

The Impact of Urban Sprawl on Residents: The Case of Tuzla (Enkomi), Famagusta

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ABSTRACT

Currently many cities are affected by the fast expansion of urban areas towards their suburbia. In a planned way, urban growth is beneficial and supports the city development. Unfortunately, in most cases urban growth results in an uncontrolled suburban growth which leads to urban sprawl. Urban sprawl is a phenomenon that firstly occurred in the United States of America and currently is one of the most controversial problems that many developed and developing countries are dealing with.

The causes for urban sprawl can be seen mainly in rapid urbanization as a result of fast population growth. Urban sprawl is not just affecting the spatial form of the city, but also has negative environmental, social and economic impacts. In this sense, Cyprus is not an exception. Especially in the past decades, we come across with urban sprawl in the form of residential development, spreading outside the city over the existing landscape and transforming large amount of agricultural land into residential settlements.

This study is focusing on sprawl development in Famagusta and its suburban region, Tuzla area. This research is shaped based on a combination of different methodologies for analyzing urban sprawl. In this sense, descriptive methods are used to evaluate the literature in order to understand the phenomenon of urban sprawl. Moreover, exploratory methods are employed to explain urban sprawl in Famagusta, Tuzla region. Remote sensing database on ArcGIS and Google Earth Pro are used to measure the amount of urban sprawl, whereas observations, interviews

and a survey with residents are conducted to analyze the impacts of sprawl. The result shows that, urban sprawl is developing significantly since 2003 in the Tuzla region. Reasons for this development can be based on low land prices in suburban areas, as well as the Annan Plan which lead to a construction boom starting from 2004 and the already existing automobile dependency, as a consequence of minimum public transportation in the city itself. However, the assessment of the impacts reveals that in the case of Famagusta sprawl has no negative influence on social interactions and is not directly related to automobile dependency as the city in general has an insufficient public transportation system. Moreover, there is a high contentment among residents living in Tuzla.

Keyword: Urban Sprawl, Urbanization, Negative Impacts of Sprawl, Measurement of Sprawl, Tuzla, Famagusta

ÖZ

Günümüzde pek çok kentin banliyölerin oluşumuna imkan sağlayacak şekilde genişlediğini ve bu durumdan olumsuz etkilendiğini görmekteyiz. Öte yandan planlı gelişmenin kentsel büyümeye katkı sağlayacağı hatta kent gelişimini olumlu etkilediği yönünde görüşler mevcuttur. Ancak çoğu zaman kentsel büyüme kent çeperindeki banliyölerin kontrolsüz genişlemesine, dolayısı ile plansız, dağınık yayılmaya neden olmaktadır. Dağınık yayılma ilk kez Amerika Birleşik Devletleri'nde ortaya atılmış bir kavram olmasına rağmen bugün gelişmiş ve gelişen ülkelerin karşı karşıya olduğu en tartışmalı sorunlarından birine dönüşmüştür.

Kentlerde karşılaşılan dağınık yayılma biçiminin nedeni olarak temelde nüfus artışı kaynaklı olduğu düşünülen hızlı kentleşme gösterilmektedir. Kentsel yayılma sadece kentin fiziksel formunu etkilemekle kalmayıp, aynı zamanda olumsuz çevresel, sosyal ve ekonomik etkilere de neden olmaktadır. Bu anlamda, Kıbrıs bir istisna değildir. Özellikle son yıllarda, kentsel yayılma konut gelişimleri şeklinde karşımıza çıkmakta; varolan peyzaja yayılarak mevcut tarım alanlarını konut bölgelerine dönüştürmektedir.

Bu çalışma, Gazimağusa'nın yayılma dokusunu incelemekte ve özellikle Tuzla bölgesine odaklanmaktadır. Bu araştırma kentsel yayılmayı analiz etmek üzere farklı kombinasyondaki yöntemlere başvurmaktadır. Bu anlamda, öncelikli olarak kentsel yayılma kavramını anlamak için mevcut yazının değerlendirildiği tanımlayıcı yöntemleri kullanılır. Bunun yanında Tuzla bölgesindeki kentsel yayılmayı açıklamak için keşife yönelik metodlar kullanılmaktadır.

Kentsel yayılmayı ölçmek için ArcGIS ve Google Earth Pro Uzaktan algılama veritabanı kullanılırken, kentsel yayılma miktarı ise gözlem, kişisel görüşme ve anketler yolu ile ölçülmüştür. Sonuç olarak Tuzla bölgesinin 2003 yılından bu yana önemli ölçüde geliştiği ve dolayısı ile kentsel yayılmaya maruz kaldığı anlaşılmaktadır. Bu gelişmenin nedenleri arasında bölgedeki düşük arazi fiyatları; 2004 Annan Planı sonrası yaşanan inşaat patlaması ve ülke bütününe hakim olan asgari kamusal ulaşım ve azami motorlu araç bağımlılığı sıralanabilir. Etki değerlendirmesi sonucunda Gazimağusa kenti ile ilgili sosyal ilişkiler bağlamında herhangi olumsuz bir duruma rastlanmamış; kentin yetersiz kamusal ulaşım imkanlarına sahip olması yanında yayılmanın araç bağımlılığı ile direkt ilişkili olmadığı anlaşılmıştır. Bunun yanında anket sonuçlarına bakıldığında Tuzla bölgesi sakinlerinin memnuniyet derecelerinin yüksek olduğu görülmektedir.

Anahtar Kelimeler: Kentsel yayılma, Kentleşme, Kentsel Yayılmanın Olumsuz Etkileri, Kentsel Yayılmanın Ölçülmesi, Tuzla bölgesi, Gazimağusa

DEDICATION

I would like to dedicate my thesis to **my beloved Family**

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This study is the culmination of my hard work during two years of study on urban design, which I have fully enjoyed working on. First of all, I am greatly indebted to Prof. Dr. Naciye Doratlı from very preliminary stage of my study as she has a significant role in encouraging me to carry on with graduate study in Urban Design. She has also coined the urban sprawl ideas that inspired this thesis during the Culture and Cities (Arch651) course.

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Chapter 1

INTRODUCTION

Throughout the history, cities have always been the fundamental core for civilization. Cities are central to progress and development, and also have a crucial influence on their surrounding regions. Moreover, cities respond to the social, political as well as economical needs of the citizens. According to the United Nations, today more than half of the world's population live in cities and by 2050 it is expected to account for more than two-thirds of the world's population (United Nations, 2015). This fast growth of cities indicates that there is a worldwide shift from rural to urban living. However, due to this rapid increase in urbanization and city growth, cities worldwide are faced with several challenges and problems. As pointed out by Harris and Ullmann, during this development process many cities provide a poor environment for humans (Harris & Ullman, 1945). Additionally, the urban form is affected as the dimensions of the city increases. In other words, rapid city growth does not always result in a desirable environment; instead of a planned compact growth the outcome often is sprawl development.

As mentioned by Bhatta (2010), urban sprawl and urban growth are extremely intertwined to each other. Urban growth itself can occur without sprawling of the cities, when planned. On the other side, urban sprawl is always a result of the urban growth (Bhatta, 2010, p. 17). Urban sprawl observed for the first time in the United States by the early 20th century and is known therefore as an 'American

phenomenon'. Unfortunately, nowadays it becomes an epidemic problem for developed and developing countries throughout the world.

According to Galster (2001), sprawl is a label for diverse, predominantly negative conditions related to urban growth. Mainly it is characterized by low-density, fragmented and auto-dependent development pattern, which can either be residential and/or nonresidential development (Galster, et al., 2001; Soule, 2006). Urban sprawl is spreading out towards the edges of the urban centers and is getting an option for many middle income residents. Apparently, the majority of urban researchers and planners consider sprawl as an unpleasant and unsustainable form of development (Samarüütel, Steen Selvig, & Holt-Jensen, 2010). However, sprawl has not only negative effects on the urban form, but also impacts on social, economic and environmental issues related to the residents (Samarüütel, Steen Selvig, & Holt-Jensen, 2010). Accordingly, sprawl development is not only affecting the city as a physical entity, but also the life and behavior of the citizens.

1.1 Problem Definition

Based on the introduction section, urban sprawl as a phenomenon is observed in both developed and developing countries around the world with more or less impact on the city form and the residents living in 'sprawl areas', whereby, Cyprus is not an exception. Especially in the past decades, urban sprawl tendencies in the form of residential development, spread over the landscape and transformed the large amount of agricultural land and green field into residential areas in the form of single family houses. Hadjigeorgiou (2015) believes that "...Cyprus offers development opportunities to the citizens mainly through a continuous urban sprawl...". This study deals with the city of Famagusta and its suburban area in Tuzla. Especially, the

lack a of a master plan along with the limited number of regulations, mostly based on the local plans, resulted in new development at the outer ring of the urban area (Önal, Dağlı, & Doratlı, 1999; Hadjigeorgiou, 2015). In addition, it should be noted that specific political events on the island have a significant role in the further development trend of cities; for instance, the Cyprus conflict of 1974 brought a physical division of island, which negatively affected the social and economic structure of the city and consequently resulted in a decline of the city development. However, with the establishment of the Eastern Mediterranean University in 1979 has an important contribution to improving the overall social and economic structure of the city and resulted once more in an acceleration of the urban development, especially towards the university (Önal, Dağlı, & Doratlı, 1999; Oktay, 2005). Another important factor is an enactment of UN peaceful plan, the Annan Plan, in 2002 (public referendum in 2004), as possible step towards a reunification of the island, which has resulted in a construction boom and massive real estate investment in whole T.R.N.C (Yorucu & Keles, 2007). As a result, there is a visible rapid suburban growth starting from 2003 around Famagusta, especially towards Tuzla (Enkomi) area. Main contributors in this trend are especially real estate companies, while the nearby location of the Eastern Mediterranean University probably has been effective in this trend.

In most parts of the world, sprawl has association with different negative impacts on the social, economic and environmental issues (known as pillars of sustainable development) such as automobile dependency, social fragmentation, numerous health issue and etc. This research however analyses urban sprawl development in Famagusta, Tuzla with a focus on its different impacts on the residents. The main

consideration is to see, whether the negative impacts of sprawl on residents, put forward by many scholars and planners, are also valid for the residents of Tuzla.

1.2 Aims and Objectives

Within the framework drawn above, this study as an aim tries to consider the residential type of urban sprawl development in Famagusta suburban with emphasize on Tuzla (Enkomi) and its surrounding area. Therefore the main aim of this study is firstly, to provide a comprehensive overview of urban sprawl by discussing dimensions, characters and causes for urban sprawl referring to current literature. Secondly, the study aims to evaluate and analyze sprawl development in Famagusta suburban area, Tuzla region. The purpose of the case study is to evaluate the negative impacts of urban sprawl on the citizens in term of social, environmental and economic factors and discuss the results considering the general negative impacts of urban sprawl, which was put forward by scholars and researchers. Of course, such scope will facilitate the study to find the main impact of the urban sprawl for both citizens and city.

1.3 Research Question

According to the aims and objective which are mentioned above, this study addresses theory based as well as case based research questions with respect to the problem definition (Table 1). Responding to the Research questions is an important step toward evaluation of urban sprawl in Famagusta suburban.

The main research question is as following:

- What are the impacts of urban sprawl on the residents of Tuzla?

The sub- research questions are as following:

- What is urban sprawl?

- What are the impacts of urban sprawl?
- How to measure urban sprawl?
- How urban sprawl can be measured in Famagusta?
- What are the characteristics of urban sprawl in Famagusta / Tuzla?

Table 1: Research Questions

	Theory Based Questions	Case Study Based Questions
Main Research Question		What are the impacts of urban sprawl on the residents of Tuzla?
Sub-Research Questions	<p>What is urban sprawl?</p> <p>What are the impacts of urban sprawl?</p> <p>How to measure urban sprawl?</p>	<p>How urban sprawl can be measured in Famagusta?</p> <p>What are the characteristics of urban sprawl in Famagusta/ Tuzla?</p>

1.4 Research Limitations

Obviously, urban sprawl is a multidimensional phenomenon and it is not possible to consider the whole dimensions of urban sprawl. Therefore, this study will focus on four issues. Firstly, the focus is on the negative impacts of urban sprawl on residents in term of social, economic and environmental dimensions. Secondly, it is limited to the residential form of developments and considering those developments, which are largely constructed by the real estate companies. Thirdly, this study has an emphasis on residents who left the inner city and chosen Tuzla as living place. Finally, this study is limited within Famagusta municipality boundaries and considering urban sprawl in Tuzla region (except village core), because of its nearness to the city.

1.5 Research Methodology

Research methodology for this study is based on the combination of quantitative and qualitative research. This study is descriptive, explanatory and exploratory. The descriptive method has been used to describe urban sprawl as a phenomenon in a systematic and categorized manner, considering different characters and dimension of urban sprawl. On the other side, the explanatory approach was used to explain the Famagusta suburban development. This methodology evaluates the sprawling of the city with emphasize on the Tuzla region while considering the main causes for the sprawl development. Finally, the exploratory methodology put forward to discover the main difference between the urban sprawl in Tuzla area in comparison with anywhere else.

In this way for responding to the methodology, information on the topic urban sprawl and related issues was gathered by literature review. For this reason primary and secondary sources have been used such as books, scientific articles, relevant reports, useful news etc. In the second step a field study was done in Famagusta/Tuzla for gathering related data for the case study. This was done through a questionnaire survey, on-site interviews and observations, photographs and the analysis of several google satellite maps. The interviews were analyzed by using google survey analysis system.

1.6 Research Structure

The study consists of four chapters as shown in Figure 1. Chapter one introduces the general idea of this study, also it discusses the urban sprawl and points out the main research problem and design the main questions as well as the aims and objective of this study, Moreover, this chapter sets the objectives to be realized and highlight the

methodology of this study. Chapter two is a literature review about urban sprawl in general. It explores urban sprawl definitions, drivers and impact and considers the proper measurement for urban sprawl. In addition, this chapter analyzes recent European and American examples of urban sprawl. In chapter three, the Tuzla area in Famagusta suburban will be introduced. The case will be evaluated in line with the findings of the literature review in terms of measuring, characteristics and impacts of urban sprawl in Tuzla. The measurement will be done by using the remote sensing data and GIS. The main focus is on the assessment of the negative impact of sprawl on the resident. Chapter four is the conclusion chapter which presents the research finding and concluding the study.

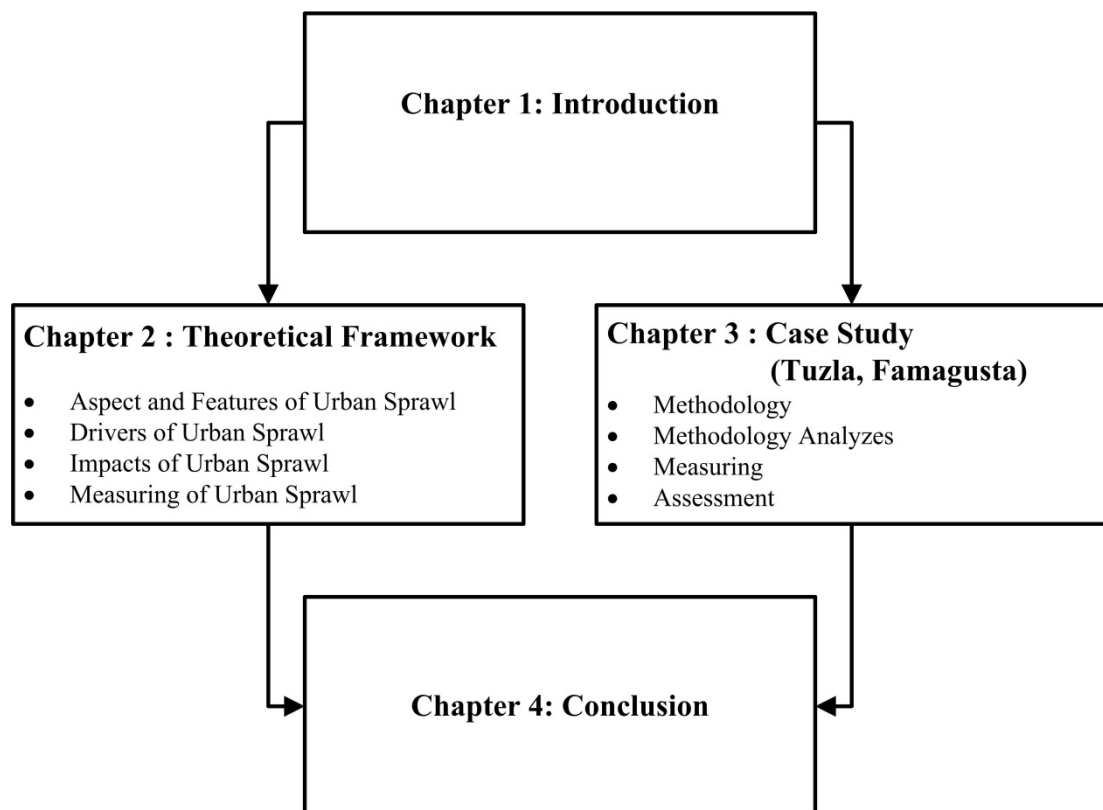


Figure 1: Research Structure (Author)

Chapter 2

URBAN SPRAWL: THEORETICAL FRAMEWORK

In the following chapter the term urban sprawl will be introduced as a part of the main research problem. A brief history of city development from urbanization to current sprawl will be reflected. Definitions, measurement techniques and impacts will be discussed by referring to scholars in the literature. In addition, several examples of sprawl development in Europe and USA will be introduced.

2.1 Introduction

All around the world cities are in a process of change and growth. As population is increasing, consequently the demand for housing and other facilities to fulfill the needs of the residents are also increasing. Population growth forces municipalities and city planners, to investigate new developments, thus, new constructions appear in the sub-urban area of the cities, which appears as urban sprawl development. As a result fragmented developments are replacing the scenic landscapes. Sprawl does not occur just as residential development, but can have a variety of forms. Many downtown stores become abandoned and transferred to shopping malls; low density housing development spread into the landscape and in this way the implementation of public transportation, because of the low density. Consequently lack of public transportation increases the automobile dependency. As a result, the CO₂ emission is increasing and this directly affects the quality of the life. As mentioned by Nelson et al., the challenges, cities are facing today, are mainly related to the quick suburbanization and development after the second World War in USA (Nelson,

Sanchez, & Dawkins, 2007, p. 1) and later, like an epidemic trend became global issue. Of course it's obvious that, whenever development tempo increases and is also associated with low density development; this process can be categorized as an unsustainable form of development, whereas the compact and arranged development might be named a sustainable development, also known as urban intensification or urban containment (Cuthbert, 2006, p. 163 and 169).

In this sense, it should be noted that, growth and development of the city is not the main problem, however the main challenge is the management of the development in way that with minimum cost providing maximum benefit for citizens (Nelson, Sanchez, & Dawkins, 2007, p. 1).

2.2 Suburbanization and Urban Sprawl

According to the historical records, industrialization started from mid of the 18th until early 19th centuries in the north of USA as well as Britain and later occurred in other parts of Europe. During this period most of the people migrated from the rural to the urban areas and fundamentally the trend was mainly towards the metropolitan area. It's obvious that, this process increased the amount of the population in urban areas and consequently this trend resulted in urbanization. Along with this, the cities start to grow especially towards the urban fringe as well none-central areas. This process established the suburbanization (Tammaru, Kulu, & Kask, 2004). Hence, suburbanization can briefly define as an expansion of the city towards the suburban and exurban area (Figure 2).

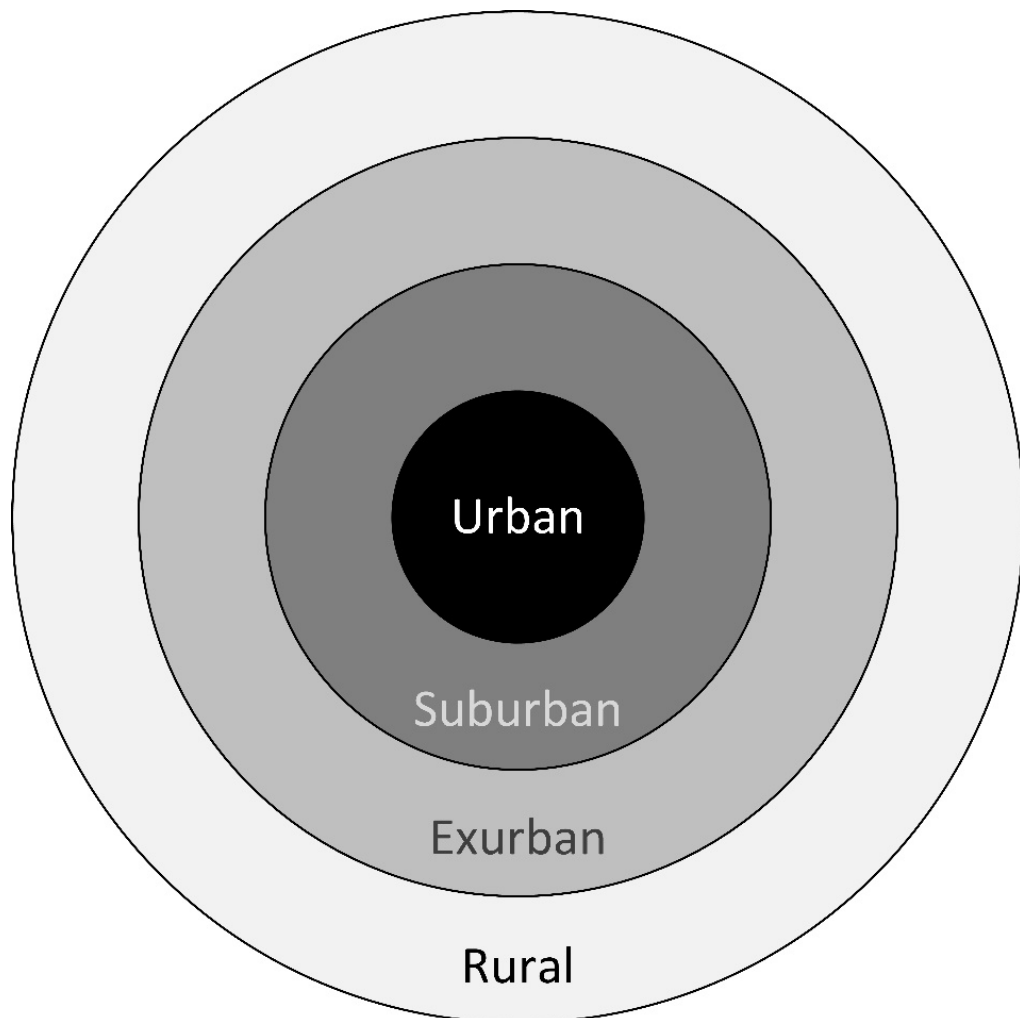


Figure 2: Urban, Suburban, Exurban and rural (Author)

According to Lang & Miller (1997, p. 39) both urbanization and suburbanization occurred parallel at the same time. However, suburban development has an eventful history. During the pre-industrial period there were few numbers of the suburban communities and later by 19th century, suburbs known as the small town based on the agricultural and trade with a weak access to the city, such as unpaved roads to the city (Baldassare, 1992). In fact the first attractive suburb in the world developed in the USA, before the American civil war in New Jersey (Jackson, 1985, p. 76). The turning point for suburban development was the invention of the trolley by late 19th century. This inexpensive public transportation tool started to tie cities together, and

most citizens start to explore the other part as well as the far neighborhoods of the city (Jackson, 1985, pp. 112-118).

By the early 20th century, with the invention of the automobile, massive investment in the development of the infrastructure, such as new roads and pavement of existing dirt roads, started and resulted in suburban boom (Jackson, 1985, pp. 157-162). Osborn correctly stated that, "...these new forms of transportation...were used...to facilitate the sprawling of suburbs..." (Osborn, 1965, p. 15). As the number of cars was limited at the beginning of the 20th century, the development of the commuter towns, which are also known as bedroom community and in some extent are similar to the garden city development, started to develop. These developments are far from the central business district and in some instance even out of the city boundary. Most of these development contained detached houses and were characterized by their small size and density. Most of the inhabitant of these town were white ethnic, family oriented and from the middle class of the society (Baldassare, 1992). Later, by 1920's suburban development started at the metropolitan fringe as cars get cheaper and suburban life become more attractive. In both America and north part of Europe, many people especially those who belong to the powerful and wealthy group of the society rush to the suburban. Later, during the London interwar about thousand modest income families left the congested inner city and start to immigrate to the urban periphery, mainly settled in row houses, semi-detached and detached houses. Fundamentally, most of these houses follow six to ten units per acre and such density was extremely low in urban standard of the Britain. Still in those days suburbia population are less than urban areas. However it is confirming the rapid suburbanization in those critical periods. On the other hand suburbanization drawn attention from the public and become a utopian by politicians, planner as well as

developers (Bruegmann, 2005, p. 33; Jackson, 1985, pp. 174-175; Baldassare, 1992). Of course suburban development is not limited to the European and US cities. Most of the countries after Second World War start to developed modern suburban capital city, for instance India and Brazil also seeking for the suburban development (Buder, 1990, p. 199). However, suburban development during the time has a profound change from the main figure. Fundamentally, suburban development approach of today is completely in contrast to the suburban development before World War 2. It is obvious that the philosophical approach of the garden city with combination of the necessary function for life such as the restaurant, office, school, library, bank, store and public transportation with housing opportunity for different array of society was not applicable. It seems that suburban development become more formless and transforms into scattered, low density and single use developments (Morris, 2005, p. 5). Gradually the density of the suburban development becomes lower than at its beginnings. From 1950 until 1960 suburban was separated greatly from the central business district. Suburban living become a desirable solution for escaping from the congestion of the city. Many people start to buy houses in large plots in suburban areas, whereas the job still has a tendency to stay in core of the cities. In the US, many people become every day commuter from urban to suburban, as the suburban population rise from 35 million to 84 million people (Baldassare, 1992), As a consequence, suburban development resulted in sprawl development, with purely residential developments, low density, and high rate of auto-dependency and also the house owners bought more automobiles for commuting to the surrounding in order to find daily life necessity (Saunders, 2005, p. VII). For instance in American become more sprawl alarming rate and most of the city transformed into more and more sprawl development (Hamidi, Ewing, Preuss, & Dodds, 2015). By 1990's urban

sprawl as a phenomenon has started to draw the attention of many city planner and scholars; still urban sprawl is controversial in terms of definition and measurement and is on the agenda of many of the international planning debates (Siedentop, 2005). However, it's obvious that for having a clear understand of the urban sprawl topic, it's required to consider different component of suburban development as there is a strong relationship and overlap.

2.3 Main Types of Suburban Development

According to many scholars and urban planners, suburban development can be identified based on five different components: **Housing Development, Shopping Centers, Office Park, Civic Institutions and Roadways**. Although these components are describing more or less suburban development, they are also valid for sprawl development. Their main characteristic is that they develop separately from the other components (Duany, Plater-Zyberk, & Speck, 2000, p. 5; Williamson, 2010, p. 25).

Housing Developments

This component is also known as housing subdivisions and regarding to their developer sometimes are named as cluster, neighborhoods and pods. These definitions are of course misleading, as all these terms were used exclusively for the complete community, where people can find all the necessary functions for daily life. However within this kind of housing development, just residential building and housing units are available (Duany, Plater-Zyberk, & Speck, 2000, p. 5).



Figure 3: Iskele Long Beach housing development (URL 08)

Shopping Centers

Shopping Centers are another important component of the suburban development. They are also called shopping malls, big box retails and strip centers. Nonetheless, their main characteristic is that they are mainly large, single level box-like buildings with huge parking opportunities in between. In fact, these places are different in size and shape, and fundamentally this kind of shopping center is not offer walking opportunities for the users as everything is indoor and excluded from other uses. Basically lack of nearby housing and office units make it distinguishable from the traditional shopping street (Duany, Plater-Zyberk, & Speck, 2000, p. 6), which was embedded into the city environment.



Figure 4: 1001 Airport Mall in Nicosia main road (URL 06)

Office Parks

For working activity, suburban development offers the office parks and business parks. Such development is a result of modernist architecture, which is based on the free standing building apart from the city center in parks. This type of contemporary development can be defined as working place development in parking lots, which is separated by nature and kept its idealistic name as well as quality of isolation. However, in practical manner mostly these developments are surrounded by traffic arteries (Duany, Plater-Zyberk, & Speck, 2000, p. 6).



Figure 5: Birmingham Business Park secures BT letting (URL 12)

Civic Institutions

This is the 4th component of suburban development. Civic institutions represent the public buildings for the suburbia in form of churches, schools, town halls as well as any other places for gathering people for cultural or communicational purposes. In a traditional tow, this kind of building is considered as focal point for the neighborhoods or cites. However, in suburban development, mainly because of the limited funding and high land costs in inner cities, it is transformed into a free standing building. Even the size of them become smaller and their identifiable feature are again large parking lots (Duany, Plater-Zyberk, & Speck, 2000, p. 6).

Roadways

The last component of the suburban development is roadways in general, which consists of kilometers of asphalt pavements. This is the vital component in suburban development, since all function of life in suburban development become separated

and as far as daily life required an array of activities, this component is used for connecting the other four separated functions with each other. Of course this function makes people more auto depended; in fact, unprecedented amount of money, petrol and time spend during the commute between the other components of suburban area and of course it generates high amount of traffic, because most of the vehicle are single occupied (Duany, Plater-Zyberk, & Speck, 2000, p. 7; Williamson, 2010, p. 25).



Figure 6: Nicosia main arteries, T.R.N.C (URL 07)

2.4 Urban Sprawl

According to the historical records the earliest use of the word ‘sprawl’ in term of land use dates back to the 1937 speech of Earl Sumner Draper, the Director of planning in Tennessee Valley Authority “Perhaps diffusion is too kind a word ... In bursting its bounds, the city actually *sprawled* and made the countryside ugly ...

uneconomic [in terms] of services and doubtful social value” (Greenwood & Holt, 2010, p. 178; Nechyba & Walsh, 2004; Brown, 2016, p. 159; Wassmer, 2002).

“...Most people don’t believe that they live in sprawl. Sprawl is where other people live, the result of other people’s poor choices...” (Bruegmann, 2005, p. 18).

Literature review indicates that defining urban sprawl is difficult. In fact, most scholars define urban sprawl as a negative form of development. Furthermore, many scholars as well as researchers are against urban sprawl, while city planners as well as authorities’ attempt to control urban sprawl. However, there is no doubt that many people live in urban sprawl and this resulted in cautious performance in many policy makers and politician (Soule, 2006, p. 3; Torrens, 2008). Most of the time urban sprawl occurs, because of the geographical enlargement of urban areas which occurs faster than it population growth (Williamson, 2010, p. 24) and obviously the urban sprawl developments occur in unplanned and unauthorized context (Bhatta, 2010, p. 7) which affect urban, suburban and rural area (Soule, 2006, p. 3). The main problem can be found in a lack of common understanding in the subject of urban sprawl. Lack of common understanding always is accompanied with problems in order to analyze urban sprawl in terms of driver, cost and impact, and formulation the appropriate strategy for later developments toward the three sustainable pillars of economy, environment and social aspects (Siedentop, 2005).

Nonetheless, there is not a comprehensive definition of sprawl yet. Most scholars approve that urban sprawl is a multidimensional phenomenon and the best method for measuring and defining it, is a combination of its dimensions (Hamidi, Ewing, Preuss, & Dodds, 2015). In this sense Galster, et al. (2001) believe that urban sprawl

can be defined based on the following categories: 1. An example can define and embody the characters of urban sprawl like Los Angeles, 2. Aesthetic judgment can be used to interpret the general pattern of urban sprawl development, for instance ugly development, monotonous development etc.3. Relevant cause as well as the externality of urban sprawl can be used to define urban sprawl, for instance commuting from inner city to urban sprawl, lack of infrastructure etc., 4. Some independent indicator can affect urban sprawl; in this case urban sprawl can be defined accordingly, for instance poor local authority decisions and/or town planner effect, 5. Existing pattern of development can be used for urban sprawl definition, for instance scatter, leapfrog, strip development, row housing, detached housing development and etc., 6. Urban sprawl as a process can be defined over the time, this means that considering expansion of the city over a specific time period.

However, the complexity of urban sprawl subject resulted in a variety of publication with numerous definitions in relation to the specific context and research area. On the other hand, most of the scholars have an attempt to offer their own interpretations considering the scope of their studies. In this sense, this study attempted to gather different definitions from well-known scholars (Table 2) and establish a comprehensive definition considering the characters of urban sprawl. By studying and comparing all gathered definitions of sprawl (Table 2), sprawl can be identified as **low density, leap-frog, scattered, single-use, auto-depend and strip development**. Table 3 compares all definitions and emphasizes repetitive and significant keywords used by scholars to define sprawl.

Table 2: Different Definition of Urban Sprawl

	Scholar	Definition	Characteristics
1	Ewing, (1997)	“The forms of development most often characterized as sprawl are: (1) leapfrog or scattered development, (2) commercial strip development , or (3) large expanses of low-density or single-use development”	<ul style="list-style-type: none"> • leapfrog or scattered • commercial strip development • low-density • single-use
2	Sierra Club, (1998)	“Sprawl is low-density development beyond the edge of service and employment, which separates where people live from where they shop, work, recreate, and educate - thus requiring cars to move between zones”	<ul style="list-style-type: none"> • low-density development • separates ...live from ...shop, work, recreate, and educate • requiring cars
3	Duany, Plater-Zyberk, & Speck, (2000, p. 4)	“sprawl is not healthy growth ; it is essentially self-destructive. Even at relatively low population densities , sprawl tends not to pay for itself financially and consumes land at an alarming rate, while producing insurmountable traffic problems and exacerbating social inequity and isolation”	<ul style="list-style-type: none"> • not healthy growth • low population densities • consumes land • traffic problems
4	Galster, et al., (2001)	“Sprawl (n.) is a pattern of land use in a UA that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses, and proximity. ”	<ul style="list-style-type: none"> • low levels density • low levels continuity • low levels concentration • low levels clustering • low levels centrality • low levels nuclearity • low levels mixed uses • low levels proximity
5	Gillham, (2002, p. 8)	“Sprawl (whether characterized as urban or suburban) is a form of urbanization distinguished by leapfrog patterns of development, commercial strips, low density, separated land uses, automobile dominance, and a minimum of public open space ”	<ul style="list-style-type: none"> • form of urbanization • leapfrog patterns of development • commercial strips, low density • separated land uses, automobile dominance • minimum of public open space
6	Ewing, Pendall, & Chen, (2002, p. 3)	“the process in which the spread of development across the landscape far outpaces population growth. The landscape sprawl creates has four dimensions: a population that is widely dispersed in lowdensity development; rigidly separated homes, shops, and workplaces; a network of roads marked by huge blocks and poor access ; and a lack of well-defined , thriving activity centers, such as downtowns and town centers. Most of the other features usually associated with sprawl—the lack of transportation choices , relative uniformity of housing options or the difficulty of walking —are a result of these conditions”	<ul style="list-style-type: none"> • development across the landscape • lowdensity • separated homes, shops, and workplaces; a network • poor access • lack of well-defined • lack of transportation choices • difficulty of walking
7	Burchell, Lowenstein, Dolphin, & Galley, (2002, p. 2)	“Sprawl is low-density, leapfrog development that is characterized by unlimited outward extension . In other words, sprawl is significant residential or nonresidential development in a relatively pristine setting”	<ul style="list-style-type: none"> • low density • leapfrog • unlimited outward extension • residential • nonresidential development
8	Johnson & Klemens, (2005, p. 4)	“Sprawl is a dispersed pattern of single-use, low-density land uses , most evident as developments of large-lot, single family homes, office campuses , and strip malls It frequently leapfrogs , jumping beyond established settlements onto farm ”	<ul style="list-style-type: none"> • dispersed pattern of single-use • low-density land uses • office campuses • strip malls • leapfrogs...settlements onto farm

9	Burchell, Downs, McCann, & Mukherji, (2005, p. 12)	“The three traits used to define sprawl here include (1) unlimited outward extension into undeveloped areas , (2) low density , and (3) leapfrog development . Sprawl also includes strict segregation of housing and commercial development, often through the construction of standardized development types, automobile dependence , and fragmented planning and governance”	<ul style="list-style-type: none"> • extension into undeveloped areas • low density • leapfrog development • segregation of housing and commercial • automobile dependence • fragmented
10	Morris, (2005, p. 17)	“1. Low density design. Sprawl is tens of thousands of physically autonomous residential subdivisions developed at low densities and spread over the landscape . 2. Lack of multi-use development patterns . With no corner stores, cafés, restaurants, offices, public buildings. 3. Automobile dependence . With the functions of life spread all over the landscape , cars are the only practical mode of transportation in sprawl. 4. Gridlock . Subdivisions in sprawl are accessible by a hierarchy of feeder roads that offer few interconnected, alternative routes. 5. Inadequate public transit . Mass transportation is scarce in sprawl, except for infrequent bus service along major arteries”	<ul style="list-style-type: none"> • Low density over the landscape • Lack of multi-use development patterns • Automobile dependence • spread all over the landscape • Gridlock • Inadequate public transit
11	Soule, (2006, p. 3)	“Sprawl is low density, auto-dependent land development taking place on the edges of urban centers , often “leapfrogging” away from current denser development nodes, to transform open, undeveloped land, into single-family residential subdivisions and campus-style commercial office parks and diffuse retail use”	<ul style="list-style-type: none"> • low density • auto-dependent • edges of urban centers • leapfrogging • single-family residential • commercial office parks
12	European Environment Agency, (2006, p. 6)	“sprawl as the physical pattern of low-density expansion of large urban areas, under market conditions, mainly into the surrounding agricultural areas . Sprawl is the leading edge of urban growth and implies little planning control of land subdivision. Development is patchy, scattered and strung out, with a tendency for discontinuity. It leap-frogs over areas, leaving agricultural enclaves”	<ul style="list-style-type: none"> • physical pattern • low-density expansion • surrounding agricultural areas • edge of urban growth • little planning control • patchy, scattered...leap-frogs
13	Hamidi, Ewing, Preuss, & Dodds, (2015)	“The definition ultimately adopted by the State encompassed the following urban forms: (1) leapfrog or scattered development , (2) commercial strip development , (3) expanses of low-density development , and (4) expanses of single-use development (as in bedroom communities, regional malls, and business parks)”	<ul style="list-style-type: none"> • leapfrog or scattered development • commercial strip development • low- density development • single-use development

Table 3: Urban Sprawl Main Characteristics

	Scholar	Low Density	Leapfrog Scatter	Single Use	Auto-depended	Commercial Strip Development
1	Ewing, (1997)	X	X	X		X
2	Sierra Club, (1998)	X		X	X	
3	Duany, Plater-Zyberk, & Speck, (2000, p. 4)	X	X			
4	Galster, et al., (2001)	X		X	X	
5	Gillham, (2002, p. 8)	X	X	X	X	X
6	Ewing, Pendall, & Chen, (2002, p. 3)	X	X	X	X	
7	Burchell, Lowenstein, Dolphin, & Galley, (2002, p. 2)	X	X	X		X
8	Johnson & Klemens, (2005, p. 4)	X	X	X		X
9	Burchell, Downs, McCann, & Mukherji, (2005, p. 12)	X	X	X	X	
10	Morris, (2005, p. 17)	X	X	X	X	
11	Soule, (2006, p. 3)	X	X	X	X	X
12	European Environment Agency, (2006, p. 6)	X	X			
13	Hamidi, Ewing, Preuss, & Dodds, (2015)	X	X	X		X

Urban Sprawl Forms

As mentioned beforehand, urban sprawl can be perceived in different ways and result in diverse interpretation. However the comparison of definitions and characteristics indicate that, the characteristics of urban sprawl are a result of the form of development. As summarized by Gillham urban sprawl as a development form occurs in four different forms: low density development, leapfrog development,

single use development and commercial strip development. In the following the different spatial forms of sprawl will be introduced (Gillham, 2002).

Low-density Development

One important indicator for sprawl is low density development (Figure 7). Low rise buildings with large gardens and single uses generally characterize low density. Large amount of independent residential housing units with parking lots and roadways shape urban sprawl. In fact, sprawl in term of density is not similar neither to the older cities with its own attractiveness and comfort nor to the rural area with family houses. Low density of urban sprawl is also known as poor accessible development. Low density is measured by considering the population density in relation to the amount of the specific land area (Morris, 2005, p. 17; Gillham, 2013, p. 382; Hamidi, Ewing, Preuss, & Dodds, 2015).



Figure 7: Low density development and single use development (URL 09)

Leapfrog / Scatter

This kind of development means that, each subdivision such as housing development, shopping center, office park and civic institutes *leapfrogged* to the forest and farmland. Such development which is mainly considered as unhealthy, based on the land consuming, is most of the time is developing haphazardly. A main characteristic is scattered development surrounded by vacant land. Of course, in many cases the reaming gaps between developments and vacant land will be later filled later with new development. Fundamentally it can be stated, that most of the rapid development in suburban and exurban is following this pattern (Gillham, 2013, p. 381; Hamidi, Ewing, Preuss, & Dodds, 2015). One of the biggest problems of this kind of development is auto dependency and the long distances to shops, working

places etc. A typical leapfrog development can be seen in Figure 8 with a highly isolated settlement.



Figure 8: Leapfrog development subdivision near farm (URL 10)

Single Use Development

Low density urban sprawl is always associated with separation of land uses. In this sense, the land uses become disconnected from each other and most of the time they are kilometers apart from each other and this make people travelling between different uses. In fact, the main problem in sprawl context is the absent of restaurants, cafés, stores and public buildings. Basically, sprawl development is deliberately based on the housing development and unfortunately most of the time the fragmentation of land uses are intentionally and formalized based on the laws subdivision and followed by planners (Morris, 2005, p. 17; Gillham, 2013, p. 382; Hamidi, Ewing, Preuss, & Dodds, 2015). In this way, residential developments are

build next to each other, and in the same context shopping malls are constructed next to other malls and continually space become more segregated (Burchell, Downs, McCann, & Mukherji, 2005, pp. 13-14).

Commercial Strip Development

According to the Hamidi, Ewing, Preuss, & Dodds (2015) commercial strip development is another form of sprawl, which indeed is not new. In this case, the consumer is passing by several uses which are located next to each other. However nowadays, most of this stores are not separated anymore, but gathered in huge shopping centers. In fact, this kind of development mostly appears across the main arteries and are visible from a distance with the help of huge logos to represent the group of shopping centers, office complex, rows of ATM, gas station, fast food restaurant etc. In short, commercial strip development appears in form of box-like buildings, surrounded by huge amount of parking lots, where sidewalks are minimized and movement along them is only possible by automobile (Gillham, 2013, p. 381).

According to Table 3 summarizing the mentioned characters, it seems that, most of the scholars agreed that urban sprawl is a *low density, single use* and *commercial strip development* which is *leapfrogging* towards the urban fringe and automobile make this development practical.

As mentioned beforehand, urban sprawl development is associated with land use segregation and whenever the function of daily life spread over the landscape, the automobile is transformed as the main and most important transportation tool for this kind of development. Obviously, suburban development is supporting automobile

dependency which on the other hand is encouraging suburban development and it's obvious that over the past decade the amount of highway development increases. As a result of the frequent use of automobiles for all needs, social isolation of inhabitants occurs. Moreover, lack of public transit is another important issue which is also resulting in increasing the automobile dependency in suburbia. In fact, implementation of public transportation in suburban sprawl development, because of the segregation of uses, become impractical (Morris, 2005, p. 17; Behan, Maoh, & Kanaroglou, 2008).

2.4.1 Drivers of Urban Sprawl

There are lots of drivers for both urban growth and urban sprawl. In most of the cases it is impossible to differentiate them, since both sprawl and urban growth become highly interlinked. However, if the cities development process becomes coordinated, the outcome is compact development otherwise the result is sprawl (Bhatta, 2010, p. 17). In fact, literature review shows that there are various drivers causing sprawl (Harvey & Clark, 1965; Squires, 2002, p. 6; Burchfield, Overman, Puga, & Turner, 2006). Though, as the main focus of this thesis is related to the impacts of sprawl on residents, the drivers will merely briefly explained. Therefore, the main arguments gathered by Bhatta, will be used in this part of the thesis to give an overview of the most important drivers, which can be categorized as socio-economic, socio-demographic, infrastructure and transportation and planning issues (Bhatta, 2010).

Socio-Economic Factors

One of the important drivers for the uncontrolled development of the cities are economic factors. *Expansion of the economy*, for instance increasing the level of per capita income, resulted in create the new housing demand, as well as new housing space for the individuals. On the other hand, to provide space for the new users most

of the developer companies encourage rapid development. Additionally, *industrialization* is another factor which also resulted in expansion of the economy, In this sense, any new kind of industry established especially in the countryside, may have as a result the expansion of city. Fundamentally, all industry requires housing units together with providing the necessary facilities for the workers and of course such developments require land more than the industry area. For instance in Atlanta the capital of Georgia in the US (Figure 9), rapid growth together with diverse kind of economy and industry resulted in increasing the per capita wealth and this in future resulted in the regional affluence and consequently become a center for high tech economy. As a result, about 650,000 people moved to the area and 350,000 new jobs were offered. Consequently, such growth resulted large areas of low density developments (Brookings Institution Center on Urban and Metropolitan Policy, 2000).



Figure 9: Atlanta Urban Sprawl (URL 05)

Another important reason is the *lack of affordable housing in the inner cities*. This is an important factor as it is encouraging developers to start developing toward the suburban. From another point of the view most of the urban residents are looking for cheap settlement. As a consequence, developers start to offer them attractive housing units with minimum prices in the countryside as the agricultural *land is cheaper* and therefore more attractive.

Socio-Demographic Factors

Different demographical factors and different expectation concerning the living place are also considered as causes for uncoordinated and unplanned development of the cities.

One of the important reasons of urban growth is the *population growth*. However rapid population growth accelerates the urbanization and growth process, and in fact population increase should be controlled and coordinated, otherwise urban growth can result in sprawling the cities. Moreover, rapid growth of cities has other strains. Governments should provide sufficient amenities and facilities for citizens to deal with sudden population increase. For instance energy, transportation, security, healthcare, sanitation have to be considered and insufficient support of these basic needs again may result in serious problem to the environment (Bhatta, 2010, pp. 18-20). Consequently, if not provided people move towards the suburbia.

Another factor is the *preference of the residents*. Many residents living in the core of the urban areas always deal with lack of sufficient space for living. Additionally, many prefer to live near the city, but in a greener environment. Most of the suburban residents lived before in the inner neighborhoods, before they have decided to move outside the centers. In fact, living retreats and desire to have more privacy together with proximity to the nature most of the time are the main reasons for escaping from the inner city. However, still other factor such as traffic congestion, high amount of pollution etc. are important factors for moving from urban to the suburban regions.

Infrastructure and Transportation

Transportation in its turn, become an important factor for sprawling the cities. In fact, the innovation of transportation reduced the cost of commuting sharply. As cars are affordable for most of the people, they provide the development opportunity for suburban living. Also most of the workers can gain higher quality of life for their families in suburbia while they working in inner cities (Kahn, 2006, p. 111; European Environment Agency, 2006, p. 17). Thus considering transportation and

realizing the facilities for the neighborhoods, connecting urban and suburbia become important and essential (Bhatta, 2010, p. 24). Roads are the main components of the transportation system and these linear routes open the access from the cities to the suburban and exurban. In fact, the developing construction of accessibility resulted in quick spreading of the cities as well as inner cities congestions. Moreover roads as an important component can accelerate the urban sprawl development. In this sense, most of the planners, for prediction the sprawling trends, consider the roads as an important factor for their models (Bhatta, 2010, p. 24).

Planning Issues

Rapid *urbanization* in most of the countries is the biggest threat to the open spaces. In order to preserve these open spaces, many countries and cities start to develop relevant policies to protect open spaces and regulate construction activities. However, in this context most of the theoretical and the econometric study depict that, enactment of such policies resulted in reducing the housing development density and consequently encourage development extensive. In this sense more amount of land requires and obviously this is not balanced with the housing demand and thus urbanization and policies are causing in this way city sprawl (Lichtenberg, 2011).

Most of the uncontrolled developments of the cities happen because of the *lack of a proper planning and policies*. Also lack of enforcement and implementation consequently resulted in numerous problems. Therefore, considering the regulatory framework become agenda for most of the developing countries. It's obvious that out of the city boundary the regulation control become minimized and most of the time the regulation are loosely. Such irregular basements provide suitable places for many individuals and developers to start new constructions. From another point of view,

lesser and loosely regulations even in cities provide different problem for the future of sustainable and compact developments of the inner cities (Bhatta, 2010, p. 24). On the other hand, decision making mostly occurs in context with *lack of master plan* and as an outcome such uncontrolled, uncoordinated and unplanned decisions for future planning mainly resulted in sprawling the cities (Bhatta, 2010, pp. 20-21).

2.4.2 Impacts of Urban Sprawl

Literature survey reveals, that urban sprawl can result in numerous impacts and consequences. Similar to the controversies in the definition of sprawl, there are different opinions in term of defining the suburban sprawl impacts .However, there is an agreement among the scholars, that sprawl has positive as well as negative impacts, whereas the negative impacts have more weight (Bhatta, 2010, p. 28). In addition, the negative impacts of sprawl are categorized and emphasis is set on different aspects. Soule (2006, p. 5) considers five factors such as *fiscal, aesthetical, public, health and elitist dimensions* (Soule, 2006, p. 5). Burchell, et al. (1998) considers the impacts of urban sprawl by evaluating *suburbia development costs, transportation and travel costs, land / natural habitat preservation, Quality of life; and social issues*. Others merely focus on *environmental issues* or *health concerns* of the residents. (Burchell, et al., 1998, p. 41&43; Kahn, 2006, p. 113; Soule, 2006, p. 5; Wilson & Chakraborty, 2013). A more comprehensive approach is developed in current research, thus, the impacts of sprawl are considered under three main categories: *socio, economic and environmental* impacts (Fan, Wang, Qiu, & Wang, 2009; Bhatta, 2010, p. 28). Hence, this research is considering the above mentioned more general classification for evaluating the impact of sprawl and tries additionally

2.4.2.1 Economic Impacts

This group of impact considers the economic impact of urban sprawl from two perspectives: public and private. From the *public* perspective, operation cost for public issues like roads, sewer and water systems, as well as the necessary maintenance and relevant expenditures are considered, whereas the *private* operation costs deals with the occupancy and construction cost of commercial, industrial and residential housing units. In fact this part mostly consider the cost and cause as well as the different density and form of the development in metropolitan area (Burchell, et al., 1998, p. 45). Economic costs are related to higher infrastructure costs, higher public operating costs, increase of development expenses, more adverse public fiscal impacts, higher aggregate land costs, higher amount of travel costs and higher energy consumption costs.

Higher Infrastructure Costs

The higher infrastructure costs of sprawl occur for several reasons. For sure each component of infrastructure such as sidewalks and curbs as well as roadways etc. needs a high level of development density. Since urban sprawl is associated with segregation of the land uses, a parallel infrastructure system is need for different uses. Moreover, scattered form of development which is far from the existing development, need to provide additional and affordable infrastructure system (Burchell, et al., 1998, pp. 46-49).

Higher Public Operating Costs

It's obvious that, the per capita cost is directly related to the density of the growth and inversely associated with rate of the growth. In other words, higher density is related with the higher amount of per capita. However, rapid and fast development

associated with less amount of per capita, and consequently suburban sprawl and any other low density development represent the low amount of per capita. Thus, because of the duplicate administrations in low density developments, more amount of operating costs are generated in low density development than in high density development (Burchell, et al., 1998, pp. 50-51).

Increase in Development Expense

Urban sprawl usually is resulting in nonresidential and residential development in large lots, which is less expensive. Controversially, developments in big plots in the city are the most expensive types of development. Since most of development occurs in low density context, minimizing number of floors, the ratio of the structure size to the construction become inappropriate and these resulted in increasing the expenses of development. In addition, developments need zoned land; therefore, the amount of available zoned land which is indicated by local zoning ordinance become important. As in many cases the amount of available zoned land is inappropriate, for residential or nonresidential purpose, the cost of development increases. Also, the excessive regulations for development permits is consuming time and consequently increase the cost of project (Burchell, et al., 1998, pp. 52-53).

More Adverse Public Fiscal Impacts

Fiscal impact hierarchy depends to the form of development. Obviously, urban sprawl development creates more negative fiscal impact than compact development. As it is mentioned before, urban sprawl generates the high amount of public operating costs and therefore, the amount of revenue which is collected from the residents is not enough to cover public costs. Of course, in compact development the costs of infrastructure is minimized, as it is most of the time already existing, which

is a positive impact to the fiscal. On the other hand, if the new development is located in proximity of the existing development then less amount of financial support is required to extend the infrastructure to these developments (Burchell, et al., 1998, pp. 54-55).

Higher Aggregate Land Costs

Urban sprawl and any low density development consume the higher amount of the land. In this sense, urban sprawl for specific amount of population need more land than compact development. Fundamentally, because the average land price in suburban is less expensive, suburban development unwarily consume higher amount of land than compact development. In addition, in suburban development there is a lack of policies for encouraging the intensification of developments. Therefore, unlike smart growth, most of the development occurs apart from each and this results in decreasing of development density and consequently waste high amount of land; which in turn generates an increase in land cost (Burchell, et al., 1998, pp. 57-58).

High amount of Travel Costs

Low density development requires more amount of vehicle miles traveled than compact form of development. Fundamentally, more amount of vehicle mile traveled requires more amount of the road to be constructed and consequently high amount of green land transformed into roads and required infrastructure. From another point of view, such greenfield transformation to the hard surface later resulted in lack of soil permeability and consequently increase the flood risk. Furthermore, high amount of the cars require to the commuting and these are associated with increase the CO₂ and greenhouse emission (Burchell, et al., 1998, pp. 61-62; Kahn, 2006, p. 116). Of course urban sprawl need more time to spend for travel and *Longer Travel Time*

(Burchell, et al., 1998, p. 64). Motorized vehicles are almost the single choice in urban sprawl and this associated with *More Automobile Trips* (Burchell, et al., 1998, p. 65). Of course high amount of automobile dependency *Increases Transportation Expense* (Burchell, et al., 1998, p. 66). In short, the *Cost-Efficient and Effective* in urban sprawl in comparison to the compact development is reduced (Burchell, et al., 1998, p. 67; Kahn, 2006, p. 116).

Higher Energy Consumption

Another important issue which is associated with urban sprawl is high energy consumption. Firstly, because of the unsustainable mode of transportation which is related to the urban sprawl, the amount of the oil consumption increase (Burchell, et al., 1998, p. 91). Secondly, most of the developers in order to decrease the construction costs use unsustainable material which is later resulted in increasing the energy consumption for cooling and heating.

2.4.2.2 Environmental Impacts

Urban sprawl has different negative impacts to the environment. However this part attempts to focus on the main ones such as : Natural Habitat Preservation, Loss of Agricultural Land, Reduced Farmland Productivity, Loss of Environmental Lands, Less Historic Preservation and More Air Pollution.

Loss of Agricultural Land

First of all urban sprawl removes more amount of the primary agricultural land from the agriculture than compact developments. The main reasons are, firstly, in low density development, because of its scattered character, most of the adjacent land cannot be used efficiently as farm land. Secondly, urban sprawl, mainly single family houses, requires more amount of land for garden and front yard than in compact

development. Thirdly in suburban areas, because of the low land prices most of the land speculators start to collect and assemble the farmland and later sell them as construction land to the developers (Burchell, et al., 1998, pp. 73-74).

Reduced Farmland Productivity

In addition, farmland productivity due to proximity to the scattered urban sprawl development are enormously reduced. Especially, the implementation of required farming operation is difficult as large lots are subdivided to small parcels for residential purposes and continuous farm land, which reduces the efficiency of the mechanized agriculture such as difficulties in movement of agricultural machine, water supply etc. However such circumstances are not sustainable for active agriculture and decreases the farmland productivity (Burchell, et al., 1998, p. 75).

Loss of Environmental Lands

Urban sprawl is also responsible for destruction of the lands in the fragile environmental. Lack of awareness and the misjudgment of local governments in many cases are causes for degradation of the natural environment through sprawl. In most of the case local government are not concerned about the importance of sensitive lands and developing land uses (Burchell, et al., 1998, p. 78).

Less Historic Preservation

Another result of urban sprawl is lack of historical building preservation. As urban sprawl encourages people to leave inner neighborhoods and move to the suburban, historic preservation gets less important. From another point of the view, different regulation as well as the policy and barriers make rehabilitation and revitalizing more difficult. From the another side, most of the time because of the older inner

neighborhoods the next building or adjacent building structure are weak and this make refurbishing more difficult and increase the cost as well, therefore mostly community prefer to leave the old structure building and choose the sprawl town (Burchell, et al., 1998, p. 92).

More Air Pollution

Low density development are related with high amount of the driving and commuting, because of the life function had distance from each other and life need to acquire basic home necessities. Therefore, high amount of the driving require and increase the vehicle mile traveled which is associated with increasing the CO₂ and greenhouse emission and also resulted to increase the total air pollution. Also most of the study demonstrate that increasing the urban sprawl significantly contribute to diminish the air quality (Burchell, et al., 1998, p. 91; Buzbee, 1999-2000; Wilson & Chakraborty, 2013). For instance according to the Kahn studies (2006, pp. 113&115-116) most of the time suburbanites has own sports utility vehicles and this number also increase, from another point of view the amount of the emissions in this type of vehicle are more than saloon car, also same study reveal that, from 1950 till 1994 in US the number of vehicle mile traveled about 140% increase, however, in same time population 50% increase, in the following, study reveal that annual household vehicle mile travel in US 14% increase as well as the reduce the quality of life.

2.4.2.3 Social Impacts

This part considers the main problem of the urban sprawl in term of the social issue. Since uses distance in suburbia made people chaffer, therefore this make problems for especially teen and elder those who can use automobile to reach for the nearest leisure facility there for its effect negatively their life, this part considering on the: Quality of Life, Aesthetically Displeasing and Weakened Sense of Community, of

course social issue can cover the Fosters suburban exclusion, Foster Spatial Mismatch, Foster Residential Segregation, Worsens City Fiscal Stress and Worsens Inner-City Deterioration which are out of this study scope.

Quality of Life

According to the Felce & Perry “Quality of life is an elusive concept approachable at varying levels of generality from the assessment of societal or community wellbeing to the specific evaluation of the situations of individuals or groups.” (Felce & Perry, 1995).

Quality of life is one of the complex topic which is broadly encompasses. Therefore, most of the scholar grapple to measuring and monitoring of the relevant attributes of it. Still a minor amount of the studies are focusing specifically on the quality of life and most of the studies deal generally with this topic in term of suburbia. However, it should be noted that low density single use residential development based on the automobile dependency would have negative impact on quality of life. But still overwhelming of the study in sprawl subject considers the negative impact of the low density development to the environment and economy. Despite considering the urban sprawl impact to the quality of life in this study become vital (Burchell, et al., 1998, p. 83). For sure quality of life has different domains, for instance: physical wellbeing, material wellbeing, social wellbeing, development and activity and emotional wellbeing (Felce & Perry, 1995), but since this study consider the quality of life in suburbia, looking toward quality of life should be considering the following issue:

- Social livability
- Economy viability
- Environmental sustainability

Aesthetically Displeasing

Fundamentally, low density developments in suburban are aesthetically minimize and provide the less cultural opportunities in comparison to the compact development. Of course the important factors in quality of life for any community are the cultural and aesthetic satisfaction of the resident during the daily life. In fact the satisfaction of the people was deriving from their surrounding environment. In this sense, sprawl developments are monotone architecture with lack of landmark and total absence of the civic space as well as the minimized in the pedestrian path ways. In fact till now there is only a few agreement about the urban sprawl development are the less pleasing than the smart growth and compact city pattern and in practical the literatures are fail to demonstrate the casual relation between low density development and aesthetically less pleasing, because there are the numerous example for the unattractive inner neighborhoods. However still the numbers of example from the low density environment which are aesthetically displeasing get weight (Burchell, et al., 1998, pp. 84-85). From another point of view, since urban sprawl associated with high amount of chauffeuring in monotone, unattractive sprawl development and this resulted in psychological stress of the commuters. Also there are some studies which are demonstrated that high amount of stress also effect on the jobs satisfaction of the sprawl commuters due to the different work absences such as illness, traffic congestion ad etc. (Burchell, et al., 1998, pp. 88-89). Urban sprawl even was not summarized with the stress, even associated with obesity, minimize the exercise, different pain related to the chest as well as the back ache and also increase the risk of cardiovascular (Frumkin, Frank, & Jackson, 2004, p. 186).

In urban sprawl development most of the local governments because of the fiscal pressure to them are unwilling to devote the resources to create the regional open

space for the sprawl resident. There for instead of the regional open space most of the time the amount of pocket parks in the region increase (Burchell, et al., 1998, p. 79).

Weakened Sense of Community

One of the big problems for the low density development is the lack of connection to the surrounding neighborhood and the large metropolitan's community. These problems in sprawl development make the resident more isolated from community and decrease the opportunity for socialize. In fact sprawl is reducing resident linkage. Of course this weak linkage is not summarized base on the neighbors. This also visible among the nearby metropolitan area and fundamentally the lack of the sociability because the low density developments are always automobile oriented rather than foot or pedestrian oriented. From another point of the view, this shortage linkage also visible in metropolitan area because of the governance and fiscal resource fragmentation, consequently this resulted in loss of the community sense. However in the compact development because of the walking, shopping opportunity transaction occur between the urban resident and this resulted in social interaction as well and increases the sense of community. From another point of the view sprawl not only weak in the neighborhood transaction, even between the families member in sprawl residence lack of transaction and lose of sensing community visible (Burchell, et al., 1998, pp. 86-87).

In the following table the negative impacts of sprawl from economic, environmental and social perspective are summarized (Table 4).

Table 4: Negative impacts of sprawl based on economic, environment and social

	Urban Sprawl Negative Impacts
Economic	Higher Infrastructure Costs Higher Public Operating Costs Increase Development Expense More Adverse Public Fiscal Impacts Higher Aggregate Land Costs High amount of Travel Costs Higher Energy Consumption
Environment	Loss of Agricultural Land Reduced Farmland Productivity Loss of Environmental Lands Lessened Historic Preservation More Air Pollution
Social	Quality of Life Aesthetically Displeasing Weakened Sense of Community

2.4.3 Measuring of Urban Sprawl

As mentioned before, urban sprawl is a multidimensional phenomenon, and still there is no agreement among scholars in terms of comprehensive definition, drivers and impacts etc. However, it should be noted that especially measuring urban sprawl is a challenging process and currently a variety of techniques and technologies are offered for measuring and monitoring of the sprawl development. Some of this methods are based on the remote sensing data as well as different geographical information system (GIS) application. Others are based on the use of specific indicators for describing the landscape characters, such as the fragmentation of the different land pattern. However, many scholars agreed in a combination of the different methods and variables as helpful tool to clarify the urban sprawl trends (Barnes, Morgan III, Roberge, & Lowe, 2001).

In the early attempt for measuring the spread of urban sprawl, most of the researchers and scholars limited the measurement on the density analysis, because the density is

known as the most obvious indicator; of course density still is an important dimension of the urban sprawl (Hamidi, Ewing, Preuss, & Dodds, 2015), but later on other dimensions were added. Literature review indicates, that the first multidimensional and wide-ranging measurement of urban sprawl was developed by Galster, et al. (2001). They measured urban sprawl based on eight dimensions, such as density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity. Another multidimensional attempt for urban sprawl measurement was introduced by Ewing, Pendall, & Chen (2002). They combined 22 variables into four groups. Four factors which are residential density, neighborhood mix uses, strength of activity centers and high accessibility of street, were considered to analyze urban sprawl.

Similar to the problems in the definition of urban sprawl, there is no any comprehensive measurement criterion for measuring amount of sprawl among researchers. In this sense, Bhatta, Saraswati, & Bandyopadhyay (2010) believed that sprawl can be measured absolutely or relatively. Absolut measurement can sharply specify the urban sprawl from the compact development, whereas, relative measurement can measure several quantitative attributes of the urban sprawl. This type of measurement can apply based on different zones, cities, time and etcetera. (Bhatta, Saraswati, & Bandyopadhyay, 2010). For sure, most of the studies measuring urban sprawl relatively and more conceptually. In this sense, studies employee the available variable for measurement. According to Frenkel & Ashkenazi (2008) most of the studies for sprawl measurement are common in **growth rate, density, spatial geometry, accessibility and aesthetic measures**. In this study, the measurement dimensions are taken as a base and will be used later in the case study to analyze sprawl. The four dimensions will be shortly introduced in the following.

Growth Rates

The growth rate shows the amount of the population or individual in specific place and periods of the time and it's calculated based on the initial population. Fundamentally, the growth rate always refers to the population change in specific periods of the time. However, the growth rate in term of the urban sprawl can define as situation which is growth rate in suburban in periods of the time are higher than the population growth in inner central cities in the same time period (Frenkel & Ashkenazi, 2008).

Density

Density of the development is most crucial factor for measuring the amount of sprawl, As Hamidi, Ewing, Preuss, & Dodds (2015) mentioned "Low residential density is on everyone's list of sprawl indicators". Fundamentally the density defined as the proportion among the certain kind of activity such as the residential units, number of dwelling or employees and the area which is these activity it take place on it. However, density in terms of urban sprawl development known as a condition which is density of activity in specific periods of the time relatively to the existing center decrease, fundamentally the density gradient to the suburban decrease (Frenkel & Ashkenazi, 2008), and most of the time the concentration of new development happen around the specific points which is consider as density concentration (Galster, et al., 2001).

Spatial Geometry (Continuity - Diversity)

Most of the geometric measures are adopted based on the ecological research or the fractal geometry. In fact both, ecological and geometric measures of the urban landscape are common in two characters of configuration and compositions.

Configuration is related to the geometry of the buildup area, whereas the composition is related to the degrees of heterogeneity. In this sense, geometry configuration of the sprawling refer to the irregular configuration such as scattered and fragmented (some of the scholar consider it as continuity), and the composition of the sprawling consider the land use composition. In fact the percentage of the different land use can represent the level of landscape heterogeneity (some scholar consider this feature as diversity) (Frenkel & Ashkenazi, 2008).

Accessibility

Most of the scholars consider accessibility as an important factor for measuring the amount of sprawling. Urban sprawl is in general related to poor accessible conditions, which results in auto dependency. In short as Al Gore vice president of the United States in his speech by 1999 mention that "...A gallon of gas can be used up just driving to get a gallon of milk..." The accessibility of urban sprawl development from the inner cities can be measured based on the house hold travel time, road area, road lengths and etc. (Frenkel & Ashkenazi, 2008).

Aesthetic Measures

Finally, sprawl sometimes is considered as monotone, homogenous and boring form of development. Of course such definitions are more subjective definition of the urban sprawl. Therefore, nowadays some of the scholar has attempted to give very fundamental forms of definition to it, like residential urban sprawl, single use development, strip mall and etc. (Frenkel & Ashkenazi, 2008), but it should be noted that the aesthetic measurements are important feature and should not be considered only as a activity pattern in term of land uses etc. In fact considering both physical form and activity pattern, as two important factors of legibility are important (Bently,

Alcock, Murrain, McGlynn, & Smith, 2005) and therefore the aesthetic value of urban sprawl also can be considered as an important fact for measuring urban sprawl.

The above presented attributes for measuring the sprawl are the most recent dimension and also will be used in the case study part to evaluate the existence of sprawl in selected area of Tuzla.

2.5 The Summary of the Chapter

After the industrial revolution, many cities started facing rapid urban growth which gradually led to urban sprawl; finally leading to growing problems in most of the cities. As most scholars believe that urban sprawl is a multidimensional phenomenon; until till now there is neither a clear definition of the terminology nor common agreement on what drivers and impacts of sprawl are as well as how it should be measured. In fact, the main problem is that urban sprawl is dependent on different fields of study; therefore different perspectives result in various interpretation of urban sprawl. However, there is an agreement that urban sprawl is the result of unplanned fast urbanization and a form of sub urbanization, which has negative impacts on social, economic and environmental issues.

This chapter firstly focuses on the way cities grow and point out two types of city development; one being compact and smart growth which involves more sustainable development and the other is sprawling towards the suburban and exurban. The study discusses rapid urbanization which resulted in suburban development. In the thesis, five main components of suburban development is introduced. For sure, urban sprawl is a controversial form of development and various definitions from different perspectives make this topic even more complex.

This chapter reviews the most important urban sprawl definitions and finds out that **Low-density development, Leapfrog / Scatter, Single Use Development and commercial Development** are the main form of urban sprawl. In addition, the main drivers of urban sprawl in term of Socio-Economic, Socio-Demographic, Infrastructure and Transportation and Planning Issues are discussed.

Since this study aims to discuss the negative impacts of urban sprawl, the more comprehensive study by Burchell, et al. (1998) which considers the impact of urban sprawl based on **the Economic, Enviromental, Social Impact** will be used in the analysis of sprawl in Famagusta.

In the last section, measuring of urban sprawl is discussed in detail. As there is not any clear agreement on what urban sprawl is, the study attempts to apply practical methods for measuring urban sprawl. This study is based on five dimensions of Frenkel & Ashkenazi (2008) as **Growth Rates, Density, Spatial Geometry, Accesibility and Aesthetic Mesures** and later use for measuring urban sprawl in case of Famagusta.

Chapter 3

ANALYZING URBAN SPRAWL IN TUZLA, FAMAGUSTA

As it is mentioned in chapter two, the urban sprawl is still a controversial phenomenon and the countless amount of research on the topic points at different aspect of urban sprawl. It is obvious that urban sprawl can be seen in both developed and developing countries and therefore Cyprus is not an exception. As mentioned previously, during the past decade most of the real estate companies in T.R.N.C started to produce mass housing, especially single-use houses, mainly along the Mediterranean coast line as well as across the main arteries towards the suburbs of main cities. Therefore, this chapter aims firstly to depict the amount of sprawling in Famagusta at the selected area as well as different impacts of urban sprawl in terms of social, economic and environmental aspects. In this respect, a questionnaire survey, observations and interviews are used to evaluate sprawl development in Tuzla.

3.1 Famagusta

Famagusta (Turkish: Gazimağusa) city (Figure 10) is known as the third largest city of Northern Cyprus, situated at eastern coast line of the island. Famagusta city has an eventful history, and it is also known as an important center for tourism and trade throughout the history of the island. Its main features today are the historic walled city, the harbor and the Eastern Mediterranean University. In 1974, as a result of an internal conflict between the two ethnic groups, the Greek and Turkish Cypriots, the

island was divided into two separate states with their own governmental organization. After the 1974 conflict, most of the cities in North Cyprus, same as for Famagusta, started to accommodate the wide range of resident which are including local Turkish Cypriot plus those who immigrated from southern part of the island as well as people from different regions of Turkey. In addition, the population of the city has increased, with the establishment of the Eastern Mediterranean University in 1979. It makes Famagusta a host for many students and instructors from different countries all around the world. Famagusta within the municipality boundary has 40,920 population, which are distributed into 17 zones, including urban, suburban and rural areas [TRNC Population Census, 2011] (2013). The population of the city by 2006 was 35,785 and in fact during 5 years since 2006 until 2011 the population of city has increased by 14,35% (Table 5). Of course, the amount of population increase in both urban and suburban area indicate that, the city is dealing with a rapid urbanization and suburbanization.



Figure 10: Cyprus Map and location of Famagusta (Author)

Table 5: Famagusta Municipality Population

	Regions	2006		2011		Growth Rate (%)
		Populations	%	Populations	%	
1	Sakarya	5,362	14.98	7,647	18.69	42.61
2	Karakol	5,585	15.61	7,046	17.22	26.16
3	Çanakkale	2,309	6.45	4,114	10.05	78.17
4	Dumlupinar	2,702	7.55	2,940	7.18	8.81
5	Tuzla	1,877	5.25	2,645	6.46	40.92
6	Baykal	3,136	8.76	2,574	6.29	-17.92
7	Canbolat	2,151	6.01	2,460	6.01	14.37
8	Zafer	2,065	5.77	2,027	4.95	-1.84
9	Lala Mustafa Paşa	2,482	6.94	1,836	4.49	-26.03
10	Anadolu	1,340	3.74	1,508	3.69	12.54
11	Suriçi	2,026	5.66	1,476	3.61	-27.15
12	Piyale Paşa	1,657	4.63	1,220	2.98	-26.37
13	Namik Kemal	1,083	3.03	1,117	2.73	3.14
14	Pertev Paşa	710	1.98	1,026	2.51	44.51
15	Harika	393	1.10	651	1.59	65.65
16	Mutluyaka	404	1.13	407	0.99	0.74
17	Kapalı Maraş	503	1.41	226	0.55	-55.07
	Total	35,785		40,920		14.35

In other words, such a population increase also raises the demand for new housing developments. The university establishment affected the overall social and economic characteristics of the city in a significant way. From another point of view, it resulted in rapid and unique expansion of the city (Önal, Dağlı, & Doratlı, 1999; Oktay, 2005). It is obvious that the rapid expansion of the city was not in the same pace with population increase or industrialization rhythm of Famagusta, but was the result of the establishment of Eastern Mediterranean University. From another point of view,

the city with especial cultural and tourism characteristics has served a specific potential for tourism activities. Therefore, these two reasons together resulted in quick expansion of the city during past decade (Oktay, 2005). From another point of view, lack of regulations regarding the current condition of the city – most of the planning and architectural regulation inherited from the British period which are enacted in 1946 – paved the way for any kind of individual and fast development (Hoşkara, Çavuşoğlu, & Öngül, 2009). In addition, another condition which accelerated the development and resulted in construction booms in the whole of T.R.N.C is the enactment of UN peace plan in 24 April 2004, known as the Annan Plan. According to Yorucu & Keles (2007) “The Annan Plan has had a major impact on the property market in Northern Cyprus. It has directly led to a huge investment in real estate...” the UN peace plan resulted in all other subsector boom such as the commercial, industry and tourism. However, the main stream was on the rapid construction, as such during 2004 the volume amount of material used for construction sector such as iron, wood and cement significantly increased which is a proof for the construction boom in the island as well as Famagusta (Yorucu & Keles, 2007). As a result it can be stated that the construction boom and the population growth have an important impact on the sub urban development of the city.

3.2 Methodology for the Case Analysis

In line with the main aim of this study, which is to analyze sprawl development in Tuzla area of Famagusta and to evaluate the impacts on residents living in Tuzla, data was collected through geographical information system (GIS), observations, interviews and questionnaire survey. Firstly, with the help of Google Earth Pro and ArcGIS programs, maps of the city from 2003-2016 is analyzed to document the growth of the city. Secondly, the developed dimensions by Frenkel & Ashkenazi

(2008), for measuring sprawl, as Growth Rate, Density, Spatial Geometry, Accessibility and Aesthetic Measures are used to measure urban sprawl in Famagusta area. Finally, for assessing the impacts of sprawl on people, criteria, which are developed by Burchell, et al., (1998) are used as a basis to evaluate the impact of urban sprawl on the resident of the selected case area. Table 6 summarizes the criteria and tools for the assessment.

Table 6: Methodology for assessment

Analysis	Assessment Criteria	Tools
Measurement of Sprawl	<ul style="list-style-type: none"> • Growth Rate • Density • Spatial Geometry • Accessibility • Aesthetic Measures 	Statistics GIS, Google Earth Pro GIS, Google Earth Pro Available Maps Pictures
Impacts of Sprawl	<ul style="list-style-type: none"> • Economic • Social • Environmental 	Observation Interview Questionnaire

Tuzla Region

As mentioned in research limitation, this study is limited to the residential form of development in Famagusta area, namely Tuzla region, and considers those developments constructed by the real estate companies which are Turan Kaynak development, Halken development, Jakaranda houses, Gossip development and Gün Işığ Tuzla houses development (Figure 11). These developments are built starting from 1994. “Turan Kaynak Sitesi” is one of the oldest and well-known, which is constructed in 1994 on approx. 56,896 m² with 63 buildings such as detached, semi-detached and apartment units. One of the more recent developments is the Gün Işığ Tuzla houses development. It consists of 31 buildings with seven different plan

solutions. In addition this development offers a large private area for the community with green spaces; sport facilities and children play ground.

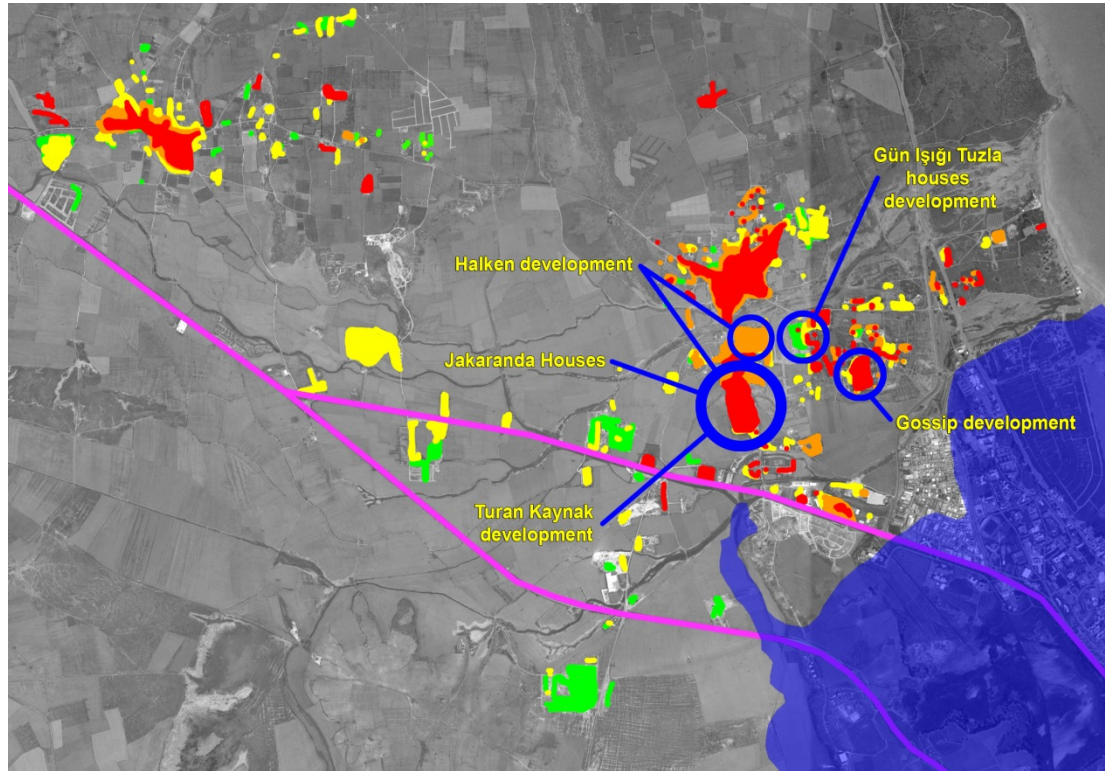





Figure 11: Selected Real Estate Developments (Author)

Table 7: Selected Real Estate

	
<p>Turan Kaynak Houses</p>	<p>Halken Houses</p>
	
<p>Jakaranda Houses</p>	<p>Gossip Houses</p>
	
<p>Gün Işığı Tuzla Houses (Partially under construction)</p>	

Geographical Information System (GIS) for Measuring Urban Sprawl

In most of the literature and dictionary geographical information system is defined as: "...A computer application used to store, view, and analyze geographical information, especially maps..." (The American heritage science dictionary, 2005, p. 260; Taniar, 2007, p. 219). According to this definition, Google Earth Pro can be considered as a geographical information system, because it's a computer application which store lots of the raster and vector based data such as the road, place, boundary, geographical terrain and etc. In addition, Google Earth Pro is a useful program for different purposes. It can be used for different analyses such as the distance and direction calculation. Especially, the integration of Google Earth Pro with other geographical information systems such as ArcGIS resulted in improving the performance as well as increasing the range of capability. From another point of view, Google Earth Pro is considered as an appropriate and economical way to have a visual study, as the historical imagery function of this program gives an opportunity to have an access to different raster images based on the time periods. As mentioned before, Google Earth Pro was not developed based on the spatial analysis. Therefore in this study the program was integrated with the ArcGIS program to increase the capability. However the main problem for integrating this two software is the obtained raster image form the Google Earth Pro, which has no coordination system. Therefore the main challenge is to coordinate those raster images with a unique coordinate system. This process can be explained in following steps:

1. The main polygon Shapefile boundary of the city, which is including the abandoned Varosha and the main core of urban area transferred by using the "Conversion Tools" in ArcGIS to a KML extension in order to import into the Google Earth Pro.

2. The city boundary import to the Google Earth Pro to have a suitable coverage from the Famagusta urban area and the surrounding suburban program view gauge level adjust to the 13,00.
3. The historical imagery of Google Earth Pro was used to get four raster images from 2003 till 2016. The whole raster export process done with the maximum resolution of 4800x2726 (Table 8). The important objective for the later coordination is to keep the imported boundary within this raster image.
4. The four raster images by using the 'Georeferencing' function in ArcGIS transformed now coordinated on the WGS_1984.
5. The suburban area in each raster is carefully recognized and the outer boundary for each raster manually (on-screen) were digitized; and all four periods overlapped in a single file and presented based on the different color according to their time period (Figure 12).

In addition, *observations and interviews* by the researcher were done to get an overview on the physical conditions and problems of the area and general impressions about the population living in the selected case area. The observations are documented by photos and maps. Furthermore, a questionnaire survey was done with 65 respondents to get a more detailed, quantitative output about the impacts of sprawl on the residents.

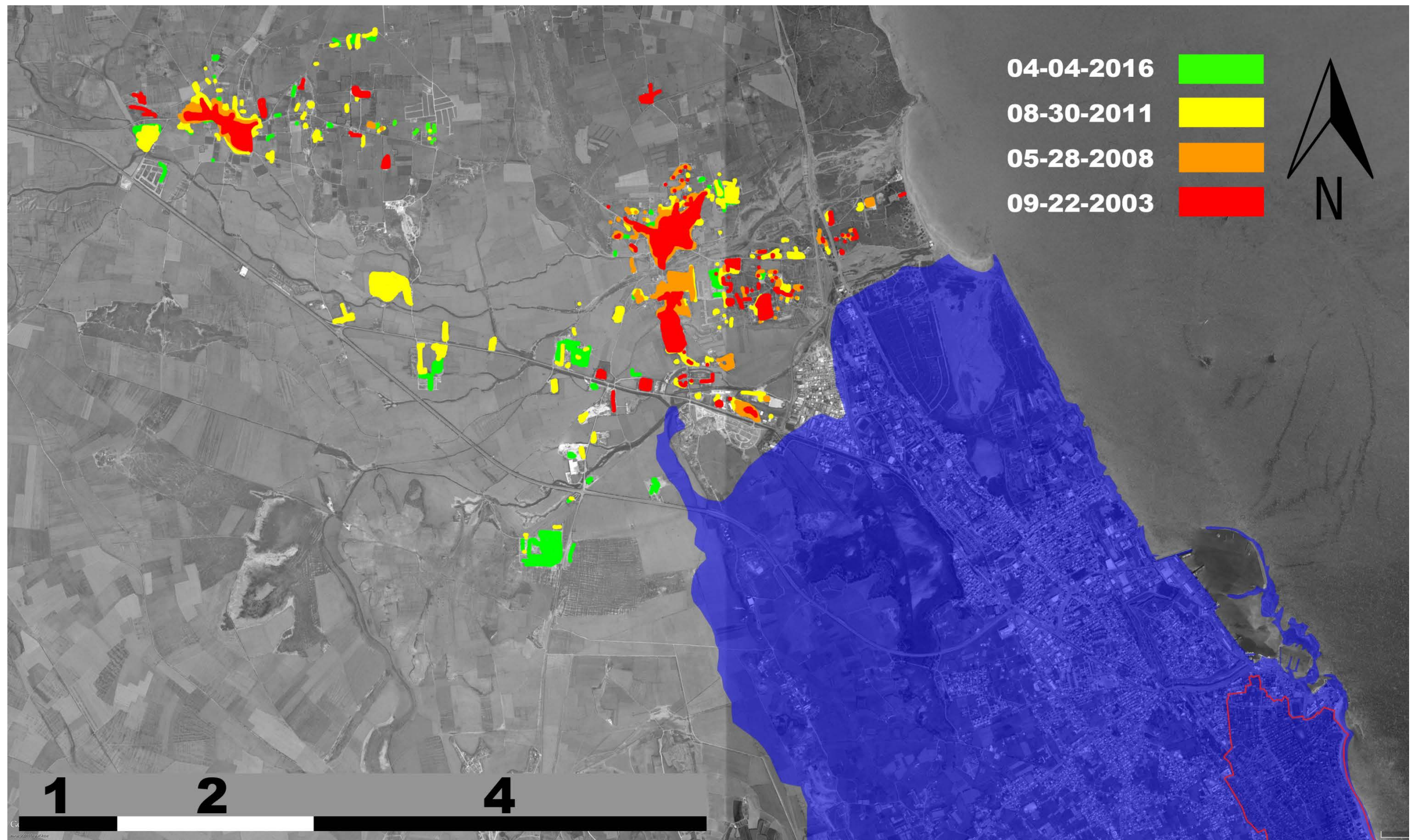



Figure 12: Famagusta Suburban Development since 2003 (Author)

3.3 Analyzing Sprawl in Tuzla, Famagusta

The main emphasis of this thesis is on the impacts of sprawl development on the residents. Before evaluating the impacts, it is crucial to analyze the existence and form of sprawl development in Tuzla region. The measurement will be done according to the five dimensions developed by Frenkel & Ashkenazi (2008), based on growth rates, density, spatial geometry, accessibility and aesthetic measures. The impacts on the residents will be evaluated by considering firstly interviews and observations, which are helpful to understand the physical conditions of the developments and tendencies in the opinions of the residents towards their living preferences. Secondly, a questionnaire survey was conducted to get more detailed feedback on the impacts.

In this study, a combination of Google Earth Pro and ArcGIS was used to analyze sprawl development from 2003 to present. The available raster images for Famagusta urban area can be obtained since 2003 till present. Unfortunately, some of the images were not suitable for the purpose of this study because of the cloud cover.

Table 8: Urban Sprawl Development in Tuzla since 2003


Urban Sprawl 2003

Urban Sprawl 2008

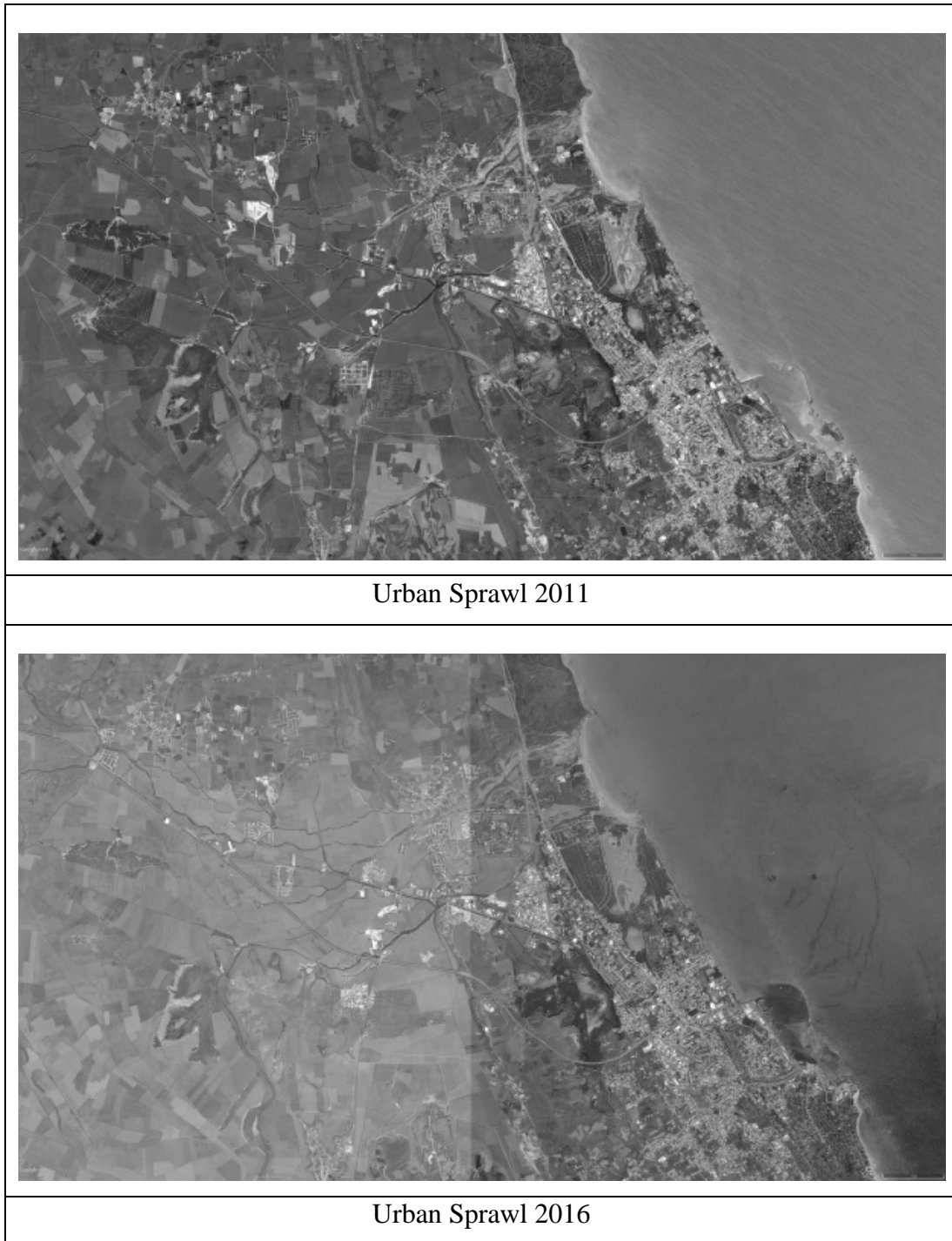


Figure 12 shows the result of suburban and sprawl development in Famagusta and its surrounding regions. The analysis of the map shows that there is a huge growth in general development especially between 2003 and 2008, and 2011 and 2016. This goes to confirm the rapid development due to the Annan Plan in 2004. The measurement of sprawl will be done by referring to the maps.

3.3.1 Measuring Urban Sprawl

As mentioned before, the measuring of urban sprawl in Tuzla region is prepared according to the five dimensions developed by Frenkel & Ashkenazi (2008) , based on Growth Rates, Density, Spatial Geometry, Accessibility and Aesthetic Measures. Therefore assessment of Tuzla region regarding to this dimensions and methodology can be as follows:

Growth Rate

According to the Frenkel & Ashkenazi (2008) the growth rate can be defined as the amount of the population or individual in specific place, which is belonging to the periods of the time and it is calculated based on the initial population of the same place. Based on this definition and according to Table 5, the Tuzla area population (suburban) increased significantly. In fact the area population was 1,876 by 2006, and this population in comparison to the 2011 raised to the 2,645 people, which is about 40,92% increase within five years. According to Frenkel & Ashkenazi (2008) and Jackson (1985, p. 238) the high growth rate of the suburban area population is also considered based on the urban population. In short, the high amount of population increase in suburban area in comparison to the urban area is referring to the amount of sprawl in suburban regions. In this sense, considering the Table 4 the growth rate in urban area in the same periods is about 12,88%, and it confirms the high rate of population growth in suburban area and refers to the high amount of sprawl.

Density

Density is an important factor for all sprawl development and most of the scholars consider this factor for measurement purpose. In this sense the amount of low density

development as a ratio or percentage to the total developed area can help for considering the amount of urban sprawl. Therefore the higher ratios of low density development to the total land developed indicates sprawl. According to this idea and based on Figure 12, the analysis of the geographical map shows that between 2003 and 2016, the amount of low density development in suburbia of Famagusta increased (Table 8). As seen in Figure 12, the real estate companies involved have a significant contribution in this development. In addition, Figure 13 reveals that most of the developments in suburban area of Famagusta occur around the two sub centers of Tuzla and Mutluyaka; in both of them the concentration of development is around the rural core and the trend goes towards a development along Nicosia road. However, in Tuzla area the development trend goes mostly towards Famagusta city and coastal line, while in Mutluyaka, development trend goes towards Tuzla and Nicosia road. Based on Figure 12 and Figure 13, most of the recent developments in suburbia, especially occur after 2008, along Nicosia road. Therefore the concentration of density in suburbia is around the two sub center as well as along Nicosia Road. In long run, the tendency seems that Mutluyaka region will expand towards Tuzla region and there will be an overlap at the boundaries.

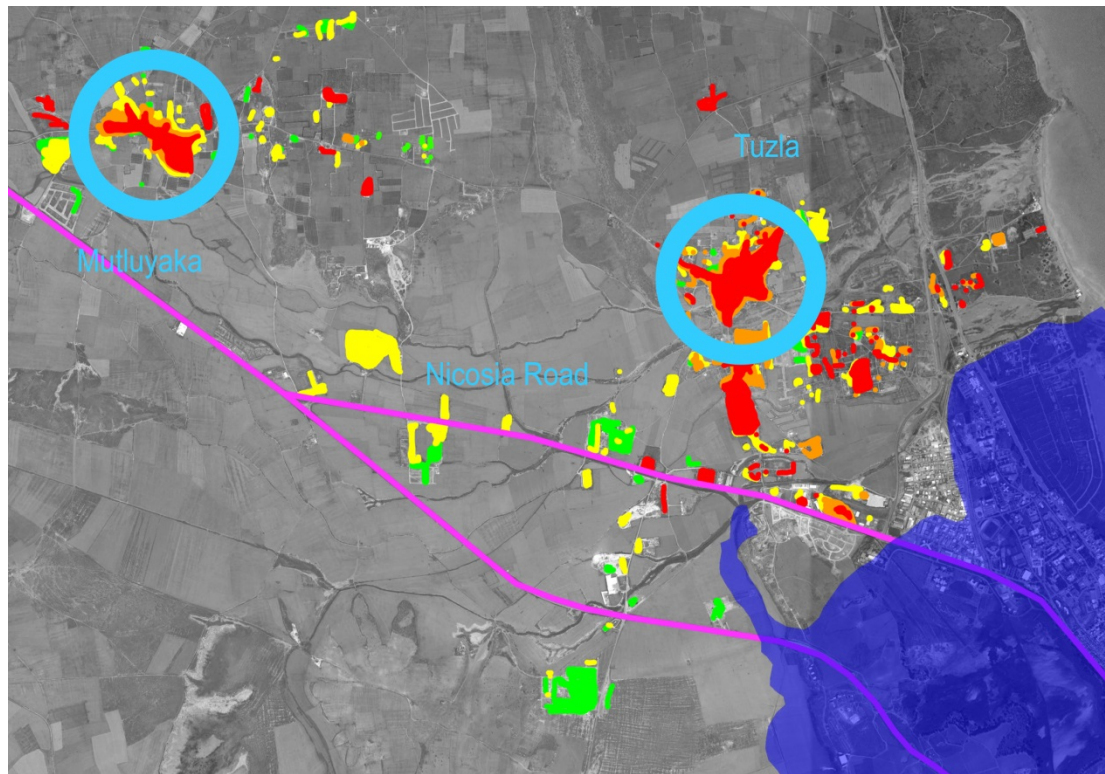


Figure 13: Low density development around the sub center (Author)

Spatial Geometry (Continuity - Diversity)

This is another important feature in measuring sprawl, as mentioned previously. This is the consideration of the continuity of development and diversity of the uses. However, based on the Frenkel & Ashkenazi (2008) geometric measures of urban landscape are common in two characters of configuration (continuity) and compositions (diversity). In this sense, by considering Figure 12, in term of geometry configuration or development continuity the form of the development seems unplanned and as explained beforehand, there is concentration of development around the two sub center and along Nicosia road (Figure 13). However, the form of development is irregular and based on the leapfrog and scattered development in the landscape. Of course, the land price and land hunger attitude as well as the availability of cheap agricultural land in this scenario gains weight. In terms of the composition or diversity according to observations, almost all the new development

in Famagusta suburban region are designed for residential uses and there is a lack of mixed use development, except for the core of rural area in both Tuzla and Mutluyaka. Of course, this is the main attribute as well as the problem for urban sprawl development and in fact, people even for daily need should drive to the city. However, it should be noted that during time, some of the residential uses transformed to other uses according to the needs of the residents. Especially in the case of “Turan Kaynak Sitesi” some of the residential uses transformed to repair shop, grocery and barbershops (Figure 14), yet, the rest of the suburban development is still single use. Lack of mixed use development confirm the existence of urban sprawl in Famagusta suburban and especially in Tuzla region, and makes people driving for their daily needs.



Figure 14: Transformation of residential to the repair shop (Author)

Accessibility

This is an important feature for considering the sprawling development. According to the urban sprawl definition, urban sprawl associated with poor accessibility and more auto dependency. In case of development in Tuzla region accessibility through public transportation is limited or not available, and automobile is a single choice in order to reach to this development. However, from another point of view, the interviews and observations reveal that, because of high amount of automobile dependency in T.R.N.C, people who live in sprawl area cannot realize the amount of daily traveling. As there is generally lack of public transportation options, people whether they live in the core of urban or in suburban areas, are dependent on their cars. In this sense, the study done by Statistical Service Cyprus (2010, p. 13) indicate that 84.3% of the transportation in Cyprus is done by personal motorized car and 14.8% by none motorized and only the 0.8% is done by public transportation. Obviously, these percentages are valid for all cities in T.R.N.C. In Famagusta, most of the transportation facility is run by the individual and institute for instance, bus service for the sake of the student is run by university and there is no any other public transportation at all. Therefore the automobile dependency and inaccessibility in T.R.N.C was not a big deal for those who live in Tuzla area. Nonetheless, it is an indicator for sprawl development.

Aesthetic Measures

Another important issue which is useful for the measuring of urban sprawl is the aesthetic dimension. Many scholars categorize this feature as single use, strip mall development. However, this definition mostly considers the functions and/or uses. Of course, the main problem of Tuzla development or any other suburban development as it is mentioned before is the single use development. Albeit, the land uses in term

of single use or mix use development, is not the concern of this part, because it is already considered by spatial geometry analysis. Aesthetic measurement is concerned with the visual component of sprawl development, such as similar or same styles, monotonous mass production etc. In case of mass housing developments in Tuzla development, certainly there is a kind of similarity in style, depending on the construction company. Therefore, the outcomes of these developments resemble each other both in physical form and activity pattern. But, there is an increase in variations in style, size, façade organization etc. between the companies. For example Jakaranda development prefer more contemporary design, whereas Halken and Turan Kaynak development are more modest and traditional (Figure 16 and Figure 17). Furthermore, there is also a tendency to differ in sizes according to user preferences. For example, Gün Işığ Tuzla houses, which is one of the latest developments and still under construction, offers seven different plan organizations and sizes due to the user needs. In addition, the developers start to create common public spaces with playgrounds and places for common activities.

The measurement on urban sprawl in the case of Famagusta by utilization of the five sprawl indicators reveals existence of urban sprawl in Famagusta. However, the main difference in the city expansion is related to the development trend. In this sense, before 1974 development trend was toward the southeast. However, after 1974 conflict, the overall development trends in city shift to the northwest. For sure, the university had a significant role in development trend (Önal, Dağlı, & Doratlı, 1999). Also location of the abandoned Varosha had significant role in new development trend.

Hoşkara, Çavuşoğlu, & Öngül believed that residential housing development during the past decades accelerated in whole T.R.N.C and this resulted in sprawling the cities mostly toward the urban fringe, Famagusta due to geographical location get tourist attraction (Hoşkara, Çavuşoğlu, & Öngül, 2009), therefore many tourists prefer to have investment by the real estate company especially in suburbia.

3.3.2 Assessment of Impacts of Sprawl

The assessment of negative impacts in urban sprawl are considered through the evaluation of **economic, social and environmental** factors. In this sense, the *interview* conducted among approximately 30 residents of the Tuzla Region. The interviews were done randomly, without following specific selection criteria, the availability and motivation of the respondent were considered important. The interviews focus on economic, social and environmental impacts of sprawl development. *Observations* in this study are used as an interview supplement. It focuses mainly on the environmental aspect. The observations done by the researcher to cover those missing part which are not detected during the interview process.

Besides interviews and observations, a questionnaire survey in same disciplines of economic, social and environmental were done among 65 people in Tuzla Region, the survey shaped by 45 questions in form of multiple choice, linier (Likert) scale, short answered and check listed asked from the responder.

According to the survey 63.1% of the responders are female and rest of them are male. About 75.4% of them are married and 63.1% of them are T.R.N.C citizens and about 58.5% of the responders are employed. The education levels of the responders are (10.8%) primary education (29.2%) secondary education, (27.7%) underrated, and the rests are (32.3%) postgraduate. The majority of the responders are house

owner, while 58.3% of them live in houses that are less than 8 years old. On the other hand about 66.7% of the responders live in current house for 1 – 8 years. The analysis of the available data shows that, the main reason for moving from the inner city to Tuzla was the availability of larger houses, duplex villa or detached house. Nearly 70% of the respondents agreed in this. In addition 43 % of the respondents moved to Tuzla because of proximity to natural environment, vegetation and green area. Nearly 40% of the respondents admit that they wanted to escape from traffic congestion and air pollution. Surprisingly, none of the respondents moved to Tuzla because it is near to their work. Also nearness to family or friends (10,8%) or house prices (9,2%) were not effective in their decisions to move to Tuzla.

Economic Factors

According to the *interviews*, increase in the household expense is the main concern for most of the residence. But all of them emphasize that “We are from wealthy and/or middle class of society, household increase is not affecting our life seriously ...”. In addition, auto-dependency was not the main concern for them because lack of public transportation in urban area makes Cypriot people automobile reliance. In short, automobile dependency and costs for cars, is not related with living in urban or suburban area. In fact “it’s vital for Cyprus daily life...”. Increase in household was mentioned in the cases, when a specialist needs to be called for any mechanical or electrical service, the service providers charges extra costs, because their house is located out of urban skirts.

According to the *survey* and the economic part of questioner based on Table 9, half of the respondents have daily shopping habits and almost all of them prefer to have larger shopping activities in the big supermarkets. It seems that about 66.7% of

responders have a shopping opportunity within 10 minutes; most of the responders at least have two cars in their homes. More than half of the respondents confirmed, that after moving from urban area to suburban they bought a new car. This indicates that there is an increase of automobile dependency.

Table 9: Economic Impact

	Frequency	Percent
<u>Shopping habit</u>		
Daily	49	75.4
3 time / week	6	9.2
Once a week	10	15.4
Other	0	0
<u>How far the nearest retail</u>		
≤ 5min walking	18	27.7
5 - 10 min walking	9	13.8
10 - 20 min walking	16	24.6
20 - 30 min walking	3	4.6
Have to used car	19	29.2
<u>How do you go to the shop</u>		
By car	40	61.5
Other	25	38.5
<u>How many motorized vehicle you have</u>		
None	3	4.6
One	2	3.1
Two	51	78.5
Three	6	9.2
≥ Four	3	4.6
<u>Did you buy any new vehicle recently</u>		
Yes	34	52.3
No	28	43.1
I plan to buy	3	4.6
<u>Total</u>	65	100

Social Factors

According to the *interview*:

- Main reason for living in suburban: “...always looking for quite place, more claim to relax, proximity to nature and green area, far enough from

Famagusta...out of the congestion...detached house increase privacy...we have two floors villa with own courtyard...enough space for cars...living in Tuzla totally in contrast with living in the core of urban area, for instance, living in apartment flat with lack of enough space for indoor and outdoor activity...always no space for the for our cars... most of the time are neighbors are noisy and loud... they leave staircase dirty dark...”.

- Most of the residents lived in the urban area before and have negative urban area experiences such as traffic congestion, small flats, and noisy neighbors. Moving to Tuzla area increased their quality of life.
- Daily life Problem: most of the people’s concern was the increase of construction developments in their nearby surrounding. In fact they complain about new development and which negatively affect their life. In their idea “...new development always associated with local habitants harassment...big trucks movement for the sake of construction site in town made threat to children...in addition to this truck movement and construction process make noise and dust in area...”. Moreover, some people complain for water shortage especially during the summer time. However, some people have concern about water logging on main arteries in winter...some people believe that municipality lighting element is not enough. In general the people have less stress and problems that are not severe.
- Social opportunity: one of the obvious things which most of the habitants mention “...lack of social opportunity for inhabitants... most of the social opportunities are far from the Tuzla region”...’ need to travel for Famagusta

or other nearby cities...” .Some people also mentioned that “...time was not enough to involve or get benefit from social activity...some of them spending time with children, elder parents...some of them invite friends to the get together over weekends...”. Of course, most of the residents believe that we know each other like friends, albeit some time the adjacent houses are empty. The social interaction between the residents is friendly and familiar. People do not feel lonely or have difficulties to come together with their neighbors. The only problem is the lack of social activities like community centers, children or youth clubs etc. offered by private or municipality initiators.

Based on to the *survey* and relevant analysis of the questionnaires shown in Table 10, about half of the respondents are going to the city center at the weekends. Almost all of them have complained about lack of relevant clubs such as sports clubs etc. and community center in proximity to their houses, On the other hand, most of the people know their neighbors and are good friends with them. The area is perceived as safe (nearly 90%) and the residents have social interactions with each other (nearly 75%). The main problem in Tuzla, which is also the main problem in any sprawl area, is the high amount of automobile dependency of responder for all daily life activities. More than 90% of the respondents admit that the use the car for going to work, taking their children or going for a drink or to a restaurant. In addition the respondents have to use their cars for other than daily needs shopping.

Table 10: Social Impact

	Frequency	Percent
<u>Weekend activity</u>		
Stay at home	27	41.5
Going to the city center	34	52.3
Spend with family	21	32.3

Spend for shopping	10	15.4
Going to picnic	16	24.6
Other	11	16.9
<u>Children kind garden from your house</u>		
≤ 5min walking	0	0
5 - 10 min walking	0	0
10 - 20 min walking	3	4.6
20 - 30 min walking	0	0
Have to used car	62	95.4
<u>Proximity of playground to your house</u>		
≤ 5min walking	0	0
5 - 10 min walking	15	23.1
10 - 20 min walking	9	13.8
20 - 30 min walking	6	9.2
Have to used car	35	53.8
<u>Surrounding neighbors</u>		
I don't know them	3	4.6
No neighbors in proximity	0	0
We are good friends with them	28	43.1
I just know them	34	52.3
<u>Going to the work</u>		
By car	61	93.8
Other	4	6.2
<u>Going to the leisure</u>		
By car	59	90.8
Other	6	9.2
<u>Going to the any civic buildings</u>		
By car	62	95.4
Other	3	4.6
<u>Total</u>	65	100

Environmental Factors

According to the *observation* the main problem in Tuzla can be summarized as follows:

- *Lack of sidewalks*: During observations, the most significant problem that was observed was the inefficiency or even lack of sidewalks. Many times even available sidewalks were used as car parking (Figure 15).

- *Lack of public green spaces:* it seems that the public green spaces and vegetation, as well as parks are inappropriate or not valid at all, which is in contrast to the idea of proximity to nature in suburban area.
- *Well maintained private gardens:* Most of the private gardens are in good condition. People like to spend time in their garden, planting trees and flowers or just relaxing.



Figure 15: Inappropriate pedestrian and inadequate green area (Author)

- *Lack of municipality services:* It is also observed that there is little maintenance of streets, garbage bins etc. especially in sub arteries (Figure 15). For instance, most of them need a new asphalt coat or repair. Also, there is a lack of lighting element in most of the streets. In addition, there is lack of appropriate waste container for these arteries. Together with waste

management, these can be a problematic issue in the future. Another issue observed was the lack of public transportation. The private car dependency is very high.



Figure 16: Jakaranda development (Author)



Figure 17: Lack of waste container and lighting elements (Author)

According to *survey* and relevant analyses of the responses shown in Table 11 most of the people (80%) are satisfied with their house with nice garden. In addition, just 32,3 % report that some buildings are under construction and there are available vacant lands. In term of green area conditions, most of the responders have emphasized lack of green area as well as unmaintained green space and almost all believe that number of playground and park are not enough for them. On the other side, about 75.0% of the responders have to use their car to access public green spaces. Lack of pedestrian path way and/or unmaintained pedestrian path way is the main concern for the majority of responders, and in general 75.0% people believe that the surrounding built environment is unplanned. The majority of the residents report that street lighting and piping water are the only services which are provided by municipality. Even though none of the respondents rate the natural environment in terms of greenery etc. as pleasant, and more than half of the respondents finds the

area unplanned and more than 63% claims lack of sidewalks, the majority of the respondents observe the private houses as well maintained. This indicates that there is a clash between public services and maintenance and private preservation of the environment. People are not satisfied with their public environment and concentrate therefore on their private houses and gardens.

Table 11: Environmental Impact

	Frequency	Percent
<u>Condition of surrounding green area</u>		
Lack of green are	34	52.3
Unmaintained green area	31	47.7
In good condition and pleasant	0	0
<u>Nearest green area to you home</u>		
≤ 5min walking	3	4.6
5 - 10 min walking	3	4.6
10 - 20 min walking	35	53.8
20 - 30 min walking	18	27.7
Have to used car	6	9.2
<u>Amount of playground and park</u>		
Enough	0	0
Not Enough	59	90.8
Not Sure	6	9.2
<u>Pedestrian path way situation</u>		
Lack of pedestrian path	41	63.1
Unmaintained path	18	27.7
Fully pedestrianize	6	9.2
<u>Surrounding built environment</u>		
Un Planned	36	55.4
Planned	29	44.6
<u>Total</u>	65	100

General Impact of Living in Tuzla

The interviews revealed that most of the residents in Tuzla sprawl area are satisfied with their life. They consider living in Tuzla as a positive fact and have good social relations with their neighbors. Car dependency is not a problematic issue as Famagusta inner city also lacks a public transportation system. In other words, all

citizens in Famagusta are dependent on private cars. Overall, the residents of sprawl are content with their living situation.

According to the analysis, nearly half of the responders believe that there is not any traffic problem in Tuzla suburban and the majority (66%) of them enjoy the silent atmosphere of the region. 46,2 % of the responders enjoy the natural environment and healthy life styles (33,8%). According to the results, more than half of the responders face with different time management problem during their daily life. Also more than half of the responders (53%) believe that after moving to Tuzla they become more automobile dependent. Nearly half of the responders believe that after moving to Tuzla, their household expenses increased. Even though the respondents feel more automobile dependent, auto dependency is not a problem for the citizens, as the majority of the responders want to stay in suburban area and live in Tuzla area. More than 76 % are very satisfied with their life quality in Tuzla.

3.4 The Summary of the Chapter

This chapter introduces Famagusta and considers the location of it in Cyprus, after a quick explanation about the history and different kinds of development, study focuses on important aspects about the city like the trend of urbanization and increasing of population. For sure, the role of the contemporary history in T.R.N.C has significant contribution for the future development of the city and especially after the division in 1974.

After explaining different aspects of the city which is affected sprawling of the city, the study explains the methodologies used to measure the urban sprawl as well as

different impacts on the environment, society and economy in the case of Tuzla region.

It is obvious that in order to have better results, methodology is divided into two parts and specifically considering each part in more detail. For measuring urban sprawl as it mentioned before, the five dimensions of Frenkel & Ashkenazi (Growth Rates, Density, Spatial Geometry, Accessibility and Aesthetic Measures) are used. The given dimensions confirm existence of urban sprawl and growth of it in Famagusta suburban area. In the second part, methodology use observation, interview and questionnerie to study the urban sprawl impact in the case region, in this part the study focuses on the dimension which is offerd by Burchell, et al.

The interview, observation and questioner survey confirm that there is not any problems interms of social and economic issues in Famagusta suburban. The important fact is such that automobile totally fills the gap of public transportation, therefor auto-dependecny in Famagusta suburbia can not be considered as a negative impact of urban sprawl. Of course, in terms of social issue, different cultures help towards social exclusion. However, in terms of the environment, the main problem in Tuzla region is known as lack of urban green space and pedestrian paths. For sure, the fragmentation of uses is another issue which is solved by high automobile dependancy in whole of Famagusta suburbia.

Chapter 4

CONCLUSION

Expansion of the cities depends on rapid urbanization and creates big problems for most of the cities. Unplanned expansion results in urban sprawl, a scattered and unsustainable development in suburban of the cities. Almost all scholars argue that urban sprawl is a multidimensional phenomenon. But, still there is not any universal understanding even in terms of its definition and other dimensions like drivers and impacts. It seems that urban sprawl is relative and depends on the specific field of study. Most of the scholars and studies judge urban sprawl according to the urban area and surrounding development. On the other side, different disciplines and studies had various understanding and interpretation of urban sprawl. Another problem is such that there are no any unique methods for measuring the amount of urban sprawl. Therefore, different studies try to employee different methods such as mathematical approach, sprawl index, remote sensing data and geographical information system (GIS).

This study have attempted to utilize a combination of different methods to provide a more comprehensive definition for urban sprawl. Additionally, it attempted to find an applicable method for measuring urban sprawl especially in T.R.N.C and Famagusta suburbia with an emphasis on Tuzla region.

For this reason, chapter one presents the main problem which shapes this study, also it points out the main aim and objective of this study. Chapter two evaluates the vast amount of literature to offer a comprehensive definition based on the scholars' ideas and approaches. As a result of the literature review, this study uses dimensions developed by Burchell, et al., (1998) for evaluating different impacts of urban sprawl and also applies criteria developed by Frenkel & Ashkenazi (2008) for measuring the expansion of urban sprawl. Chapter three explains the Famagusta urban area as well as the suburban development in Tuzla region. Later, the case area is evaluated based on the mentioned dimensions. In this chapter, the remote sensing data accompanied with the geographical information system is used to evaluate the expansion of Famagusta. Besides, questionnaire survey, interview and observation all together are used for monitoring the impact of urban sprawl on both citizens and the city.

This study confirms the rapid expansion of the city of Famagusta towards the suburbia since 2003. Fundamentally, it seems that expansion of the city has also been influenced by the enactment of the UN peaceful plan, which is known as Annan Plan. This plan obviously accelerated the construction trend in T.R.N.C and obviously Famagusta is not an exception (Yorucu & Keles, 2007).

According to the relevant analysis (Figure 13), concentration of recent density development occurs mainly around the two sub center of Tuzla and Mutluyaka and development continues along the Nicosia Road and development pace has increased starting from 2003. It is seen that the population of Tuzla area between 2006 till 2011 has increased to about 40,92% (Table 5), which is a significant increase and again confirms the sprawl development. In terms of spatial geometry based on the continuity dimension, the development is not following any regulation and

framework, so it is a leapfrog development that is scattered. According to the diversity dimension, all the new developments are residential and single use development. However, there are some transformations in uses in some of the developing areas such as “Turan Kaynak Sitesi” (Figure 14), In terms of accessibility the Tuzla region is inaccessible without private cars and this strengthens automobile dependency. In terms of aesthetic measurement, there is a stereotype residential development according to the architectural style of the real estate companies. Therefore, in terms of architectural quality, mostly similar images are displayed (Figure 16 and Figure 17).

This part sums up the important findings related to the different urban sprawl impact and tries to summarize them as following:

- More than half of the residents moved by last 10 years to the Tuzla area and all of the responders are coming from the city center to the Tuzla region
- More than half of residents decided to move to Tuzla for having a larger house with a nice, private garden.
- About half of the people describe their surrounding environment with empty plots and/or buildings under construction
- Lack of public green space and pedestrian path ways are the main concerns for most of the residents
- Lack of leisure facilities force the residents to use the automobile for going to nearest restaurant

- More than half of people prefer to go to the city center at the weekends
- Majority of the people feel safe even at night in Tuzla region, and even safety and peace have a significant role for choosing Tuzla area as a residential area
- Every household has at least two automobiles, and more than half of the responders bought a new automobile after moving to Tuzla area
- About half of the responders are daily shopper and believe that their households expenses increase since moving to Tuzla area ; they prefer to do their larger shopping from the magnet shops
- More than half of the responder face with time management issue during their daily life
- Nearly half of the responders believe that they become more automobile dependent since moving into Tuzla area, but this has not a negative impact on them, as the city has no efficient public transportation system
- The majority of the respondents believe that they have good social contact with their neighbors
- The majority of the respondents are satisfied with their living conditions and would not move back to the city center

As a conclusion, it seems that there is a suburbia living desire which started since last decades, and different people from different array of occupation, education level and nationality started to move into Tuzla region. According to the data the Tuzla suburbia is still under construction and the first developed site is known as Turan Kaynak Sitesi. Although the majority of the resident are not facing with economic and social impact, this does not confirm the urban sprawl.

Controlling the urban sprawl in most of the countries around the world becomes an agenda. However, urban sprawl in Famagusta because of the mentioned problems, was never curb and continuity develop. Even it becomes a profitable business for most of the real estate company. Since in T.R.N.C urban sprawl has no negative impact for their residence, people enthusiastically accept it and want to live in urban sprawl.

Urban sprawl is a multidimensional issue, and it can have different impacts on the economy, society and environment. Therefore this topic has opportunity for different interdisciplinary studies. Obviously, based on these three aspects much research can be done along with urban sprawl topic. In addition to that, it should be mentioned, having awareness about this phenomenon for both citizens and city planners are vital. For sure, awareness about different aspects of urban sprawl can decrease considerable amount of urban sprawl negative repercussions.

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APPENDICES

Appendix A: Questionnaire Sample

Date: _____ No: _____

Dear responder, this survey is conducted for an academic purpose and aims to evaluate the impact of city expansion into the Famagusta citizens. Obviously the gathering data from this survey were used anonymously therefore you are requested to respond to them carefully.

A. Socio – Demographical Factors

1. Please fill the following table with your household member:

	Gender		Age						Marital Status		Occupation				Education Level			
	Male	Female	≤ 12	13-18	19-24	35-50	51-64	≥ 65	Single	Married	Employed	Self-employed	Unemployed	Student	Primary Education	Secondary Education	Undergraduate (B.Sc.)	Postgraduate (M.Sc., PhD)
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

2. What is your profession?

3. What is your Nationality?

☐ Turkish Cypriots/Turkish ☐ Turkish Cypriots ☐ Turkish ☐ Other.....

B. House preference

1. Your home is ☐ Owned by you ☐ Rented ☐ Other.....
2. How old is your house? ☐ 1 – 8 ☐ 9 – 16 ☐ 17 – 24 ☐ ≥ 25
3. How long do you live in this house?
☐ 1 – 8 ☐ 9 – 16 ☐ 17 – 24 ☐ ≥ 25
4. Where did you live before moving to Tuzla area?
☐ Inner City ☐ Suburban ☐ Rural (Village) ☐ Other country
5. What were your reason / reasons for moving to Tuzla?
☐ Proximity to natural environment, vegetation and green area
☐ Escape from crowded city, traffic congestion, air pollution
☐ House prices and the later value of investments
☐ Larger house, duplex Villa, detached house
☐ Proximity to family and/or friends
☐ Proximity to work
☐ Other.....

C. Environment

1. How would you describe your surrounding environment in general?
☐ Well maintained houses with nice gardens
☐ New roads, streets and paved pedestrian walkways
☐ Open spaces / Empty plots
☐ Still there are empty buildings and plots
☐ Still some buildings are under construction
☐ Some streets have no asphalt yet
☐ Houses and gardens are in poor condition
☐ Open spaces / Empty plots are in poor condition and used for garbage
2. How would you rate the condition of your surrounding environment in general?
Need maintenance ☐ ☐ ☐ ☐ ☐ Very good condition
3. How would you rate the condition of your surrounding natural environment?
Lack of Green Area ☐ ☐ ☐ ☐ ☐ Very good and pleasant

4. How far is the nearest public open space (Green Area, Park, Picnic area and...) from your home?

- ☐ ≤5min walking
☐ 5-10min walking
☐ 10-20min walking
☐ 20-30min walking
☐ have to use car

5. How would you rate the condition of your surrounding built environment?

Not Planned ☐ ☐ ☐ ☐ ☐ Planned

6. How would you rate your surrounding street and arteries in terms of quality?

Poor Condition ☐ ☐ ☐ ☐ ☐ Good Condition

7. How would you rate the pedestrian walkways in your surrounding?

Lack of pedestrian paths ☐ ☐ ☐ ☐ ☐ Fully Pedestrianized

8. Which services are provided by the municipality for your area?

- ☐ Piping water
☐ Waste management
☐ Street light
☐ Paved streets (Asphalt)
☐ Canalization
☐ Pedestrian paths
☐ Street furniture
☐ Public transportation
☐ Civic buildings (mosque, library and...)
☐ Other.....

9. How would you rate the municipality services in general?

Very Poor Quality ☐ ☐ ☐ ☐ ☐ Very High Quality

D. Social

1. How do you spend your weekends or short time holidays?

- ☐ Stay at home ☐ Go to the city ☐ Spend time with Family/Friend
☐ Spend time for shopping ☐ Go to picnic ☐ Other.....

2. Do you know your surrounding neighbors?

- ☐ I don't know them ☐ No neighbors in proximity (empty plot, building and...)
☐ We are good friends ☐ Just in case of problem I call them

3. Do you feel safe in your neighborhood? (for instance at night)
- Very Safe ☐ ☐ ☐ ☐ ☐ Very Unsafe
4. How would you rate your social transaction with neighbor in Tuzla area?
- No Social Interaction ☐ ☐ ☐ ☐ ☐ Very Good Social Interaction
5. Which of the following social opportunity provide by municipality for your area?
- ☐ Sport club ☐ Youth club ☐ Library ☐ Community center ☐ Other.....
6. How far is the school, kindergarten of your children from your home?
- ☐ ≤5min walking
☐ 5-10min walking
☐ 10-20min walking
☐ 20-30min walking
☐ have to use car
7. How do you go to your work place?
- ☐ By Car ☐ If not by car, How.....
8. How do you go to any civic building (bank, municipality, district office, tax office and...)?
- ☐ By Car ☐ If not by car, How.....
9. How do you go to the nearest leisure facility (Cafe, Bar and etc.) from your home?
- ☐ By Car ☐ If not by car, How.....
10. How far is the nearest children playground from your home?
- ☐ ≤5min walking
☐ 5-10min walking
☐ 10-20min walking
☐ 20-30min walking
☐ have to use car
11. Do you think the amount of playground and park enough for your surrounding environment?
- ☐ Yes ☐ No ☐ Not Sure

E. Economy

1. How often are you going shopping for daily needs (Breads, milks, newspaper and...)?
- ☐ Daily ☐ 3 time/ Week ☐ Once a Week ☐ 2 Time / Month
2. How do you do your daily needs shopping?
- ☐ By Car ☐ If not by car, How.....

3. How far is the nearest retail opportunity (shop, market, barber and...) from your home?

- ☐ ≤5min walking
☐ 5-10min walking
☐ 10-20min walking
☐ 20-30min walking
☐ have to use car

4. How many motorized vehicles (Car, motorbike and...) do you have in your home?

- ☐ One ☐ Two ☐ Three ☐ ≥ four

5. Did you buy any other motorized vehicle (Car, motorbike and...) after you moved to Tuzla area?

- ☐ Yes ☐ No ☐ I plan to buy

F. General Impact of Living in Tuzla

1. In term of quality of life how satisfied are you with your life in Tuzla?

- Very Unsatisfied ☐ ☐ ☐ ☐ ☐ Very Satisfied

2. Which benefits do you get from the natural environment?

- ☐ Enjoy spending time in the natural environment
☐ Good air quality
☐ No traffic problems
☐ Silent environment with no crowd
☐ Healthy lifestyle (sport activities, walking, jogging and...)
☐ Other.....

3. Have you ever faced with time management problems (Children pick, delay for work, school and...)

- ☐ Yes ☐ No ☐ Not Sure

4. In case you moved from a city center to Tuzla area, did you become more automobile depended?

- Definitely agree ☐ ☐ ☐ ☐ ☐ Definitely disagree

5. In case you moved from a city center to Tuzla area, did you perceive any household expenses increase since moving to the Tuzla?

- Increase too much ☐ ☐ ☐ ☐ ☐ Decrease too much

6. Do you think of moving (back) to the city center?

- ☐ Yes ☐ No ☐ Not Sure

Thank you for your patience

Appendix B: Summery of the Responders

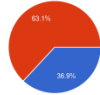
65 responses

[View all responses](#) [Publish analytics](#)

Summary

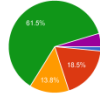
A. Socio – Demographical Factors

Gender



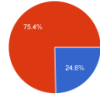
Male	24	36.9%
Female	41	63.1%

Age



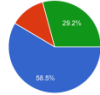
≤ 12	1	1.5%
13-18	12	18.5%
19-34	9	13.8%
35-50	40	61.5%
51-64	3	4.6%
≥ 65	0	0%

Marital Status



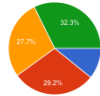
Single	16	24.6%
Married	49	75.4%

Occupation



Employed (Part / Full time)	38	58.5%
Self-employed	8	12.3%
Unemployed	0	0%
Student (University / School /...)	19	29.2%
Housewife	0	0%
Retired	0	0%

Education Level

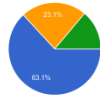


Primary Education	7	10.8%
Secondary Education	19	29.2%
Undergraduate (B.Sc.)	18	27.7%
Postgraduate (M.Sc., PhD)	21	32.3%

What is your profession?

öğrenci
teacher
Student
memur
işletme
devlet
Muhasebe
Mimar
Elektrikçi
Satıcı
University Lecturer
banka
Elektrikçiler
satıcı
banka
yönetici asistanı
memur banka
MEMUR DAU
memur

What is your nationality?



T.R.N.C	41	63.1%
T.C	0	0%
Both	15	23.1%
Other	9	13.8%

Number of Children

2
0
1

B. House preference

Your home is



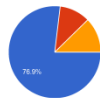
Owned by you **54** 83.1%
Rented **11** 15.9%
Other **0** 0%

How old is your living house?



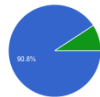
1 - 8 **47** 72.3%
9 - 14 **10** 15.4%
≥ 15 **8** 12.3%

How long do you live in this house?



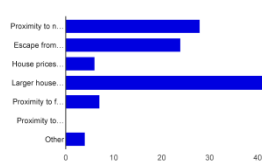
1 - 8 **50** 76.9%
9 - 14 **7** 10.8%
≥ 15 **8** 12.3%

Where did you live before moving to Tuzla (Enkom) area?



Inner city **59** 90.8%
Suburban **0** 0%
Rural (Village) **0** 0%
Other **6** 9.2%

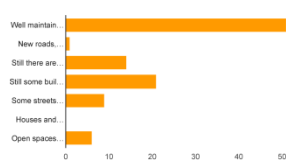
What was your reason / reasons for moving to Tuzla?



Proximity to natural environment, Vegetation and green area **28** 43.1%
Escape from crowded city, traffic congestion, air pollution **24** 36.9%
House prices and the later value of investments **6** 9.2%
Larger house, duplex Villa, detached house **46** 70.8%
Proximity to family or friends **7** 10.8%
Proximity to work **0** 0%
Other **4** 6.2%

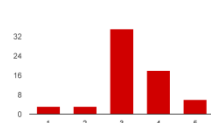
C. Environment

How would you describe your surrounding environment in general?



Well maintained houses with nice gardens **51** 78.5%
New roads, streets and paved pedestrian walkways **1** 1.5%
Still there are empty buildings and plots **14** 21.5%
Still some buildings are under construction **21** 32.3%
Some streets have no asphalt yet **9** 13.8%
Houses and gardens are in poor condition **0** 0%
Open spaces / Empty plots are in poor condition and used for garbage **6** 9.2%

How would you rate the condition of your surrounding environment in general?



Need maintenance: 1 **3** 4.6%
2 **3** 4.6%
3 **35** 53.8%
4 **18** 27.7%
Very Good Condition: 5 **6** 9.2%

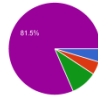
How would you rate the condition of your surrounding natural environment?



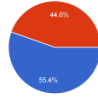
Lack of Green Area **34** 52.3%
Green Area Without Maintenance **31** 47.7%

Very good and pleasant 0 0%

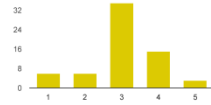
How far is the nearest Public open space (Green Area, Park, Picnic area and etc.) from your home?



How would you rate the condition of your surrounding built environment?



How would you rate your surrounding street and arteries in terms of quality?

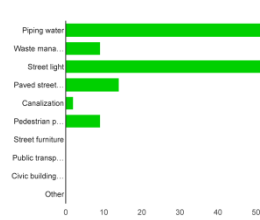


Poor Condition: 1 6 9.2%
2 6 9.2%
3 35 53.8%
4 15 23.1%
Good Condition: 5 3 4.6%

How would you rate the pedestrian path way in your surrounding?



Which kind of services are provided by the municipality for your area?



Piping water 52 80%
Waste management 9 13.8%
Street light 14 21.5%
Paved streets (Asphalt) 2 3.1%
Canalization 2 3.1%
Pedestrian path way 9 13.8%
Street furniture 0 0%
Public transportation 0 0%
Civic buildings such as mosque, library and etc. 0 0%
Other 0 0%

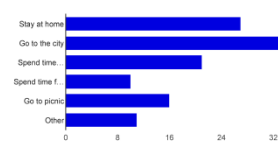
How would you rate to the municipality services in term of waste managements and sanitation?



Lack of managment: 1 3 4.6%
2 26 40%
3 30 46.2%
4 6 9.2%
Fully equipped: 5 0 0%

D. Social

How do you spend your weekends or short time holidays?



Stay at home 27 41.5%
Go to the city 34 52.3%
Spend time with Family/Friend 21 32.3%
Spend time for shopping 10 15.4%
Go to picnic 16 24.6%
Other 11 16.9%

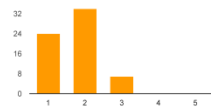
Do you know your surrounding neighbors?



I don't know them 3 4.6%

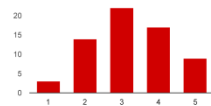
No neighbors in proximity (empty plot, building and...)	0	0%
We are good friends	28	43.1%
I know them	34	52.3%

Do you feel safe in your neighborhood? (for instance at night)



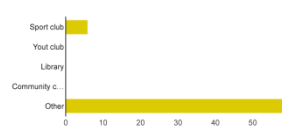
Very safe : 1	24	36.9%
2	34	52.3%
3	7	10.8%
4	0	0%
Very unsafe: 5	0	0%

How would you rate your social transaction with neighbor in Tuzla area?



No social interactions: 1	3	4.6%
2	14	21.5%
3	22	33.8%
4	17	26.2%
Good social interactions: 5	9	13.8%

which of the following social opportunity provide by municipality for your area?



Sport club	6	9.2%
Youth club	0	0%
Library	0	0%
Community center	0	0%
Other	59	90.8%

How far is the school, kindergarten of your children from your home?



≤ 5min walking	0	0%
5-10min walking	0	0%
10-20min walking	3	4.6%
20-30min walking	0	0%
have to use car	59	90.8%
Other	3	4.6%

How do you go to your work place?



By Car	61	93.8%
Other	4	6.2%

How do you go to any civic building (bank, municipality, district office, tax office and...)?



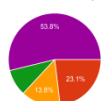
By Car	62	95.4%
Other	3	4.6%

How do you go to the nearest leisure facility (Cafe, Bar and etc.) from your home?



By Car	59	90.8%
Other	6	9.2%

How far is the nearest children playground from your home?



≤ 5min walking	0	0%
5-10min walking	15	23.1%
10-20min walking	9	13.8%
20-30min walking	6	9.2%
have to use car	35	53.8%

Do you think the amount of playground and park enough for your surrounding environment?



Yes	0	0%
No	59	90.8%
Not sure	6	9.2%

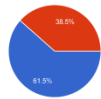
E. Economy

How often are you going shopping for daily needs (Breads, milks, newspaper and...)?



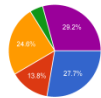
Daily	49	75.4%
3 time/ Week	6	9.2%
Once a week	10	15.4%
Other	0	0%

How do you do your daily needs shopping?



By Car	40	61.5%
Other	25	38.5%

How far is the nearest retail opportunity (shop, market, barber...) from your home?



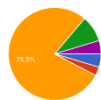
≤ 5min walking	18	27.7%
5-10min walking	9	13.8%
10-20min walking	16	24.6%
20-30min walking	3	4.6%
have to use car	19	29.2%

Where did you buy your overall needs?



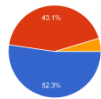
Local Grocery Shop	3	4.6%
Magmet Shop (Lemar, Onder, 1001 and ...)	62	95.4%

How many motorized vehicles (Car, motorbike, ...) do you have in your home?



None	3	4.6%
One	2	3.1%
Two	51	78.5%
Three	6	9.2%
≥ four	3	4.6%

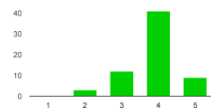
Did you buy any other motorized vehicle (Car, motorbike, ...) after you moved to Tuzla area?



Yes	34	52.3%
No	28	43.1%
I plan to buy	3	4.6%

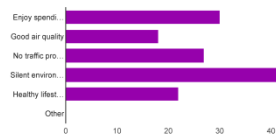
F. General Impact of Living in Tuzla

In term of quality of life how satisfied are you with your life in Tuzla?



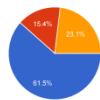
Very unsatisfied: 1	0	0%
2	3	4.6%
3	12	18.5%
4	41	63.1%
Very satisfied : 5	9	13.8%

Which benefits do you get from the natural environment ?



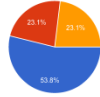
Enjoy spending time in the natural environment	30	46.2%
Good air quality	18	27.7%
No traffic problems	27	41.5%
Silent environment with no crowd	43	66.2%
Healthy lifestyle (sport activities, walking, jogging, etc.)	22	33.8%
Other	0	0%

Have you ever faced with time management problems (Children pick, delay for work, school and etc.)



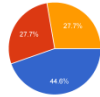
Yes	40	61.5%
No	10	15.4%
Not Sure	15	23.1%

In case you moved from a city center to Tuzla area, did you become more automobile depended?



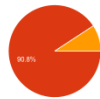
Yes	35	53.8%
No	15	23.1%
Not Sure	15	23.1%

In case you moved from a city center to Tuzla area, did you perceive any household expenses increase since moving to the Tuzla?



Yes	29	44.6%
No	18	27.7%
Not Sure	18	27.7%

Do you think of moving (back) to the city center ?



Yes	0	0%
No	59	90.8%
Not Sure	6	9.2%

Thank you !