2009 reached (342) people per one square kilometer.(*GIZ,2011*).

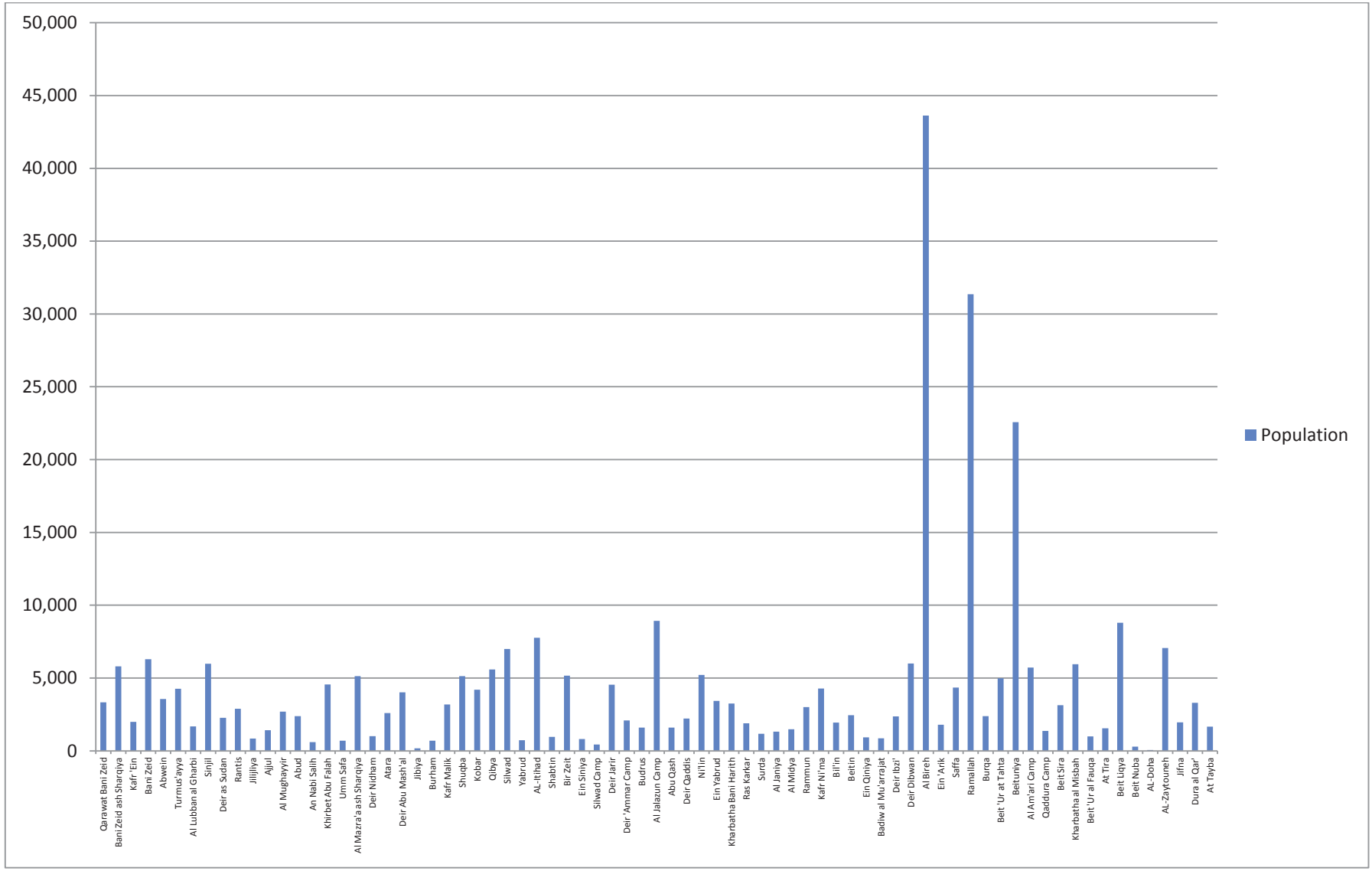
The total population of Ramallah governorate presents about 12% from the total population of the West Bank in the year 2012, with gross density of about 358 p/km^2, in the same year. (*PCBS, 2012*). According to age, (41.4) percent of the governorate's population is under 15 years and 58.6 percent is 15 years and above, which indicates that the population is young like other governorate in the West Bank.(*GIZ,2011*).

(Table 5.2) and (Figure 5.2) show the detailed population numbers for all communities within Ramallah Governorate for the year 2012, according to the *PCBS, 2012*.

Table 5.2: Population of Ramallah Governorate's Agglomerations

Agglomeration	Population	Agglomeration	Population
Qarawat Bani Zeid	3,329	Abu Qash	1,603
Bani Zeid ash Sharqiya	5,804	Deir Qaddis	2,218
Kafr 'Ein	1,990	Ni'lin	5,222
Bani Zeid	6,297	Ein Yabrud	3,425
Abwein	3,562	Kharbatha Bani Harith	3,250
Turmus'ayya	4,266	Ras Karkar	1,899
Al Lubban al Gharbi	1,685	Surda	1,177
Sinjil	5,979	Al Janiya	1,328
Deir as Sudan	2,273	Al Midya	1,486
Rantis	2,894	Rammun	2,999
Jilijliya	846	Kafr Ni'ma	4,282
Ajjul	1,413	Bil'in	1,942
Al Mughayyir	2,704	Beitin	2,447
Abud	2,380	Ein Qiniya	927
An Nabi Salih	610	Badiw al Mu'arrajat	860
Khirbet Abu Falah	4,563	Deir Ibzi'	2,363
Umm Safa	699	Deir Dibwan	5,997
Al Mazra'a ash Sharqiya	5,133	**Al Bireh**	**43,622**
Deir Nidham	1,004	Ein 'Arik	1,789
Atara	2,592	Saffa	4,341
Deir Abu Mash'al	4,022	**Ramallah**	**31,356**
Jibiya	169	Burqa	2,387
Burham	703	Beit 'Ur at Tahta	4,992
Kafr Malik	3,182	**Beituniya**	**22,565**
Shuqba	5,135	Al Am'ari Camp	5,725
Kobar	4,199	Qaddura Camp	1,379
Qibya	5,596	Beit Sira	3,139
Silwad	6,992	Kharbatha al Misbah	5,950
Yabrud	735	Beit 'Ur al Fauqa	987
AL-Itihad	7,768	At Tira	1,551
Shabtin	964	Beit Liqya	8,804
Bir Zeit	5,172	Beit Nuba	284
Ein Siniya	812	AL-Doha	57
Silwad Camp	436	AL-Zaytouneh	7,068
Deir Jarir	4,552	Jifna	1,959
Deir 'Ammar Camp	2,094	Dura al Qar'	3,308
Budrus	1,597	At Tayba	1,658
Al Jalazun Camp	8,922		
Total population of Ramallah Governorate = 319,418 **Source:** *PCBS, 2012.*			

Figure 5.1 : Population Numbers in Ramallah Governorate (*PCBS,2012*)



(Table 5.2) shows that (30 %) from the total population of Ramallah Governorate concentrates in 3 centers (the main centers of the Governorate ; Ramallah - Al bireh - Bitunya), while (70 %) inhabits the remaining (72) centers with an average of less than (1%) from the total governorate's population for each of these communities (villages mainly), (see Figure 5.1). This is also similar to the other governorates of the West Bank, where the population concentrates within the urban center (city) of each governorate.

- **Hierarchical Classification of Ramallah Governorate's Communities**

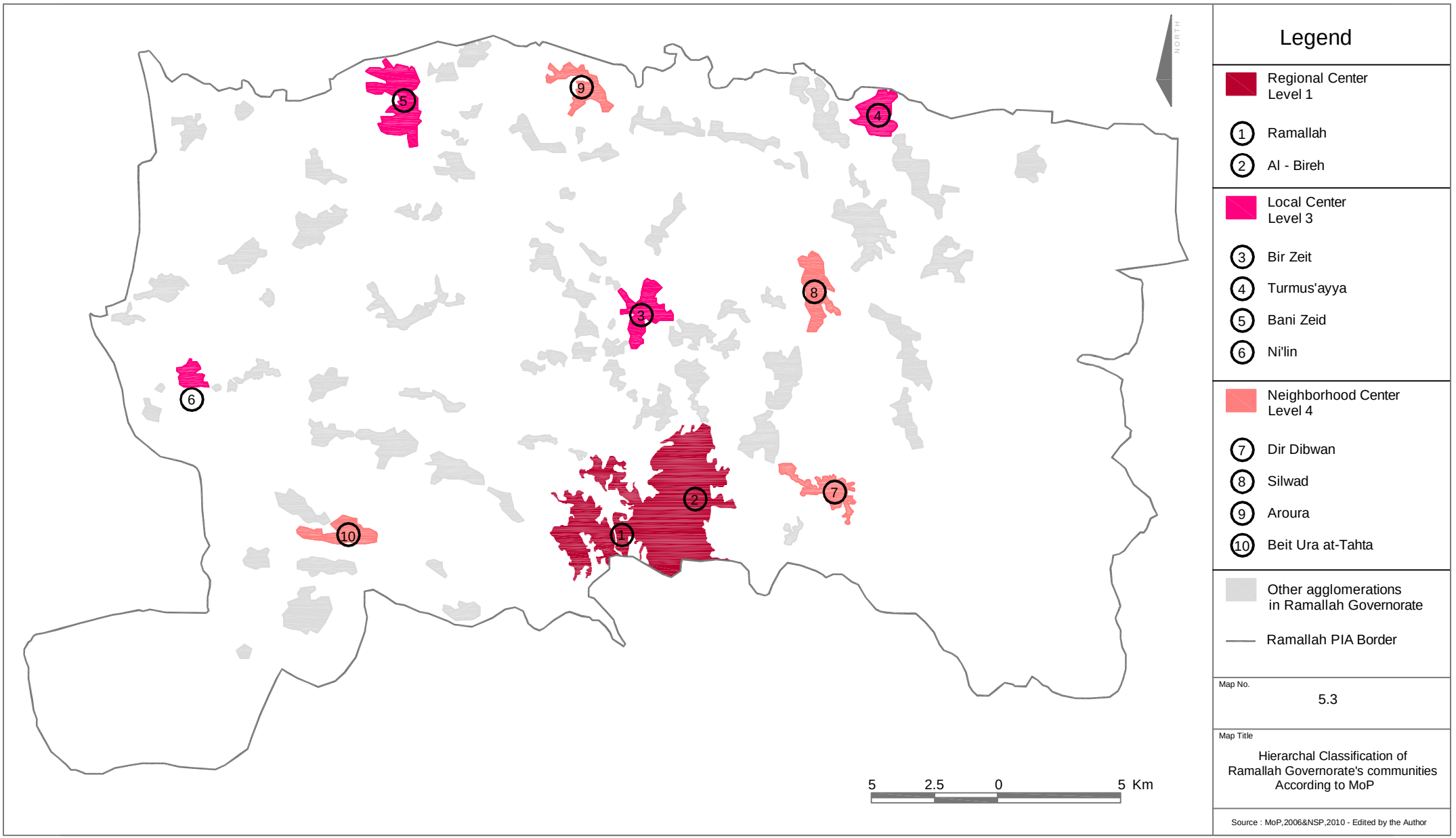
The Ministry of Planning (2006), has published a study that classified the hierarchies of the Palestinian agglomerations, the localities were classified into four levels of centers; regional, sub-regional, local, and neighborhood centers, based on number of public services in the locality, commuted population, and weighted population served, (see section 2.3).

Building on the results of the MoP study, (Table 5.3) shows the classification of the agglomerations within the case study area, while (Map 5.3) illustrates the distribution of these agglomerations.

Table 5.3: Hierarchical Classification of Ramallah's Communities According to MoP

Level 1: Regional Centers	**Level 2 : Sub Regional Centers**	**Level 3 : Local Centers**	**Level 4: Neighborhood Centers**
Ramallah/ Al-Bireh	-	Bir Zeit Turmus'ayya Bani Zeid Ni'lin	Dir Dibwan Silwad Aroura Beit Ura at-Tahta
Source: *MoP, 1998.*			

(Table 5.3) shows that there is no sub-regional centers in Ramallah Governorate, and there are only four center classified as local enter (level 3), and this reflects that there is one dominant center in the Governorate, which contains most services and it attracts other centers populations. Moreover, this table introduces for the other agglomerations (level 3 and level 4) that could be strengthen to work as sub-centers in the future, according to the polycentric model.


NORTH
5
9
4
3
8
6
2
7
1
10
5 2.5 0 5 Km
Legend
Regional Center Level 1
1 Ramallah
2 Al - Bireh
Local Center Level 3
3 Bir Zeit
4 Turmus'ayya
5 Bani Zeid
6 Ni'lin
Neighborhood Center Level 4
7 Dir Dibwan
8 Silwad
9 Aroura
10 Beit Ura at-Tahta
Other agglomerations in Ramallah Governorate
Ramallah PIA Border
Map No.
5.3
Map Title
Hierarchal Classification of Ramallah Governorate's communities According to MoP
Source : MoP,2006&NSP,2010 - Edited by the Author

- **Merged Rural Communities**

Merge policy which has been implemented by the Ministry of Local Government passed through many previous stages, the Regional Planning Committees, Joints Services Councils, and the merge of some localities, (See section 2.3).

In order to take what exists on the real land in consideration, the merged rural communities in Ramallah Governorate will be analyzed at this stage, either the integrated areas, or the merged municipalities (see section 2.3). (Map 5.4) addresses the integrated and merged areas within Ramallah Governorate, these areas are:

1. **Bani Zaid :** This aggregation considered the first integrated municipality in Ramallah Governorate, it was established in 1966, and it consists of two local areas, Beit Rima and Dir Ghassaneh. It locates in the north west part of Ramallah Governorate, with a total area of 21.5 Km^2, it contains 6,297 inhabitants. (*MoLG,2012& PCBS,2012*).

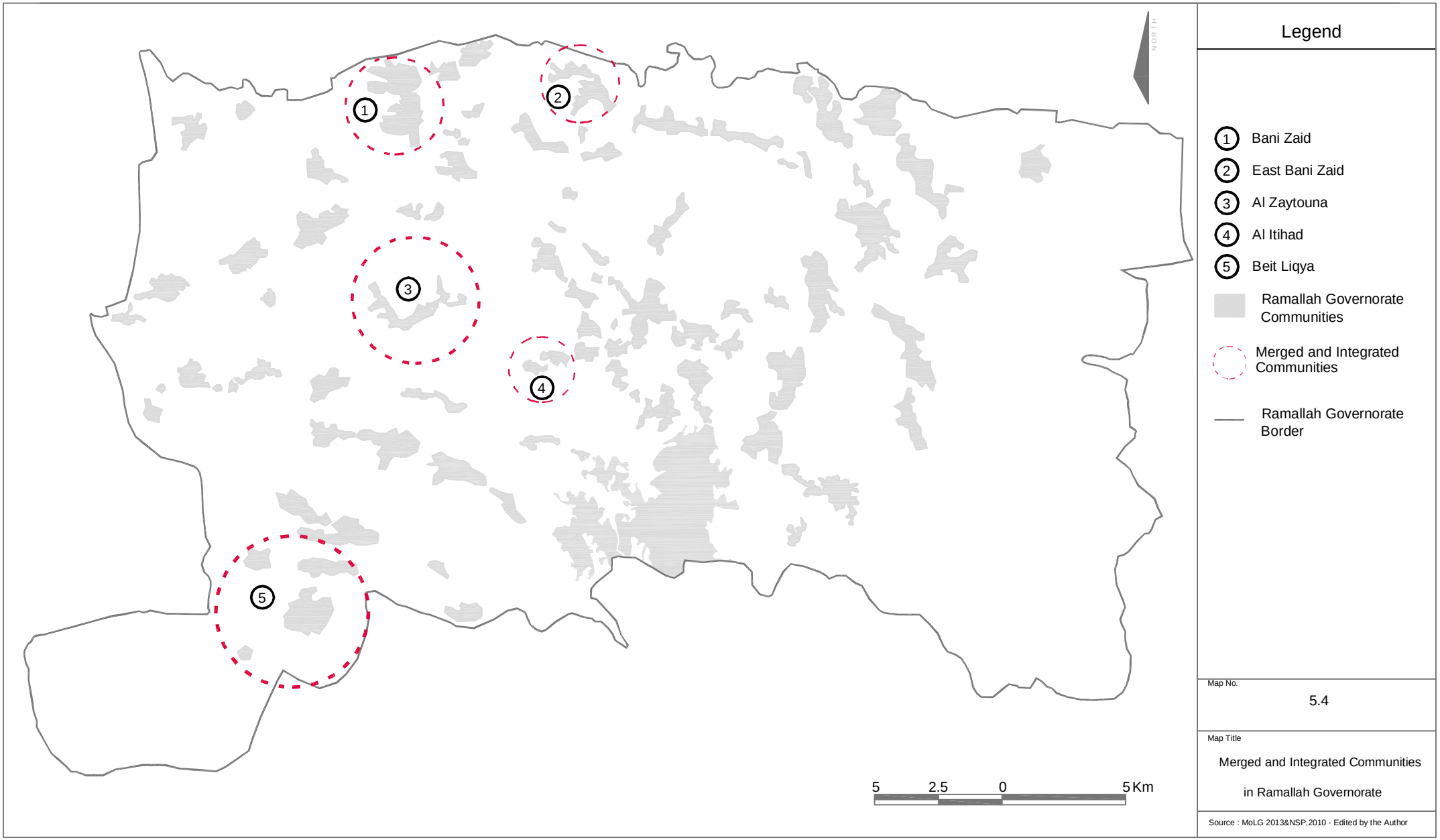
2. **East Bani Zaid :** This aggregation consists of two localities: Aroura and Mazare' al Noubani, it locates in the southern part of Ramallah Governorate, it covers an area of 19,06 Km^2, and it has population of about 5,133 inhabitants. (*MoLG,2012& PCBS,2012*).

3. **Al Zaytouna :** This aggregation consists of two localities: Al Mazra' al Qeblya and Abu Shkhaidm, it locates a central part of Ramallah Governorate, about 10 Km from Ramallah city, it covers an area of 15 Km^2, and it has population of about 7,068 inhabitants. (*MoLG,2012& PCBS,2012*).

4. **Al Itihad :** This aggregation considered the newest integrated municipality in Ramallah Governorate, it was established in 2005 as one joint planning area, and it consists of three local areas Dir Ammar, Bit Illou and Jammala. It locates in the west part of Ramallah Governorate about 17 Km from Ramallah city, with a total area of 27 Km^2, it also contains 7,768 inhabitants. (*MoLG,2012& PCBS,2012*).

5. **Beit Liqya :** This new municipality still a proposal within the Ministry of local government documents, Four localities will be merged according to this proposal; Beit Liqya, Kharbatha al Mosbah, Beit Sira, and Beit Noba. This aggregation locates in the southern west part of Ramallah Governorate, about 20 Km from Ramallah city, it will cover an area of 68 Km^2, and its population is about 18,182 inhabitants.(*MoLG,2012& PCBS,2012*).

   The merged communities within Ramallah Governorate will be adopted through the application of the polycentric model.(see section 5.3.1).



Legend

1 Bani Zaid
2 East Bani Zaid
3 Al Zaytouna
4 Al Itihad
5 Beit Liqya

Ramallah Governorate Communities

Merged and Integrated Communities

Ramallah Governorate Border

Map No.

5.4

Map Title

Merged and Integrated Communities in Ramallah Governorate

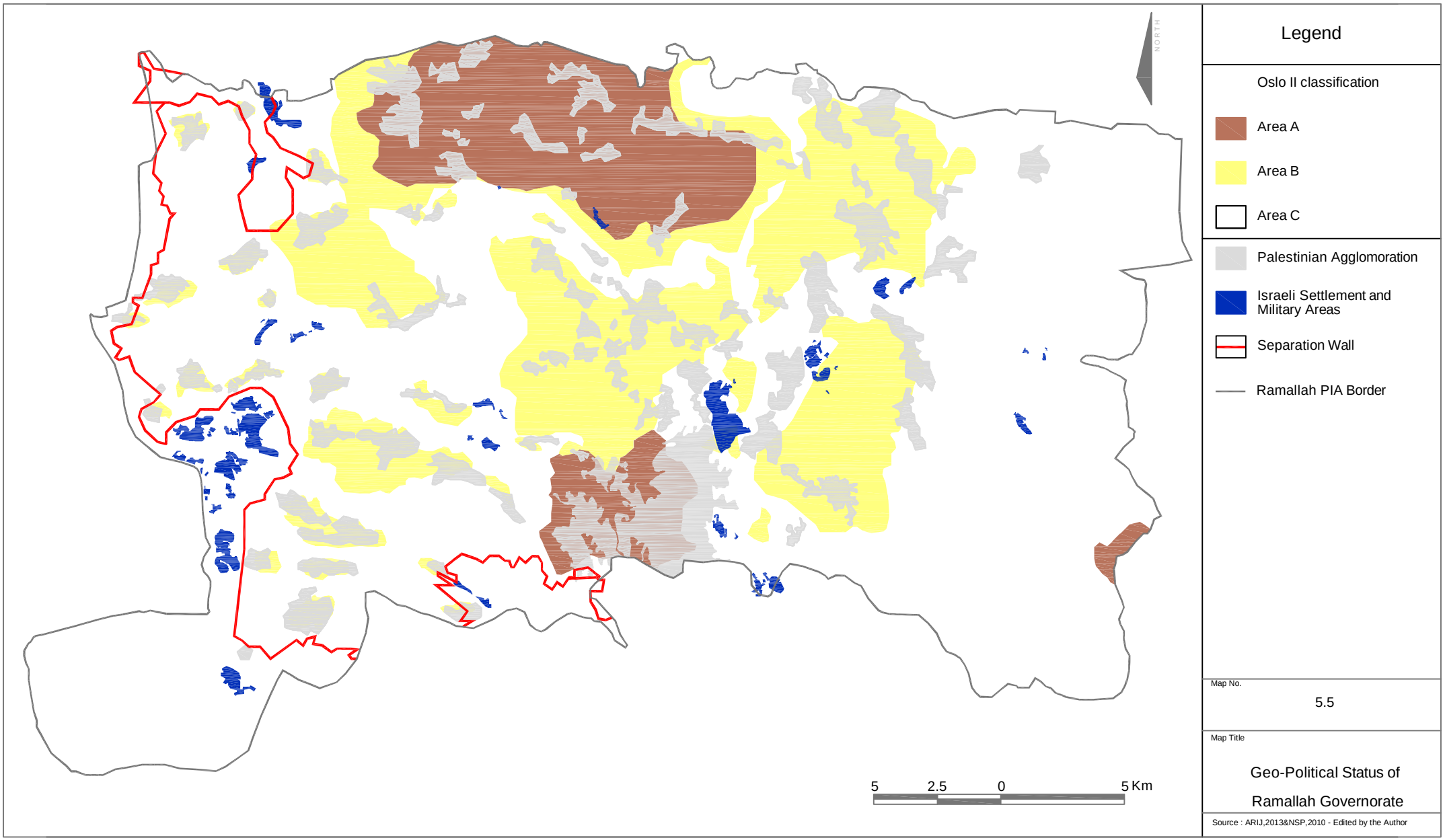
Source : MoLG 2013&NSP,2010 - Edited by the Author

- **Geopolitical Context**

According to the Oslo II Interim Agreement, Ramallah Governorate had been classified into three areas (A,B, and C) as following:

- 101.731 Km^2 (12%) of Ramallah governorate were classified as Area A (areas under Palestinian control).
- 210.738 Km^2 (24.8%) were classified as Area B (areas under Palestinian civil administration but Israel continued to have overriding control on security).
- 536.359 Km^2 (63.2%) were classified as Area C (areas under full Israeli control).(*ARIJ,2005*).

During the past 40 years, 30 illegal Israeli settlements were established on an area of 30,675 Km^2, with a total hold of (69,933) Israeli settler population (*ARIJ,2005*). (Map 5.5) shows the Geo-political context of Ramallah Governorate.


NORTH
5 2.5 0 5 Km
Legend
Oslo II classification
Area A
Area B
Area C
Palestinian Agglomoration
Israeli Settlement and Military Areas
Separation Wall
Ramallah PIA Border
Map No.
5.5
Map Title
Geo-Political Status of Ramallah Governorate
Source : ARIJ,2013&NSP,2010 - Edited by the Author

5.2.2 Economic/Functional Situation in Ramallah Governorate

This part of the study highlights the economic and functional situation in Ramallah governorate, by analyzing sectors and economic activities in the governorate in terms of the number of establishments, number of working laborers.

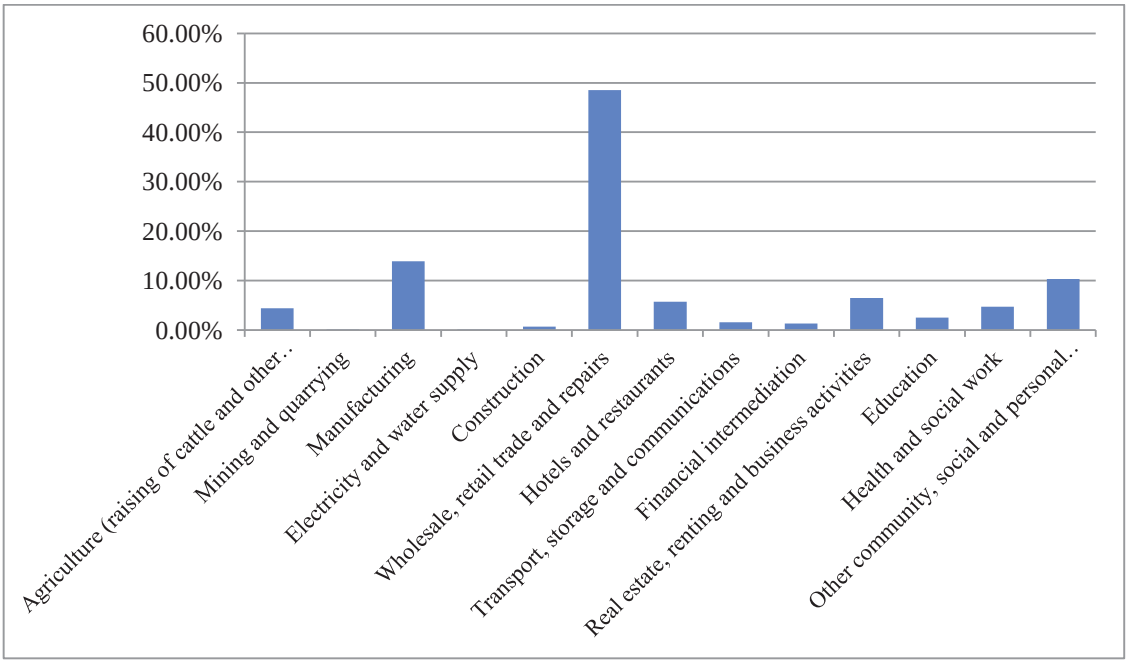
Functionally, Ramallah city considered to be one of the most important services centers in the West Bank. Since 1994 the governorate witnessed a rapid development due to the concentration of the government, public and foreign organizations.(*GIZ,2011*).

(Table 5.4) and (Figure 5.2) show the main functions in Ramallah governorate, the number of the working establishments and number of employees in each sector.

Table 5.4 : The Main Functions in Ramallah Governorate-2009

Economic Activity	Establishments	Percentage %	Employed Persons	Percentage %
Agriculture (raising of cattle and other animals)	483	4.4%	1,077	2.5%
Mining and quarrying	6	0.1%	46	0.1%
Manufacturing	1,520	13.9%	7,311	17.3%
Electricity and water supply	7	0.1%	411	1.0%
Construction	73	0.7%	1,012	2.4%
Wholesale, retail trade and repairs	5,316	48.5%	12,160	28.8%
Hotels and restaurants	620	5.7%	1,873	4.4%
Transport, storage and communications	170	1.6%	2,543	6.0%
Financial intermediation	140	1.3%	3,202	7.6%
Real estate, renting and business activities	711	6.5%	2,910	6.9%
Education	274	2.5%	2,974	7.0%
Health and social work	513	4.7%	2,300	5.4%
Other community, social and personal services	1,123	10.3%	4,453	10.5%
Total	**10,956**	**100.0%**	**42,272**	**100.0%**
Source : PCBS, 2011.				

Figure 5.2 : Percentages of The Numbers of Working Establishments of the Main Functions in Ramallah Governorate-2009



Source : PCBS, 2011.

(Figure 5.2) shows that (48.5 percent) of economic establishments are commercial and include wholesale and retail commerce and vehicle repair. Economic establishments working in services comprise 30 percent and include hotels, restaurants, real estate, leasing, education, health, social work, and social service, hotels, restaurants, social services and real estate constitute most of the establishments providing services. Manufacturing comprises 14 percent and is limited to metal production (26 percent), furniture (23 percent) and food industry (17.5 percent). Finally there are 4% from the total establishments working in agriculture. It was found that 184.9 square kilometers comprising 22 percent of the total area of the governorate is agricultural land suitable for cultivation. On the other hand, there are only very few establishments working in mining, electrical and water supplies.(*GIZ.2001*).

5.3 Implementation of the Polycentricity Model

Promoting integrated spatial development strategies for the dispersed agglomerations is the notion of creating polycentricity at regional scales, (*Meijers,2002*). Accordingly, Regional polycentricity refers to peculiar spatial patterns which could be achieved through creating extensive commuting zones surrounding the larger cities, and giving more attention for the significance of smaller towns in rural areas, this means creating new types of flows by creating new functional centers. (*Meredith,2006*).

By using the polycentric concept terminologies which presented in chapter 3, Polycentricity notion could be rephrased as : "Creating new sub-regional FUAs by developing the centers of these FUAs (sub-centers and local centers), this will be resulted in the definition of new PUSHs areas around these sub-regional FUAs, which includes other local FUAs".

The innovation of these sub-regional FUAs will be obtained by two synchronized processes; morphological and functional dimensions implementation processes.

5.3.1 Morphological Dimension Implementation

The Morphological dimension refers to the spatial physical distribution of the despaired agglomerations. According to the theoretical discussions of chapter 3; the morphological dimension is subjected to three criteria; centers hierarchies, centers distribution and centers clustering. (see section 3.8.1). Step by step approach will be used to define and apply these criteria in the study area.

- **Criteria No. 1 : Centers Hierarchies**

Previously, polycentricity has been presented as multi-levels concept. Moreover; polycentricity refers to the existence of several urban centers (agglomerations) with different hierarchies in a certain region (*Meijers, 2002*).

Three hierarchal levels of the centers were presented in chapter three, which have been defined as centers of polycentric Functional Urban Areas (FUAs), these enters are : (centers of MIGAs, centers of national FUAs and centers of sub-regional / local FUAs). (*ESPON, 2004*).

The centers of the MEGAs have been excluded from the study, while the centers of the national FUAs have been defined in (chapter 3 - section 3.6). Moreover, the lower level of these centers has been sub-divided in to two levels; Sub- centers and Local centers.(see section 4.2).

Accordingly, this section aims to highlight the agglomerations that have the potential to work as sub-centers, it also aims to define the local centers within the study area.

Ministry of Planning (2006), has published a study that classified the hierarchies of the Palestinian agglomerations, this classification has been presented in (sections 2.3 and 5.2.1). Obviously, the MoP study, and the classification of hierarchies according to polycentricity literatures could meet in the main characteristics of the hierarchies criteria, despite the different naming of these centers. (Table 5.5) shows the hierarchies of centers according to the theory (mainly ESPON's classification) compared to the proposed centers of MOP study.

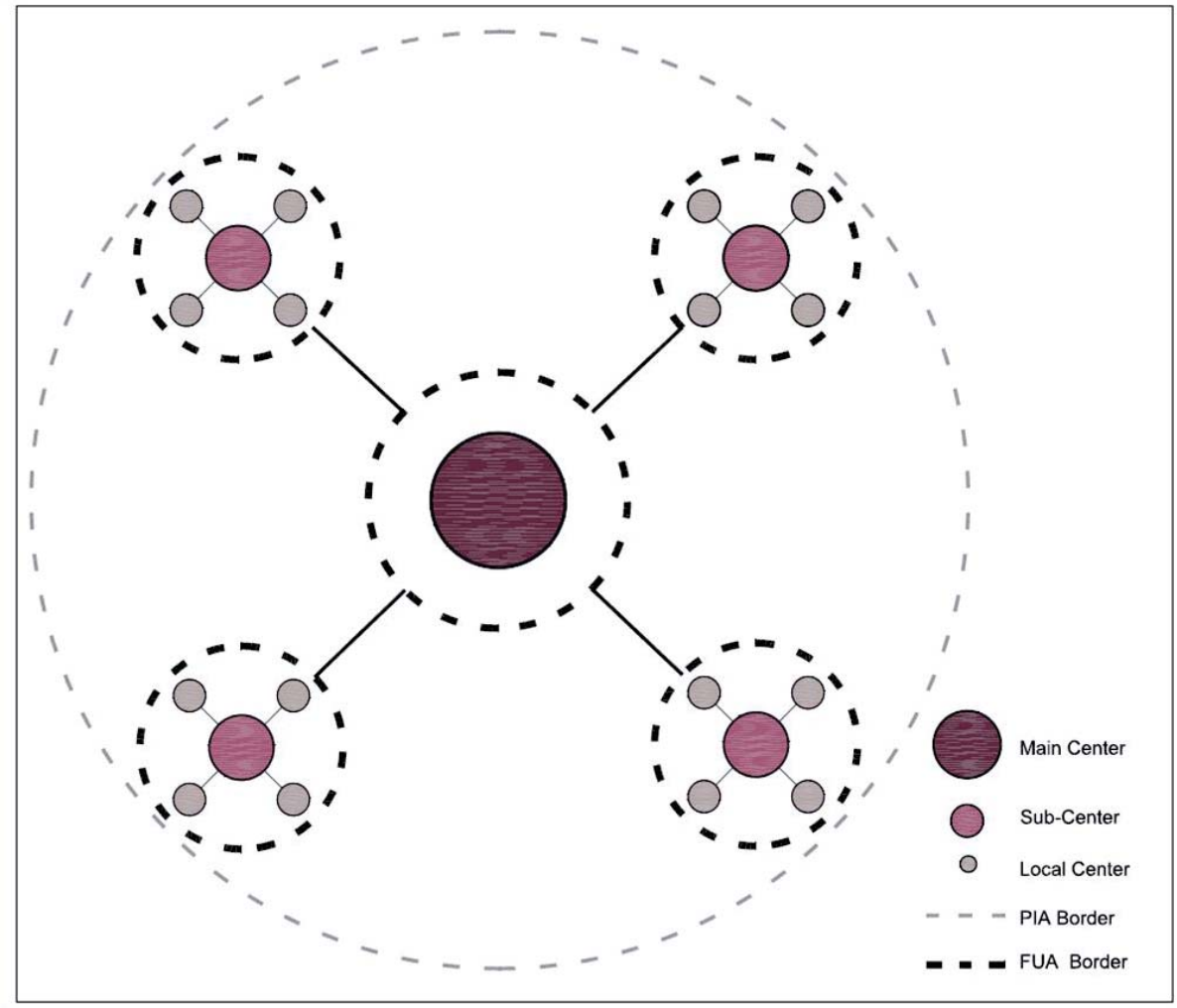
Table 5.5: Matching between the hierarchies of centers developed by the polycentric theory and the proposed hierarchies by the MoP.

MoP classification	ESPON classification	Common Features and Criteria
Level 1: Regional centers	National FUAs Centers	Both levels 1 and 2 contain the highest levels of services that attract commuters from all around the West Bank, even level 1 is higher than level 2 in the classification. Furthermore, both levels contains more than 15,000 population number, Thus; both levels meets the criteria of the national level of FUAs centers.(see section 3.6 and section 4.2-part 1).
Level 2:Sub regional centers		
Level 3 : Local centers	Sub-Regional FUAs Centers	Although the sub-regional FUAs centers haven't been determined yet, but both levels 3 and 4 are related to centers that works as centers that have potentials to serve surrounding communities, which meets the notion of the sub-regional FUAs centers.
Level 4: Neighborhood centers		
Other remaining agglomerations	Local FUAs Centers	The classification of the MoP excludes the lower level of agglomerations this includes the local level of centers, this level meets the definition of the local FUAs.
Source : MoP,1998 & ESPON,2003.		

This study will adopt the terminologies of the related theory of polycentricity, this will exclude the term 'national center', since the West Bank doesn't represent a 'National level', Thus, the national centers will be introduced as 'main centers'. And so, the study area contains three levels of centers hierarchies; (Main centers, Sub-center and Local centers), as shown in (Figure 5.3).

- Level One: 'main centers' which represents the centers of the national FUAs.
- Level Two: 'sub- centers' which represents the centers of the sub-regional FUAs.
- Level Three: 'local centers' that represents the centers of the local FUAs.

Figure 5.3 : Main Concepts, Level and Terminologies of Polycentricity



Theoretical reviews about polycentricity provide two elements to allocate the hierarchies of centers; these elements refer to **the population number** in these centers as well as **the number of the services areas** (zones).

1. Population Component

The population component is considered a remarkable indicator of the center's sizes, the higher level centers (Main centers) usually contain the highest population numbers, while the lower levels absorb less population base. Main centers population has been defined in (section 4.2 part 1) with population of (more than 15,000).

This section highlights the process of classification of both sub-centers and local centers in the study area, based on the population number of these agglomerations. The proposed process will also adopt the results of the MoP study[7] of the hierarchical classification.

To achieve this, a classification model has been proposed, (Table 5.6) shows the proposed model of figures required to categorize each level of centers.

Table 5.6 : The Proposed Model of Figures Required to Categorize each level of Centers Hierarchy According to Population Numbers.

Center Hierarchy	Proposed Criteria
Main center	More than (X)
Sub center	Less than (X) - more than (Y)
Local center	Less than (Y)

Obviously, the maximum population number for the sub-centers (X) had been fixed, as a result of the determination of the minimum population of the main centers which is (15,000 person). Thus, the proposed process will determine the minimum population number of the sub-centers (Y) building on the results of the MoP classification of centers. (Table 5.7) shows the population of the sub-centers (levels 3 and 4) according to the MoP classification.

[7] Regional plan for the West Bank,1998.

Table 5.7 : Population numbers of the third and fourth level centers according to MoP classification

Sub-center (according to Mop)	Population-2012
Bir Zeit	5,172
Turmus'ayya	4,266
Bani Zeid	6,297
Ni'lin	5,222
Dir Dibwan	5,997
Silwad	6,992
Aroura	5,804
Beit Ura at-Tahta	4,992
Source:*MoP,1998 &PCBS,2012.*	

(Table 5.7) shows that the minimum population number of the sub-regional agglomerations according to the MoP is about (4,000). Comparatively, the minimum population number of the sub-centers (Y) will be (4,000). Accordingly, the following results could be applied:

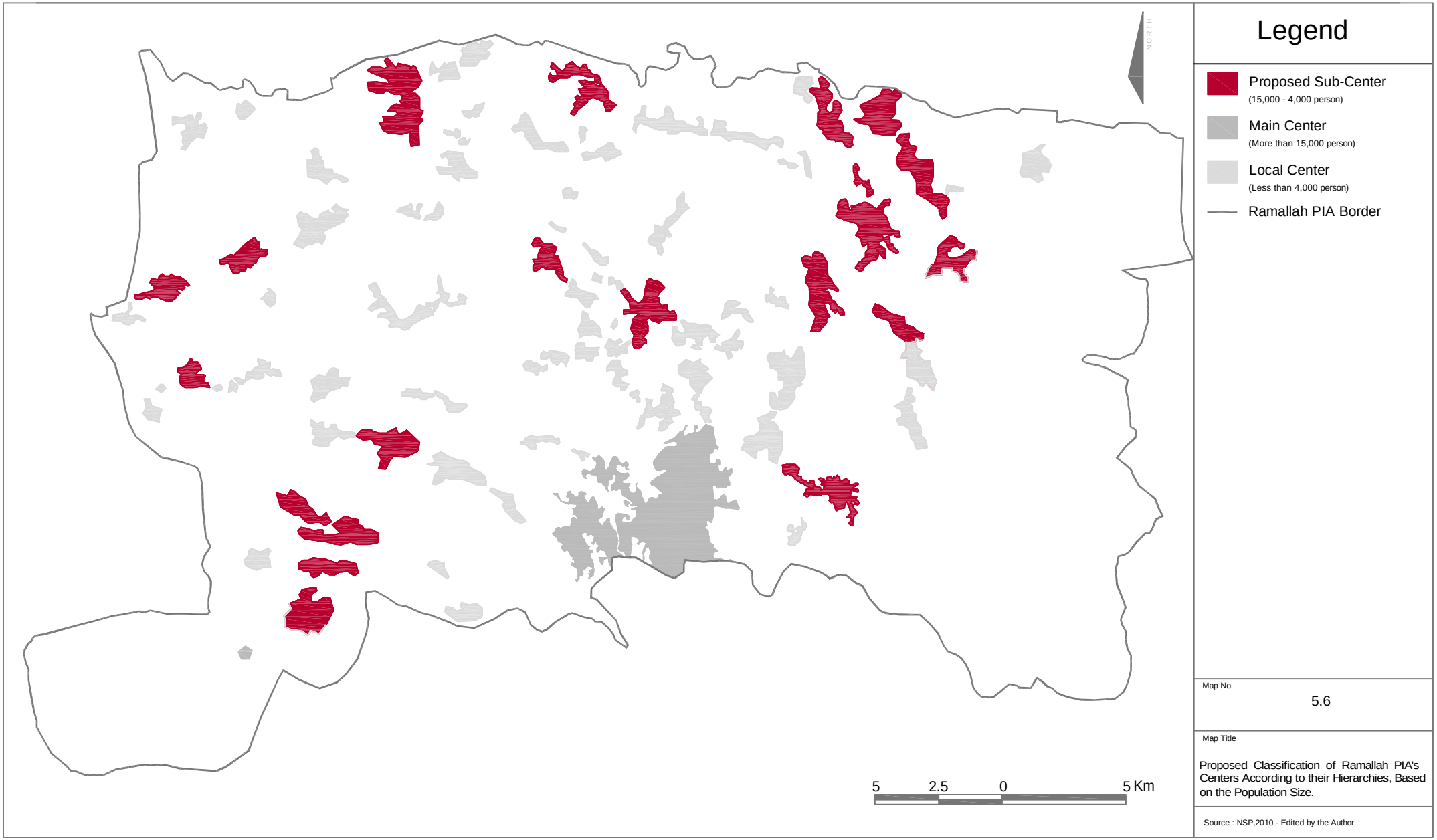
- Centers with population number that exceeds 15,000 person, are considered as main centers.
- Centers with population number between 15,000 - 4,000 person, will have the potential to be developed as sub-centers.
- Centers with population number less than 4,000 person, will be considered as local Centers.

(Map 5.6) illustrates the proposed classification of Ramallah PIA's centers according to their hierarchies, based on the population size. whereas (Table 5.8) shows the numbers and the percentages of these centers.

Table 5.8: Classification of Ramallah Governorate population - Numbers and Percentages

Population	Number of Clusters	Percentage %
More than 15,000 *	3	4
4,000 - 15,000	21	30
Less than 4,000	46	66
Total	**70**	**100**

* Population of the Main Centers ranges between (184,000 -15,000 person), accordingly these main centers could be sub divided into 2 levels if this study applied on the sub-regional level (relations between sub-regional FUAs).



Legend

- Proposed Sub-Center (15,000 - 4,000 person)
- Main Center (More than 15,000 person)
- Local Center (Less than 4,000 person)
- Ramallah PIA Border

Map No.

5.6

Map Title

Proposed Classification of Ramallah PIA's Centers According to their Hierarchies, Based on the Population Size.

Source : NSP,2010 - Edited by the Author

2. Services Areas Component

The number of establishments of the private sector, governmental organization sector and government companies, will be the indicator of the services areas within the study area.

Services areas contribute in measuring of the potentials of centers to work as functional centers for their surrounding areas. It's also clear that the higher number of services areas within a center, the higher the potential of that center to work as a functional center.

Main centers within the case study area have been allocated, represented by (Ramallah- Albeireh- Bitonya). Apparently, these centers contain the higher number of the services centers. Comparatively, sub-centers will include less number of services areas than the main centers, while the local centers will contain less number of services centers than both main and sub-centers.

This section highlights the process of classification of both sub-centers and local centers in the study area, based on the service areas number of these agglomerations. The proposed process will adopt the results of the MoP study[8] of the hierarchical classification.

To achieve this, a classification model has been proposed, (Table 5.9) shows the proposed model of figures required to categorize each level of centers.

Table 5.9 : The Proposed Model of Figures Required to categorize each Level of Centers Hierarchy according to Working Establishments.

Center Hierarchy	Proposed Criteria
Main center	More than Z
Sub-center	Less than Z - more than S
Local center	Less than S

According to the PCBS, the main centers contain (5,729) service establishments in 2009, as shown in (Table 5.10).

[8] Regional plan for the West Bank,1998.

Table 5.10: Services establishments in the eain eenters in Ramallah PIA

National Center	The Number of Establishments
Ramallah	3,047
Al Bireh	2,208
Bitonya	474
Total	**5,729**
Source:*PCBS,2011*	

(Table 5.10) shows that the minimum number of services establishments in the main centers of the study area is about 500 establishments. Thus, this number will be considered as the maximum number of establishments within each sub-centers (Z).

Obviously, the maximum services establishments number (Z) for the sub-centers had been fixed. Thus, the following step is to determine the minimum services establishments number (S) of the sub-centers. (Table 5.11) shows the number of services establishments of the sub-regional centers according to the MoP classification.

Table 5.11: Numbers of services areas of the third and fourth level centers according to MoP classification

Sub-Regional centers (according to MoP)	Number of services areas
Bir Zeit	**258**
Turmus'ayya	**125**
Bani Zeid	**133**
Ni'lin	**215**
Dir Dibwan	**199**
Silwad	**190**
Aroura	**138**
Beit Ura at-Tahta	**120**
Source:*MoP,1998 & PCBS,2009.*	

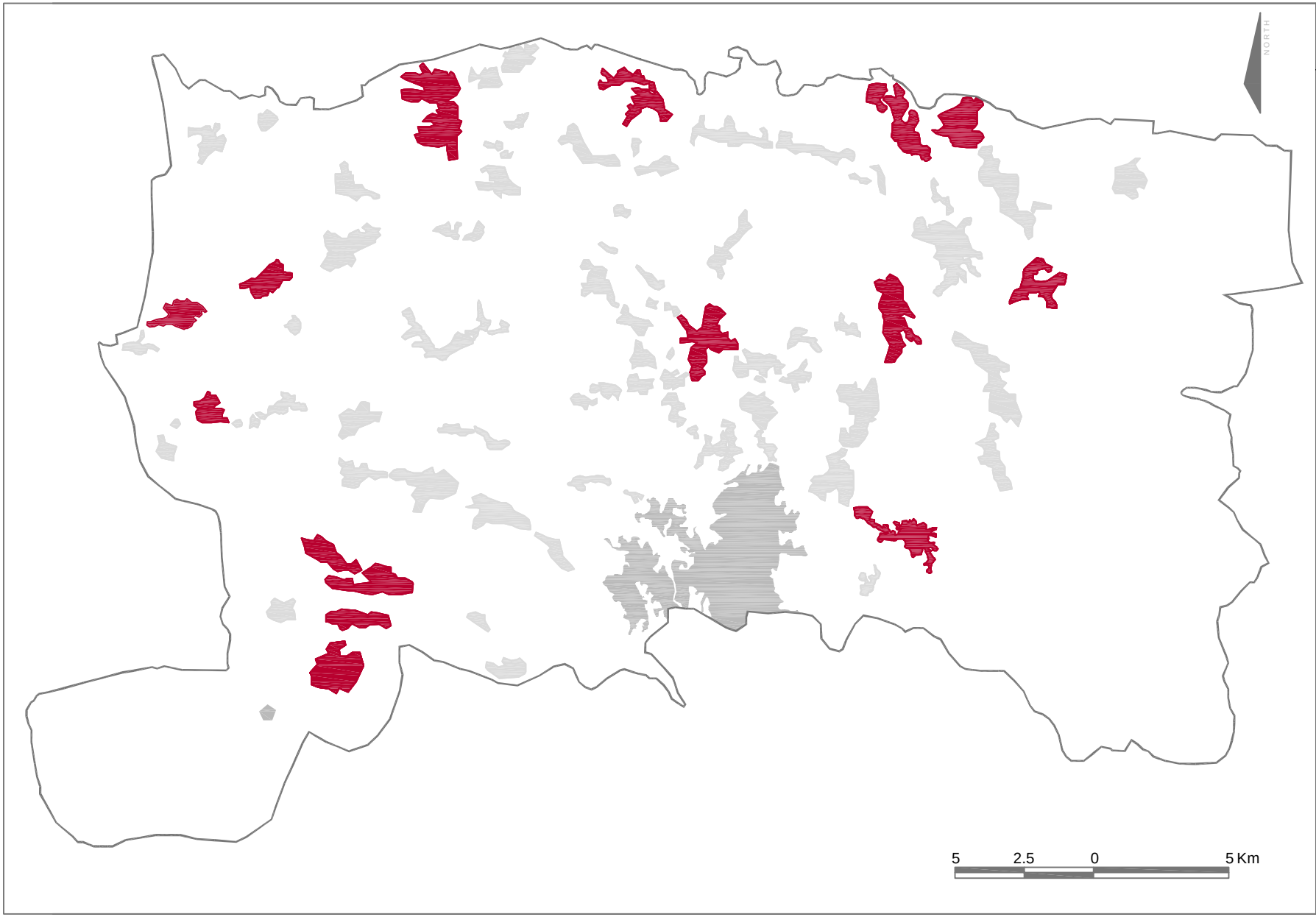
(Table 5.11) shows that the minimum number (S) of services establishments in the previous eight agglomerations is (120). Comparatively, the minimum service establishment number (S) of sub- centers will be (120). Accordingly, the following results could be found:

- Centers with a total number of services areas that exceeds 500 establishments, are considered as main centers.
- Centers with a total number of services areas between 500 - 120 establishments, will have the potential to be developed as sub-centers.
- Centers with a total number of services areas that is less than 120 establishments, will be considered as local centers.

(Map 5.7) illustrates the proposed classification of Ramallah PIA's centers according to their hierarchies, based on the number of the working establishments - service areas. Whereas (Table 5.12) shows the numbers and the percentages of these centers within the study area.

Table 5.12: Classification of Ramallah governorate working establishments - Numbers and percentages

Number of Services	Number of Agglomerations	Percentage %
More than 500	3	4
120-500	16	23
Less than 120	51	73
Total	**70**	**100**



Legend

- Proposed Sub-Center (15,000 - 4,000 person)
- Main Center (More than 15,000 person)
- Local Center (Less than 4,000 person)
- Ramallah PIA Border

Map No.

5.7

Map Title

Proposed Classification of Ramallah PIA's Centers According to their Hierarchies, Based on the (Working Establishment) services Areas

Source : NSP,2010 - Edited by the Author

3. Assessment for the Centers

The definition of the hierarchical aspect within the study area based mainly on two components: Population and Service areas (working establishments). Whereby the hierarchical classification of the centers contain three levels; main centers, sub-centers as well as local centers.

- **Main Centers**

The main centers represent the highest level of centers hierarchies, these centers work on the national level of the West Bank. Moreover, these centers absorb the highest number of population; as well they contain the highest number of the services-working establishments.

Within the study area (Ramallah PIA); three main centers have been defined, these centers are (Ramallah - Al Bireh - Bitounya).

- **Sub-Centers**

The discussion of the population and services areas aspects have presented several agglomerations within the study area, which have the potential to be developed and to work as sub-centers. However, the discussion did not provide the final allocation of the sub-centers.

As consequently, an evaluation for these 'proposed' sub-centers will be discussed in this section. Furthermore, the results of the MoP study for centers hierarchies will be taken in to consideration through the evaluation process.

1. ***Evaluation According to Population Number***

Building on the results of the population aspect analysis, the agglomerations that have the potential to be developed as sub-centers have population number between (15,000 - 4,000) person.

In the study area, the population number ranges between (7,000 - 4,000), in addition to one agglomeration that contains more than 7,000 person. This difference in the ranges refers to the criteria of the main centers classification (see section 4.2) where the minimum number of the main centers was 15,000 person, but in Ramallah Governorate there was a great gap between population of the main centers and proposed sub-centers (80,383 person in the main core - Ramallah Albireh Biytounyeh) and (7,000 person in the following biggest agglomeration -Beit Liqia).

Accordingly, the evaluation process of the proposed sub- centers will rank them according to the different population numbers and give a score for each category, by which the higher the population, the higher the score is it, (see Table 5.13).

Table 5.13: Scores of sub-centers according to population number

Category	Score	Agglomerations
More than 7,000	4	Beit Liqya
More than 6,000	3	Silwad, Bani Zeid
More than 5,000	2	Bani Zeid ash Sharqiya, Sinjil, Qibya, Bir Zeit, Ni'lin, Deir Dibwan, Kharbatha al Misbah
More than 4,000	1	Turmus'ayya, Khirbet Abu Falah, Al Mazra'a ash Sharqiya, Shuqba, Kobar, Deir Jarir, Kafr Ni'ma, Saffa, Beit 'Ur at Tahta

2. Evaluation According to Working Establishments Number

Building on the results of the analysis of the working establishments aspect, agglomerations that have the potential to be developed as sub-centers have working establishments number between (500 - 120) establishment.

In the study area, the working establishments numbers range between (300 - 100). Accordingly, the evaluation of the proposed sub-centers will follow the results of ranking the different categories of working establishments numbers and giving a score for each category, the higher the working establishments number, the higher the score is that, (See Table 5.14).

Table 5.14: Scores of sub-regional centers according to the number of working establishments

Category	Score	Agglomerations
More than 250	4	Bir Zeit
More than 200	3	Ni'lin, Deir Dibwan, Beit Liqya
More than 150	2	Saffa, Silwad, Shuqba
More than 100	1	Beit 'Ur at Tahta, Kharbatha al Misbah, Qibya, Kafr Malik, Sinjil, Turmus'ayya, Bani Zeid, Bani Zeid ash Sharqiya

3. Evaluation According to the MoP Hierarchical Classification

Other additional aspect will be inserted in the evaluation process, it's the result of the MoP hierarchical studies, (Table 5.15) shows the proposed ranked categories for this aspect.

Table 5.15: Scores of sub-regional centers according to the MOP classification

Category	Score*	Agglomerations
Level 3	4	Bir Zeit, Turmus'ayya, Bani Zeid, Ni'lin
Level 4	2	Dir Dibwan, Silwad, Aroura, Beit Ura at-Tahta

* Since the evaluation of Table 5.13 contains only 2 categories, the scores will be (4 or 2 points), in comparison with the previous two evaluation tables (Tables 5.11 and 5.12) which contain 4 categories with scores (1- 4 points).

4. Final Evaluation

The score of each agglomeration will be ranked according to the summation results of the total scores (population, working establishments aspects, as well as the hierarchies criteria of the MoP). (Table 5.16) shows the results of the different agglomerations, it contains only the agglomerations that achieve scores by 2 criteria at least, while the agglomerations that score only one criteria will be deleted.

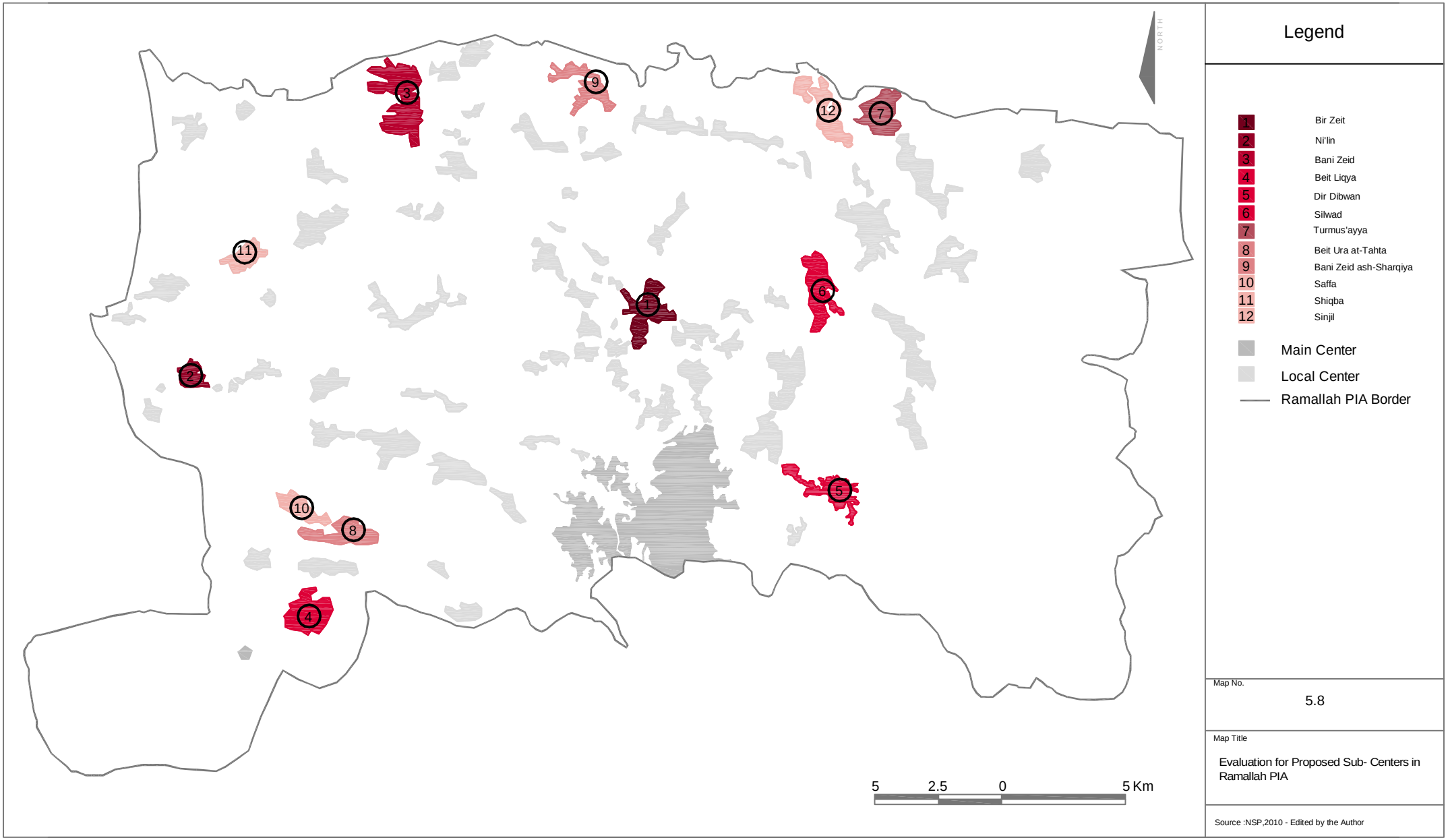
Table 5.16: Final scores for proposed sub-centers in Ramallah PIA

Agglomeration	Score
Bir Zeit	10
Ni'lin	9
Bani Zeid	8
Beit Liqya	7
Dir Dibwan	7
Silwad	7
Turmus'ayya	6
Beit Ura at-Tahta	5
Bani Zeid ash -Sharqiya	5
Saffa	3
Shuqba	3
Sinjil	3

(Table 5.16) shows that some agglomerations have a highest potential to be developed as sub-centers (i.e. Bir Zeit, Ni'lin and Bani Zeid), while other centers have less opportunities since of the low scores (i.e. Saffa, Shuqba, Sinjil). Furthermore, These evaluations will be taken in to consideration, during the centers distribution process (the next criteria), where the centers with the highest scores will have the precedence to be allocated as sub-centers, (See Map 5.8).

- **Local Centers**

The remaining centers in the study area after the determination of the main and sub- centers will be considered as local centers. Since the sub-centers have not been allocated yet, local centers will be fixed after the determination of the final allocation of the sub-centers.



Legend

1	Bir Zeit
2	Ni'lin
3	Bani Zeid
4	Beit Liqya
5	Dir Dibwan
6	Silwad
7	Turmus'ayya
8	Beit Ura at-Tahta
9	Bani Zeid ash-Sharqiya
10	Saffa
11	Shiqba
12	Sinjil

Main Center

Local Center

Ramallah PIA Border

Map No.

5.8

Map Title

Evaluation for Proposed Sub- Centers in Ramallah PIA

Source :NSP,2010 - Edited by the Author

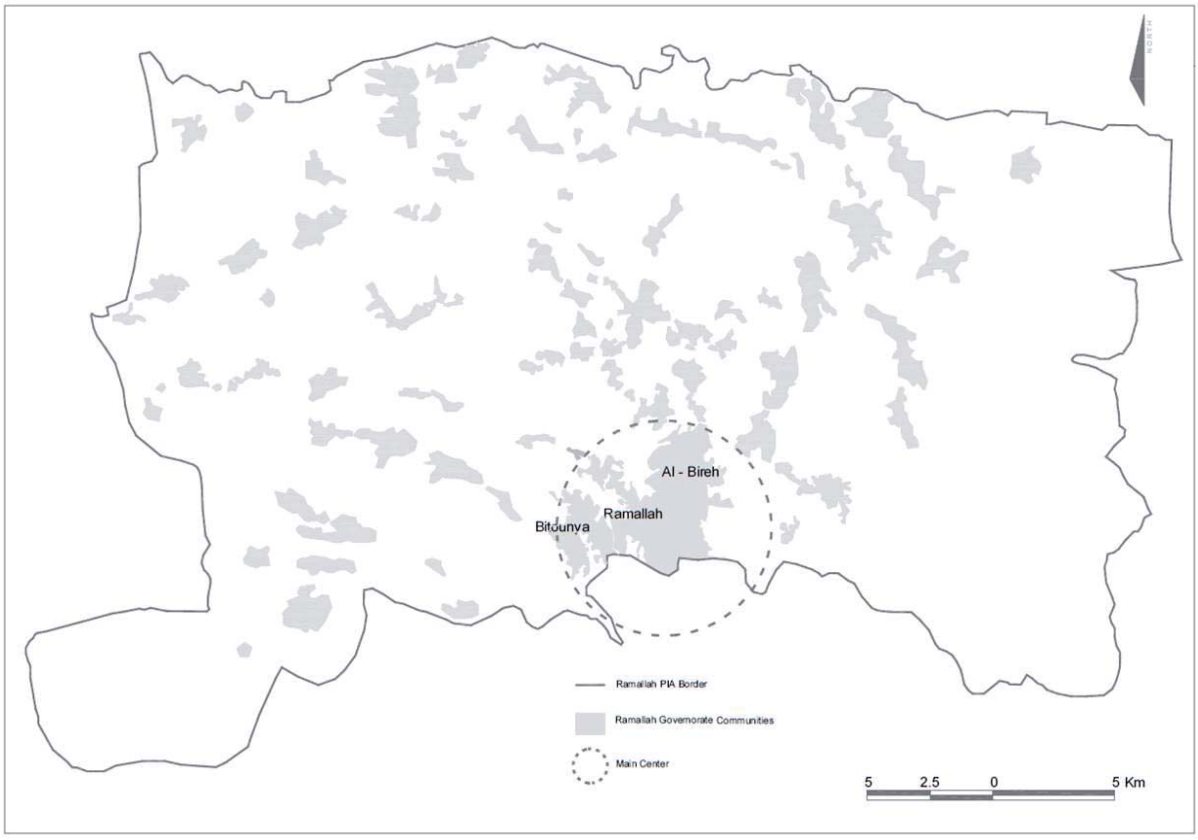
- **Criteria NO.2 : Distribution (Spacing) of Centers**

The results of the application of the first criteria of the morphological dimension (hierarchies of centers) provides a list of the centers that have the potentials to be developed as sub- centers (See Table 5.16), while the second criteria (distribution - spacing of centers) will filter these sub-centers and fix them according to their spatial distribution.

The notion of this process is to obtain the perfect and the most balanced distribution of sub-centers and local centers as much as possible, However the extreme spatial configuration at this level is to get equal distances between different centers(i.e. sub centers - sub centers / Sub centers - local center / local center - local center).

At this stage, the main centers within the study area (Ramallah - Al Bireh - Bitonya) will be integrated as one main 'national' center, due to the spatial proximity between them, as shown in (Map 5.9). Accordingly, the locations of the other centers (sub-center and local centers) will be referenced to the location of the main center of the PIA.

Map 5.9 : Main Center in Ramallah PIA (Ramallah - AlBerih - Bitounya)



Based on the literature discussions and focusing on the sub-regional and local levels, there was no direct procedure that have been proposed for the application of the 'centers distribution' criteria. However, *ESPON* (2005) suggested an approach for the process of centers spacing to get the most balanced configuration; this approach could be defined as 'Grid Distribution Process (G.D.P)', (See section 3.7.1.1).

This procedure will contribute in fixing the sub- centers of the study area, while the remaining centers will be defined as local centers. Local centers will be attached to the sub-centers according to their proximity and functional relations to create sub- regional Functional Urban Areas (FUAs), and this will be the content of the final criteria of the morphological dimension (clustering of centers).

At this level, the analysis of the merged communities in Ramallah Governorate would be valuable. (section 5.2.1) presented 5 clusters that were merged by the MoLG, these 5 clusters are: (Bani Zaid, East Bani Zaid, Al Zaytouna, Al Itihad and Beit Liqya). The four clusters of Bani Zaid, East Bani Zaid, Al Zaytouna and Al Itihad, will be considered as merged communities according to the MoLG classification. Because these clusters were merged since a long time and there are no problematic issues considering the society in these communities.

While the fifth merged municipality (Beit Liqya), will be analyzed in the next step of analysis (clustering of centers) since this municipality includes 4 dispersed agglomerations, which are supposed to be dissolved in one municipality.

- ***Grid Distribution Process (G.D.P)***

Based on the theoretical analysis for the grid approach for centers distribution, which divides of the territory into raster cells of equal size, each cell represents one service area (FUA), that could contain a sub-center, and other (local centers) that are allocated to the nearest sub-center. By this way; the area served by each sub-centre can be measured. (*ESPON, 2005*).

This section presents the procedure of the application of the grid within the study area. The proposed Grid has been studied to fit the study area, whereby each of the grid cells was designed to represent one service area (FUA), and contains one main or sub-center and its surrounding area. Thus, the total number of the proposed sub-centers in (Table 5.14) is 12 centers, in addition to the main center (Ramallah-Alberih - Bitonya). Accordingly the total required cells are 13 cells. The application of the proposed grid will follow two main steps; the Grid allocation within the study area, and the distribution of the centers according to the grid.

Grid Allocation

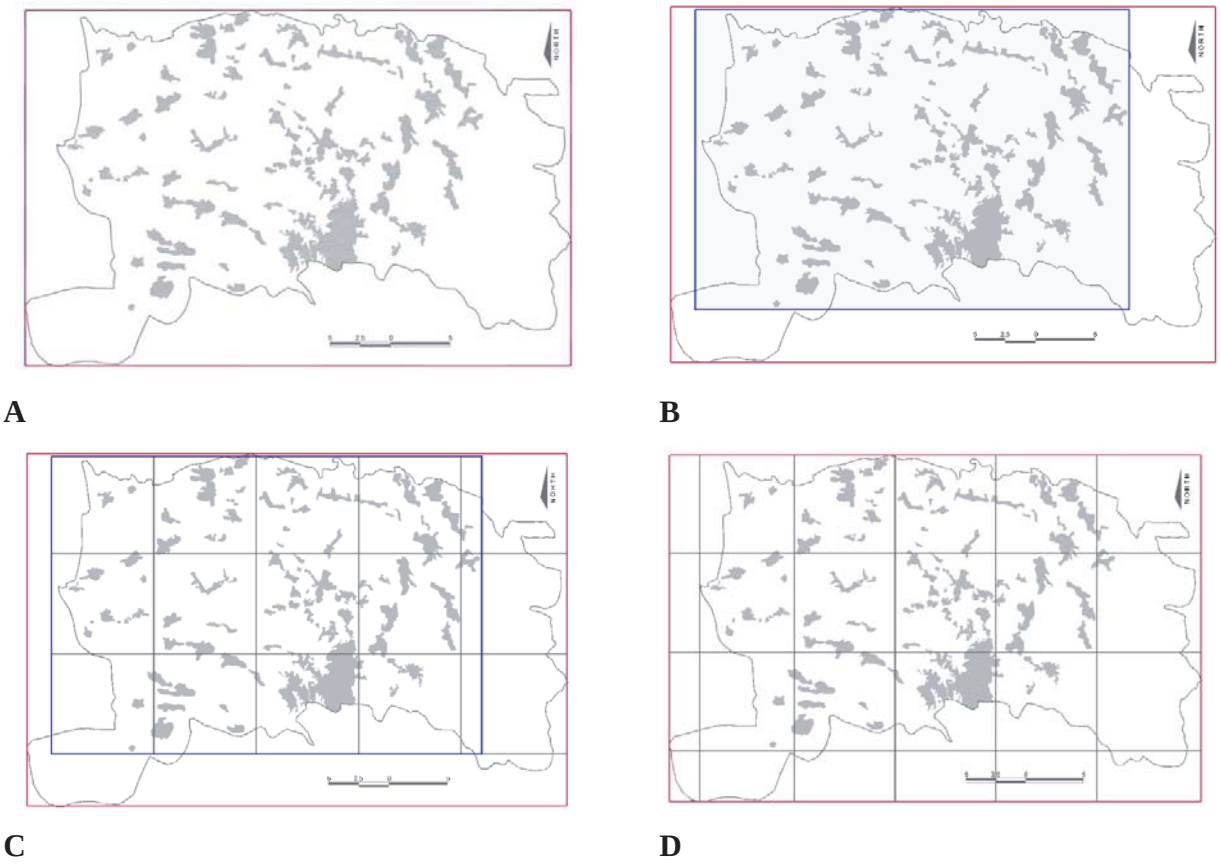
The analysis of Ramallah Governorate shape reflects a rectangular shape, so the borders of the proposed grid follow the borders of the governorate (See Figure 5.4 - A).

Then, a smaller rectangle had been drawn to surround the built-up area of the governorate, in order to exclude the empty areas of the governorate (See Figure 5.4-B).

By dividing the total area of the rectangle that surrounds the built-up area over 13 (the number o the proposed main and sub-centers), the result will represent the area of each FUA within Ramallah PIA. Then the dimensions of the cells were calculated by getting the sqrt of the cells areas. (See Figure 5.4-C).

The last step was to complete the grid cells to cover the whole area of the governorate, (See Figure 5.4-D).

Figure 5.4 : Proposed Grid Allocation Procedure



A **B**

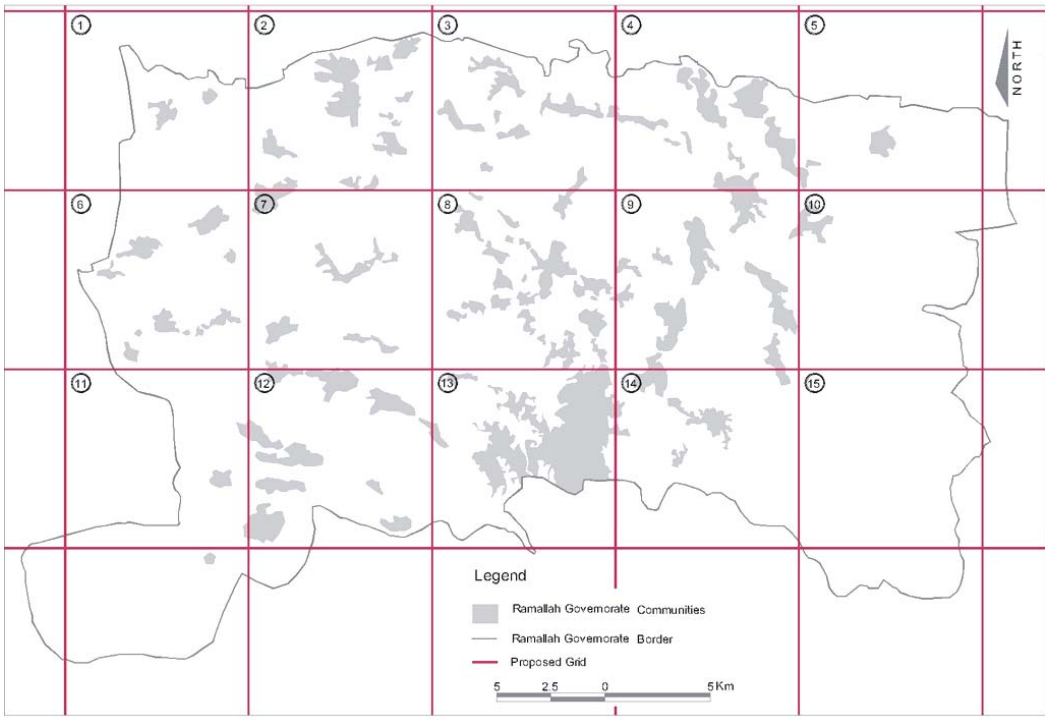
C **D**

Grid Distribution

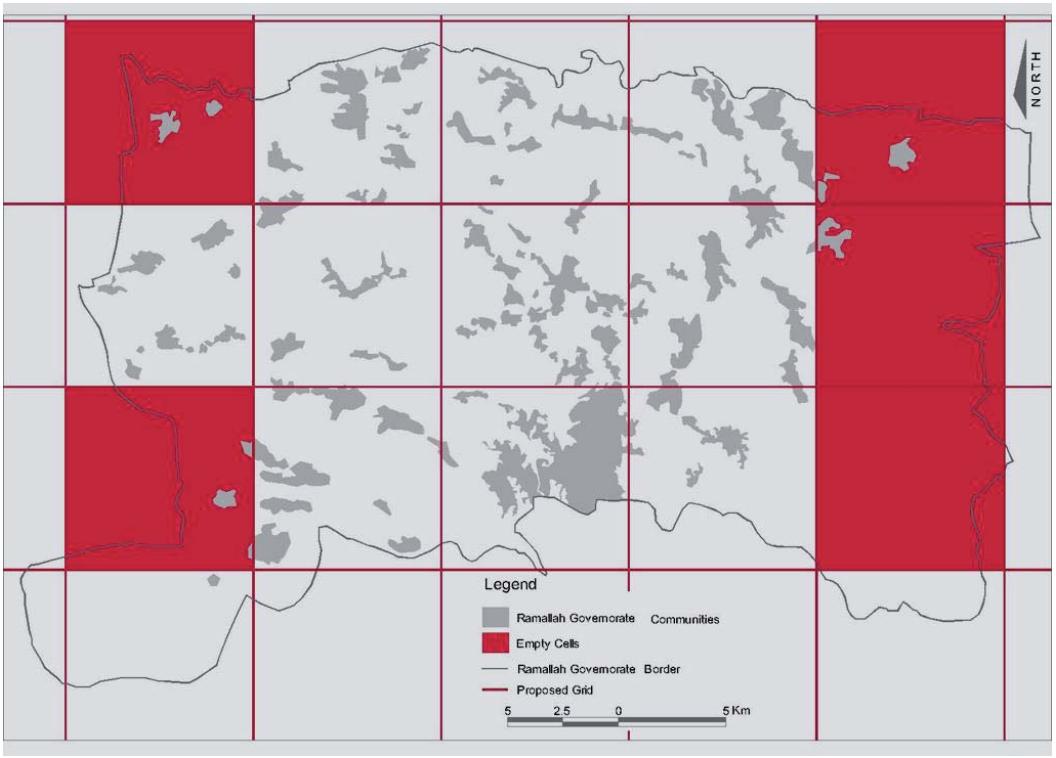
The Grid Distribution Process illustrated in (Maps 5.10A - 5.10D). The final allocation of the grid cells within the case study area illustrated in (Map 5.10-A).

As mentioned before, each cell will contain one main center or sub-center, except the cells that contains no agglomerations, or the cells with scare agglomerations configuration, which will be attached to the adjacent cell. (Map 5.10-B) shows the agglomerations distribution within the cells as well as the cells that contain no agglomerations.

Map 5.10-A : Proposed Grid



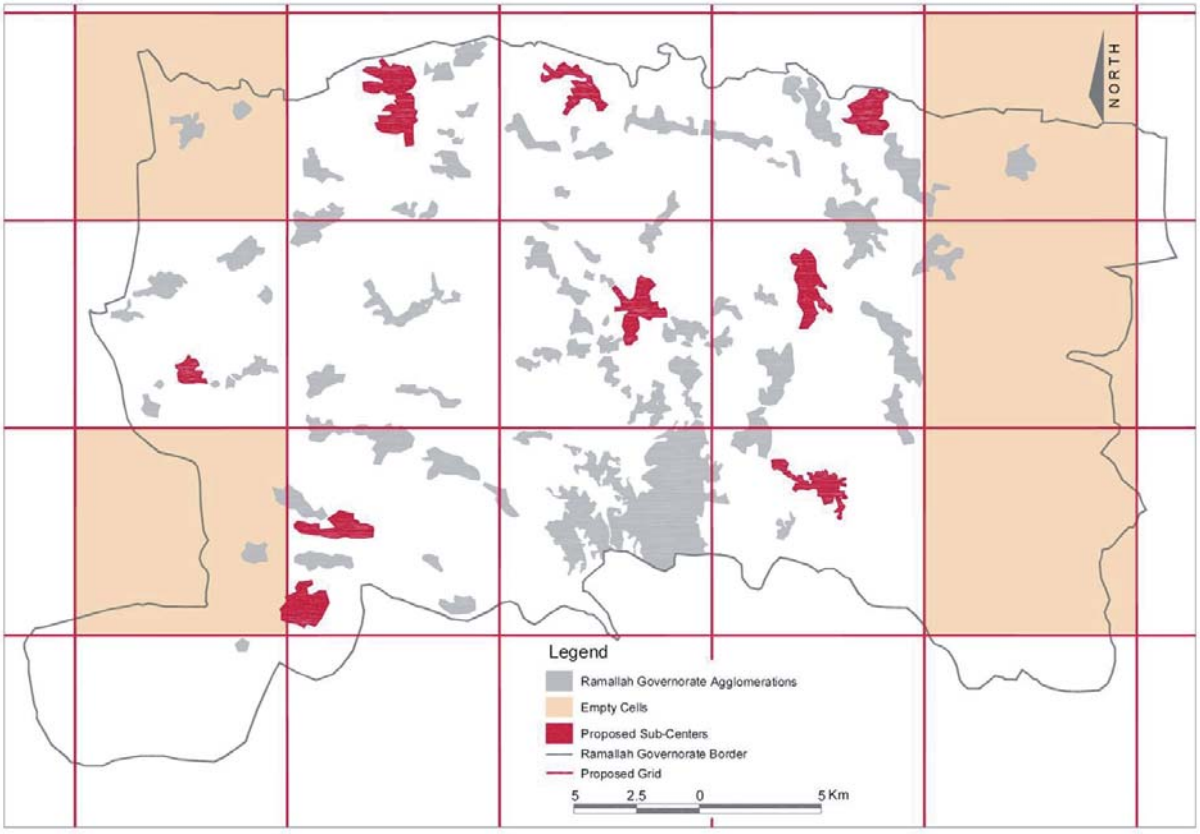
Map 5.10-B : The Empty Cells of the Grid



The next step is to distribute the potential sub- centers which have resulted from the previous morphological criteria 'Hierarchies of centers' (See Table 5.16). (Map 5.10-C) shows the distribution of the proposed sub- centers over the grid cells.

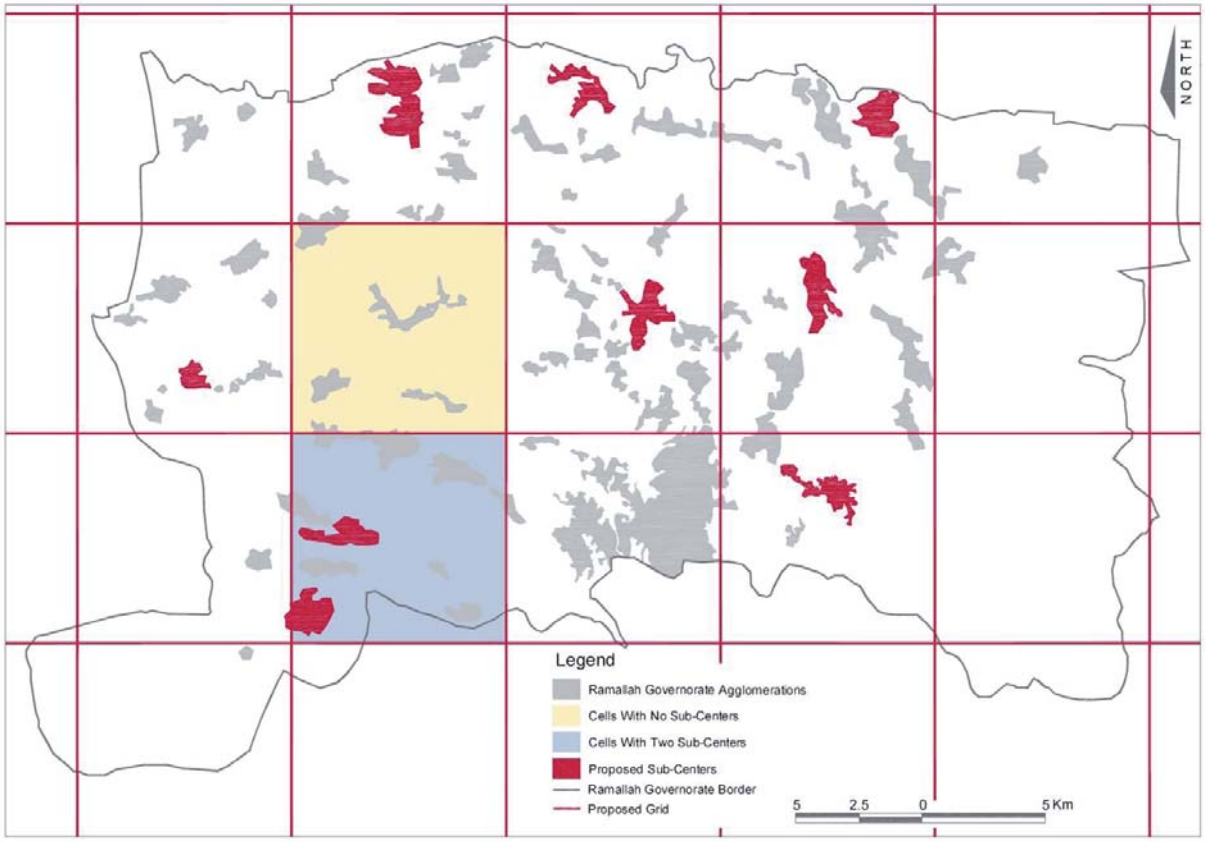
The sub- centers allocation will start with the allocation of the highest score centers according to (Table 5.16), by allocating one sub- center at least in each cell. The final distribution shows that centers with scores (10-5 points) have been fixed as sub- centers, while the remaining centers have been fixed as local center (centers with 3 points scores - see Table 5.16).

Map 5.10-C : The Distribution of the Proposed Sub-Centers Over the Grid Cells



Then, assessment for the cells (regions) is conducted, where some cells contains more than one proposed center, where as other cells contains no proposed sub- centers.(Map 5.10-D) shows the cells with more than one proposed sub- center, as well as the cells that do not have any proposed sub- center.

Map 5.10-D : Cells With No Sub- Center vs. cells with more than one sub-center



Accordingly, there is a need for one proposed sub-center in the empty cell (sub-regional FUA). The selected sub-center will be one of the eight agglomerations included within the cell, and clarified in (Table 5.17).

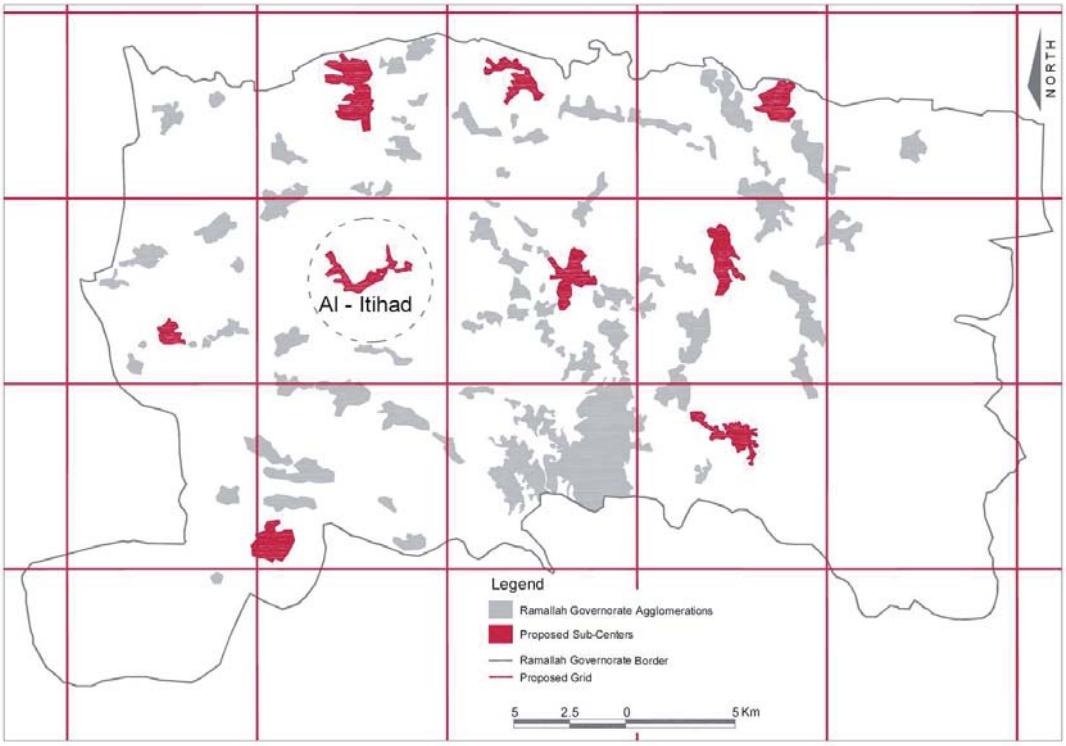
The selection process of this new center will follow the same procedure of selection, based on the population and working establishments of criteria No. 1 (Centers Hierarchies), as shown in (Table 5.17).

Table 5.17: Selection of the missing required sub- center

Center	Population	Working Establishments
AL-Itihad	7,768	115
Deir Nidham	1,004	8
Deir Abu Mash'al	4,022	96
Kharbatha Bani Harith	3,250	88
Ras Karkar	1,899	30
Al Janiya	1,328	14
Kafr Ni'ma	4,282	91
Bil'in	1,942	51
Source: *PCBS,2012*		

(Table 5.15) shows that Al-Ithiad center achieved the highest score of evaluation according to the proposed criteria. Moreover; (Al-Itihad) center locates in a central position according to the region (cell) configuration. Accordingly, Al-Itihad center will be developed to work as a sub- center in Ramallah PIA. (See Map 5.10-E).

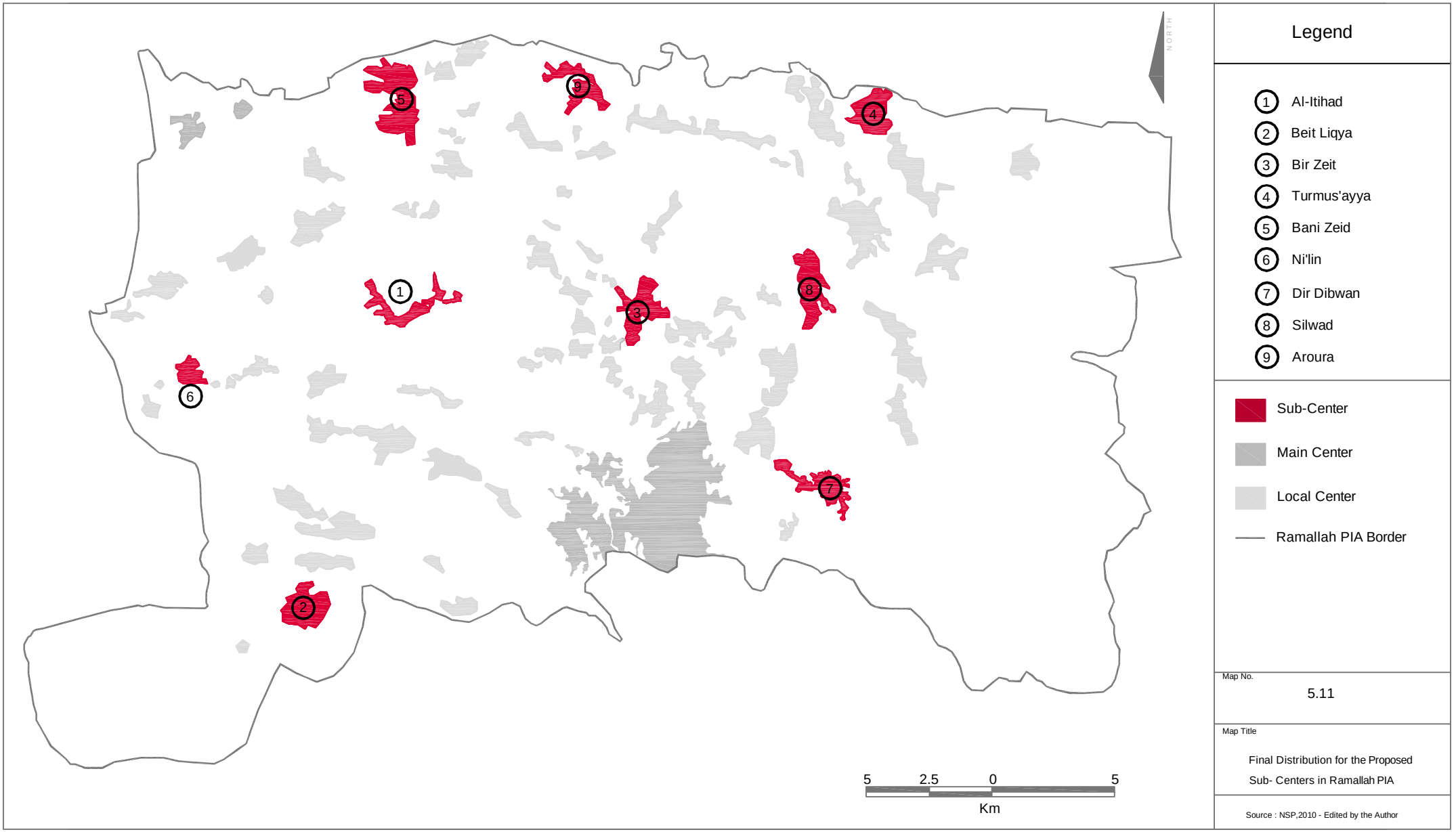
Map 5.10-E : Al-Itihad Sub- Center



Furthermore; there is a cell that illustrated in (Map 5.10-D) that contains two centers, in this sub-regional FUA two centers have been nominated to be developed as sub-centers; Beit Liqia and Beit Our Althta. However, Beit Liqia scored more points (7 points) according to the evaluation (Table 4.15), so it will be considered the center of this sub-regional FUA.

In this sub-regional FUA, there is a merged municipality according to the MoLG, as shown in section 5.2.1. This new municipality includes four agglomerations (Beit Liqya, Kharbatha al Mosbah, Beit Sira, and Beit Noba). Accordingly the sub-regional FUA concept will not conflict with this merged municipality, but the three communities (Kharbatha al Mosbah, Beit Sira, and Beit Noba), will be developed as local centers, and accordingly will keep their names. Each of these local centers will be related to Beit Liqia sub-center, but they will not be dissolved in it.

(Map 5.11) illustrates the proposed sub- centers in Ramallah PIA, where 9 new Sub- centers have been proposed to be developed to work beside the main center (Ramallah- Al Bireh-Bitounya). The following criteria (criteria No. 3) analyze the borders of the sub- regional FUAs and the local centers related to each sub-center.



Legend

1. Al-Itihad
2. Beit Liqya
3. Bir Zeit
4. Turmus'ayya
5. Bani Zeid
6. Ni'lin
7. Dir Dibwan
8. Silwad
9. Aroura

Sub-Center

Main Center

Local Center

Ramallah PIA Border

Map No.

5.11

Map Title

Final Distribution for the Proposed Sub- Centers in Ramallah PIA

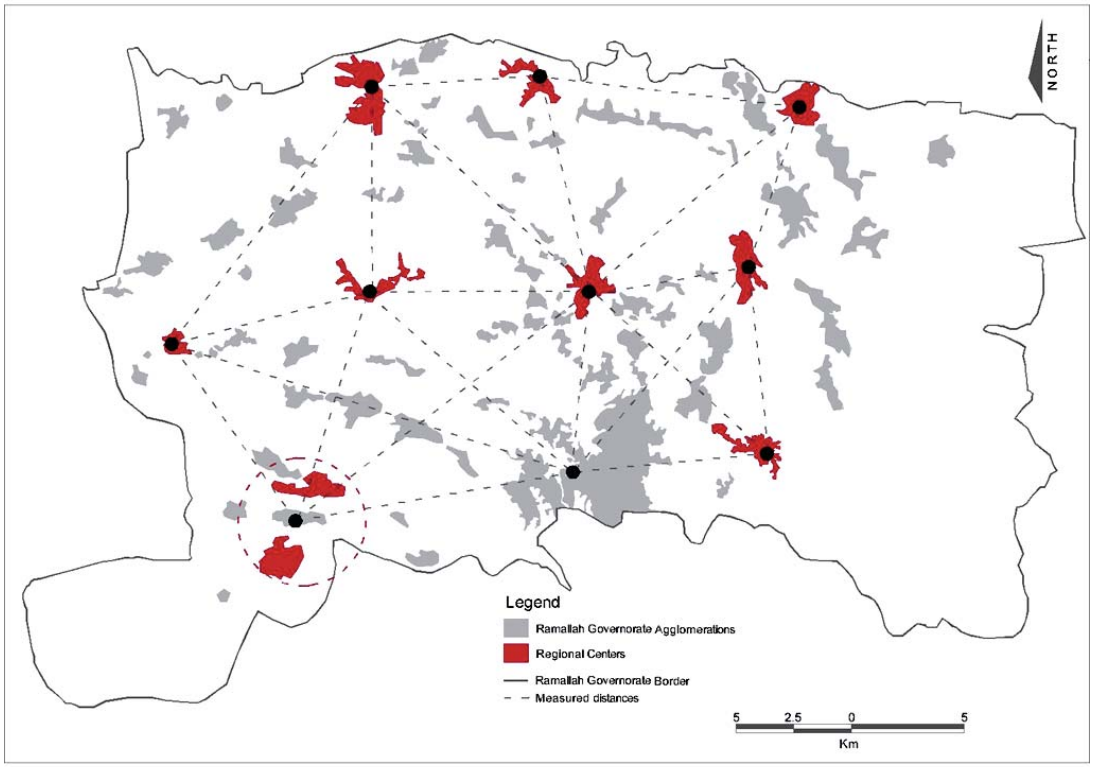
Source : NSP,2010 - Edited by the Author

- **Criteria NO.3 : Clustering of Centers**

This criteria aim to collect and integrate the local centers that refer to each sub center in one zone, in order to create new sub-regional FUA. Furthermore, in this stage the sub-regional PUSH areas within the study area will be determined where the zone that will be serviced functionally by each sub center, as well as the local centers that will complement these sub centers. Consequently, new Functional Urban Areas (FUAs) will be created within the study area, which will be activated functionally by applying the functional dimension in the study area within the next section (see section 5.3.2).

Bordering of the sub-regional PUSHs implies the determination of the maximum distances that could be reached by car from each sub-center. In previous stage, the national PUSHs have been defined within the radius (13 Km) around each Main center (see section 4.2). Comparatively, the adopted criteria of sub-regional PUSHs classification will adapt the same procedure, by measuring the half value of the average distances between each two adjacent sub-centers,(see Map 5.12).

Map 5.12: Distances Between Different Sub-Centers in Ramallah PIA



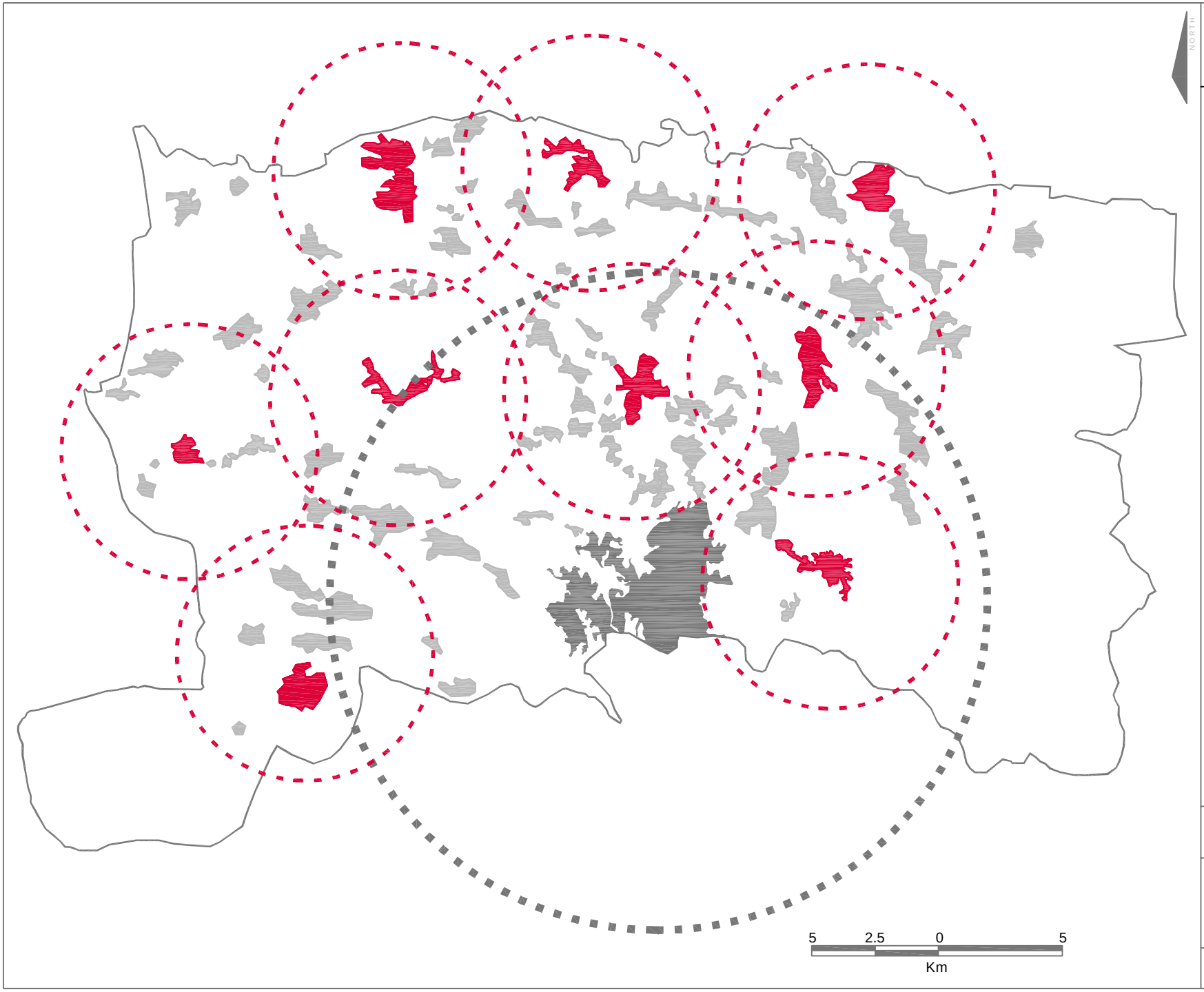
Based on the results of the distances shown in (Map 5.12) the sub-regional PUSHs around each sub-center will be defined by (5 Km) radius around each sub-center, (Map 5.13) illustrates the sub-regional PUSHs in Ramallah PIA.

In particular, the analysis of the sub-regional PUSHs distribution matches the grid process distribution results, whereby each regional PUSH area matches on cell of the grid (one sub regional FUA), (see map 5.14). However, these PUSHs do not define the sub regional FUAs around each sub-center because of the multiple intersections between different PUSHs areas.

Accordingly, avoiding intersections between PUSHs zones to create sub-regional FUAs, considered to be an essential step, it is important to make each local center related to one sub-regional FUA, and to one sub-center as well.

So, the modification of these joint zones based on two aspects; the configuration proximity and the roads network. Local centers that locates in common zones between two PUSHs were studied and analyzed according to its physical proximity for the adjacent sub-centers, and according to the existing road network and connections, (see map 5.15).

(Map 5.15) introduces for the clustering process of the centers in the study area and this will be the main content of the following section.



Legend

- Main Center
- Sub- Center
- Local Center
- Main PUSH Border
- Sub- Regional PUSH Border
- Ramallah PIA Border

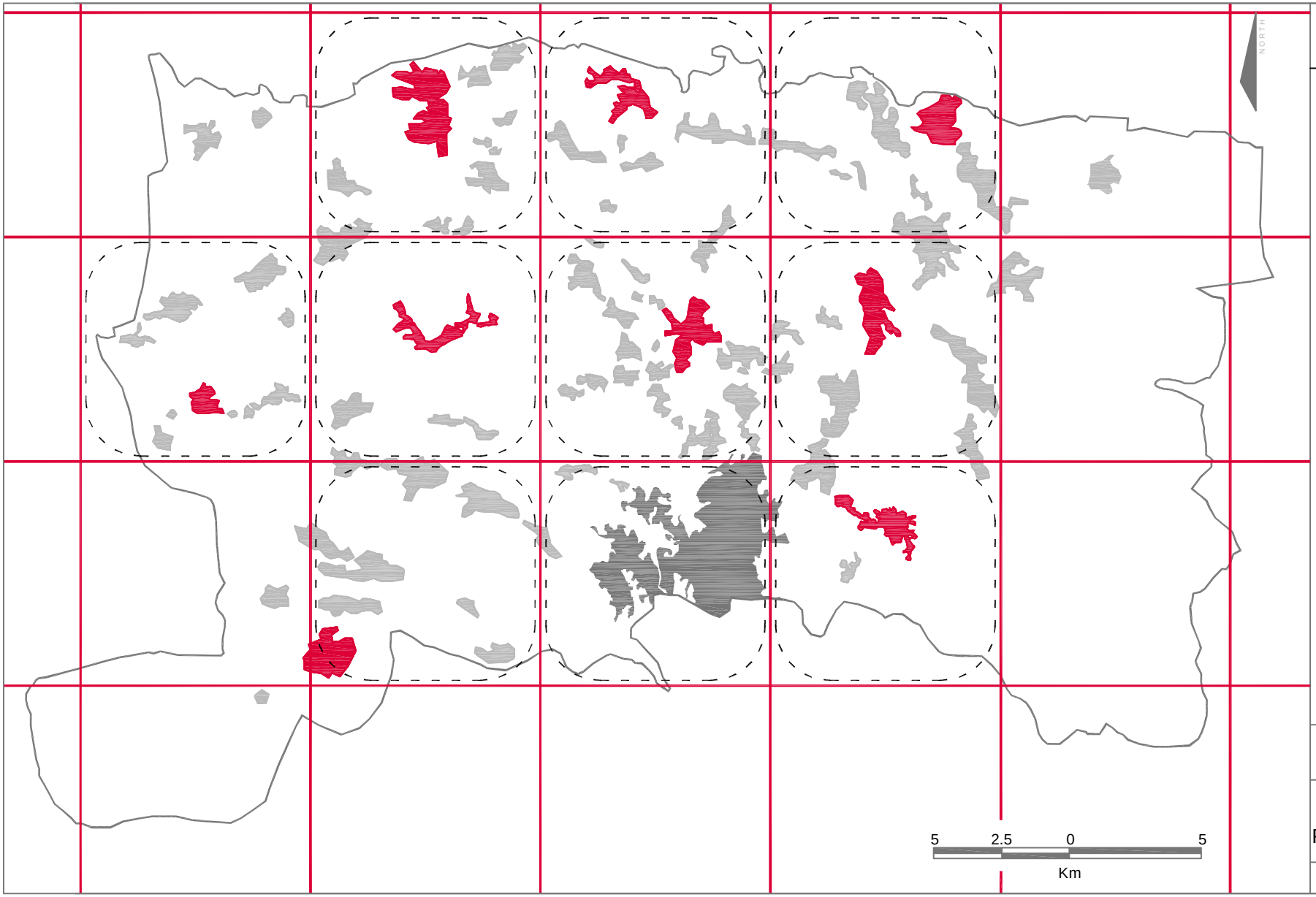
Map No.

5.13

Map Title

Regional PUSHs in Ramallah PIA

Source : NSP,2010 - Edited by the Author



Legend

- Main Center
- Sub-Center
- Local Center
- Modified PUSH Borders
- Grid Lines
- Ramallah PIA Border

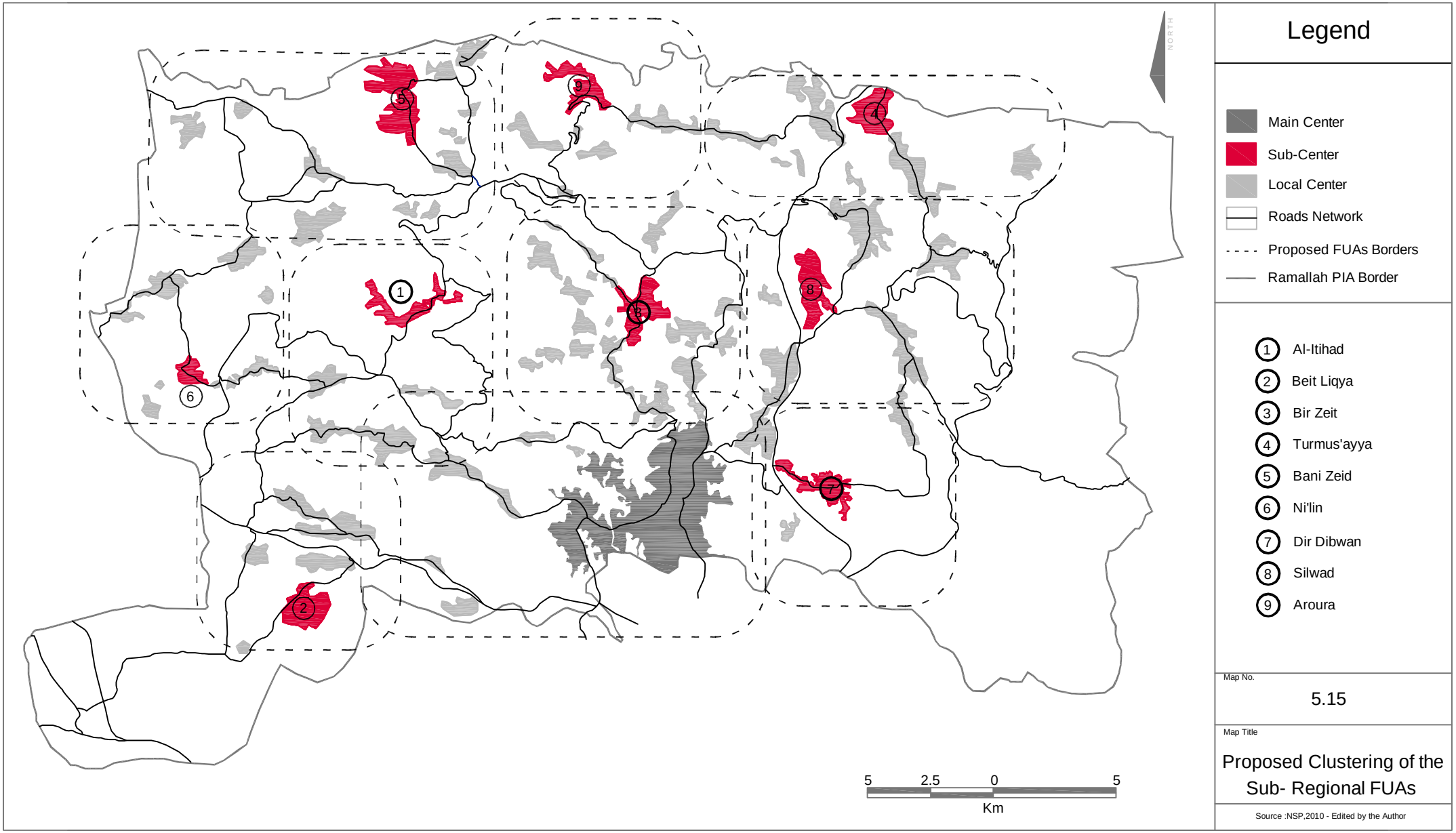
Map No.

5.14

Map Title

PUSHs Areas vs. Grid cells

Source : NSP,2010 - Edited by the Author



Legend

- Main Center
- Sub-Center
- Local Center
- Roads Network
- Proposed FUAs Borders
- Ramallah PIA Border

1. Al-Itihad
2. Beit Liqya
3. Bir Zeit
4. Turmus'ayya
5. Bani Zeid
6. Ni'lin
7. Dir Dibwan
8. Silwad
9. Aroura

Map No.

5.15

Map Title

Proposed Clustering of the Sub- Regional FUAs

Source :NSP,2010 - Edited by the Author

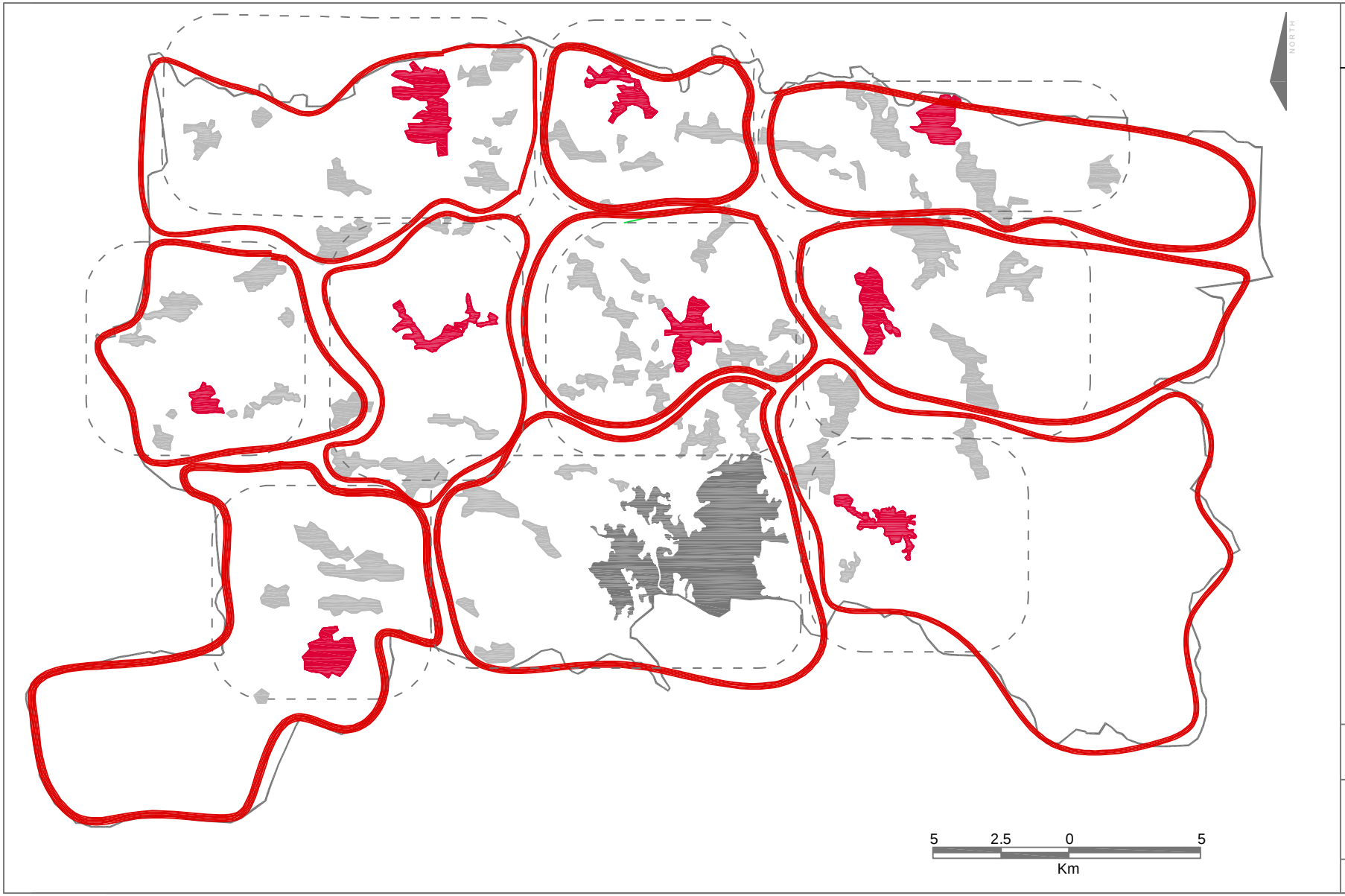
- **Additional Morphological Criteria**

At this level of the morphological analysis, the borders of the different sub-regional FUAs will be defined. Each FUA will contain one sub center in addition to the other surrounding local centers that also will be related functionally to this sub- center. Moreover, local centers which surround the main center according to their spatial distribution and locations will be related directly to the main center to create main 'national' FUA.

Literature about the clustering process provides an approach (sub-factors) for the application of these criteria; which could be summarized by creating balanced model. However; additional points could be proposed because of the particularity of the Palestinian context. These sub-factors are connected mainly to the geo-political situation of the Palestinian territories; following are the sub-factors which have been proposed to apply the clustering criteria.

1. **Equal Areas of different FUAs**

The extremely perfect distribution of the polycentric regions represented by equal areas for different FUAs, the more the areas distribution is balanced; the more polycentric is the region. Comparatively; the previous 'Grid concept' of distribution in the study area meets this purpose, where the total area of Ramallah PIA has divided into equal cells, and each cell often presents one sub-regional FUA. (Map 5.16) illustrates the initial zoning of the sub-regional FUAs in the study area, building on the results of the sub- centers distribution.



Legend

- Main Center
- Sub-Center
- Local Center
- Initial FUAs Zoning Lines
- Proposed FUAs Borders
- Ramallah PIA Border

Map No.

5.16

Map Title

Initial zoning of the sub-regional FUAs

Source : NSP,2010 - Edited by the Author

2. Geo-Political Situation

The geo-political situation could be physically represented by the Israeli settlements, land classicization (A,B and C), Israeli military areas, separation wall, and the by-pass roads. All of these factors should be included within the morphological criteria, since they are existing features within the physical context that cannot be ignored.

The assumption for the Israeli settlements is that ' these Israeli settlements will be a part of the model as long as they are existing on the ground'. Moreover, the land classification (A,B and C), will be considered in the detailed application of the model, in terms of proposed new roads for example, since the model in general deals with the relations between centers.

The existing built up Israeli settlements represent additional urban layer of the physical context in the study area. These Israeli settlements are often distributed within agglomerations (groups) as shown in (Map 5.5). The analysis of the Israeli settlements configuration within Ramallah Governorate (PIA) shows that there are two Israeli settlements (from 30 settlements) located on the lands of the main center (Ramallah - Al Bierh - Betoniya), while the other 28 settlements located within the rural areas, in a way that separates the different local agglomerations and communities.

The Israeli settlements impose an isolation factor between the Palestinian agglomerations. Thus, the clustering process of each sub regional FUA should be planned in such a way that does not affect the connectivity between the different centers of the new sub-regional FUAs and even between the different FUAs. in this way, the Israeli settlements aggregations will be blocked out of the FUAs borders as shown in (Map 5.17).

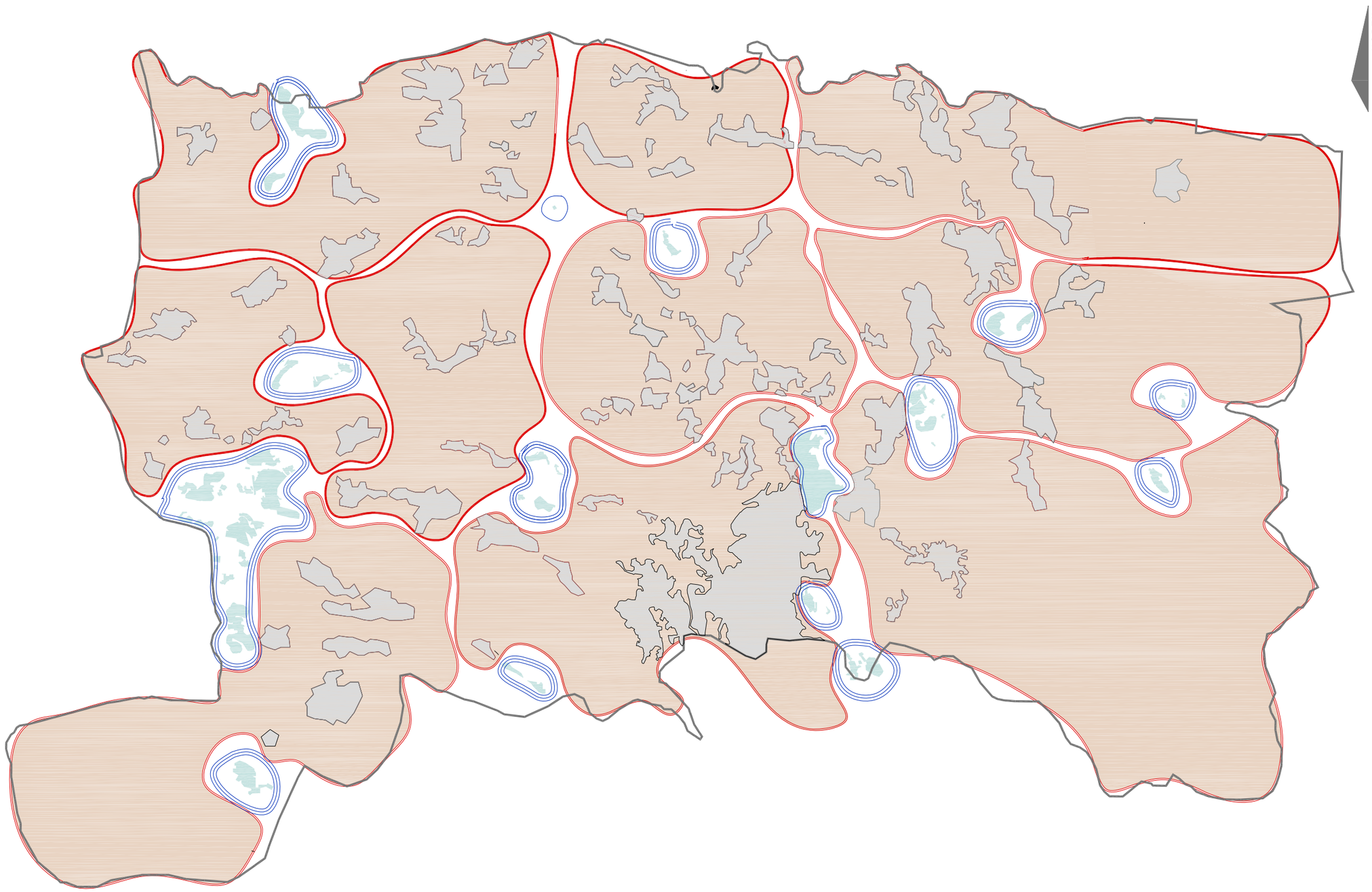
3. Roads Network

Roads network represents an important layer of the morphological dimension in general and of the clustering process in particular, whereby the roads between the different centers and the connectivity between them executed.

The initial clustering attempts that shown in (Maps 5.16 ad 5.17) has been reviewed according to the local connections between the local and the sub- centers in each sub-regional FUA represented by the local roads, as well as the regional connections between the sub-regional

FUAs and the main FUA. (Map 5.18) shows the reflections of the roads network layer application in the clustering process.

The current connections between the centers have been taken into consideration in an early stage of the model implementation, to guarantee the most efficient status, by which the current connections could efficiently be used. Roads network as an accessibility and connection facility will be discussed in details during the functional dimension implementation (see section 5.3.2).



Legend

- Ramallah PIA's Centers
- FUAs Zones
- Israeli Settlements and Military Areas
- Ramallah PIA Border

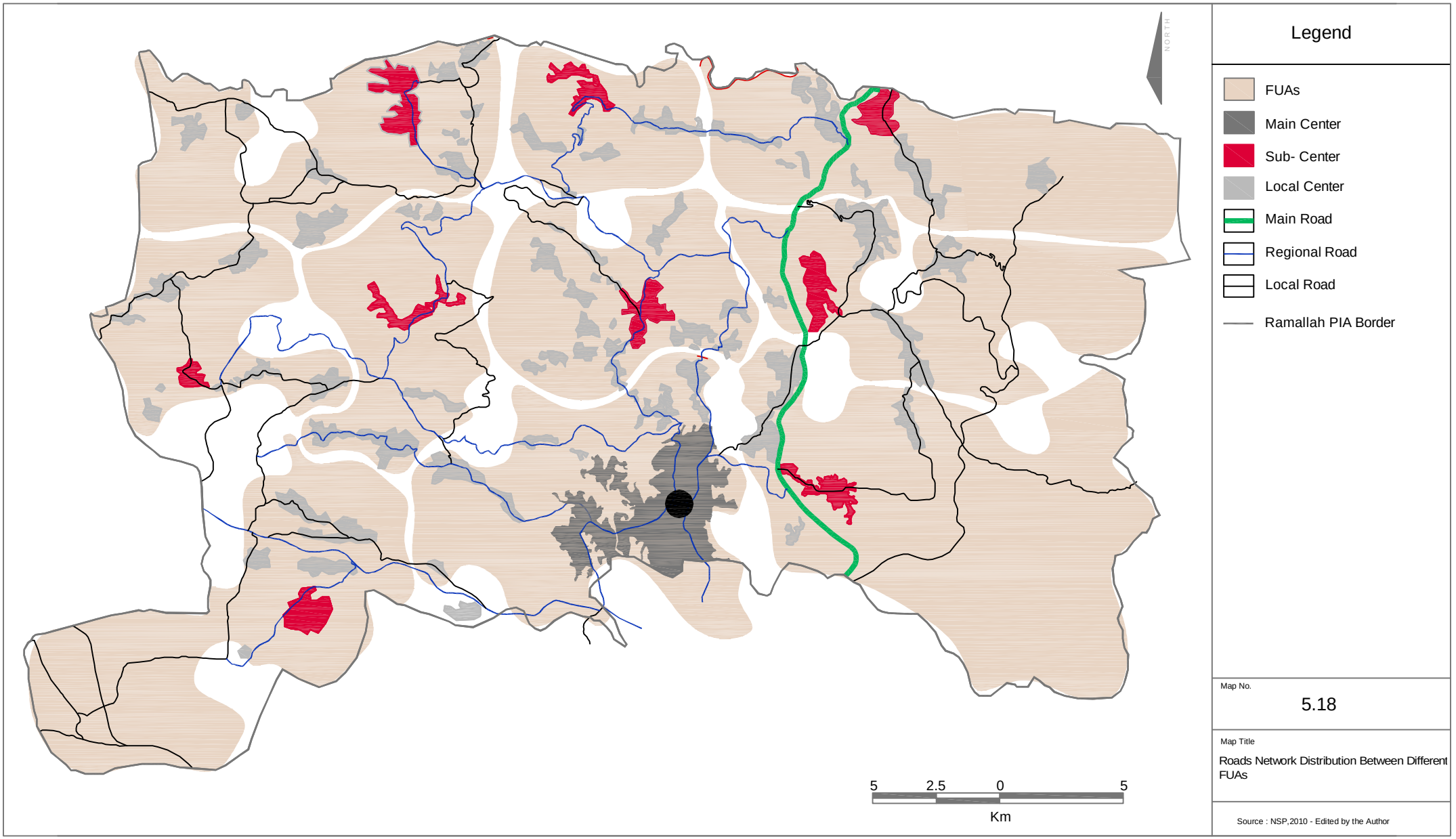
Map No.

5.17

Map Title

Israeli Settlements distribution between different FUAs

Source : ARIJ,2013&NSP,2010 - Edited by the Author


NORTH
Legend
FUAs
Main Center
Sub- Center
Local Center
Main Road
Regional Road
Local Road
Ramallah PIA Border
5 2.5 0 5
Km
Map No.
5.18
Map Title
Roads Network Distribution Between Different FUAs
Source : NSP,2010 - Edited by the Author

5.3.1.1 Results of the Morphological Dimension Implementation

According to the previous three stages of the morphology determination application (hierarchies, distribution, and clustering), the morphological polycentricity model has been applied in the study area (Ramallah Governorate/ PIA) according to the adopted and modified criteria list that has been modified to fit the study area.

The morphological dimension in the study area (Ramallah PIA) has resulted in creating 9 sub-regional FUAs and one main FUA. Each of the sub-regional FUAs contains one sub- center at least as well as many other local centers related physically and functionally to this sub- center.

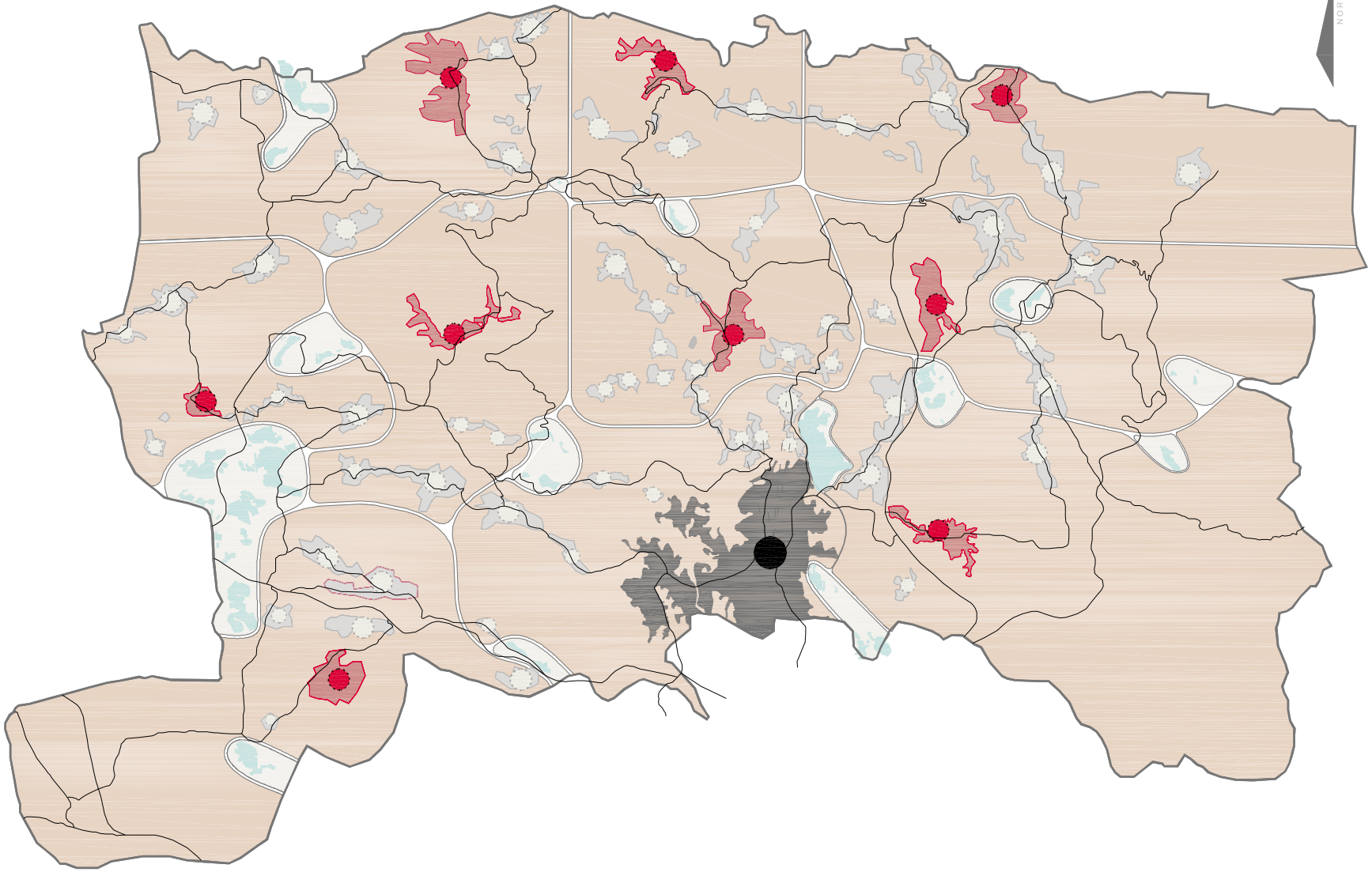
(Map 5.19) and (Table 5.18) show the final result for the morphological polycentric model in Ramallah PIA, and this demonstrate the first part of the model. While the second part (Functional Part) will be discussed in the following section of this chapter.

Table 5.18: FUAs classification in Ramallah PIA

FUA No.	FUA	Centers	Center Classification
1	Bani Zeid	Bain Zied	Sub- Center
		Al Lubban al Gharbi	Local Center
		Rantis	Local Center
		Deir Abu Mash'al	Local Center
		An Nabi Salih	Local Center
		Abud	Local Center
		Qarawat Bani Zeid	Local Center
		Kafr 'Ein	Local Center
2	Bani Zeid ash Sharqiya	Bani Zeid ash Sharqiya	Sub- Center
		Abwein	Local Center
		Ajjul	Local Center
		Deir as Sudan	Local Center
		Umm Safa	Local Center

3	Turmus'ayya	Turmus'ayya	Sub- Center
		Khirbet Abu Falah	Local Center
		Al Mughayyir	Local Center
		Sinjil	Local Center
		Jilijliya	Local Center
4	Silwad	Silwad	Sub- Center
		Al Mazra'a ash Sharqiya	Local Center
		Deir Jarir	Local Center
		At Tayba	Local Center
		Yabrud	Local Center
		Kafr Malik	Local Center
5	Bir Zeit	Bir Zeit	Sub- Center
		Atara	Local Center
		Jibiya	Local Center
		Burham	Local Center
		Kobar	Local Center
		Ein Siniya	Local Center
		Dura al Qar'	Local Center
		Jifna	Local Center
		AL-Doha	Local Center
		Abu Qash	Local Center
		AL-Zaytouneh	Local Center
6	AL-Itihad	AL-Itihad	Sub- Center
		Deir Nidham	Local Center
		Ras Karkar	Local Center
		Al Janiya	Local Center
		Kafr Ni'ma	Local Center
		Bil'in	Local Center

7	Ni'lin	Ni'lin	Sub- Center
		Deir Qaddis	Local Center
		Kharbatha Bani Harith	Local Center
		Shuqba	Local Center
		Qibya	Local Center
		Budrus	Local Center
		Al Midya	Local Center
8	Beit Liqya	Beit Liqya	Sub- Center
		Beit 'Ur at Tahta	Sub- Center
		Saffa	Local Center
		Beit Sira	Local Center
		Beit Nuba	Local Center
		Kharbatha al Misbah	Local Center
9	Deir Dibwan	Deir Dibwan	Sub- Center
		Ein Yabrud	Local Center
		Beitin	Local Center
		Burqa	Local Center
10	Ramallah	Ramallah	Main Center
		Al Bireh	Main Center
		Beituniya	Main Center
		Surda	Local Center
		Ein Qiniya	Local Center
		Ein 'Arik	Local Center
		Deir Ibzi'	Local Center
		Beit 'Ur al Fauqa	Local Center



Legend

- FUAs
- Main Center
- Sub- Center
- Local Center
- Israeli Settlements
- Roads Network
- Ramallah PIA Border

Map No.

5.19

Map Title

Final Result for the Morphological Polycentric Model in Ramallah PIA

Source : ARIJ,2013&NSP,2010 - Edited by the Author

5.3.2 Applying Functional Dimension

As a counterpart of the morphological dimension; the functional dimension contributes strongly in the shaping of the polycentric regions. This section will be built on the main results of the previous section the "morphological dimension" in the study area, and highlights the common criteria and components between the two dimensions.

In (section 3.8.2) of the theoretical analysis about functional dimension two main criteria have been adopted to fit the Palestinian context, these two criteria were; functions and connectivity. This section of the study presents applying these two criteria within the study area.

The functional dimension application process will start with an assessment for the current functional situation based on the main indicators of the functional dimension (Flows indicator). The next step will be a proposal for the methodology of applying the criteria to the study area.

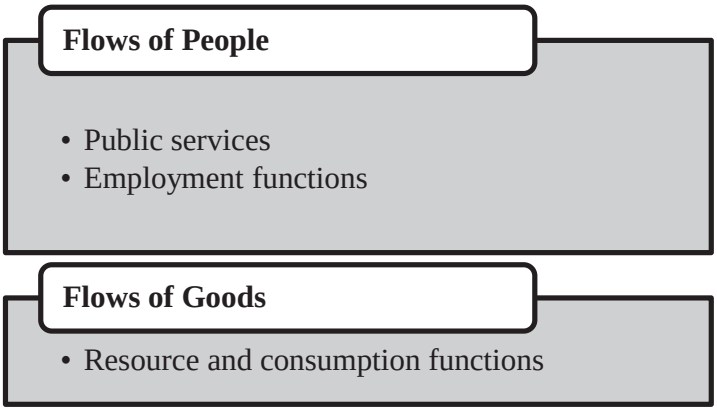
5.3.2.1 Assessment for the Current Functional Situation

Assessment process based mainly on the flows; flows considered to be the main indicator by which the functional dimension is measured, the higher variety and complexity of flows in a region the more polycentric that region is.

Furthermore, the flows in a polycentric region should be characterized by lower hierarchical dominances which reflects more homocentric regions. (*Kloosterman and Lambregts, 2001).*

In previous section, flows have been categorized by two main types; flows of people and flows of goods. Moreover; three types of functions were defined to match these flows as shown in (Figure 5.5).

Figure 5.5 : Different Types of Flows and Related Functions



At this stage, only the 'daily' flows, and the flows that include the higher amounts of commuters will be defined. For this purpose the population pyramid of the study area has been analyzed to define the zones of higher commuters concentrations. (Table 5.19) shows the population distribution between different age categories in Ramallah Governorate.

Table 5.19: Classification of Population According to Age Categories in Ramallah Governorate - 2011

Age category	Percentage %
0-4	13
5-14	25
15-64	55.5
+65	3.9
Other	2.6
Source : *PCBS,2011.*	

(Table 5.19) clarifies two main categories where the population are mostly concentrated, these categories are; young ages (5-14 years) which represents (38%) from the total population number, and youth ages - working ages (15-64 years) which represents (55.5%).

Obviously; this distribution of population reflects two main functions that required daily movement of population of these two categories; the daily commuting trips for jobs for the working ages (15-64), as well as daily commuting trips for education for students (young ages 5-14) - to schools or to universities. Accordingly; the analysis of the flows of people will contain the employment functions as well as the education functions.

1. Flows for Jobs (Employment Functions)

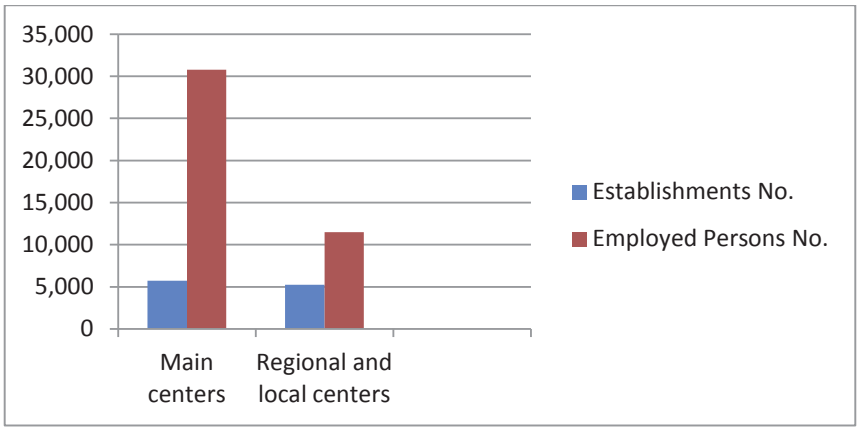
The first type of the daily flows that contains the highest commuters number is the jobs or employment functions. This type is mainly practiced by the people of ages between (24 - 60).

The jobs or employment functions include many kinds of jobs, (Table 5.4) shows the employment activities in Ramallah PIA, as well as the number of establishments for each category and the number of employed persons in each type. Whereas (Table 5.20) and (Figure 5.6) show the distribution of these working establishments between the different levels of centers.

Table 5.20 : Distribution of Working Establishments Between the Different Centers Hierarchies in Ramallah PIA

Center's Hierarchies	Establishments No.	percentage %	Employed Persons No.	Percentage %
Main centers (3)	5,729	52.3	30,773	72.8
Sub- centers (9)	1,605	14.6	4,297	10.2
Local centers (58)	3,622	33.1	7,202	17.0
Total	**10,956**	**100.0**	**42,272**	**100.0**

Figure 5.6 : Distribution of Working Establishments and Employee Persons between the different Centers Hierarchies in Ramallah PIA



(Table 5.20) and (Figure 5.5) reflect a monocentric situation of the functional distributions in the study area, where more than the half number of working establishments are concentrated in the main center (Ramallah - Al-Bireh - Bitounya). Where the biggest share of flows appears, the work establishments attract about (73%) from the total working persons (30,773 working commuters/day). However; other centers (sub-centers and local centers) attracts only (27%) from the total commuters.

And if this situation applied to the new proposal of the sub- regional FUAs, then each sub-regional FUA will have an average (5%) percentage from the total working establishments, and only (3%) from the total number of employees. See (Map 5.20) and (Table 5.21).

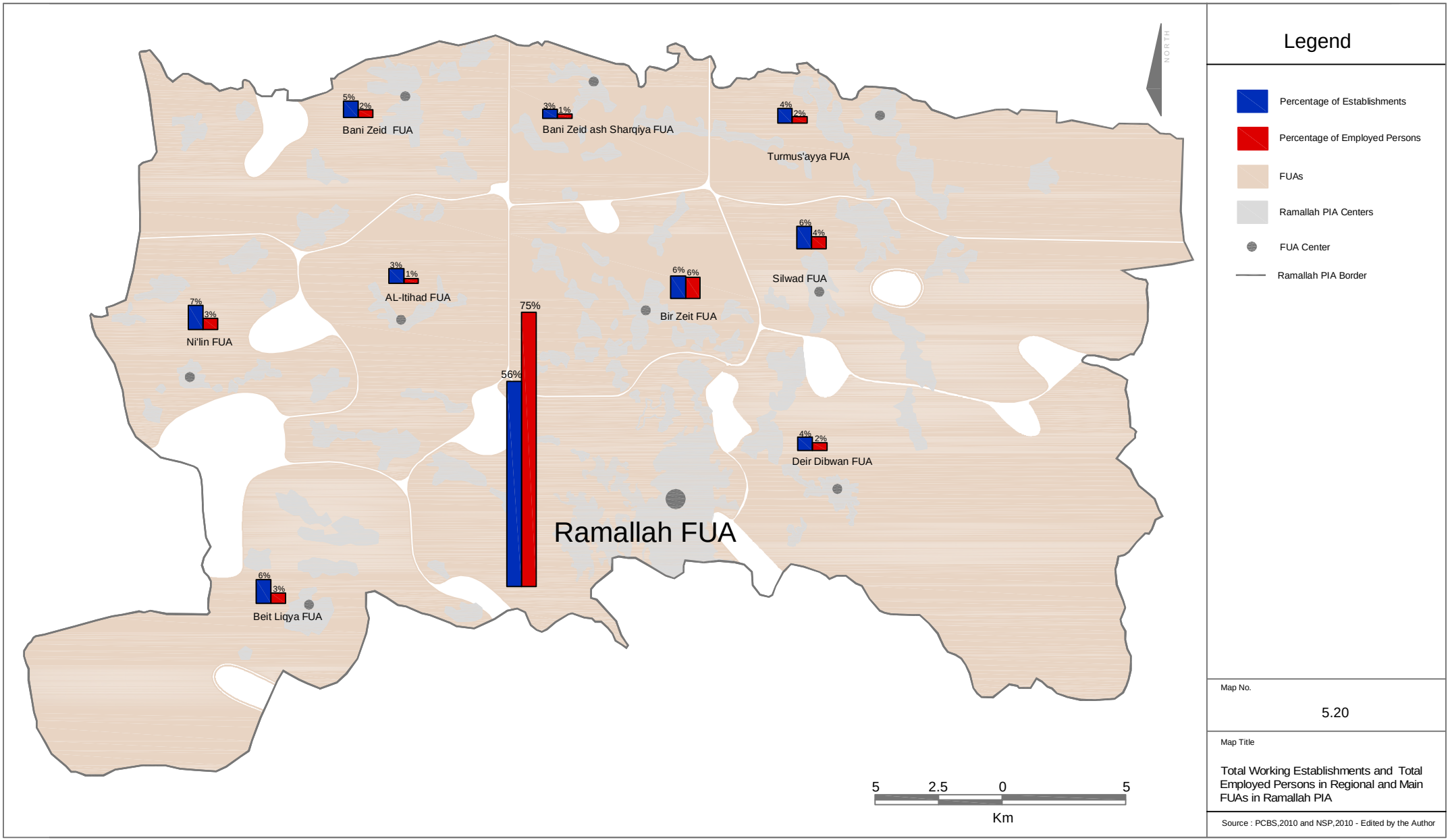
Table 5.21: No. of Working Establishments and No. of Employed Persons in each center in Ramallah PIA classified according to the FUAs.

FUA	Center	No. of Establishments	No. of Employed Persons	Employee / Establishment ratio
Bani Zeid	Bain Zied	133	284	2
	Al Lubban al Gharbi	42	81	2
	Rantis	60	97	2
	Deir Abu Mash'al	96	165	2
	An Nabi Salih	11	23	2
	Abud	54	137	3
	Qarawat Bani Zeid	73	118	2
	Kafr 'Ein	36	51	1
Bani Zeid ash Sharqiya	Bani Zeid ash Sharqiya	138	265	2
	Abwein	81	134	2
	Ajjul	16	22	1
	Deir as Sudan	20	26	1
	Umm Safa	19	34	2

Turmus'ayya	Turmus'ayya	125	265	2
	Khirbet Abu Falah	98	161	2
	Al Mughayyir	61	96	2
	Sinjil	125	228	2
	Jilijliya	9	13	1
Silwad	Silwad	190	368	2
	Al Mazra'a ash Sharqiya	140	349	2
	Deir Jarir	95	167	2
	At Tayba	86	325	4
	Yabrud	9	16	2
	Kafr Malik	124	235	2
Bir Zeit	Bir Zeit	258	1613	6
	Atara	39	67	2
	Jibiya	4	7	2
	Burham	5	74	15
	Kobar	72	120	2
	Ein Siniya	19	38	2
	Dura al Qar'	47	115	2
	Jifna	47	141	3
	AL-Doha	-	-	
	Abu Qash	65	159	2
	AL-Zaytouneh	92	168	2
AL-Itihad	AL-Itihad	115	205	2
	Deir Nidham	8	14	2
	Ras Karkar	30	54	2
	Al Janiya	14	22	2
	Kafr Ni'ma	91	175	2
	Bil'in	51	84	2

Ni'lin	Ni'lin	215	452	2
	Deir Qaddis	50	104	2
	Kharbatha Bani Harith	88	159	2
	Shuqba	162	298	2
	Qibya	125	213	2
	Budrus	23	38	2
	Al Midya	16	19	1
Beit Liqya	Beit Liqya	227	381	2
	Beit 'Ur at Tahta	120	208	2
	Saffa	152	271	2
	Beit Sira	60	110	2
	Beit Nuba	4	9	2
	Kharbatha al Misbah	110	225	2
Deir Dibwan	Deir Dibwan	103	213	2
	Ein Yabrud	69	223	3
	Beitin	199	461	2
	Burqa	40	74	2
Ramallah	Ramallah	3,047	15,577	5
	Al Bireh	2,208	13,350	6
	Beituniya	474	18,46	4
	Surda	16	41	3
	Ein Qiniya	6	13	2
	Ein 'Arik	48	97	2
	Deir Ibzi'	41	102	2
	Beit 'Ur al Fauqa	26	40	2

Moreover; the distribution of the employees per working establishment in the different centers in the study area reflects higher average of workers per establishment in the main center (about 5 workers/establishment), whereas the same average in the sub- centers is about (2 workers / establishment), as shown in (Table 5.19), which implies that the working establishments in the main centers are larger and required more workers, and attracts more users as well, than the establishments of the sub- centers.



Legend

- Percentage of Establishments
- Percentage of Employed Persons
- FUAs
- Ramallah PIA Centers
- FUA Center
- Ramallah PIA Border

Map No.

5.20

Map Title

Total Working Establishments and Total Employed Persons in Regional and Main FUAs in Ramallah PIA

Source : PCBS,2010 and NSP,2010 - Edited by the Author

2. Education Functions Flows

This type of flows can also be divided in to two sub-divisions according to the categories of education; Primary education (for ages 6-18 years), and high education (for ages 19-23 years).

Analysis of the low level of education in the study area presents that there are about (80,509 students) of ages between (6-18 years), whom represent about (25%) of the total population of Ramallah governorate (PIA).

Obviously; education functions are distributed in all of the study area centers, where every agglomeration contains at least one primary school, and in many cases two adjacent centers may share the same secondary school. However; the main center (Ramallah - Al Bireh - Bitounya) contains the highest number of schools and students as well.

The main high level education center in the study area is represented by Bir Zeit University, which receives about 10,000 commuters / day from all over the West Bank.

Other universities and colleges for high level education also locate in the study area like Alquds open university.

- **Results of the Functional Assessment**

In the study area (Ramallah PIA), the location pattern of service distribution is affected to a great extent by the existing physical pattern, which reflects a dispersed and scattered distribution of agglomerations. The highest percentage of population is concentrated in the main centre (Ramallah -Al Bireh - Bitonya) -around 97,543 habitants, almost 30% of the total population- accordingly it contains the biggest share of the flows. while the rest of the population is geographically distributed between large numbers of small rural communities. (*MoP,2006*).

Obviously, this scattered pattern has lead to high concentration of different functions in large urban communities, which act as centers serving their population as well as residents of the surrounding rural communities. This situation reflects monomcentric types of flows and interactions, indeed.

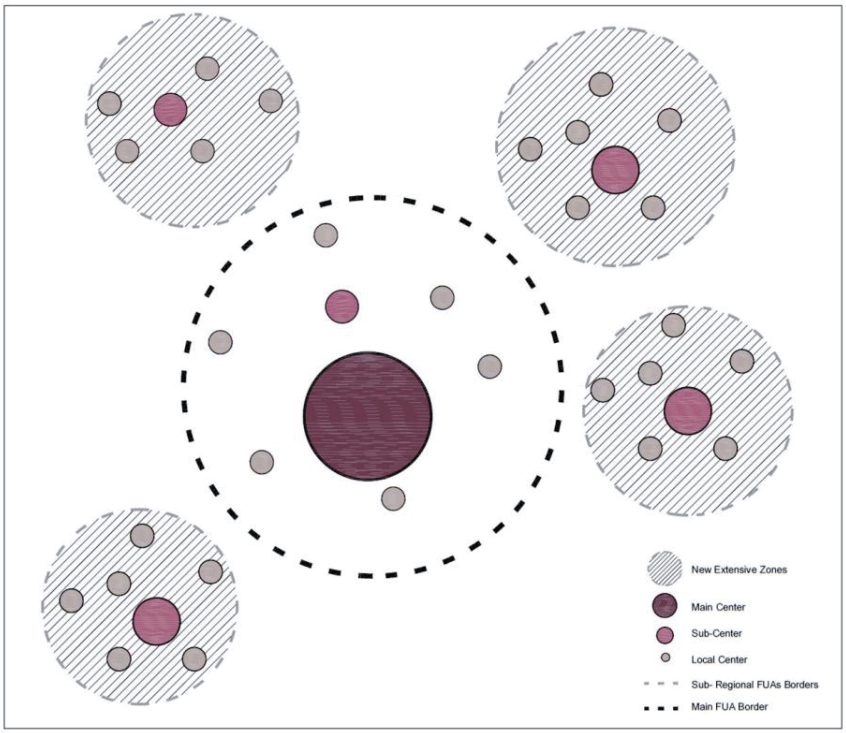
The notion of this section is to change this monocentric situation into more polycentric one, by creating new sub-regional functional zones by integrating the small scattered agglomerations in the study area, which contributes in the development of these areas, and to reduce the pressure over the main center at the same time.

However, the structure appears to be not totally monocentric, but seems to be, at least, characterized by two main urban agglomerations. In fact, a large amount of flows appears in the central part of the region and in Bir Zeit agglomeration, where the university is located.

5.3.2.2 Applying of the Functional Dimension

- **Concept :** Building on the main concept of polycentricity at its lower levels of hierarchy which is: " *To raise the significance of the smaller rural areas, by creating new extensive zones surrounding the main centers*". And taking into consideration the spatial structure of the study area, and the results of the morphological dimension adaption, where the final result that has been illustrated in (Map 5.19) showed that the case study area (Ramallah PIA) has divided into 9 sub-regional FUAs areas added to the main FUA (Ramallah - Al-Bireh - Bitonya). Accordingly; these surrounding (sub-regional) FUAs will be considered the new extensive zones that surround the main center. Furthermore, these sub-regional FUAs will pass through the experiment of testing of their potentials to work as functional zones, where new types of flows will be created in order to obtain a polycentric region with new potential commuter catchments.(see Figure 5.7).

Figure 5.7 : Creating New Extensive Zones



- **Criteria :** According to the literature reviews; achieving functional dimension of polycentricity refers to the provision of a certain level of functions within certain centers, to develop them as functional centers that can serve surrounding areas, in order to develop new functional urban areas, which could work as potential commuter catchments areas. However, this is preconditioned by promoting accessibility to assure the functions that underlying interactions and flows of commuters between different functional centers, in order to activate these new functional areas. Thus; the functional dimension could be promoted to a certain region by achieving two criteria (sub-components); Functions and Connectivity, following sections discuss the adaption of these two criteria, and the methodology by which they could be applied to the study area.

1. Functions (Typologies and Hierarchies)

The definition of functions within different centers considered to be the first factor in creating Functional Urban Areas (FUAs).

Based on the theory that ' there are certain facilities / functions which make some localities work as a sub- center and attract commuters' (*MoP,2006:p65*).

Overall, functional dimension application at this stage considered the potentials of the existing spatial structure, and potentials of communities which may act as services provision centers for the surrounding communities and analyze strategies to develop them all as Polycentric Urban Areas.

There are non-confined types of functions that characterized different centers. Previously, functions of polycentric areas were classified according to their hierarchies (i.e. functions of higher levels centers of polycentricity, and functions of lower levels centers of hierarchies). Furthermore, the theoretical discussion of functions typologies presented these typologies of three compacted and representative categories; Public services, Jobs (employment) activates and resources and consumption functions, based on the flows of people and goods between centers.

Functions hierarchies imply that the degree of complexity and variations of the three types of functions refers to the level of hierarchy of the center which contains these functions. Apparently, the relation between the degree of complexity and variation of functions and the hierarchy of the center is directly proportional.

Centers hierarchies in the study area (section 5.3.1), have been defined according to the population base of these centers, as well as the number of working establishments in these centers. This implies that the classification of different centers were basically based on the functional dimension.

Distribution of the different functional hierarchies should be planned to obtain the most efficient way, which is also referred to the population size that will be served by these facilities, in addition to the geographical locations of these facilities and the accessibility to them as well. Thus; smaller facilities (Basic facilities like essential schools and clinics) are located within the lower hierarchal order of services, and often apply the needs of smaller population size, while the higher level of facilities like universities and specialized hospitals which supposed to serve larger population base, should be concentrated in specific locations to provide appropriate levels of functions for surrounding areas. (*Mop, 2006*).

Previously; MoP (2006) has published the study for the hierarchies of different agglomerations in the West Bank according to their services facilities, it also has proposed a certain level of functions in each level of hierarchy.

This study presents spatial model for the development of service centers, and the allocation of these centers within various hierarchies. This was developed based on analysis of existing conditions, the contribution of each service to the formation of a center, the population served, and the geographic distribution of localities.

Accordingly, four levels of centers have been identified; regional, sub-regional, local, and neighborhood level. These centers are based on the number of public services in the locality, commuting population, and weighted population served. Different criteria have been considered for location and distribution of the hierarchical order of functions in different centers:

- Population size in each center;
- Population size in sub-region;
- Links between localities and centers;
- Accessibility to centers; and
- Geographical distribution of centers in relation to the surrounding communities.(*MoP, 2006*).

The results of this study have been taken into consideration while developing the morphological hierarchies of this study (see item 5.3.1) which asserts that both morphological and functional dimensions are parallel and cannot be isolated. This implies that the hierarchical morphological definition of the sub- centers has been conducted according to the functional dimension as well.

- ***Existing Functional Situation in the Proposed Sub- Centers***

Building on the final distribution of the proposed morphological polycentric model in the study area which is illustrated in (Map 5.19); nine centers have been proposed to work as sub- centers for the sub-regional FUAs. The analysis of functions within the proposed sub- centers, reflects that each of these agglomerations has certain level of functions, which provides strong potential for each of these centers to work as a sub- center and serve the surrounding areas, (see Table 5.22).

Table 5.22: Functions in the proposed sub- centers

Proposed Sub- Center	Functions
Bir Zeit	• University (Bir Zeit University) which attracts students from all over the West Bank • 5 schools • Primary care clinic • 3 pharmacies • Many commercial, Wholesale, retail trade and repairs facilities • Public parks • Swimming pools • Many stone quarries • Pharmaceutical factory • Wheat mill • Dorms for students and related facilities • Buses and transportation company • Many professional workshops • 2 gas stations • Cultural center • Sport facilities and GYM • Olive oil factory • Banks branches

Ni'lin	• 3 schools • 4 kindergartens • Cultural center • 2 women centers • Sport center • Playground • Court, • Healthcare center, • Self-protection center • Gas stations • Many banks branches • Red crescent health center • General petroleum authority stores • Light industries • Many drinks factories • Buses and transportation company • Leather factory • Olive oil factory • Public park • Many commercial, wholesale, retail trade and repairs facilities
Bani Zeid	• 4 schools • 2 medical centers • Playground • Public park • Police office • 4 olive oil factories • Sport, social and cultural center • Fire station
Beit Liqya and Beit Ura at-Tahta	• 5 schools • 2 health clinics • 3 healthcare centers • 1 pharmacy • Municipal stadium • 2 medical libratory • Motherhood and childhood center • Radiology center • Physiotherapy center

	• Cultural center • Union sports club • 50 grocery stores • Two bakeries • 6 butcheries • 12 different service stores • 15 professional workshops • Wholesale, retail trade and repairs facilities
Dir Dibwan	• 2 schools • Hospital • Clinic • Banks branches • Restaurants • Commercial wholesale, retail trade and repairs facilities • Professional workshops • Pharmacy
Silwad	• Hospital • 2 motherhood and childhood clinics • Red Crescent health center • Court • Post office • Women society • Agricultural society • Sport club • Center of rehabilitation of disabled • 5 schools • 2 kindergartens • Women center • Child park • Sport field 'playground' • Governmental health center • Specialized clinic • Governmental physical clinic • 3 x-ray centers • 2 medial analysis laboratories • 3 pharmacies • Some industrial facilities including the construction

	sector • Wholesale, retail trade and repairs facilities • 17 professional workshops • Stone quarry • Olive oil presser • Restaurants • Gas station • Brick factory
Turmus'ayya	• Private general clinic • Medical laboratory • X-ray center • Two private pharmacies • Governmental health center • Governmental hospital (ash sheikha fatima hospital • 3 schools • 1 kindergarten • 2 pharmacies • Wholesale, retail trade and repairs facilities • Workshops • 2 stones quarries • 2 olive oil factories
Bani Zeid ash -Sharqiya	• Schools • Kindergartens • Hospital • Sport center • Cultural and society center • Police office • Olive oil factory • Pharmacy
Source: *ARIJ,2012*.	

2. Connectivity

Connectivity and accessibility between the FUAs considered to be a pillar factor of polycentricity, since any process of economic functions sharing cannot be really effective unless accompanied by an efficient transport infrastructure and by accessibility. Transport is measured by means of the main transport nodes which differs according to the hierarchical level of polycentricity.

- **Transportation Networks**

Creating networks layers, should be efficient, safe, and environmentally friendly, this could be obtained by reducing the needs for long trips movements, and reducing the economic drawbacks, through short distances. Therefore; centers distribution patterns should be in such a way that contribute to lower traffics, and this matches the main goal of the polycentricity dimensions at this level, since the promotion of new sub-regional functional centers surrounding the main center will shorten the distances between the sub-centers and local centers and the main center, (*MoP,1998*). Physical networks contain various components like; major roads, railways, terminals, airlines, and others.

The only physical form of networks in the study area (Ramallah PIA) is the roads networks, which could be classified in to three levels of hierarchies according to the centers hierarchies of this study as shown in (Map 5.21), these levels are:

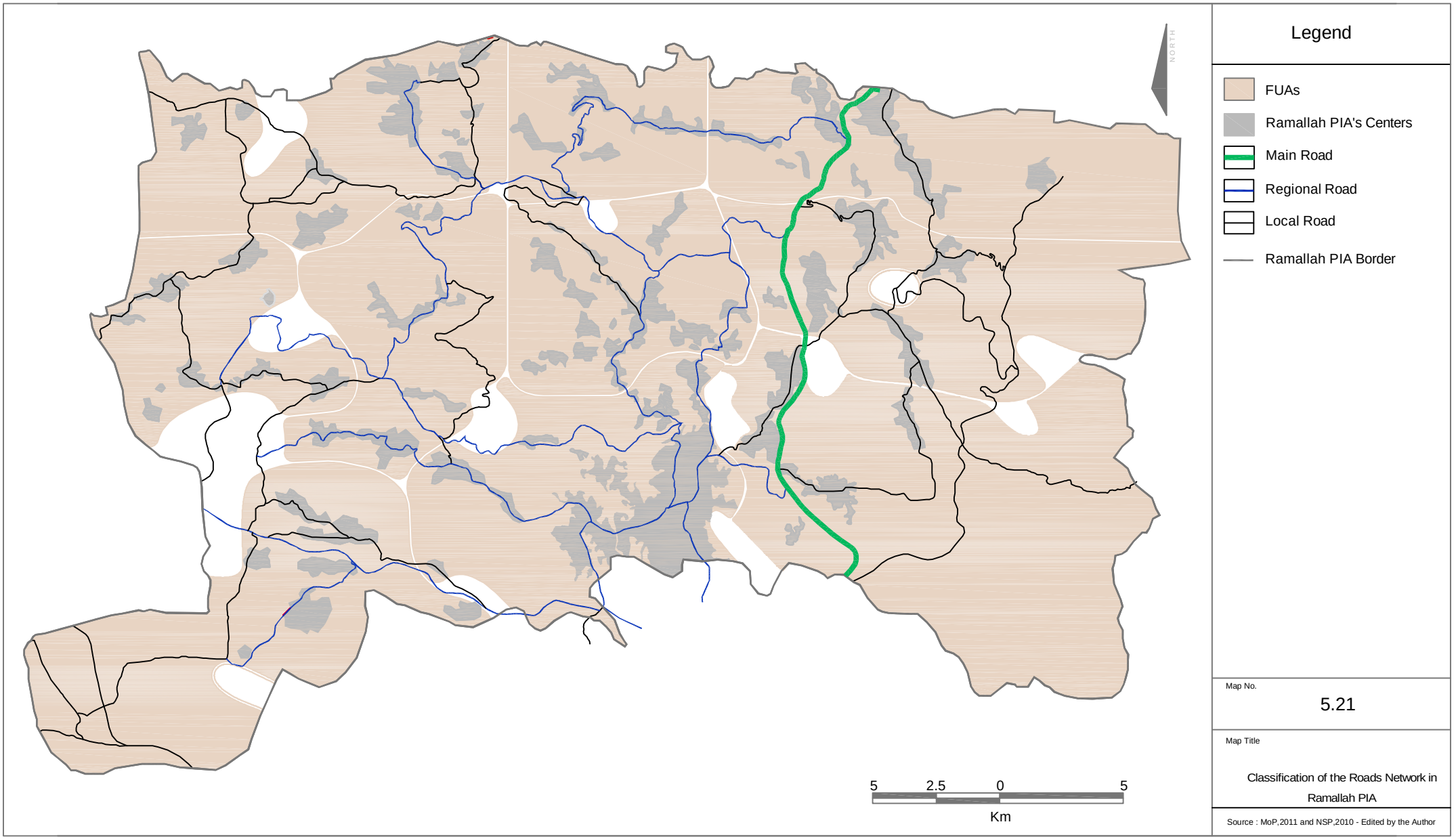
- Main roads which connect between main centers;
- Regional roads which connect between sub-regional and main centers;
- Local roads which connect between sub- regional and local centers.

- **Public Transportation**

To obtain an acceptable degree of connectivity by the existing roots of transportation, a new model for public transportation between different centers should be discussed.

The proposed public transport system will consist of the following components:

- Direct physical connections between different centers which is represented by the roads networks;
- Different levels of bus terminals to fit the different centers;
- Bus travelling system to carry people, organized by the government.



Legend

- FUAs
- Ramallah PIA's Centers
- Main Road
- Regional Road
- Local Road
- Ramallah PIA Border

Map No.

5.21

Map Title

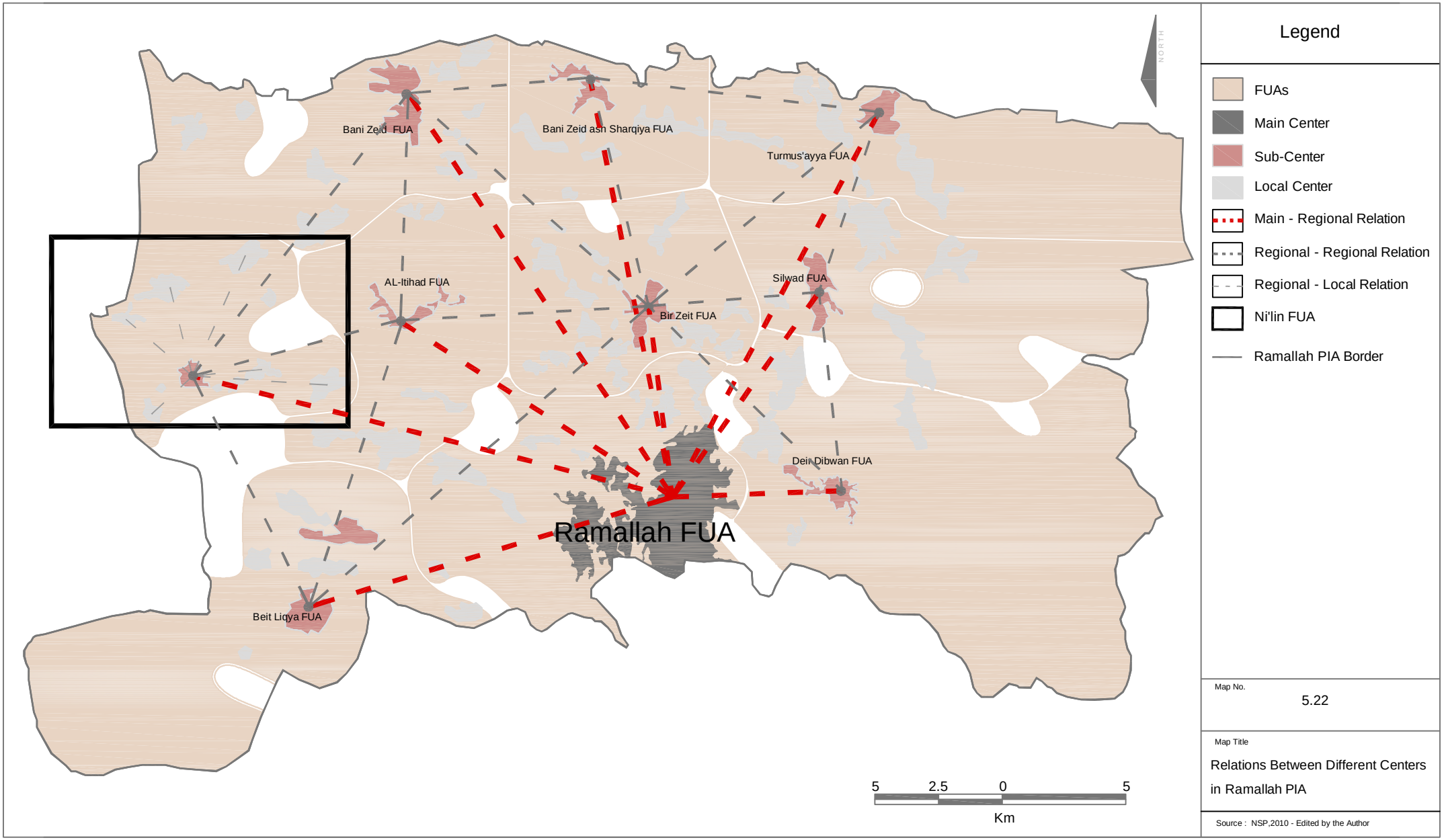
Classification of the Roads Network in Ramallah PIA

Source : MoP,2011 and NSP,2010 - Edited by the Author

- **Methodology:** The functional dimension relies on the **relations** between different levels of centers hierarchies, these relations could be classified according to literature discussions into three types:
    - Relations between high level centers;
    - Relations between low level centers;
    - Relations between high and low level centers.

  Obviously; the study area (Ramallah PIA) represents a field for all of these relations, based on the defined centers hierarchies, which ranges between higher level (main centers) and lower level (local centers). Building on the results of the morphological analysis of the study area, where 10 FUAs have been proposed and the three types of relations have been defined, (Map 5.22) illustrates the different types of relations between different centers in Ramallah PIA.

  For the purpose of achieving a comprehensive analysis for all of these relations within the study area, two models will be analyzed, both models will be built on the results of the morphological dimension implementation; the first model includes the higher level relations between the main and the sub-regional FUAs, this model will be represented by the whole Ramallah PIA area.
  While the second model includes the lower level of relations between the sub-regional and the local centers in each FUA, this model will be represented by a sample sub-regional FUA, this FUA is Ni'lin FUA,(see Map 5.22).
  In these two models both criteria (components) of the functional dimension will be applied (functions and connectivity). Moreover, the application process will begin with the more detailed and the lower level model (Ni'lin FUA), where the results could be generalized to the other remaining sub-regional FUAs, then the more general and the higher level model (Ramallah PIA) will be presented.

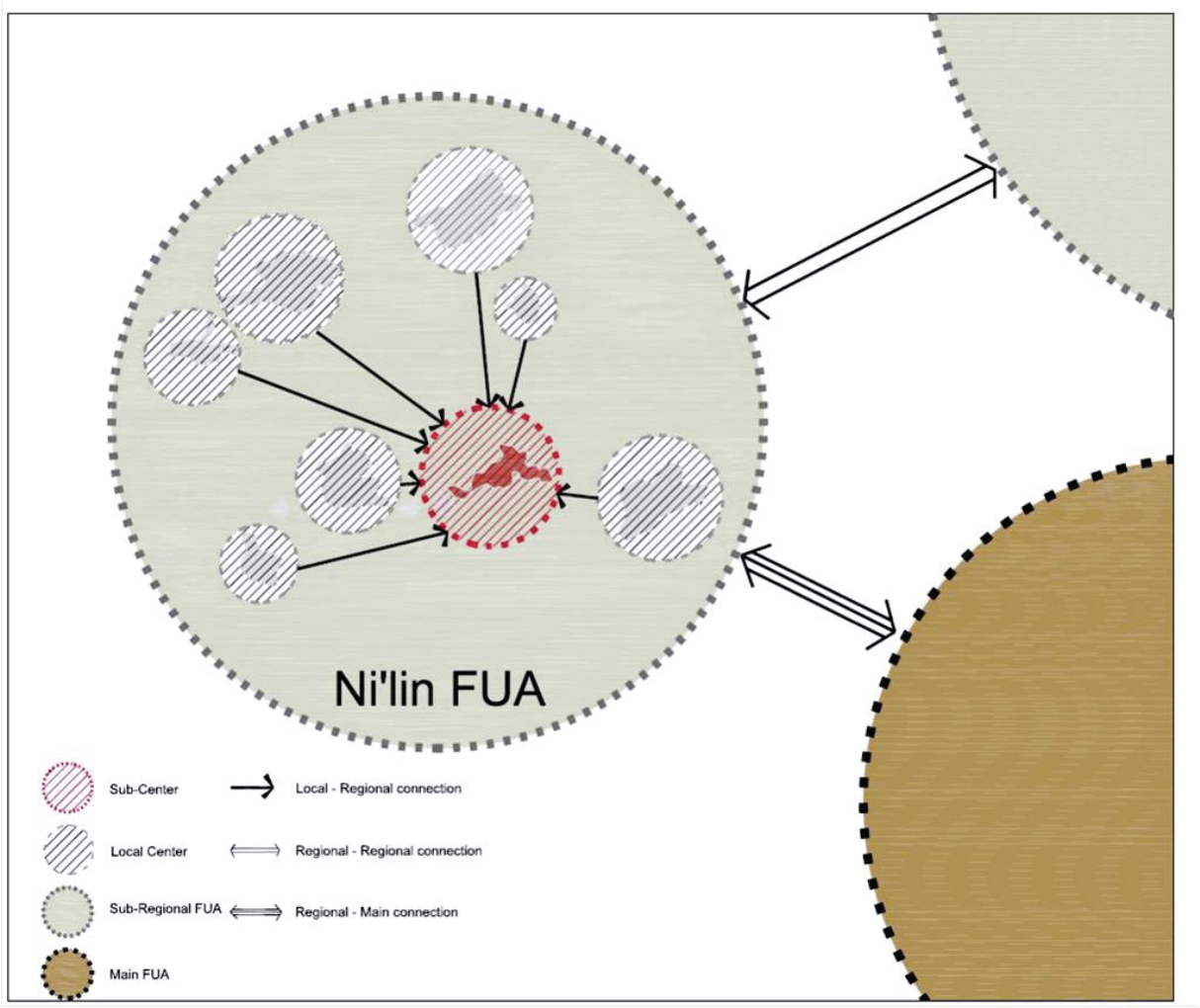

Bani Zeid FUA
Bani Zeid ash Sharqiya FUA
Turmus'ayya FUA
AL-Itihad FUA
Bir Zeit FUA
Silwad FUA
Deir Dibwan FUA
Ramallah FUA
Beit Liqya FUA
NORTH
5 2.5 0 5
Km
Legend
FUAs
Main Center
Sub-Center
Local Center
Main - Regional Relation
Regional - Regional Relation
Regional - Local Relation
Ni'lin FUA
Ramallah PIA Border
Map No.
5.22
Map Title
Relations Between Different Centers in Ramallah PIA
Source : NSP,2010 - Edited by the Author

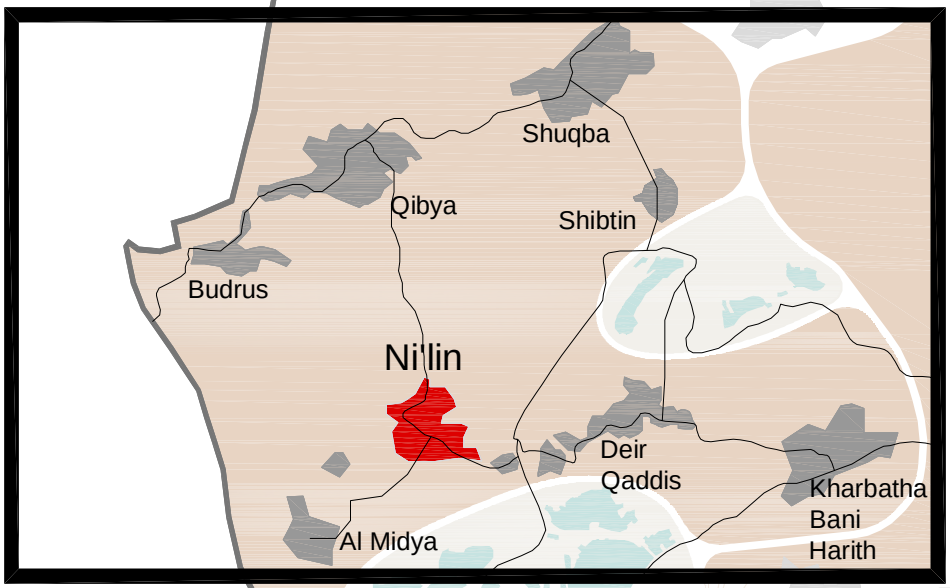
Part One : Ni'lin FUA

The purpose of this stage of the model's application is to activate (Ni'lin FUA) as one sub-regional FUA, Building on the proposed methodology for this process, where two main steps will be analyzed; The functional typologies and the connectivity. Ni'lin FUA consists of the sub-center Ni'lin and other related local centers (Deir Qaddis, Shuqba, Kharbatha Bani Harith, Qibya, Budrus, Al Midya), (see Map 5.23).

(Figure 5.8) illustrates the conceptual functional model for Ni'lin FUA; The main vision of the model is (**to develop the sub- center as a functional center for the surrounding local centers, and to develop the local centers as well**).

Figure 5.8 : Conceptual Functional Model for Ni'lin FUA





Legend

- FUAs
- Sub-Center
- Local Center
- Other Centers Center
- Israeli Settlement
- Blocks Around Israeli Settlements
- Roads Network
- Ni'lin FUA
- Ramallah PIA Border

10 5 0 10

Km

Map No.

5.23

Map Title

Ni'lin FUA

Source : NSP,2010 - Edited by the Author

Step One : Functions Typologies

In order to activate this region functionally, certain level of proposed functions should be provided to each type of these centers according to the center's hierarchy. In particular this could be translated by two proposals:

- The provision of a certain level of functions in the sub- center; these functions will serve the population of the sub- center as well as the surrounding areas, the range of these functions will fit the population base of the sub-regional FUA.
- The provision of certain level of functions in the local centers; these functions will serve the population of the local center mainly. The range of these functions will fit the population base of the local center.

The MoP in its two studies; both the *regional plan of the West Bank* and the study of *Defining Spatial Structure for Public Service Centers in the West Bank,* has proposed a certain level of hierarchies for the public facilities in each center of the West Bank.

The results of (Table 2.4) of the minimum level of public services provision according to the centers hierarchies, and the proposed levels of centers hierarchies that have been discussed in section 2.3 will be adapted at this stage in order to fit the proposed hierarchical distribution of the centers in the study area, (sub-centers and local centers).

(Table 5.23) and (Table 5.24) show the suggested minimum level of public services in the sub-centers and local centers, building on the MoP proposals.

The scope of some of the facilities will cover the entire sub-regional FUA, such as the general hospitals - or health care centers and the regional markets, these facilities will be concentrated in the sub- centers.

Other facilities will cover two or more adjacent centers, such as the secondary schools. Finally, some public facilities will be concentrated in each sub-center and local center to serve basically the population of that center, such as the essential schools and the local clinics.

Table 5.23: Minimum level of public services provision in the sub- centers

Public facilities		Scope of service
Education	Kindergarten	The sub- center
	Essential school	The sub- center
	Secondary school	The sub- center and some adjacent local centers
	Secondary special school	The entire sub-regional FUA centers
Health	Health clinic	The sub- center
	Health center	The sub- center and some adjacent local centers
	General hospital	The entire sub-regional FUA centers
Religious	Mosque/church	The sub- center
	Graveyard	The sub- center
Recreational	Playground	The sub- center
	Play area	The sub- center and some adjacent local centers
	Sport center	The entire sub-regional FUA centers
	Youth center	The entire sub-regional FUA centers
	Youth club	The entire sub-regional FUA centers
Open space	Local park	The sub- center
	Public park	The entire sub-regional FUA centers
Cultural	Social center	The sub- center and some adjacent local centers
	Women's center	The sub- center and some adjacent local centers
	Library	The entire sub- regional FUA centers
Government	Local market	The sub- center and some adjacent local centers
	Municipal office	The sub- center
	Police office	The entire sub-regional FUA centers
	Fire station	The entire sub-regional FUA centers
	Central market	The entire sub-regional FUA centers
Transport	Regional bus terminal	The entire sub-regional FUA centers
Communication	Regional post office	The entire sub-regional FUA centers
Source : *MoPIC,1998-edited by the author.*		

Table 5.24: Minimum level of public services provision in the local centers

Public facilities		Scope of service
Education	Kindergarten	Local center
	Essential school	Local center
	Secondary school	Adjacent local centers could share the same secondary school
Health	Health clinic	Local center
	Health center	Local center
Religious	Mosque/church	Local center
	Graveyard	Local center
Recreational	Playground	Local center
	Play area	Adjacent local centers could share the same Play area
Open space	Local park	Local center
Cultural	Social center Women's center	Both centers could be merged in one local cultural center
Government	Local market	Local center
	Municipal office	Local center
Transport	Local bus terminal	Adjacent local centers could share the same local bus terminal
Communication	Local post office	Adjacent local centers could share the same local bus terminal
Source : *MoPIC,1998-edited by the author.*		

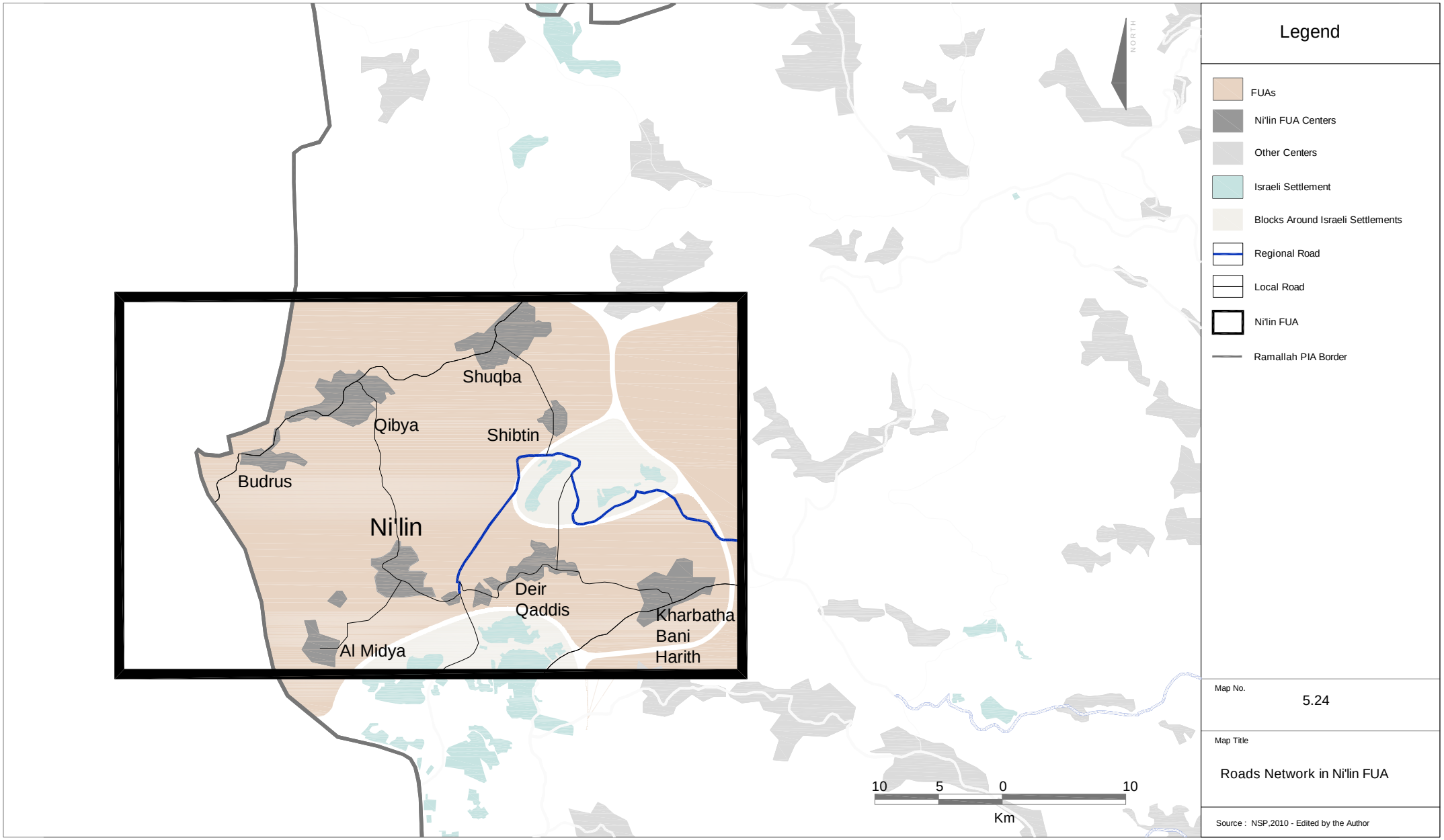
Step Two : Connectivity

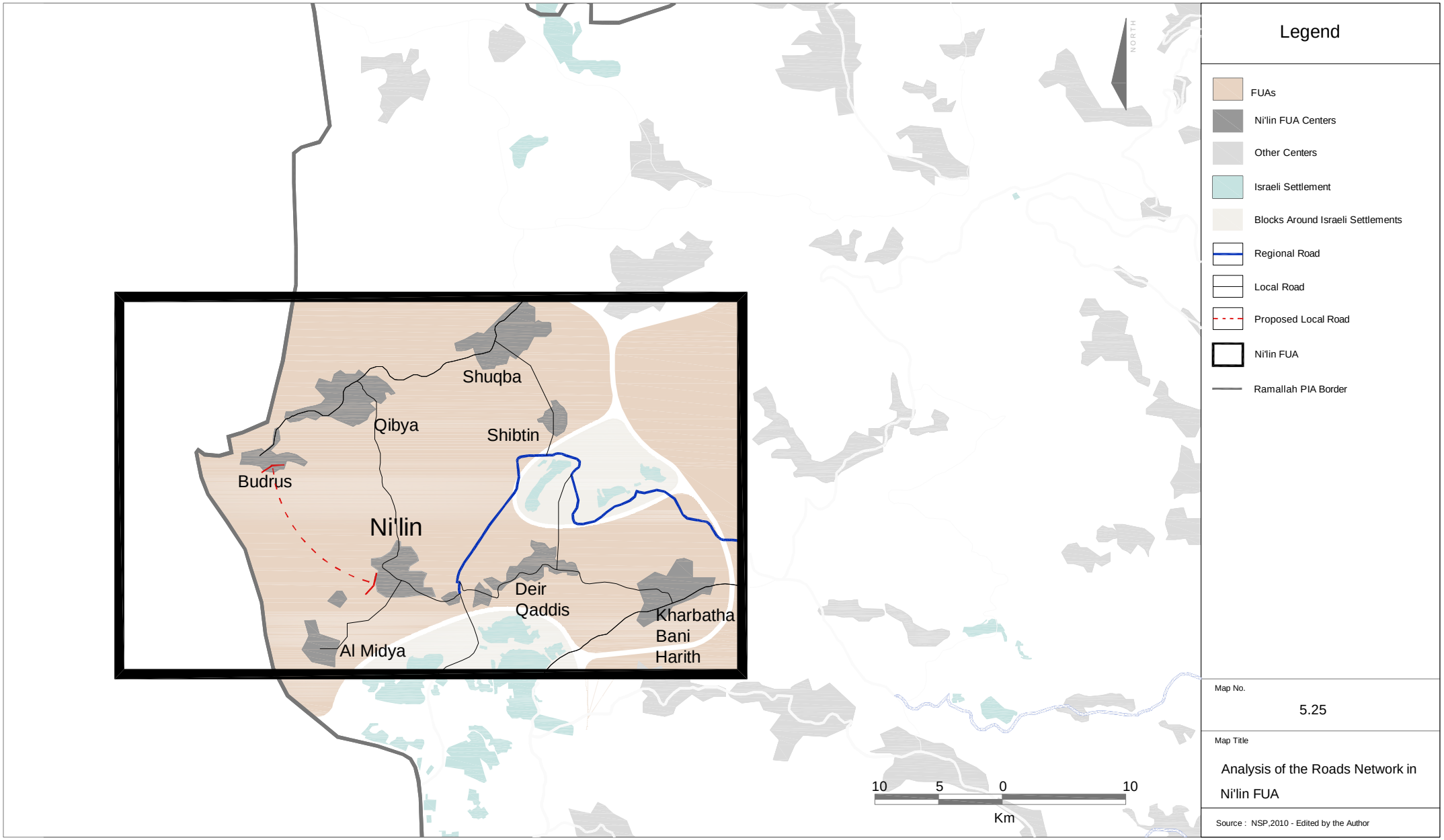
The second part of the functional dimension application in Ni'lin FUA, is the 'connectivity' component application. This will be obtained by two steps; the analysis of the physical networks (transportation roots), and the public transportation system as shown in the proposed methodology.

- ***Physical Networks (Transportation Roots)***

In (section 5.3.2.1), it has been mentioned that the only physical form of networks in the study area are the roads networks, these roads have been classified into 3 types according to their hierarchies. In Ni'lin FUA, the roads network consists mainly from the local roads which connect between the local centers and the sub- center, see (Map 5.24).

Based on the methodological approach which has proposed to apply the functional polycentric dimension at this level of analysis; the main aim of this stage is to provide one direct route between the sub- center and each of local centers in Ni'lin FUA. The concerned roads network should be sufficient for the amount of flows between different centers, it should be efficient and environmentally friendly, accordingly the shortest route should be applied. (Map 5.25) illustrates the analysis of the roads network in Ni'lin FUA.


Shuqba
Qibya
Shibtin
Budrus
Ni'lin
Deir
Qaddis
Kharbatha
Bani
Harith
Al Midya
NORTH
10
5
0
10
Km
Legend
FUAs
Ni'lin FUA Centers
Other Centers
Israeli Settlement
Blocks Around Israeli Settlements
Regional Road
Local Road
Ni'lin FUA
Ramallah PIA Border
Map No.
5.24
Map Title
Roads Network in Ni'lin FUA
Source : NSP,2010 - Edited by the Author



Legend

- FUAs
- Ni'lin FUA Centers
- Other Centers
- Israeli Settlement
- Blocks Around Israeli Settlements
- Regional Road
- Local Road
- Proposed Local Road
- Ni'lin FUA
- Ramallah PIA Border

Map No.

5.25

Map Title

Analysis of the Roads Network in Ni'lin FUA

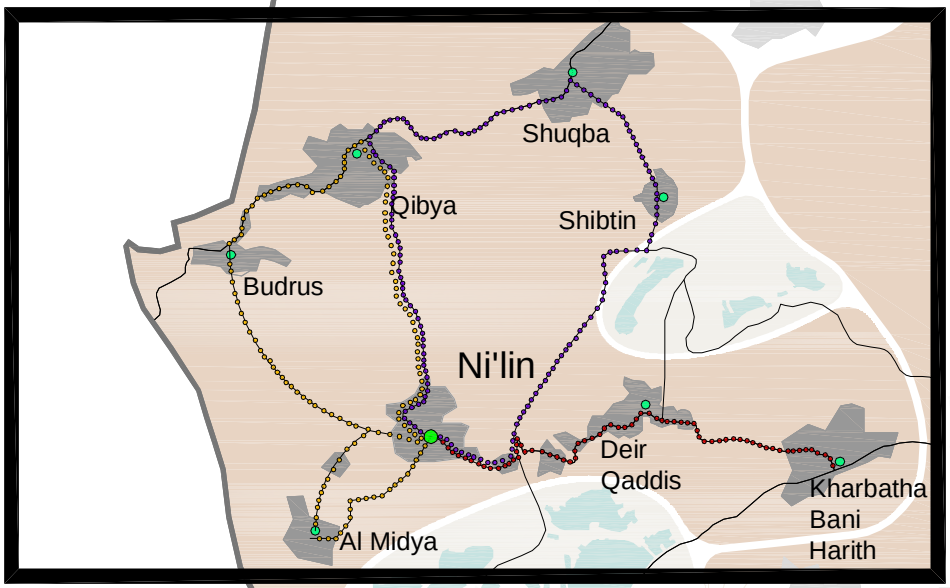
Source : NSP,2010 - Edited by the Author

- ***Public Transportation Route***

In particular; the public transportation system in Ni'lin FUA represents a smaller part of the general system in Ramallah PIA. The proposed system in Ni'lin FUA consists mainly of two parts; the bus stations and the public routes.

(Map 5.26) illustrates the public transportation system in Ni'lin FUA; the map shows that the system consists of one central 'regional' bus terminal in the sub- center 'Ni'lin', in addition to 7 local bus terminals in each local center, see (Tables 5.21 and 5.22), it contains 3 proposed routes which could cover the entire FUA, these routes are:

- Ni'lin - Qibya - Budrus - Almidya
- Ni'lin - Qibya - Shuqba - Shibteen
- Ni'lin - Dir Qiddes - Kharbatha bani Hareth



NORTH

10 5 0 10

Km

Legend

- FUAs
- Ni'lin FUA Centers
- Other Centers Center
- Israeli Settlement
- Blocks Around Israeli Settlements
- Regional Terminal
- Local Terminal
- Route No.1
- Route No.2
- Route No.3
- Ni'lin FUA
- Ramallah PIA Border

Map No.

5.26

Map Title

Proposed Public Transportation Routes in Ni'lin FUA

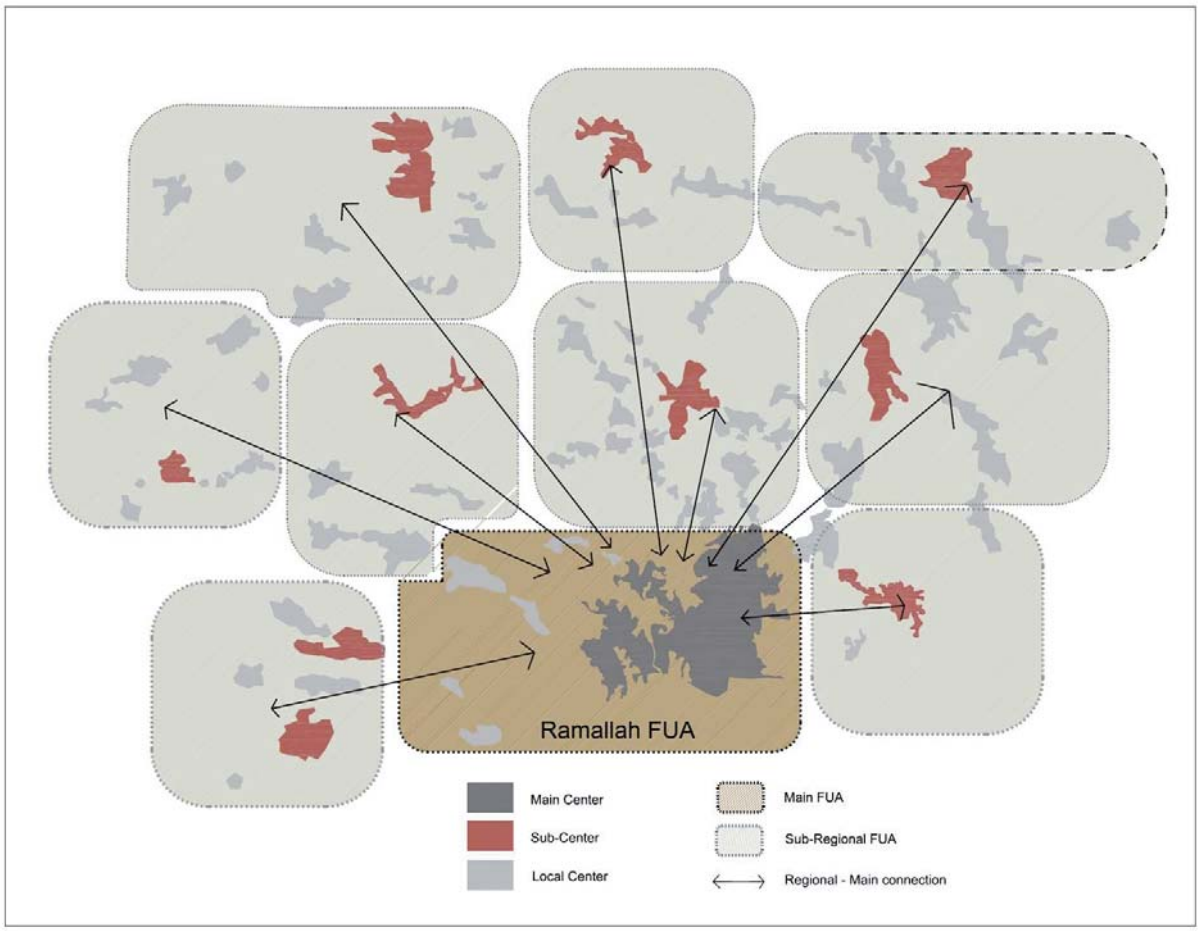
Source : NSP,2010 - Edited by the Author

Part Two : Ramallah PIA

The purpose of this stage of the model application is to define the sub regional - sub regional relations in Ramallah PIA. Based on the proposed methodology for this process, and the results of the morphological dimension application results; two main steps will be analyzed; the functions and the connectivity. Ramallah PIA have been divided into 9 sub- centers and one main center as shown in (Map 5.19).

(Figure 5.9) illustrates the conceptual functional model for Ramallah PIA; The main vision of the model is to develop the sub- regional FUAs as new functional zones which could attract new types of flows, and more commuters, like Ni'lin functional zone.

Figure 5.9 : Conceptual Functional Model for Ramallah PIA



Step One: Functions

This part of the analysis discusses the proposals for the functional typologies that could contribute in the development of the sub-regional FUAs as new active functional catchment zones, that could attract new types of regional and sub-regional connections and more commuters.

The analysis of (Table 5.19) results, create an approach of thinking about the functional development of the sub-regional FUAs. Whereby the higher level functions, which have been classified within level one of the functional hierarchal order (i.e. the universities), and which are situated in the main centers according to their standards of location and served population base, could be allocated in the sub- centers, to assert more commuters to these regions.

Factually; one of the most significant contributor to economic growth in these sub-regional FUAs is the public capital investments, where the government-owned aggregate bodies predominantly contribute in the activation of these sub-regional areas to work as sub-regional FUAs through the provision of new functions/investments or the transfer of some of the higher level functions from the main FUA to the sub-regional FUAs. The transformation of the 'higher level functions' from the main center will imply the reduction of the commuters flows and accordingly the pressure on these main centers, which meets the objectives of this research.

Thus; one of the most important recommendations at this stage is to confirm the allocation of a certain part of the budgets of these public capital investments for each of these sub-regional FUAs, to assure the attraction of the investments to these regions.

Step Two: Connectivity

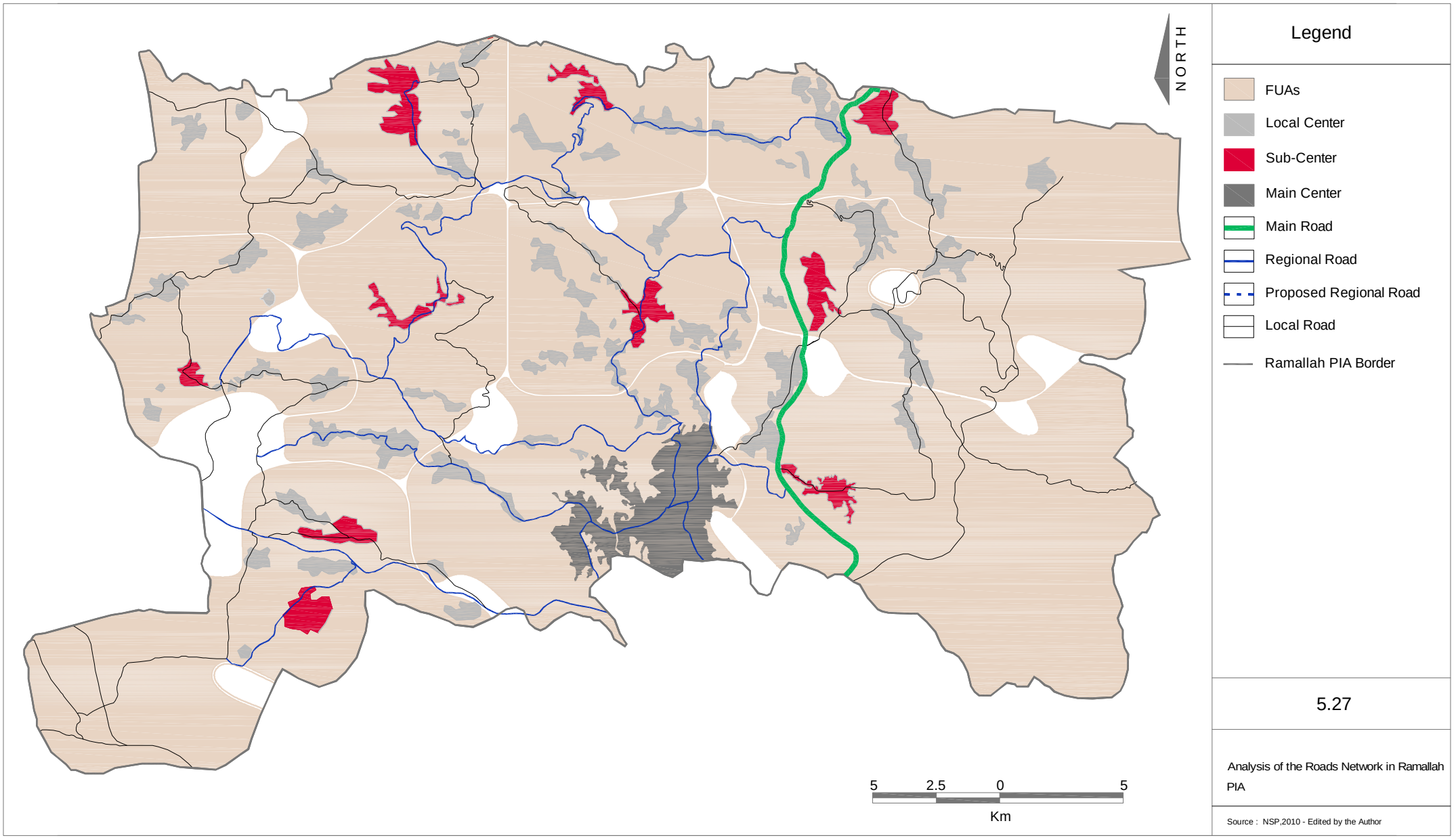
Similar to the method that has been followed in the application of the connectivity criteria/ component, in the detailed study area (Ni'lin FUA); This criteria will be applied in its overall frame (Ramallah PIA), based on two main aspects; The physical networks (Transportation roots), public transportation.

- ***Physical Networks (Transportation Roots)***

Regional roads considered to be the most important level in order to present different sub-regional FUAs as new functional zones, direct accessibility paths should be vouched between the main center and each of the sub-centers, to activate the proposed functions of these sub- centers. Creation of these direct connections between the centers will emphasize the anticipated role of transportation for facilities which will lead to create new balanced flows between centers.

In section (5.3.1) it has mentioned that the only physical form of networks in the study area is the roads networks, these roads have been classified into 3 types according to their hierarchies. In Ramallah PIA, the roads network consists mainly from the local roads which connect between the local centers and the sub- center, followed by the regional roads which connect between the sub-centers and the main centers.(See Map 5.21).
Based on the methodological approach of the functional polycentric dimension application at this level of analysis; the main vision of this stage is to provide one direct route at least between each of the sub- centers and the main center. The concerned roads network should be sufficient for the amount of flows between different centers, it should be efficient and environmentally friendly, accordingly the shortest route should be applied. (Map 5.27) illustrates the analysis of the local roads network in Ramallah PIA.

The analysis of (Map 5.27) shows that there is one regional / main connection between the main center of Ramallah PIA and each of its sub- centers.


NORTH
Legend
FUAs
Local Center
Sub-Center
Main Center
Main Road
Regional Road
Proposed Regional Road
Local Road
Ramallah PIA Border
5 2.5 0 5
Km
5.27
Analysis of the Roads Network in Ramallah PIA
Source : NSP,2010 - Edited by the Author

- ***Public Transportation Route***

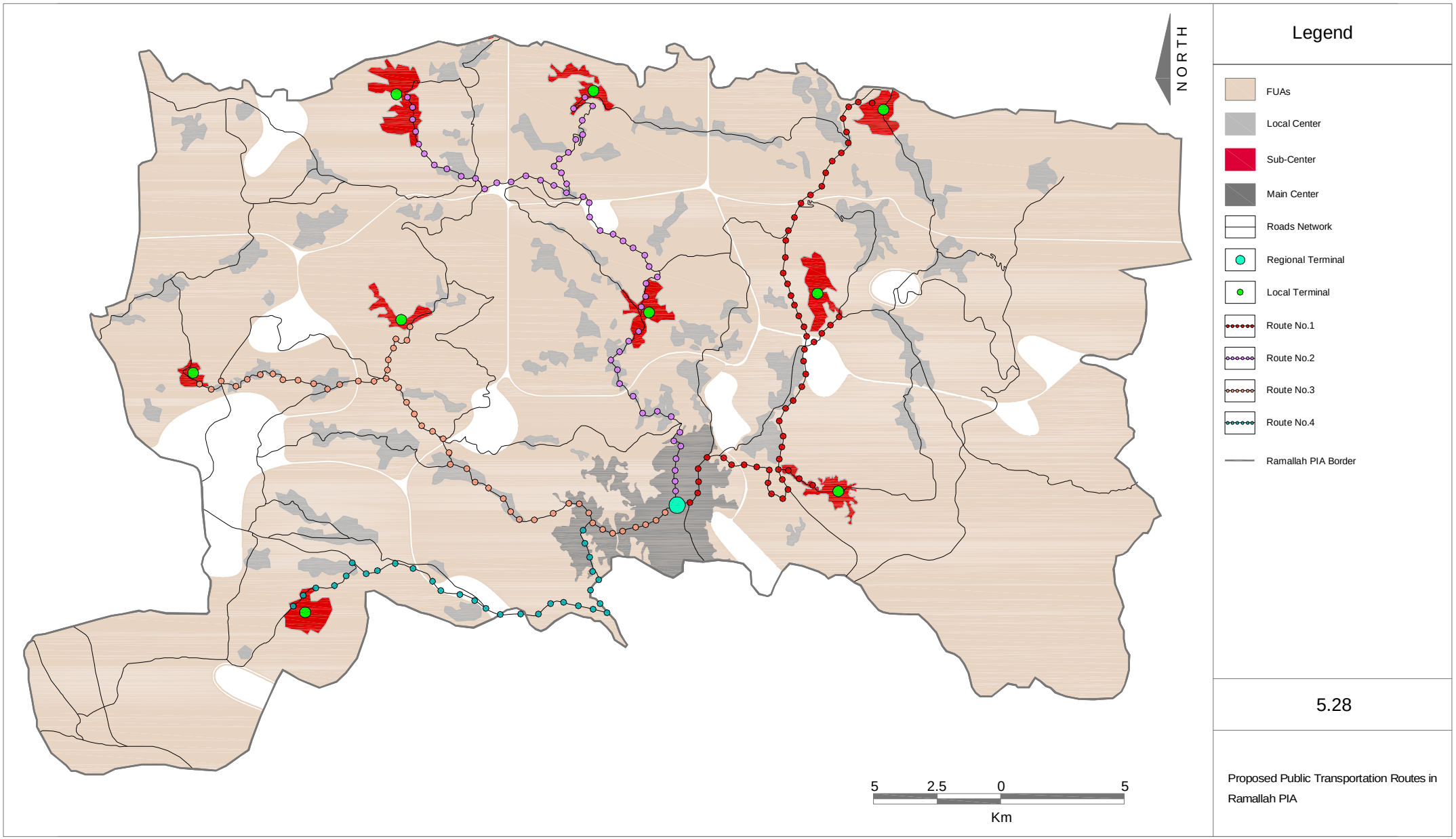
The proposed system in Ramallah PIA consists mainly of two parts; the bus stations and the public routes.

(Map 5.28) illustrates the public transportation system in Ramallah PIA; the map shows that the system consists of one central 'Main' bus terminal in the main center 'Ramallah', in addition to 9 local bus terminals in each sub- center, (see Tables 5.21). Accordingly; it contains 4 proposed routes which could cover the entire PIA. These routes are:

- Ramallah - Bit liqya
- Ramallah - Alitihad - Ni'lin
- Ramallah - Bir Zeit - Bani Zaid - Bani Zaid Ashrqyeh
- Ramallah - Dir Dibwan - Silwad - Turmosayya.

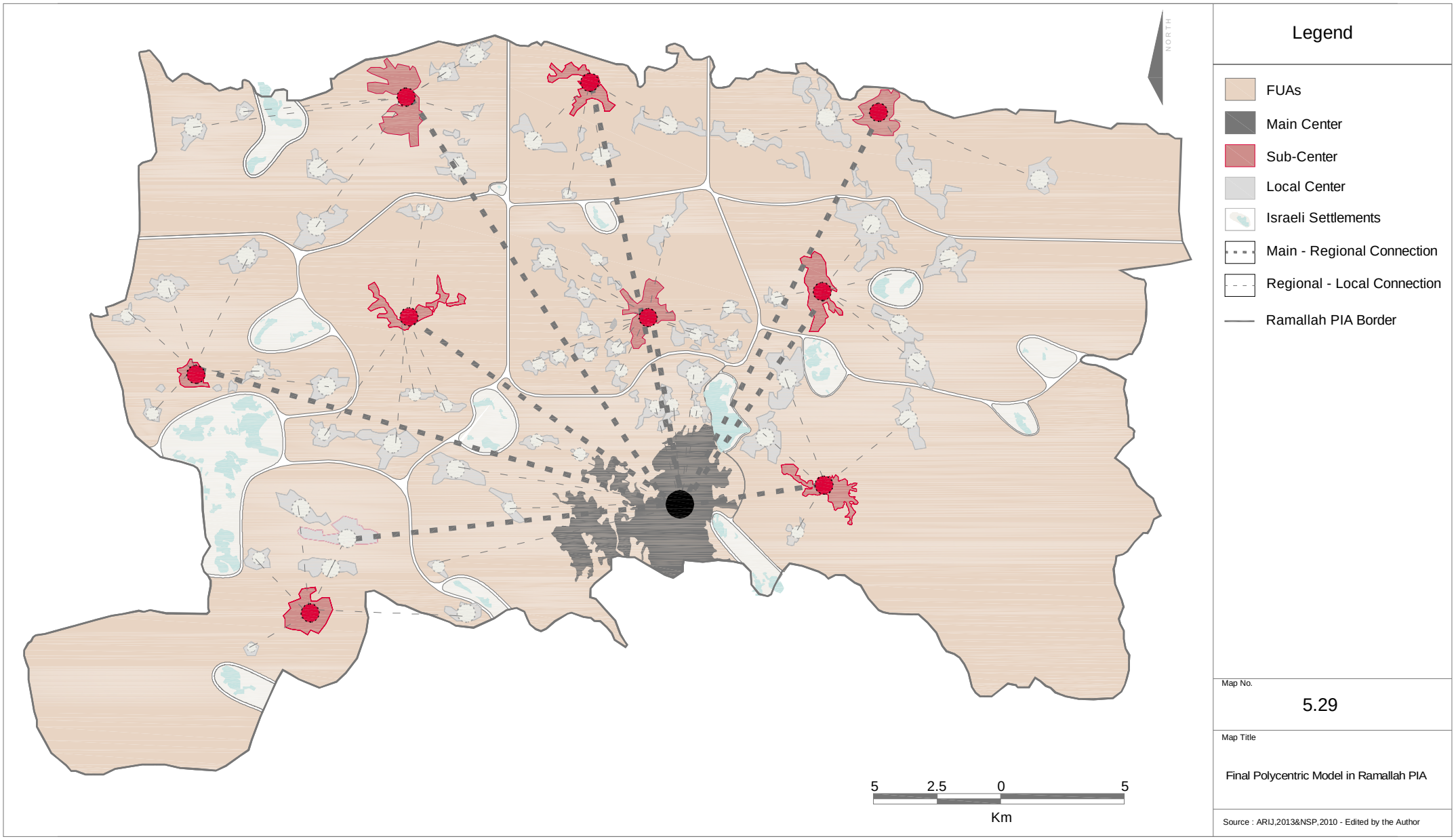
5.3.3 Ramallah Polycentric Region

(Map 5.29) shows the final model of Ramallah PIA after the application of the main components of polycentricity (morphological and functional) and the sub-components as well.



5.28

Proposed Public Transportation Routes in Ramallah PIA



Legend

- FUAs
- Main Center
- Sub-Center
- Local Center
- Israeli Settlements
- Main - Regional Connection
- Regional - Local Connection
- Ramallah PIA Border

Map No.

5.29

Map Title

Final Polycentric Model in Ramallah PIA

Source : ARIJ,2013&NSP,2010 - Edited by the Author

5.3.4 Conclusion

In particular; this chapter answers the main question of this thesis research, where it proved that the urban area of Ramallah Governorate (PIA) has the potential to be developed as a polycentric region with multi related sub- regional FUAs, connected to the main FUA.

The polycentric model has been applied to the study area (Ramallah Governorate) through its two components; the morphological and the functional components.

The chapter firstly introduced for the status of the study area, Ramallah Governorate, through an analysis for the related items and the required fields in terms of the structural and the functional contexts (based on the two main components of the model), then the adopted criteria lists for both components have been adjusted to be implemented in the study area.

Chapter Six
Conclusion and Recommendations

6.1 Introduction

This closing sense chapter aims at two main goals; the first is to close the picture along with the theoretical framework, through a scantly test for its effectiveness to meet its goals; while the second is to create a bridge between the planning ideas about the concept of polycentricity, and the real ground.

This chapter contains two main parts; the first discusses the possibilities of the model's generalization in other regions, while the second contains a list of key recommendations in order to promote this model as a new planning approach in the West Bank's regions.

6.2 Research Reflections

This research thesis set out to explore the feasibility of the implementation of the polycentric approach of planning in the West Bank. To answer the research question, four detailed aims were specified in the thesis introduction (see section 1.4). These research aims were revisited in this chapter to bring them together in concluding the research.

- ✓ **Research aim (No.1)** asked ' to develop a methodology to implement the polycentricity in the Palestinian context'.

  Overall, the methodology of the model's implementation has been drawn in chapter one and translated in the following chapters of the research. The proposed methodology has built through the analysis of two main foundations, the **study area** and the **polycentricity**, and the content of this thesis is an interpretation for the merge process between these two foundations, where the **polycentricity** model has been implemented in the **study area**. Moreover, this implementation carried out through two steps according to the scale of the study area, the first step provided an inclusive regional framework for the model, while the second applied the model in the lower regional/local scale.

  In particular; chapter two presented a general analysis framework of understanding for the Palestinian spatial and functional context, which has been introduced for the models application in the generic level of the West Bank in chapter four. While chapter five

provided a detailed (zoomed-in) analysis for the specific regional/local study area (Ramallah Governorate), which introduced for the models application in the local level (the main focus of this study) in the same chapter (chapter five).

Chapter three presented an analysis of the polycentricity, and found a logical breakdown for it; by analyzing its definitions, scales, components and concepts. The same chapter also set out a group of testable factors (criteria list), for testing the potential of the West Bank or it's certain regions to become polycentric, this criteria list have been followed in the model's application.

- ✓ **Research aim (No.2)** required a theoretical analysis to identify polycentricity and relate this analysis to criteria. Apparently; the process of making the criteria list (testable factors) has passed through several successive steps, as shown in chapter three and as listed below:
  - Theoretical analysis for polycentricity to create a framework of understanding for its concepts, definitions, levels, components and other related issues.
  - A logical breakdown for the model, to obtain the main criteria required for its implementation, in this context; chapter three produced two main criteria dimensions; the morphological criteria and the functional criteria.
  - Adoption process for the proposed criteria in order to fit the Palestinian context. in this step both the morphological and the functional criteria were divided into sub-components. The morphological contains three sub-components: (Centers Hierarchies, Centers Distribution, Centers Clustering). While the functional criteria contain two sub-components: (functions typologies and hierarchies, and the connectivity).

- ✓ **Research aim (No.3)** asked 'to combine different scales and levels of polycentricity with the current scales of the urban agglomerations in the West Bank '.

  Chapter four has been prepared to replay this research aim, where the different scales and concepts of polycentricity were redefined to match the current scales of the Palestinian agglomerations.

This combining between the model and the current status of the West Bank created an approach for the model's application within the selected detailed study area (Ramallah Governorate) in chapter five, and ensure its application within the correct framework.

- ✓ Finally; **research aim (No.4)** called for the 'discussion of the implications of the polycentricity model application in the Palestinian context and consider whether it could be applied and generalized for all the West Bank's regions or not'.

  Chapter five presented the steps of the application of polycentricity in the case study area (Ramallah Governorate) according to the proposed methodology of chapter 1 and the adopted criteria lists of chapter 3, whereby both components of polycentricity (morphological and functional components) have been applied to the study area, the outputs of these process presented by maps, figures, charts and tables, by which the feasibility of the model to be applied in the study area was improved.

  Furthermore, the study area (Ramallah Governorate / PIA) has been formatted to work as a polycentric region, this PIA contains one main FUA, and nine sub-regional FUAs (two of them was merged with the main center). Functionally; each sub- center of the sub-regional FUAs proposed to contain a certain level of functions to serve the population base associated to its hierarchical order.

  These FUAs were connected to the main FUA in one side, and to other sub-regional FUAs from the other side in order to activate the model and to support these new sub-centers (sub-regional FUAs centers) to serve their surroundings, in such a way that could develop these regions and reduce the pressure on the main center. Following sections of this chapter discuses a list of key recommendation to ensure the activation of the model, and to support it implications and generalization.

6.3 Application of Polycentric Model to Other Governorates

The application of the testable factors (criteria list) and the analysis methodologies have been restricted in this research to Ramallah governorate only. Certainly; it would be valuable to implement these criteria and methods in other governorates to allow a much border perspective about polycentricity model and its potentials in other urban context, and to compare trends in Ramallah governorate with other governorates.

The main question of this research refers to the Palestinian context, not Ramallah Governorate itself, such question cannot be answered by examining Ramallah governorate alone. The approach used in this research to develop the methodology components to Ramallah governorate could be very straightforward to be applied to other regions because of the similar conditions and urban statuses for these regions.

However, the application of the proposed methodology in the generic regional context could require a greater degree of interpretations as different governorates have different particular circumstances. Moreover; the application of the model in other governorate brings the chance to improve new measurements and comparisons between both PIAs, and creates the possibility to measure higher levels of polycentricity at the generic regional level (between PIAs), not only the regional/local level. Thus, the continuation of the polycentric analysis and implementation for other governorates would be very fruitful direction for other researches.

6.4 Key Recommendations

Building on the main findings of this research which extracted directly from the author's observations, the following key recommendations are proposed within namely outlined interventions according to two scales; the generic - national scale of the West Bank, and the lower sub-regional/local scale of the study area (Ramallah Governorate).

6.4.1 Generic - National Level

Following are the main recommendations on the national level, to apply the polycentric model :

- Assert the alteration of the current concentrated distribution of the main function in the main centers, specially the governmental institutions which employed and attracted the highest numbers of users per day, in order to get fair distribution of these functions between different centers of the West Bank.

- Adopt public capital investment projects for the development of the new FUAs specially for the sub- centers to ensure its implementation, according to the proposed distribution of the FUAs of the polycentric regions. And to ensure the change of the current concentration of the main functions within the biggest main centers.
- Develop the current transportation system, whereby a new railway system between the different PIAs of the West Bank could be proposed, to support the application of the model since it will guarantee the accessibility to all functions, and the activation of the model consequently.
- Support public transportation by the government institutions; in such a way that could be compatible with the proposed configuration of the model and centers hierarchies.
- Administrative borders between governorates will probably be unsubstantial, when the model be applied to other governorates, since local centers form certain governorate may be linked to a Sub-center in other adjacent governorate.

6.4.2 Sub-Regional/Local Scale

Following are the main recommendations on the sub-regional level, to apply the polycentric model :

- Orientate the future urban development and recognize the spatial structures in Ramallah Governorate within the proposed polycentric configuration of the main and sub-regional FUAs, stipulated from the analysis of chapter five.
- Create transit oriented nodes within the different levels of centers, to support the public transportation in the proposed FUAs.
- Develop a detailed land use plan for each sub-regional FUA to ensure the application of the polycentric model in the study area.
- Support the provision of the proposed functions in each FUA center and the other local centers by the governmental policies.
- Support the exploration of the future development for the blocked areas of the Israeli settlements between the FUAs of the model, to be a part of the model in the future.
- Provide evaluation mechanism that evidently reviews the efficiency of the model, compare and measure the degree of the obtained development through direct indicators.
- Ensure technical and financial support for the model's application within the study area.

- Create more public awareness about the sub-regional development.
- Modify the planning codes and laws, specially the administrative codes in order to match the new concepts of the Palestinian polycentric regions.
- Consensual policy that can merge between the current planning orientations of the Palestinian government with the proposed trends of the research, and this is applicable at the short term relative to the current merge trends, that provide an elusive entry way to change the current planning laws.
- New Sub-urban regions like Rawabi will be a part of the model in the future, these suburbs could be classified as sub-centers or local centers based on its functions and relations with other centers.

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