

EVALUATION OF CREATIVE CAPABILITIES OF CITIES
IN A PATH DEPENDENT CONTEXT:
THE CASE OF ULUTEK TECHNOLOGY DEVELOPMENT ZONE
AND NİLÜFER DISTRICT

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**EVALUATION OF CREATIVE CAPABILITIES OF CITIES
IN A PATH DEPENDENT CONTEXT:
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AND NİLÜFER DISTRICT**

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ABSTRACT

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Cities, with respect to the labour force they contain, have been undergoing transformations since pre-Industrial Revolution periods. The increasing role of machinery in production has significantly altered how labour had expended in production process while increasing the welfare and variety of consumption modes. The events in this context have been effective in shaping the path cities around the world take towards their growth. The theories developed in the past have put emphasis on production forces in shaping the urban space and economy. On the other hand, recent theories on urban growth focused on the relation between consumption, creativity and human capital since the start of the 21st century. However, these approaches have displayed several shortcomings not only in theoretical forms but also in their practices. These two lines of research argue for urban growth to stem from either consumption or production based urban policies. However, they also share a common point for a lively urban economy which is human interaction. Using this common characteristic as a starting point, this study aims to evaluate creative capabilities of ULUTEK Technology Development Zone (TDZ) and Nilüfer district in the city of Bursa by incorporating both perspectives in a path dependence context.

Towards this aim, production based theories are used in the case of ULUTEK TDZ and its knowledge networks whereas consumption based theories are used to evaluate the built environment of Nilüfer and its quality-of-life from the perspective of talented labour force in ULUTEK TDZ. Ultimately, both evaluations will make it possible to draw conclusions on the development trajectory of Nilüfer and Bursa's urban space and economy in the context of path dependence.

Keywords: Innovative Capacity, Industrial Geography, Path Dependence, Urban Development, Local Economic Development

ÖZ

KENTLERİN YARATICILIK KAPASİTELERİNİN YOL BAĞIMLILIĞI ÇERÇEVESİNDE DEĞERLENDİRİLMESİ: ULUTEK TEKNOLOJİ GELİŞTİRME BÖLGESİ VE NİLÜFER İLÇESİ ÖRNEĞİ

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Kentler, sahip oldukları iş gücüne dayalı olarak, Sanayi Devrimi'nden bu yana çeşitli dönüşümler geçirmişlerdir. Makinelerin üretimde gittikçe artan rolleri, üretim süreçlerinde iş gücünün nasıl kullanıldığını önemli biçimde etkilemiş, aynı zamanda, refahı ve tüketim biçimlerini arttırmıştır. Bu bağlamdaki olaylar, dünyadaki şehirlerin büyümelerine dair ne yönde gelişim yolları izleyeceğini şekillendirmekte etkili olmuşlardır. Geçmiş yaklaşımlar üretime dayalı etkenleri kentsel mekanın ve ekonominin gelişiminde ön plana çıkarmışlardır. Diğer yandan, 21. Yüzyılın başından itibaren tüketim, yaratıcılık ve beşeri sermaye arasındaki ilişkileri dikkate alan çeşitli kentsel gelişim teorileri de geliştirilmiştir. Fakat, yakın zamandaki bu teoriler sadece teorik olarak değil pratikte de çeşitli eksiklikler göstermişlerdir. Bu iki araştırma yaklaşımı, kentsel büyümenin üretim ya da tüketim temelli kentsel politikalardan ortaya çıktıklarını savunmuşlardır. Ancak, canlı bir kentsel ekonomi yönünde ortak olarak paylaştıkları bir nokta bulunmaktadır: İnsan etkileşimi. Bu ortak karakteristik çıkış noktası olmak üzere, bu çalışma her iki perspektifi yol bağımlılığı bağlamına yerleştirerek, Bursa şehri özelinde ULUTEK Teknoloji

Geliştirme Bölgesi (TGB) ve Nilüfer ilçesinin yaratıcılık kapasitelerini değerlendirmeyi hedeflemektedir. Bu doğrultuda, alan çalışması kapsamında üretim temelli teoriler ULUTEK TGB ve bilgi ağlarını değerlendirmekte, tüketim temelli teoriler ise Nilüfer yapılı çevresindeki yaşam kalitesini ULUTEK TGB’de çalışan gelişmiş iş gücünün gözünden değerlendirmekte kullanılmaktadır. Sonuç olarak, her iki değerlendirme yol bağımlılığı kapsamında Bursa’nın kentsel mekan ve ekonomi açısından gelişim yönüne dair çıkarımlar yapılmasını sağlayacaktır.

Anahtar Kelimeler: Yenilikçilik Kapasitesi, Sanayi Coğrafyası, Yol Bağımlılığı, Kentsel Gelişim, Yerel Ekonomik Gelişim

To My Parents

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CHAPTER 1

INTRODUCTION

Production and consumption have both been effective forces in shaping the urban landscape in various time periods in history. Consumption in the form of trade has long been one of the constitutive forces in the emergence and development of urban settlements and economies; whereas production has become most effective with the increased automation after the 18th century. Links between these forces became increasingly connected with the increased importance of knowledge as an input in the globalized economy by the late 20th century. In urban development studies, this resulted in deeper examination of human and human labour, as the source of new knowledge production, in directing urban growth and transformation. In this regard, understanding on human capital has set the foundations on how urban space and economy can be affected by human labour and *vice versa*.

The two-ended connection between urban space and economy, and human capital is based on production and consumption activities of highly qualified human capital in the 21st century. In this context, knowledge production spaces, characterized by high technology, creativity and innovation emphasis in production, constitute one of the primary concentration areas for qualified human labour in the 21st century. On the other hand, the cities, where these production spaces are located, provide consumption options based on high quality of life expectancies of these qualified individuals. In the light of this perspective, a comprehensive urban development perspective based on human capital approach may need to cover development of both these production and consumption forces.

Towards such a perspective, knowledge flows present an important subject to be observed. These flows enable to utilize creativity in a systematic way which, then, brings about development of novel ideas into new goods and services.

As a result, interaction among the production agents is required for efficient local economy in the context of global knowledge economy. On the other hand, cities provide for the demands of qualified labour force in order to either attract similar additional inhabitants or maintain the existing ones by appealing to their satisfaction from the urban environment.

This study attempts to evaluate creative capabilities of cities with this perspective. In the accomplishment of such an attempt, past events and structures are also aimed to be taken into consideration in order to identify which factors contributed to the emergence of relevant functions and human capital in a city. Therefore, path dependence is employed as a framework to observe the historical conditions which shaped the existing production and consumption forces. Moreover, the findings from such analysis also makes it possible to evaluate future trajectories based on observations regarding existing barriers and shortcomings to development.

1.1. The Aim and the Scope of the Study

In the context highlighted above, the aim of the study is to examine the emergence and growth of knowledge and creativity based urban development from both production and consumption spheres of a city from an evolutionary perspective. In this setting, path dependence is used as a framework to analyse development of production forces and how urban space evolves to support such development. Towards this aim with respect to the role foreseen for the path dependence framework, three objectives are identified and used to shape the structure of the thesis:

1. To highlight the existing economic background in which cities experience spatial and economic growth
2. To discover how path dependence is used empirically and systematically in the observation of spatial and economic growth
3. To carry out path dependence analysis on Bursa's industrial and urban development to understand future development trajectories

In regards to the case, the evaluation of future development trajectories are made based on two entities. ULUTEK Technology Development Zone (TDZ) is a knowledge and creativity intensive production node. On the other hand, Nilüfer district is a high quality built environment which present higher quality-of-life in its local development. The use of evolutionary perspective on these cases in the setting of Bursa represents the contribution of the thesis. As per path dependence, the thesis not only analyses present-day but also the historical processes and conditions in which the TDZ and the district has emerged in. The hard and soft infrastructure Nilüfer possesses provides relevant opportunities to examine the district in terms of quality-of-life discourse. On the other hand, the current emphasis of Nilüfer on quality-of-life is in parallel with the recent changes in the province's industrial and economic geography,

In the light of this approach, the evaluation of the case demonstrates that Bursa's industry has been under a stagnation period due to both endogenous and exogenous factors. It is argued that the development trajectory is in a path dependent structure. As a result, there is a need for deeper insight into the existing and future paths for Bursa's development.

According to recent developments, there are attempts towards increased innovation and diversification in the existing industries through local policies led by multiple stakeholders such as municipality, local chamber of commerce and industry, and universities. In parallel with these attempts, quality of urban space is of significant importance. Various theories developed over human capital highlight quality-of-life factors in attracting and maintaining talented individuals. Therefore, in terms of creation and management of a qualified labour pool for flourishing knowledge and innovation rich industrial environment in Bursa, it is a must to have an accommodating built environment and relevant soft infrastructure. As per these conditions, and the geographical proximity to the ULUTEK TDZ taken into consideration, Nilüfer is the district of Bursa that provides such a built environment according to initial observations.

In summary, these considerations lead to a two-pronged hypothesis for the study:

Hypothesis 1: “ULUTEK cluster is providing an opportunity for Bursa’s industry as an agency-based, path-creative force to diverge from a potential negative lock-in in the local economic development.”

Towards this hypothesis, the industrial background of Bursa, in which ULUTEK TDZ emerges, is analysed. The industrial background is analysed through literature review, sector reports and statistics. Breaking points are aimed to be identified along the development trajectory of the city’s economy through these reviews and reports. On the other hand, the TDZ is specifically analysed through a questionnaire with reference to networks among the firms and the institutions in the TDZ. These connections are expected to provide insight into the capability of the TDZ as a creativity and knowledge based production node.

Hypothesis 2: “Urban policies and conditions of Nilüfer are favourable for flourishing and maintaining a talent pool required by the emergence of new, creativity and knowledge based industries.”

As for the second hypothesis, the quality-of-life in Nilüfer is measured based on the questionnaires provided to the employees of the firms in ULUTEK. The questions are categorized into two subjects: Satisfaction from the living area and satisfaction from leisure, sport and cultural amenities. In addition, the questionnaire also examines knowledge flows on interpersonal scale and spatial environment they take place in.

The connections among the literature and the case in the study is as highlighted in Figure 1. In detail, the chapter on knowledge economy composes the basis on which the subsequent concepts take place in Bursa case. The path dependence enables to gain insight on historical conditions in which ULUTEK TDZ and Nilüfer district emerged. In turn, in which way ULUTEK TDZ can influence the future development path and how Nilüfer district can support the zone is scrutinized. The figure also highlights which literature is benefited from in finding answers to the hypotheses of the study.

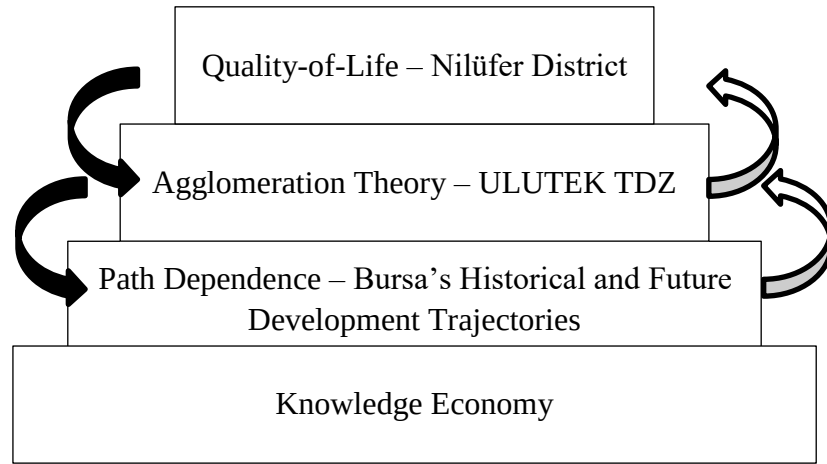


Figure 1. Connections among the Literature and the Case in the Study

1.2. The Design of the Field Survey

The reasons behind the selection of Bursa as the case are connected to the historical characteristic of the city in which industry and metropolitan characteristic has been embedded for a long time. This historical and metropolitan characteristics increase the measurability and applicability of the path dependence and human capital approaches in the study. In other words, the thesis uses path dependence framework to analyse not only the present-day conditions but also the past conditions in which the TDZ and the district emerged.

The historical importance of the city is also highlighted in the prominence of its industry. This makes it possible to trace the presence or lack of changes undertaken in the face of emerging knowledge economy. Towards this goal, ULUTEK TDZ represents industries that may diversify or develop the existing industrial portfolio through innovative economic activities. It presents an opportunity to evaluate potential links from traditional manufacturing sectors to knowledge based services and manufacturing. On the other hand, the employee structure of the TDZ can be argued to be composed of skilled human capital. These individuals are expected to demand higher quality-of-life which establishes the connection between the development of TDZ and the development of Nilüfer district.

There have been a variety of methods employed in carrying out the research. First, preliminary interviews were carried out with personnel from support institutions in ULUTEK such as the management firm of the cluster and the technology transfer office. These interviews provided insight into the inner dynamics of ULUTEK as well as providing required data on the activities and attributes of the firms in the cluster. The interviews have also been effective in shaping the two questionnaires, outputs of which were essential to the finalization of the study.

Secondly, in addition to the preliminary interviews, two questionnaires have been prepared for different measurements involving firms and their personnel. The questionnaires are presented online as the firms have been reported to turn away in-person questionnaire attempts while being more trustful and attentive towards those made from formal institutional communication channels. Therefore, questionnaires were prepared on the online browser based tool SurveyMonkey and distributed to the firms in the TDZ through ULUTEK's Department of Corporate Affairs several times in a span of 2 months. As a result of this mode of operation, the firm questionnaire and the personal questionnaire had to be delivered through a single and two layers of interfaces respectively (Figure 2.).

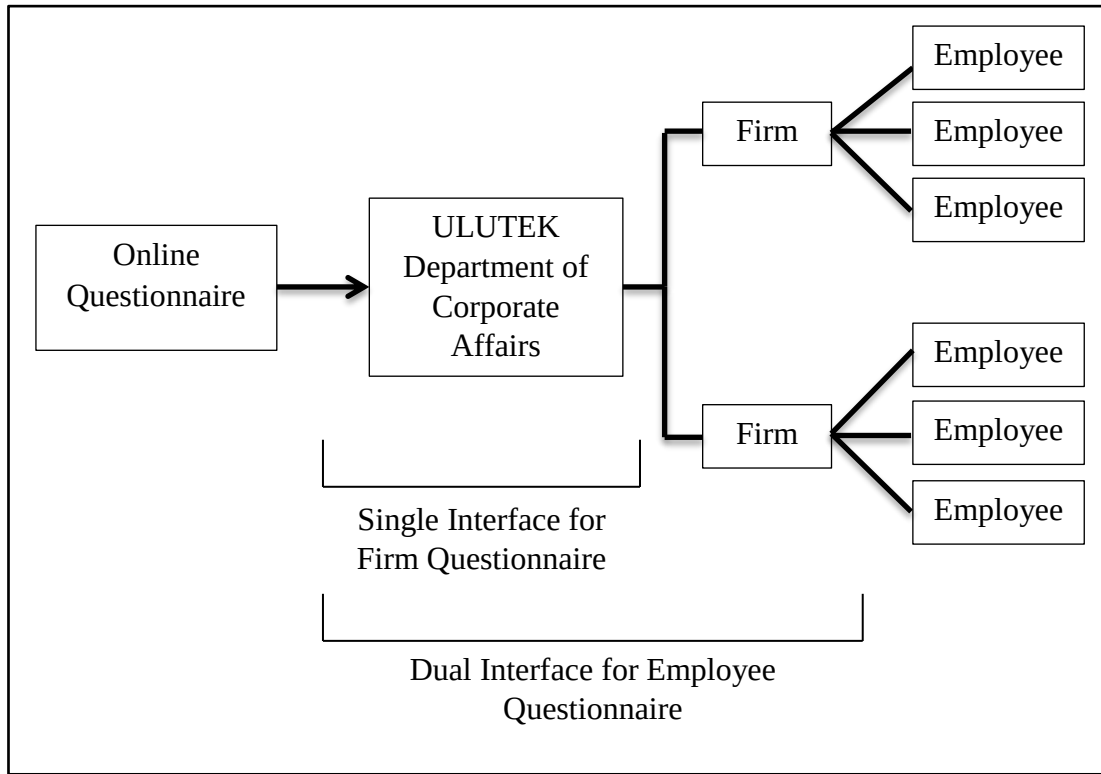


Figure 2. Method of the Questionnaire

The addition of interfaces is reflected in the amount of returns to the questionnaires. In total, 15 firms out of 134 and 35 employees out of 979 answered the questionnaire. While the firm questionnaire reached to the ratio of 11.2%, the dual interface of the employee questionnaire led to a turnout of 3.5%, cause of which is interpreted to stem from not only the low answer rates by employees but also the low amount of distribution of the online questionnaire to the employees by their respective firms. Further comments and observations will be made regarding the response frequencies in the following chapters on the case.

The questionnaire given to the firms has been designed to discover interorganizational knowledge flows among firms and support institutions in ULUTEK ecosystem as well as to evaluate the firms' innovative and competitive capabilities. On the other hand, the questionnaire aimed at the employees measures the preferences of qualified workforce regarding perceived quality-of-life in Nilüfer district of Bursa, where the TDZ is also located. Additionally, the questionnaire enables to look into whether ULUTEK TDZ, as a cluster, is benefiting from the

quality-of-life levels in its own development process as they contribute to maintaining and attracting talented individuals (Arora et al., 2000).

The questions asked to the personnel of the firms regarding the built environment are composed to be not too specific in nature. The reason behind this preference came from a criticism by Storper and Manville (2006) as they note that “...one person’s amenity is often the next person’s inconvenience.” (p.1252). Therefore, by eliminating specifics, preferences of a wider group of people become more accountable in designating common preferences for the qualified workforce in question.

The neighbourhoods of Nilüfer included in the questionnaire are designated based on their geographical proximity and their inherent qualities that differentiate one from another. First, these neighbourhoods are classified based on geographical proximity. 5 kilometer diameters were taken into consideration which put Görükle and Yüzüncüyıl / Özlüce together in the first diameter. Then, their attributes based on demographic structure, residence types and urban life have been taken into accordance to finalize how to present them to participants (Table 1.) (Figure 3.).

Table 1. Sorting System of Neighbourhoods in the Questions

Geographical Proximity		Attributional Differences
Görükle, Yüzüncüyıl, Özlüce		Görükle
Neighbourhoods North of İzmir Road (İhsaniye, Ataevler, ...),		Yüzüncüyıl, Özlüce
Neighbourhoods South of İzmir Road (Konak, Üçevler, Beşevler, ...)		Neighbourhoods North of İzmir Road (İhsaniye, Ataevler, ...)
Nilüfer (Other)		Neighbourhoods South of İzmir Road (Konak, Üçevler, Beşevler, ...)
Not located in Nilüfer		Nilüfer (Other)
		Not located in Nilüfer

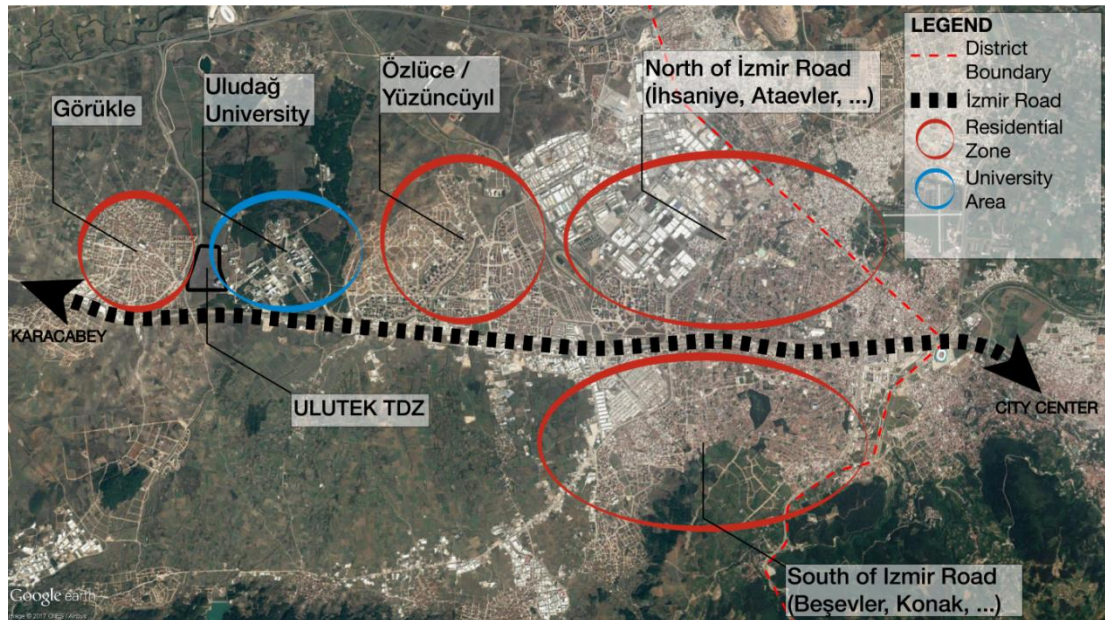


Figure 3. Selection of Residential Zones in Questions

Source: (Personal Drawing)

While Görükle and Özlüce/Yüzüncüyıl are both geographically close to Uludağ University and ULUTEK, they are separated into two choices in the final sort. The reason behind is that both neighbourhoods display different characteristics. Görükle has been historically much more under influence of Uludağ University's growth, therefore, the differences can be found in terms of demographic, residential rent prices, residence types and urban life in the district.

Preliminary on-site observations show that, for Görükle, demographic structure is composed of mostly university students with a small number of inhabitants located in there since when it was rural; on the other hand, vicinity of Özlüce and Yüzüncüyıl are rapidly urbanizing neighbourhoods with more working-age individuals and families. TURKSTAT does not provide detailed demographic information at neighbourhood scale. Therefore, in its stead, age classes above and below 18 on neighbourhood scale is utilized to justify the difference. The reason why is that the higher ratio of those below age 18 to those above 18 can be argued to signal families with children rather than single, working age individuals in the corresponding neighbourhoods (Table 2).

Table 2. Demographic Difference among Görükle, Özlüce and Yüzüncüyıl

Neighbourhood	Pop. Above Age 18	Pop. Below Age 18	Ratio of X<18 / X>18
Görükle	15952	1970	0,12
Özlüce	884	296	0,33
Yüzüncüyıl	14064	5126	0,36

Source: (TUIK, 2016)

Ultimately, the difference in demographic structure influences the other attributes. Görükle consists of cheaper residence opportunities appealing to the students; lower room and floor numbers in residence types; more vibrant urban atmosphere in terms of leisure, sports and cultural activities.

On the other hand, leisure options given to the participants also include nodal activity places such as shopping malls alongside with more zonal choices such as boulevards.

The comparison between shopping malls and area-based ones with distinct characteristics is expected to yield findings regarding the urban life in Nilüfer (Figure 4.).

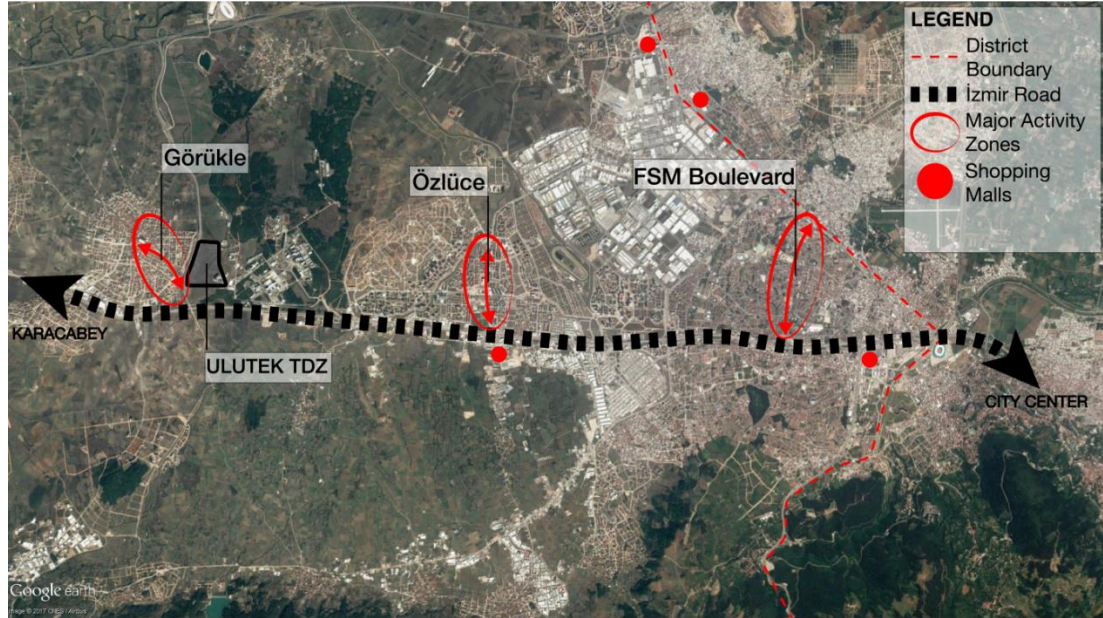


Figure 4. Selection of Activity Zones in Questions

Source: (Personal Drawing)

1.3. The Structure of the Thesis

The thesis is composed of 5 other chapters besides the introductory one. Following this introduction chapter, **the second chapter** of the study examines knowledge economy and related concepts. The contribution of this chapter to the aim and the objectives of the study lie in the justification of the inevitable effects of changing human labour and, subsequent transformation of the urban space and economy in its wake. The first section will introduce knowledge economy by providing information about types of knowledge, interplay among knowledge, labour and urban space in historical context, and initial periods of knowledge economy. The second and the third sections will succinctly brief about crucial concepts of innovation, entrepreneurship and creativity: An overview of an influential perspective towards innovation in the concept of creative destruction and, those who are active in its

processes, entrepreneurs, will be provided under innovation sub-chapter; whereas creativity is scrutinised in its connection to innovation.

The third chapter moves the discussion towards the spatial aspect of the subject by delving into the theories regarding growth of knowledge production spaces. This chapter sets the foundations for discussions and evaluation of knowledge and creativity based urban development in the thesis. First, a general overview concerning the recent connection between knowledge and the urban space will be made. Next, the theories that contribute to the discussions surrounding knowledge production and cities are detailed. Agglomeration theory and human capital theories are scrutinized in this context.

In **the fourth chapter**, the main method of analysis as the path dependency is analysed in detail as an approach from evolutionary economic geography (EEG). In this context, approaches developed under EEG is conveyed first. Then, as the most suitable among them, path dependence framework is explained in two sub-categories: first, several concepts that prove to be sufficient tools are defined while secondly, path creation as an additional concept is clarified while expanding the foundations of path dependency framework. Lastly, empirical studies are going to be overviewed in order to shape the analysis method to be followed in this study. These studies will be analysed under two branches according to the objectives of the study: The first is focused on the emergence of new industries while the second puts emphasis on those that place the role of human capital at the center of the path dependency context.

In **the fifth chapter**, the analysis of the case starts with establishment of three sequential periods. The questionnaire results are evaluated in the context of these periods. Each period is examined in terms of both industrial and urban development. In the first period, transition of Bursa into an industrial city is being observed from the start of the Republican era to the late 1960s. Next, the peak performance period for existing industries as well as the emergence of new industries are examined between the years 1970 and 2001. Following period extends from 2001 to the present day, in which, a new path dependent structure is argued to be established. In the light

of the findings on these periods, ULUTEK TDZ is analysed through variety of methods with respect to factors effective on path creation and dependency. In addition, the quality-of-life characteristics of Nilüfer district are analysed with reference to their role in retaining and attracting talented individuals.

As the last one, the sixth chapter presents a succinct conclusion is provided. In this context, summary of the research is undertaken. In addition, findings are evaluated and discussion over them are carried out as well.

CHAPTER 2

KNOWLEDGE ECONOMY AND FORCES THAT SHAPE IT

Knowledge has been in the process of constant utilization as long as humanity was around. However, its prominence as a part of economy on the production side was identified as recent as late 19th century as Marshall's study (1920) underlined that "knowledge is our most powerful engine of production" (p.84). On the other hand, since then while it was brought up by various studies over the decades, almost a century had to pass before it actually rose to prominence as an input within production. Today it is considered to be the primary input that determines high-value added characteristic in wide range of products (Drucker, 1993; Rodrigues, 2003; Powell & Snellman, 2004; Carlaw et al., 2006) and seen as a vital factor for organizations to possess (Rodrigues, 2003). The economy based on this input has consisted of "production and services based on knowledge intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence." (Powell & Snellman, 2004, p.401).

Some key features of this type of resource are needed to be understood for better understanding of the spatial issues dealt with in the extent of the study. Therefore, in the initial stage of this section, knowledge and its different types will be briefly presented. This resource has been utilized over the decades and centuries, which affected labour market as well as urban space. Hence, next, historical context of the interplay among knowledge, labour market and cities will be examined to highlight these connections. This historical context will set the foundations to identify the developments underway during the existing period according to the same interplay. Therefore, last but not least, the existing trends along this interplay, which have been active since the 1990s, will be investigated with more emphasis.

2.1. Knowledge, Knowledge Types and Their Role in Production

The terms data, information and knowledge are all related to each other in a sequential way. Data represents raw facts; organized form of these data equals to information; whereas, knowledge is operationalized version of information with which problems can be identified and addressed (Lambooy, 2004). In other words, if information is organized data without human processing, knowledge is information subjected to a human evaluation. Many high value goods and services are imbued with this resource today. Therefore, it is important to understand its different types, their nature as well as their own dynamics in their dissemination before delving into the historical context on how it became the main input in the existing global economic structure.

The means to enable mobility or transmission of knowledge depends on the type and nature of knowledge. Even before globalization and emergence of knowledge-based economies, there were observations about the nature of this issue. One such study belonged to Michael Polanyi (2009) in which he clarified the distinction of tacit knowledge from codified knowledge. The starting point of Polanyi in discerning tacit knowledge was that “we can know more than we can tell” (2009, p.4). It is considered to be an important separation in identifying how new knowledge is being formulated, which asserts itself to be a critical consideration from an epistemological standpoint (Nonaka, 1994).

The transmission of knowledge becomes the central issue in shedding light on the differences between codified and tacit knowledge. Codified knowledge is the type of knowledge that can be transferred to another individual through systematic, formulized communication or similar other means. On the other hand, tacit knowledge is the type of knowledge embodied within body or mind of an individual or group of individuals. Unlike its codified counterpart, it cannot be transmitted to others by writing it in a book systematically and having it read by others (Smith, 2001). It requires personal face-to-face interaction (Hansen et al., 1999) and considered to contain the “know-how” of a task while the codified knowledge embodies “know-what” information (Smith, 2001).

Similar to the relation between master and apprentice, tacit knowledge can also be transferred through observations, imitations; experience plays indispensable role in the achievement of this knowledge (Nonaka, 1994). As gaining this knowledge requires different mechanisms than codified one, it is not simply and only employed in a master-apprentice setting but in various ways in today's practices. It is consciously being sought after to embed this knowledge in the workers of this era to have them more competent and resolute in the face of increasing and more complex workloads in parallel with diminishing time intervals (Smith, 2001).

2.1.1. Historical Interplay among Knowledge, Labour and Urban Space

Before gaining its various types of uses today, the utilization of knowledge has undergone a few changes during the last three centuries starting with the pre-Industrial Revolution periods. It is also no coincidence that transformation of societies took place especially at those changing points in history. In the case of these transition periods since Industrial Revolution, the reason behind these changes has been the change of productivity which allowed generation as well as evaluation of knowledge (Drucker, 1993). The section will be structured with periodical examinations of relations between knowledge and labour (both machine and human) with accompanying changes in urban space.

Before the Industrial Revolution, production was undertaken by artisans and their respective guilds, which limited the mobility of knowledge to a certain circle. Tacit in nature, this accumulation of knowledge turned into craft secrets of these guilds which were passed from masters to apprentices. As for the locational preferences of these artisans and their guilds, there had been two main considerations: access to largest market size possible (Desmet et al., 2016) and access to water as an energy source (Marshall, 1920). These considerations led to the two implications for the formation of industrial units in cities: First consideration, that is the largest market size, led to the concentration of guilds in only a few cities while the second, access to water, enabled location of units in any form (dispersed or concentrated) as long as they had that access.

This limited, secretive approach to dissemination of knowledge started to be challenged in Western societies during the 18th century in which various steps have been taken such as establishment of technical universities in France and Germany; writing of first encyclopaedia; patent grants to public in Britain (Drucker, 1993). The knowledge generated as output of these processes were translated into invention of more machinery to be utilized in industry which, in turn, enabled much faster accumulation of new information and knowledge than before.

These developments have led to the mixed results. While there were benefits for majority, the process was not devoid of backlash by those who experienced the losses among which artisans could be counted (Mokyr, 1992). These groups reacted negatively because previously limited number of jobs got split up into the tasks to which unskilled masses started to attend for much lower costs. It was assembly line that enabled such transformation, which was born out of technological advancements in automated machinery. In this process, the tacit knowledge of artisans was translated into a simplified, codified form that enabled unskilled masses to find employment in industry (Drucker, 1993).

The reason of this change in transfer of knowledge has been the advances towards increasing productivity in industry. Automation of machinery, as a part of technological change, transformed human labour of the past. In the new type of production enabled by the Industrial Revolution, one person with knowledge of several processes of a production was not required; but rather, specialization over only a single task of an artisanal craft was needed from an individual worker which was more favourable for deskilled human labour. In other words, automation created mass employment opportunity for unskilled workers while displacing few skilled ones out of their jobs (Goldin and Katz, 1998). This resulted in gradual disappearance of skills based on artisanal crafts and, in their stead, development of new skills towards the functioning of production line (Hobsbawm, 1997). This also underlines that technological change did not necessarily meant rendering human labour obsolete at that time as much more amount of people were given opportunity to find employment in contrast to limited number of artisans.

On regional scale, formation of factories had started in previously rural towns away from the major cities of the time in order to side-track the regulations of the guilds active in those cities (Desmet et al., 2016). As for urban scale, agglomeration of factories and the externalities they provide had been documented by Weber (1909) and Marshall (1920). Economies of scale had been the most highlighted feature of Marshall's study; however he had also identified the existence of knowledge flows among production units enabled by their spatial concentration (1920). On a different note, residential units were located close to factories as part of closer distance to workplaces. In terms of land use decisions, more rigid lines among different uses were drawn unlike the mixed formation of the past (Florida, 2010).

By the early 20th century, labour and power came to be concentrated in the hands of capitalists, specifically in western societies. This segment of the society comprised the winning side in the society in detriment of workers. Therefore, class conflict and uncertainties came to influence the urban geography around the globe during this period. Taylorism has been an important school of thought during this period, which spawned several tasks out of single, more complex tasks, and (Biscontini, 2015). It has been argued to side-track class conflict by making workers more productive and, thus, gain more money (Drucker, 1993, p.61). However, it also created discontent because managers were argued to exploit workers as the workers' rise in productivity did not necessarily meant rise in wages for them (Biscontini, 2015). Therefore, it has been attributed that Taylorism was one of the reasons in the active pursuit of automation and offshore (Biscontini, 2015). The following increase in new machinery for production did not only augment workers, but also replaced some of them to a degree this time (Frey and Osborne, 2013, p.10).

The seeds that were planted by various developed countries in the form of Taylorism to avoid class conflicts sprouted into welfare states with Keynesian economies in the later periods. Welfare states provided various goods and services to their citizens, among which unemployment benefits were also counted (Jessop, 2000). This helped to fuel Fordist approach to the production in the face of consumption for which needs were being created or renewed due to increasing welfare. Information was gaining

value as an input in production because the introduction of new machinery had amplified the amount of information generated as part of production efforts. Therefore, white collar workers had been required and demanded as a part of information and service sector to manage and make use of this new information (Goldin and Katz, 1998).

During the period from the start of the 20th century to the 1970s, incomes kept increasing, despite temporary falls during the World Wars and economic crises in between. As the World Wars ended and a relatively more peaceful era started, consumption of masses experienced a boom compared to before, in parallel with the rapidly increasing population and welfare. Urban space had also been subjected to this consumption trend. Suburbanization was one of the outcomes during this era, especially in U.S. where Fordism was at its peak in practice until mid-1960s (Florida and Feldman, 1988). At the same time, competition was causing firms to lower prices of goods and services alongside the increasing wages. As a result of this, shopping malls in both U.S. and parts of Europe started to emerge as the spatial translation of a unique mass consumption culture (Moretti, 2012).

Despite superficially better lifestyles, these developments were actually at the behest of workers in the long run whose wages were increasing accordingly with welfare policies. This meant increasing labour costs for the companies whose profit levels kept falling down. Therefore, companies started seeking out human labour at lower costs which they found in East Asia and thus taken the first steps towards a globalized economy (Lash and Urry, 1987; Massey, 1995; Leslie & Rantisi, 2012). Exploiting the labour force existing in East Asia was enabled through loosened border controls and economic regulations. Furthermore, these approaches did not only produce further subsequent economic changes, but social change has also become part of the process (Leslie & Rantisi, 2012).

The companies that achieved the global institutional structure removed the shackles on their high production costs in a way. They started to dominate the market and their competitors, the result of which led not only to the loss of jobs due to these offshoring activities but also to the bankruptcy of the companies that stayed behind.

The number of unemployed soared as did the total amount of unemployment benefits the welfare states were providing. Oil crises of the 1970s were the last blow in this sequence. Thus came the crisis of the welfare state during the 1970s (Joppke, 1987). The reasons of success of the economic structure of the era also became the reason behind its downfall (Drucker, 1993, pp.64-65).

The emergence of globalized economic structure brought along significant changes in labour markets as well as the role of knowledge in production. Knowledge has come to be used in producing new knowledge, finding out whether that new knowledge is feasible or not and how to further evolve it if it is so. Strategy on niche market development was adopted in countries with advanced economies based on the image and symbolic value of the products (Lash & Urry, 1994). On the industrial geography, deindustrialization is attributed to be the factor in creating a new international division of labour as a result of cheaper labour force in Asian labour markets while higher amount of educated and talented individuals has started to concentrate in Western countries. In this context, knowledge became the main resource (Leslie & Rantisi, 2012) and has been transforming the economic landscape globally since then.

2.1.2. 1990s' Transitory Steps towards Knowledge Economy

In the initial stage after the fall of Keynesian economic model, the 1980s was a period of stagnation in which no new economic models arose (Thrift, 2001). However, several factors gave shape to what has been named as the “new economy” during the 1990s. Higher numbers of youth as part of increasing welfare, rise of information technology and, lastly, emergence of need for management of knowledge contributed towards the emergence of this setting (Thrift, 2001).

At the initial stage, after the World War II, extended life as well as work-life span of individuals enabled prolonged education (Drucker, 1968) which enabled more time for human labour to be devoted on the development of further knowledge. The rising centrality of knowledge as an asset by this accumulation brought the constant need for management of it (Thrift, 2001) giving rise to new business types specialized

over management of this resource. Ultimately, information technologies flourished out of the utilization of knowledge created over the years. As a result, these processes were effective in giving shape to “new economy” during the 1990s.

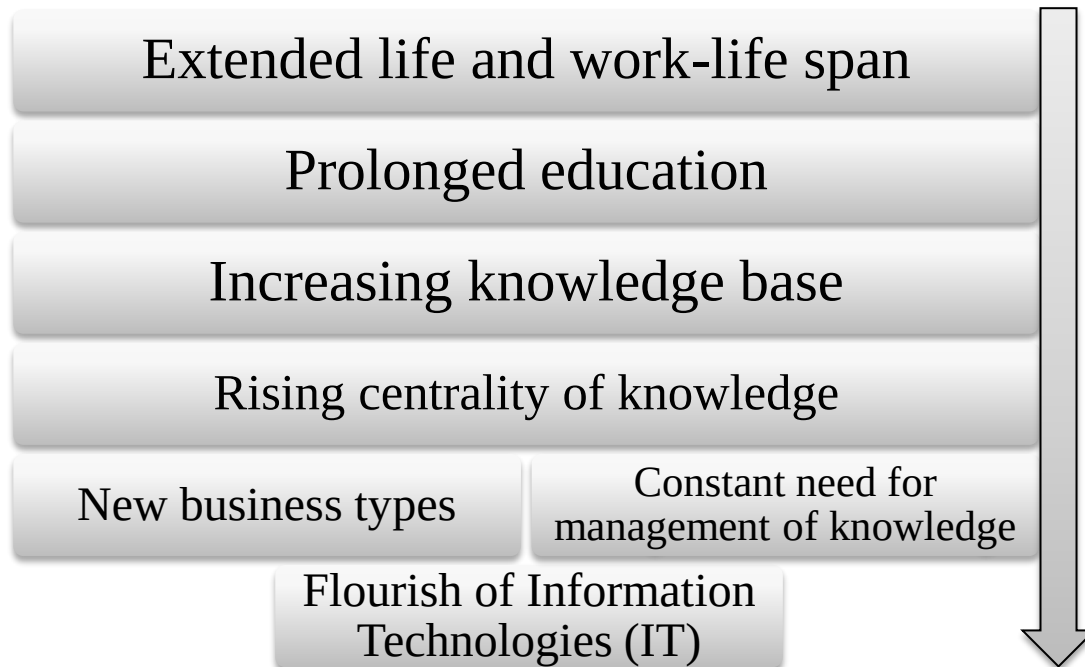


Figure 5. Emergent Dynamics behind Information Technologies
(Source: Personal Drawing)

In this new setting, time became an incredibly valuable asset by the advancements in Information and Communication Technology (ICT) leading to faster production and consumption periods (Thrift, 2000). This meant boosting production speeds for the firms, and easier accessibility and reachability to products for the consumers. Competition and cooperation was increased among various actors to provide suitable goods and services for the needs of consumers or to quickly overcome market rivals’ activities that may outperform them (Thrift, 2000). As a result of this, two dynamics that correspond to these two activities can be underlined: properly continuing operation of existing production services and need for innovation in order to continue to exist in the market. Ultimately, in the execution of both, it is the knowledge as an asset that takes the place as the essential cornerstone (Thrift, 1997, 1999).

This new economy was characterised by small and medium-sized enterprises (SMEs) in high technology industry, talented and mobile labour force, entrepreneurial spirit and lastly, venture capital (Thrift, 2001). Owing to these factors, higher economic growth became reachable with less labour power compared to the manufacturing industry dominated economy. Out of this process, ICT sector rapidly started to dominate the global economic landscape.

The 1990s, in that regard, was the crossroads where knowledge-based economy and globalization intersected, as mobility of knowledge transcended from the physical space to virtual ones as a result of the advanced forms of ICT. New, physical or virtual spaces have spawned, new work environments are established in them and they have become increasingly connected on a global scale to produce new knowledge and knowledge outputs through collaborations of this era's workers (Carlaw et al., 2006).

2.2. Innovation: Utilizing Knowledge in the Market

Knowledge has become an essential product itself by the 1990s, meaning its formulation and transfer towards economic yield came to hold utmost importance (Castells, 2010). Innovation, in this regard, came to emerge as the core concept to describe this process. OECD (2005) defines the term as “the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.”. A different description highlights innovation as a process that identifies a problem area towards which new knowledge is formulated as a solution (Nonaka, 1994).

Innovation was started to be actively utilized and sought after as an important dynamic in production after the 1980s. However, actually, it was mentioned as early as late 19th century that it is a trait of “modern manufacturer” to create new needs for masses and ensure that their newfound demand is provided with enough supply (as cited in Marshall, 1920, p.162). Decades after these brief explanations, Schumpeter (2003) detailed the concept of innovation through his influential “Creative

Destruction” theory in the 1940s. The creative destruction perspective foresaw employing knowledge to produce new knowledge that transforms existing practices. Schumpeter (2003, p.84) criticized his contemporaries based on their price based competition understanding and argued for the importance of competing on the bases of “new commodity, new technology, new source of supply, new type of organization, ... which strikes not at the margins of profits and the outputs of the existing firms but at their foundations and their very lives.”. Ultimately, this leads to transformation of economy by its very components’ destructive and creative activities and, thus, formation of the process he calls as Creative Destruction.

Development of both academic and professional interest in Schumpeter’s approach of innovation is rather recent. This can be argued to be related to the increased insight into the nature of innovation. Innovation is classified into two categories based on its transformative effects: Incremental and radical. Incremental innovation is known to be the development of a technology by gradual improvement which allows for reduced risk in terms of resources spent. However, the increasing pace of competition in most economic sectors led to the active utilization of another type, which has been named radical innovation in general (Leifer, 2000). Moreover, the increasing amount of technological innovation that came up in the post-1990s led to increased role of radical innovations in advancing our societies rather than incremental ones (Hirst et al., 2009). This increased role may be argued to support the rise in the interest towards Schumpeter’s studies on creative destruction.

Innovation is a concept that is bound to economic sphere of life. This is also where it gets separated from invention as a term. While invention leads to the emergence of a new good or service, innovation is where a product or a service is also commercialized and introduced to a market (Schumpeter, 1939). Their difference is also highlighted by the different characteristics required from actors. Invention processes benefit from an intellectual capacity whereas business mind and will contribute to innovation processes (Schumpeter, 1939).

2.3. Creativity: Emergence of New Knowledge

Creativity has been assumed to play a prominent part in surging economic development and competitiveness. As a result of changing nature of economies, rising income levels and more free time to enjoy enabled by an advanced economy, demand towards products increase in variety to open up for more creativity to be explored in production (Work Foundation, 2007). The concept can be defined as “the ability to come up with ideas and artefacts that are new, surprising and valuable.” (Boden, 2003, p.1).

The source of creativity is argued under two theories, which are attribute theory and systemic theory (Runge, 2014). The earlier argues that creativity is a result of genetic favour which is a dead-end statement and almost deterministic for further discussion in flourishing creativity whereas the latter states that creativity is born out of intricate combinations of personal characteristics, competences, experiences, knowledge, interactions and other attributes. The outputs of creativity as well as the process of creative thinking is expected to be unique and argued to be born out of a perspective that enables one to identify unknown concepts (Runge, 2014). The components of creativity, in that regard, include: Establishing previously unexplored links between objects, knowledge and occasions; bringing data and concepts together; out-of-the-box perspective and radical approach on normalized objects and routinized processes (Runge, 2014).

In its relation with knowledge, tacit knowledge is argued to be directly connected to creativity of individuals. Nonaka (1994) argues that this type of knowledge is fully utilized in a time of uncertainty during which what he calls “Creative Chaos” takes place, similar to Schumpeter’s creative destruction processes. Either in spontaneity or in a staged effort, this setting of uncertainty provides individuals to maximize their efforts in their productive activities to be creative. This is the point in which the dynamics that govern knowledge economy today are situated at.

It is also by these definitions that creativity’s intricate connection to innovation as well as entrepreneurship is demonstrated. There is a predecessor - successor relation between creativity and innovation: For creativity to turn into a successful innovation

and, thus, get transformed into an economic value, “its value has to be positively evaluated” by a market (Schweizer, 2003). Furthermore, as creativity stems from human labour, the entrepreneurial spirit of people that form a labour force becomes essential in having that creativity correspond to the needs of societies or a segment of them and play an active role in developing solutions to the problems or deficiencies faced.

The concepts of knowledge economy have been examined in this section to underline the inevitable transformation of labour force today. The place of knowledge, innovation and creativity in the global, knowledge economy conditions as well as their historical background highlight the reasons why human labour is required to be more developed than ever before. As the connection between labour and cities were highlighted in the sub-section on historical background, the cities of today and their inhabitants interact with each other in peculiar ways as well. The changing characteristics of labour require local governments to plan and manage urban spaces under new perspectives based on the conditions imposed by concepts of knowledge economy. In addition to firms’ agglomeration trends, concentration of highly skilled labour force is also an urban economic and spatial growth factor for the past few decades. To discover different viewpoints over urban space since early 20th century, the next chapter examines agglomeration and human capital theories.

CHAPTER 3

GROWTH OF KNOWLEDGE PRODUCTION SPACES

History of knowledge dissemination has long been associated with reducing spatial proximity among agents. The transition from secretive artisanal crafts to production line was underlined in the previous chapter. The outcome of this transition in the 19th century was an amplified production capacity that required more labour and energy than ever before. Due to the technological limitations at the time, labour and energy requirements of the production processes couldn't have been easily presented to thousands of smaller industrial units dispersed over space (Drucker, 1993, p.59). Therefore, the change in utilization of knowledge in production and consequently transformed human labour brought along spatial transformations. These changes have cemented the role of cities as clusters of production, a trend which still continues today with much more increased number of variables. Thus, urban space will be observed under the framework of these new economic conditions imposed by knowledge economy, innovation and creativity.

3.1. Knowledge Production, Flows and Cities

The importance of the role cities play in growth of innovation, creativity and knowledge-intensive businesses have been highlighted by various studies, especially since the 1990s (Storper, 1995, 1997; Florida, 2002; Oinas and Malecki, 2002). Cities host agglomerations which provide several advantages such as shared labour pool and shared infrastructure. However, more importantly in the knowledge economy, cities also increase chances of interaction among variety of individuals, and interaction is an essential activity for production of new knowledge (Helbrecht, 2004). It is the central piece towards the establishment of innovation and creativity as

embedded factors in a city or a region (Kratke, 2011). As Florida (2010) has underlined “the jostling of many different professions, and different types of people, ..., is essential to the creation of things that are truly new.” (p.70). Interaction can establish links between previously unexplored subjects or fields which can generate creativity in production process as well (Runge, 2014). Other studies focused further on the role of interaction, as creativity in the context of urban space is described in terms of creative capital of cities which is an “aggregated collective capability of its economic and social actors” and, thus, a quality that requires connectivity of its actors (Kratke, 2011, p.3). Therefore, knowledge flows among these actors give rise to new knowledge and their application fields. As a result, these flows are vital to the impactful knowledge generation processes that arise from creativity.

In the light of this emphasis on interaction, Lucas’ (1988) study becomes relevant as he states that knowledge transfers increase in frequency when there is higher density of knowledge workers in a space. Higher density means increased chances of contact and higher quality and variance of knowledge and information flows, all of which positively contribute to the innovative capacity of a spatial entity. In other words, agents are required to be closer to benefit from faster and effective knowledge transfers. Furthermore, the concentration of firms and talents also increase competitive and innovative capacity of spatial entities in question besides advancing the growth for the area (Desrochers, 2001, p. 369). Spatial concentrations hold importance for the greater returns as per the importance face-to-face interaction holds (Saxenian, 1994). Despite the rising prominence of ICT in connecting individuals, decision making and idea development still preferably take place locally through face-to-face contacts (Castells, 2010).

Based on these discussions on spatial concentration and density as well as the role of talented individuals in the context of better knowledge flows, agglomeration and human capital theories are given emphasis in the following sections. The discussion on agglomerations will later contribute to the study on the case regarding ULUTEK TDZ. On the other hand, human capital theory and additional discussions on its relation to quality-of-life will be benefited from on the case of Nilüfer district.

3.2. Agglomeration Theory

Agglomeration theory is a highly influential theory with roots dating back to the late 19th century. The theory has been one of the first to shape professional and academic perspective on spaces of production.

In the context of industrial districts, agglomeration economies theory highlight that higher profits are more achievable in case of reduced proximity among industrial units. Marshall (1920) had been the first in advancing this line of research on the theoretical foundations for establishment of industrial districts. The relation he establishes between proximity and profits was based on transport costs of moving goods, people and ideas which decrease as the distance between the firms decrease (Marshall, 1920). Therefore, it is in the interest of firms to locate closer to their suppliers or their market in order to benefit from lower costs of production or commercial activities. Moreover, their agglomeration closer to suppliers and markets is followed by location of related labour force within their proximity as well, joining to the agglomeration. Closer proximity also enables production processes in the 21st century to be more interactive among vertical production. Lastly, enhanced flows of information and knowledge as a result of this concentration were identified and appreciated as a positive externality even in the early 20th century (Marshall, 1920).

Succinctly, the theory holds sharing inputs, labour pool and mobility of knowledge central to its aims (Erkut & Albayrak, 2010). In time, more specific characteristics have been identified. According to their different externalities, agglomeration economies are classified under two categories (de Propris et al., 2009; Kratke, 2011). **Localization economies** signify the agglomeration of firms with similar industrial background. What Marshall (1920) argued as externalities of agglomeration economies fall under this category as firms from same industries benefit from large, shared labour pool, mobility of skilled and experienced labour among firms and knowledge spillovers over the field the firms are active in.

On the other hand, **urbanization economies** are attributed to Jacobs (1969) by various studies (de Propris et al., 2009; Kratke, 2011). These economies are established by the concentration of firms from different background in contrast to

localization economies. The co-location of such firms enable them to tap into diversified human capital pool, diverse knowledge base composed by variety of industries and goods, services and expertise provided by firms from different economic sectors. Moreover, diversity of specializations concentrated in a certain space is argued to foster radical innovations among the actors as well. The main perspective of both agglomeration types are highlighted in the Table 3. below.

Table 3. Defining Characteristics of Different Agglomeration Types

Localization Economies	Urbanization Economies
Firms from similar fields	Firms from diverse fields
Shared labour pool	Diversified human capital
Easy mobility of skilled and experienced labour	Diverse knowledge base
Knowledge spillovers	Radical innovation from diversity of specializations

Source: Author's Analysis

There are various benefits that both localization and urbanization economies provide (De Propris et al., 2009). To start with those of localization economies, first, they provide closer, more personal connections to individuals that possess high skills. Skilled labour as a resource leads firms to co-locate closer in order to reduce their search costs in finding such employees. Secondly, knowledge spillovers take place through transactions of goods, services and ideas among the firms concentrated in an urban space.

Next among the benefits, continuous interaction is ensured among individuals and firms they represent by being closer in space. Moreover, this close proximity is also considered as a prerequisite for diffusion of unique knowledge types such as tacit knowledge (Polanyi, 2009). In addition, this not only increases the mobility of knowledge from one agent to another, but it also increases the social capital. Tacit knowledge becomes more mobile in space, increasing awareness and distributing information about labour market and opportunities while social capital establishes trust and reduces uncertainties in the transactions (Lorenzen and Frederiksen, 2008).

It is argued that through trust, the networks established in the local level are able to make greater gains towards growth as they expand to form global level networks (Belussi et al., 2010). Eventually, this expansion would bring information and knowledge regarding foreign preferences and opportunities to support ventures of these actors (Tolstoy, 2010). Lastly, institutional bonds are strengthened from the colocation of firms, public bodies and education institutions active in the same sector (Lorenzen and Frederiksen, 2008). By the inclusion of public agencies and education institutions, necessities occur within private sector is met more interactively and precisely.

On the other hand, urbanization economies lead to a few differences in benefits from those of localization economies. As noted previously, the emphasis is on agglomeration of diverse sectors, thus, there is emphasis on benefits acquired from the presence of diversity. However, there are two views within urban studies on how diversity brings benefits as well. First one argues that the synthesis of ideas from different fields produce new ideas and knowledge which brings innovation and subsequent growth (De Propris et al. 2009). According to the second viewpoint, diversity is an element that appeals and enhances creative individuals and their creativity for which firms agglomerate close to where those individuals are in order to acquire benefits of diversity (Florida, 2002).

3.3. Human Capital Theory

The importance of the role of human in economic development has undergone transformations over years starting with the late 20th century. Transition of competition from price based understanding towards innovation and creativity based one has increased demand for higher quality labour. As a result, qualifications of human labour in the form of human capital became a central subject in academia. While human capital has been a central issue, the subject also set foundations for further arguments with increased emphasis on creativity as well through creative class discourse (Florida, 2002, 2003). However, this study will not delve into details of this discourse as it does not aim to measure whether there is a creative class or not in the extent of its case. At the same time, the connections between creative class as a

qualified workforce and cities are still benefited from in the extent of link between human capital and quality-of-life discussions.

The transformation in the perspective towards human labour was triggered by factors such as increased number of knowledge-intensive businesses and increased importance of talented and qualified human labour. The increasing presence of knowledge intensive industries require equally increasing qualifications from the local labour pool. This qualified work force would bring technological change required to fuel economic growth. Therefore, human labour and technological change is intricately linked in this context. However, this linkage was identified during the 1980s whereas the discussions on the role of technological change was subjected to research during mid-20th century. In that regard, Solow's (1957) study represents a mostly accepted reference point for the identification of role of technological change in economic growth (Mellander & Florida, 2007; Collinge & Staines, 2009).

Solow (1957) highlighted the role of technological advancements in gaining economic growth as an exogenous factor. After three decades following his study, this viewpoint was changed. The role of technological change transitioned from an exogenous factor to being an endogenous one (Romer, 1990). The difference from exogenous model was that the new one put greater role on human capital and its knowledge in the invention of new technologies and, thus, achieving economic growth. In his endogenous growth model, Romer (1986, 1990), regarded growth of technological knowledge itself as the source of per capita growth. He also noted the effect of incorporating knowledge with other inputs which ultimately provide increasing returns to scale. In other words, endogenous growth theory enabled to identify that there was no need to be a link between future growth and diminished returns, which opened path for long-run growth scenarios to be developed and implemented.

Shifting focus towards the importance of technological knowledge resulted in reconsideration of human labour's role in economic growth. The economy studies revolved on the topic of human capital in which educational attainment of labour

force has started to be considered and evaluated. Lucas (1988), on the other hand, undertook human capital as a general skill level for each individual worker and built upon the relation between human capital and urban geography further.

As Lucas (1988) improved human capital approach further, one of the points of his study was the role of cities in which human capital tends to cluster. There are certain externalities that individuals benefit from cities as a physical environment. Especially in the fields of arts and sciences, which promote creativity within their contents, mobility of knowledge is highly essential in the realization of new ideas and their materialisation. What cities accomplish in this sense is that they provide the required environment in which knowledge spillover and its effects take place (Lucas, 1988). Agents, that represent cumulative human capital value of a city economy, interact with each other in higher frequency by being closer in physical space. This increases individual productivity and potential of innovative activity of these people due to knowledge transfers (Knudsen et al., 2007; Glaeser & Resseger, 2010; Glaeser, 2011). Furthermore, the positive effects of density on productivity are even more amplified when the space in question is a metropolitan area (Glaeser & Resseger, 2010).

On the other hand, connection between the human capital and the cities also spawned another discussion on based on the skilled individuals' consumption habits. The social, political, economic factors and type of production was decisive in having the workers of the past to work for the system whereas tide has turned during our age as systems has to serve qualified workers (Drucker, 2002) based on the emphasis given to small and valuable supply of creativity and innovation expected out of human labour now. Viewpoint towards local development was no exception in this regard. In this perspective, urban environment also became a competition area in which local policies are developed to draw qualified workers. In turn, their activities would contribute to local economy.

The location decision of individuals who are representative of high level human capital can be argued to be based on the quality of a built environment. The urban settlement they prefer is debated to benefit from their economic activity and, in

addition, local firms' efforts to provide supply to their consumption demands (Storper & Scott, 2009). Therefore, the quality is mostly measured by the consumption options a city presents to its inhabitants (Glaeser et al., 2000). In this context, consumption options based on urban amenities came to hold a central position for cities' development and production in creative industries. Quality-of-life/place became an encompassing concept corresponding to the preferences of the high level human capital from an urban space (Florida, 2005; van den Berg et al., 2005; Brown & Meczynski, 2009).

Traditionally, high accessibility options; attractive living environment; presence of various modes of cultural consumption have been showcase items of cities in attracting high level human capital (Brown & Meczynski, 2009). In terms of built environment, even the physical look of a city is argued to contribute towards an urban settlement's attractiveness (Glaeser, 2000; Helbrecht, 2004). Traditionally accepted appeals such as having a sophisticated cultural environment and architectural heritage are stated to strengthen implementation of urban development along this perspective (Asheim, 2012). Further studies have highlighted the role of "soft infrastructures" effective in the locational choices of knowledge workers. In that regard, nodal components of a city such as amenities, recreation facilities, shopping options as well as aspects of built environment such as environmental quality have become central as well (Brown & Meczynski, 2009, p.239).

In addition to both soft and hard infrastructure, inhabitants of an urban area can also be argued to contribute to the quality-of-life in their environment. By their increased density, demand for products and services on the margin can become available in the local economy. They develop themselves socioeconomically by making use of the variety of amenities. Afterwards, their consumption preferences become more sophisticated because of their demand for an improved quality-of-life (Florida, 2005). Therefore, the quality, quantity and variance of the urban amenities a city offers become vital to draw and maintain these individuals.

While these theories were studied extensively both theoretically and empirically, their evaluation with reference to the historical conditions and structures has not

drawn similar attention. As per this emphasis on historical characteristics, a process-oriented viewpoint on the relation with urban environment can provide more comprehensive understanding over cases in empirical studies. Moreover, the consideration of the past enables more reasonable evaluations to be made regarding future development. With this consideration, path dependence is explored in the next chapter as part of evolutionary perspective towards development.

CHAPTER 4

PATH DEPENDENCE FRAMEWORK AND DEVELOPMENT OF INDUSTRIAL LANDSCAPE

In the light of the theories reviewed in the preceding chapter, it can be noted that spatial and economic development is linked with urban policies under the knowledge economy conditions. Their transformation throughout time decide the development trajectory of local growth. Contingencies or structures established in the past can affect present and future development. Therefore, in order to make informed evaluations on the present and future development of the case, path dependence framework is aimed to be used. With this framework: (1) Past events and agent structures that affect present-day situation will be highlighted; (2) the emergence and role of an existing innovative cluster will be evaluated; (3) whether consumption preferences of qualified workers support this new cluster and subsequent local economic development will be measured.

In this chapter, evolutionary economic geography and its path dependence approach will be explained in detail. First, its definition, historical roots as well as its various approaches are presented. Second, the framework to be used in the case study, that is path dependence, is featured. The selection of the framework is based on the evaluation of existing criticisms towards all approaches noted under evolutionary economic geography. Under this section, concepts that shape up the path dependence approach and path creation as an expansion to the approach taken are presented. Next, empirical studies that employ path dependence to explain emergence of various industries are presented to shape up an understanding over how the studies are being carried out. The importance of this sub-section comes from the need to present a systematic way of observation, since there has not been such an approach towards cases.

4.1. Approaches in Evolutionary Economic Geography

In the end of the 19th century, Veblen (1898) questioned the lack of evolutionary characteristics in economics. Since then, evolutionary economics have been discussed periodically; however inquiry into its spatial nature has lagged behind until the late 1990s (Boschma and Lambooy, 1999). In this regard, evolutionary economic geography is a framework that seeks to understand how economic geographies are transformed by their persistent, self-reinforcing dynamics put into motion by human agency or contingency (Boschma and Martin, 2010). Policy interventions made or spontaneous developments that took place in the past are all considered to be in conjunction with present systems governing the economic and spatial development (Boschma & Frenken, 2010).

Industrial dynamics that are influencing firms are argued to be explanatory to generating and transforming economic dynamics in a city, region or other spatial entities of different scales. In the light of transformative nature of capitalism and innovation based understanding, which strongly influences the market in the form of creative destruction (Schumpeter, 2003), the development of an equally evolutionary framework is argued to hold vital importance (Martin and Sunley, 2015). Other studies have also drawn attention to Schumpeterian roots of the theory in highlighting the importance of individuals and firms as active growth forces behind spatial economic systems (Boschma and Martin, 2010, p.5; Brouder and Eriksson, 2013, p.371, Essletzbichler, 2015). These roots, therefore, constitute the decision to establish the connection of the evolutionary economic geography to the knowledge and creativity based development.

In this context, handful of studies has been undertaken on the development of evolutionary economic geography as a field. Nelson and Winter (1982) has been credited to be the influential study to the field (Boschma and Frenken, 2010) while the first modern approach has been shaped almost two decades ago with the studies by Boschma and Lambooy (1999). The study of Boschma and Lambooy (1999) underlined evolutionary economic geography as a field to understand how modern

day economic dynamics such as collective learning on a local scale, increasingly volatile economic landscape and spatial evolution of economic sectors may affect space on diverse scales and *vice versa*.

Studies made over years can be classified at three different scales under evolutionary economic geography. At the *micro-level* scale, analysis, decision-making and locational preferences at the firm level are considered. At the *meso-level* studies industries' location, co-location as well as their economic and spatial transformations together with technological and institutional changes over the years are taken into consideration. Lastly, regional or national scale studies are undertaken at the *macro level* (Vergne and Durand, 2010; Berg and Hassink, 2014). Meso-level studies compose the important level to be delved into in the context of this study.

Later studies expanded the theory from its history-based roots, through identification of several links to different fields or concepts such as biology or adaptive complex systems. Over the years, evolutionary economic geography has evolved to encompass three main types of approaches: *Generalized Darwinism*, *path dependence* and *complexity theory* (Boschma and Martin, 2010). Therefore, a further selection beyond evolutionary economic geography has to be made among these approaches as well.

Martin and Sunley (2015) highlights the connection of the evolutionary segment of the framework to Neo-Darwinism under Generalized Darwinism. Criticisms towards Generalized Darwinism have been made by several studies since then, as a reaction for the concept's effort to overreach its theoretical boundaries in seeking combinatory explanations for socio-cultural development and economic change (Nelson, 2007; Levit et al., 2011). On the other hand, complexity approach in evolutionary economic geography has yet to produce substantial amount of empirical research into the relationship between evolutionary economic geography and itself (Zakrzewska-Póltorak, 2014). The studies that undertake such an endeavour highlight that the approach is more suitable for insight into micro-level dynamics (Comunian, 2010).

In the light of these criticisms, Generalized Darwinism and complexity approach can both only be partially effective in reaching the goals of the study. On the other hand, path dependence framework provide the most holistic and systematic framework at the meso-level with variety of empirical studies contributed towards it over the years. Therefore, only the concepts associated with this path dependence is analysed in detail.

4.2. Path Dependence Framework

The path dependence concept has its roots in the intersection of economics and history (David, 1985; Arthur, 1989); however, it is widely employed in a variety of disciplines ranging from sociology and politics to management. While the term has long been a subject of discussion in terms of its wide and obscure definition (Pierson, 2000; Vergne and Durand, 2010), it is considered to be essential to the discussions concerning evolutionary economic geography, as documented by several studies (Boschma and Lambooy, 1999; Boschma and Frenken, 2006, 2010; Berg and Hassink, 2014).

Path dependence focuses on the persistent structural changes past events, processes or actions may bring on present conditions and, eventually, *lock-in* to a path to carry these changes onto the future (Martin and Sunley, 2006). These paths will also be crucial in the emergence of new paths, or patterns of future development, either contextually or directly. *Lock-ins* take place through a combination of factors, such as (1) preceding institutional and structural settings with long-run effects; (2) increasing returns; (3) network externalities (Martin, 2010; Garud et al., 2010). The origination of a path truly occurs once a technology or an industry spatially emerges and, then, divergence from a path is only regarded in the event of exogenous shocks (Martin, 2010). In this context, increased innovative characteristics in firms are argued to contribute to evasion of lock-ins in spatial economic system as well (Bosma et al., 2011).

Spatially, path dependence is linked to regional development as regions are argued to continue their institutional dynamics, knowledge base as well as social networks over

long periods of time which brings a form of stability expected from a path (Storper, 1997). Innovation and learning based agglomerations are representative to this type of development (Boschma and Lambooy, 1999). In this setting, actors at lower scales also become attuned to these regional characteristics at organizational scale, making them equally path-dependent (cited by Boschma and Lambooy, 1999). However, this attunement does not take place spontaneously as *routine* firm activity is required to be influential towards the realization of such economically beneficial conditions. These conditions are not only on micro level but also on all levels through interactions among actors active at relevant scales (Berg and Hassink, 2014).

4.2.1. Concepts of Path Dependence

Increasing returns is one of the terms that has become intricately involved with path dependence approach. On the basis of technological development, It was defined as results of small effects in the past building up the foundations for the greater, persistent returns. It signifies the self-reinforcing conditions or structures and argued to be generative for path dependence (Pierson, 2000, p.251). This understanding shows similarities to evolutionary economics as self-transformative forces compose focal points in their setting as well (Witt, 2003). Spatially, the benefits agglomeration economies provide to the firms it hosts are also considered to be representative to increasing returns, which are shared pool of talent and intermediate services as well as opportunities for increased exposure to other firms and their knowledge stock (Marshall, 1920; Krugman, 1991).

Related variety or *relatedness* is one of the path generating or reinforcing condition as well (Frenken et al., 2007; Boschma and Frenken, 2010; Ma and Hassink, 2014). The emergence of new industries can benefit from the presence of technologically related industries. In the related literature, this connection is addressed as core-periphery in some of the studies (Storz, 2009) while others name it as (regional) branching (Boschma and Frenken, 2011; Neffke et al., 2011; Brouder and Eriksson, 2013). While the empirical studies conducted on regional scale, the indicators in line with the concept such as spinoffs, diversification, labour mobility and networking (Boschma et al., 2013) can also be traced at a local level.

Routine activities of firms are individual, repeating actions and practices formed in micro-level which influence meso- and macro-levels. Interaction, in this context, is increasingly widespread with the efforts towards further networking activities and increasing complexity of networking concepts such as knowledge networks or business networks (Giuliani, 2005, July). Increased networking would establish more complex sets of relations, which would form up into better-developed routines while also leaving the door open for further improvement.

Concepts within evolutionary economic geography are numerous with each approach having its own terminology. Therefore, Table 4 displays the concepts listed above as well as their brief definitions and examples for clear understanding over the ones employed in path dependence approach. Sources for each of the concepts are provided at the foot of the table.

Table 4. Concepts of Path Dependency and Their Definitions

Concept	Definition	Reference Studies
Path dependency	Past events being influential in how present and future is being shaped either by contingency or human agency	Martin and Sunley (2006)
Lock-in	Persistent, self-reinforcing mechanisms emerge as a result of past events and establish a path for a spatial system	Martin and Sunley (2006); Grabher (2005)
Increasing returns	Small events that took place in the past add up to formulate greater returns	Arthur (1989), Pierson (2000)
Related variety (Relatedness)	Institutions and knowledge stock of existing related industries support and reinforce the path taken by a new industry	Frenken et al. (2007), Boschma and Frenken (2010)
Routine	Firm and individual level routine structures that arise in time affect upper scale structures	Giuliani (2005); Berg and Hassink (2014)

4.2.2. Path Creation: An Alternative or a Complement

Path creation had shown obscurity in the literature regarding the nature of the term. The concept is argued to emerge as a term from the criticism of relatively passive

role played by actors, who are envisioned to be unavoidably bound to continue on the contextually set paths (Garud et al., 2010). In other words, path creation is argued to credit contingency as a less of a decisive factor and boosts the role of human agency instead.

On the issue of contingency *vis-à-vis* human agency, some of the past examples demonstrate differences regarding the emergence of new industries. Based on empirical studies, Boschma and Wenting (2007) highlight the role of related industries as the path generative force behind the new industries. Karnøe and Garud (2012), on the other hand, argue that state intervention and collective learning are the path-creating components behind the growth of wind power market in Denmark. Besides such interventions, stakeholder collaboration is also regarded as a path-creative force in the literature (Brouder and Eriksson, 2013).

In the context of path creation, human agency is given more credit in the direction of paths taken. The term is argued to act as an alternative to path dependence approach in this regard. Actors are expected to perform accordingly to the events and structures that took place in the past and influence paths (Karnøe and Garud, 2012). However, whether path dependence and path creation are two competing terms is not yet clear as path dependence is still being actively regarded as an umbrella term for both active human agency processes and contingencies (Zakrzewska-Póltorak, 2014; Berg and Hassink, 2014). Indeed, Brouder and Eriksson (2013) list several studies that utilized path dependence with more active role being credited to human agency in influencing development paths. Therefore, the concept will also be employed accordingly to this viewpoint in this study.

4.3. Empirical Studies on Path Dependence Framework

While the path dependence is still in continuous transition in its definition and concepts, it still provides powerful tools to make inferences regarding the relation between space and economy. In the light of the concepts given above, several empirical studies feature use of different combinations of those concepts in analysing their cases. The scale of these studies range from national to local levels. Moreover,

their aims also show differences. While there are few studies that employ path dependency in exploring urban development, more examples can be found concerning the emergence of new industries and their respective clusters. Among these examples, some of the studies limit their analyses to description and identification of historical processes. On the other hand, other studies analyse those historical processes with the concepts listed in previous sub-section to systematically detail the mechanisms behind the path created.

Studies on path dependence and spatial systems at urban scale can be classified under two branches concerning their relevance to the analysis of the case of this thesis. *First branch* aims to explain the emergence of new industries and/or detail the mechanisms of path dependence behind their development trajectory (Nelles et al., 2005; Karnøe and Garud, 2012; Brouder and Eriksson, 2013; Ma and Hassink, 2014). There are several such studies with differing approaches in the use of various concepts listed above. However, despite the difference, they constitute a general understanding on how to conduct a path dependence research. The second branch analyses the development process of an urban economy and space. There are fewer amounts of empirical studies in this context. However, they are noteworthy for this study as emergence of innovation in the example of a cluster is strongly linked with urban development trend of a city in these examples (Petrov, 2007; Musterd et al., 2007; Bontje and Musterd, 2008).

4.3.1. The First Branch: Emergence of New Industries

Within the extent of the spatial innovation systems, formation of clusters composes the main research scale (Nelles et al., 2005). Studies over years have employed either several or few concepts of path dependency and attempted to explain the emergence or development of clusters. The fields subject to research range from a wide spectrum, including ICT (Nelles et al., 2005), wind turbine (Karnøe and Garud, 2012), optics (Sydow et al., 2010) and even tourism (Brouder and Eriksson, 2013; Ma and Hassink, 2014).

There are also other studies that differ in their preference of analysis or scale. As an example, there are studies at national scale that still give clues regarding the indicators to be analysed at lower scales. Their subjects include customized software industry (Strambach, 2008), software and biotechnology (Storz, 2009).

A process can be identified from the use of the concepts of path dependence in the development cycle of an industry, which enables to expand a systematic analysis of cases in the framework. While there have been only few studies to carry out such process based approach (Ma and Hassink, 2014), many other studies have already done so without emphasizing such a distinction. They will be succinctly overviewed to set the foundations for the methodology to be followed in this study.

The process based approach can be undertaken at three phases: Emergence period of clusters, establishment of self-reinforcing mechanisms, and development of new path trajectory as a result of events that take place during the previous steps (Figure 6.) (Table 5.).

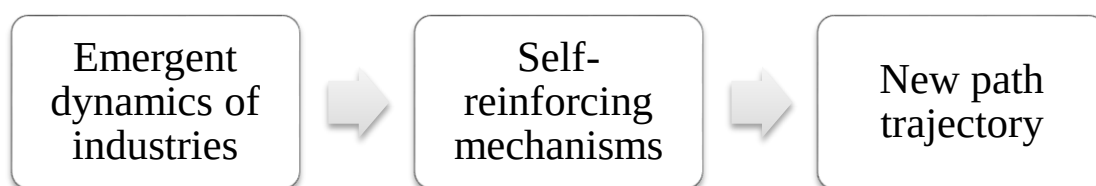


Figure 6. Phases of Development of Path Trajectory

Table 5. Classification of Path Dependence Concepts in a Process

Emergence of New Industry	New Path and Its Self-Reinforcing Mechanisms	Path Dependency
Historical and Initial Conditions	Institutions	Evaluation of Path Trajectory & Lock-in
Relatedness (Related Variety)	Networks (as part of Routines)	
	Increasing Returns	
	Labour Market & Skilled Labour Force	
	Urban Amenities	

As seen in the Table 6., in the emergence period of the clusters, initial conditions (Ma and Hassink, 2014) and related variety (Storz, 2009; Neffke et al., 2011) have been used empirically to set the background for the emergence of new industries.

Initial conditions can consist of a variety of historical conditions, settings and agent-based structures that exist before the present-day conditions are taking place. In the case of Ma and Hassink (2014), the development of their case in the context of tourism sector is based on two such conditions: firstly, existing touristic values such as natural resources and, secondly, good transportation accessibility to their region. Shefer and Frenkel (2011) highlight the role of an institutional policy in the form of incubator programmes, which led to emergence of high-tech sector.

Relatedness, as the other emergent mechanism, is evaluated by Storz (2009) through a core-periphery approach. Different fields that are considered to be peripheral to a core industry, actively support the emergence of that core industry through the knowledge accumulated within their own fields. Other studies also point to relatedness as noting that technologically similar industries are more likely to draw or give rise to new industries (Neffke et al., 2011).

Aside from relatedness, most referred areas to be explored with path dependence perspective consists of *institutions* and *networks* in the examination of new industries' paths (Nelles et al., 2005; Strambach, 2008; Brouder and Eriksson, 2013;

Ma and Hassink, 2014).). Additionally, increasing returns are also a strong indication as a self-reinforcing mechanism (Ma and Hassink, 2014) which can be seen as a result of all the previously mentioned factors. In other words, one of the reasons for networks and institutions to become a self-reinforcing mechanism is that they bring increasing returns at some point in the history of a cluster. This renders existing path trajectory more resilient to change from the perspective of the agents involved in.

Institutions are one of the most referred areas in the analysis of emergence as well as growth of industries in the path dependence literature. They develop alongside industries as a support mechanism. However, this support role is decisive in designating lock-in to a path as they are effective entities in directing the actors' actions and routines (Strambach, 2008). Institutions can be expected to be replaced by new institutions under agency-driven *path creation* forces or act as a stabilising factor within a cluster to reinforce that cluster's development trajectory against change (Strambach, 2008). Labour market, policy decisions of all scales, investments, funding mechanisms and cultural structures can be examined in finding traces of institutions' role in emergence and growth of clusters. Gertler's (2008) explanations on communities of practice also highlight informal mechanisms such as attitudes, norms in describing further institutions that stem from cultural sphere.

Networks are the second mechanism essential to the path dependence processes. Networks may enable increasing returns, contribute to lock-ins or create pathways out of lock-ins. The most widely used definition for networks can be found in sociology. Social networks are series of linkages, or relationships, among units in interaction with each other. They may demonstrate certain patterns that is important to understand the way in which a communication-based structure is working or what kind of output it is producing (Wasserman and Faust, 1994). On the other hand, in the specific context of this study, the types of networks under analysis are known as knowledge networks in the literature. In these networks, the analysis of generation and transmission of knowledge among units is paramount (Phelps et al., 2012). Networks represent the most effective type of knowledge transmission (Tödtling et al., 2006, p. 1039) which is crucial to creativity. Therefore, understanding networks

within a case would provide information about both trajectory tendencies and hints about creativity and knowledge based production capability in a specific industry field.

4.3.2. The Second Branch: Talented Individuals and Path Dependency

Some studies also established connections between qualified workforce and its relation with the path dependence framework (Petrov, 2007; Musterd et al., 2007; Bontje and Musterd, 2008). While the studies evaluate the workforce in question under creative class theory of Richard Florida (2002, 2003), the creative class is fundamentally a segment of society which is composed of high level human capital. Therefore, their studies do not misalign with the aims of this thesis. These studies do not employ the concepts utilized in path dependence framework. However, they analyse historical contingencies and agency effects on the recent and future development paths undertaken by cities and regions. In this regard, the way talented individuals are evaluated can be seen under the light of a focus on agency effect, as some of these studies highlight these individuals as a path creative force in the development trajectory of a whole city (Petrov, 2007; Musterd et al., 2007.).

In this context, Petrov (2007) studies the role of creative individuals in metropolitan and peripheral settlement settings. Although Florida (2002) argues that the closer bonds in peripheral settlements lead to lock-ins within those communities, Petrov (2007) finds out that creative individuals are more effective in directing path trajectory of peripheral ones by becoming a path creative force themselves. In other words, his findings point out that members of this class are not a dominant force in a metropolitan setting individually and requires additional mechanisms in path creation processes. To evaluate the findings, it can be said that the increased complexity of cities requires increased set of measures such as those highlighted in this study: Networks, institutions, and other mechanisms such as relatedness.

Bontje and Musterd (2008) highlights the cities, which historically possess multiple economic fields, in having higher opportunities to develop along knowledge intensive businesses and sectors compared to those that focus on a single sector. This

has allowed these cities and their economies to adapt to knowledge economy conditions more smoothly (Bontje and Musterd, 2008).

In another study, Bontje and Musterd (2009) evaluate variety of cities to get an insight regarding their historical relation with creativity and knowledge based growth. While some of the cases in this study actively focus on local policies in flourishing creativity, other cases rather focus on firms' role in attracting qualified workforce. Especially, historically large cities are argued to be more adaptive to knowledge economy conditions, owing to their usually long-running diverse economy (Bontje and Musterd, 2009, pp. 6-7). This history also allows them to be more passive in interventions and let spontaneity or indirect policies lead their cities' creative environment and atmosphere (Bontje and Musterd, 2009).

Both branches may be argued to be supportive to the aims of this study. The first branch represents the use of specific concepts in analysis of cases which create opportunities to draw comparisons. On the other hand, the studies in the latter put more emphasis on the basic argument of path dependence that is "history matters", and analyse cases accordingly to that. However, as underlined in one of the objectives of this thesis, the study aims to undertake a systematic perspective to path dependence analysis. Therefore the first branch becomes a more suitable method with its clearly defined concepts. Therefore, studies in the first branch will compose the empirical foundations of this study.

The path dependence framework starts from the premise of "history matters". Based on history of an industry or a city, development trends can be identified in terms of economic or urban development. The influential factors in emergence and development of industries can designate whether that spatial economic system is under negative influences or not. The following chapter on the cases of this study, scrutinize the historical background of Bursa in which ULUTEK TDZ and Nilüfer district emerged in. Analysis is attempted on the relation between the growth of the district and the zone with the historical conditions of Bursa. Later, the present conditions for the zone and the district are also analysed to make evaluations for the future development trajectory of the city.

CHAPTER 5

BURSA’S URBAN AND INDUSTRIAL DEVELOPMENT IN KNOWLEDGE ECONOMY

In the light of studies undertaken in the previous chapters, the case of ULUTEK and Nilüfer district in Bursa is analysed in this chapter through path dependence approach. The reason behind the use of path dependence framework was to analyse the TDZ and the district with respect to the historical conditions in which they emerged and developed. Therefore, this chapter first analyse the historical background of Bursa’s industry and urban development. Towards this end, the study is separated into three periodically successive sections: Transition (1923-1970), Growth (1970-2001), Stagnation (2001 to present).

The differentiation of the periods is mainly based on the changes experienced in the industrial landscape of the city. In this context, the first period highlights the development of textile and revitalization of sericulture industries in Bursa from the heritage left behind by the Imperial era. The second period is set between 1970 and 2001 with respect to significant increased returns gained and subsequent exogenous shocks experienced by the textile industry on the development path of the city. Clothing industry of Bursa also emerged during this period. In addition, the emergence of automotive industry is also important for the designation of the period because it eventually becomes the successor to the path advanced by the textile industry. In the last period between 2001 and the present-day, the new development trajectory on automotive industry is taken into consideration.

The historical contingencies and agent structures are taken into consideration in understanding the development of industries. Statistics on employment, export and production amount are also used to support the claims on the changes in the development path. However, same indicators are not available for every industry

within these periods. Therefore, their use vary based on the availability of data for the observed industry. The development of the industries are examined decade by decade within each periodical section.

On the urban development side of the discussion, the changes in the urban space are examined with respect to the transformations in the economic activity. Once again, historical contingencies and structures are taken into consideration. At the same time, the claims based on these factors are supported with changes in population numbers as well as the growth of urban macroform.

Following this historical background, ULUTEK TDZ and Nilüfer district are evaluated. The section on the TDZ evaluates the impacts the TDZ can have on the development trajectory of Bursa's industry. This is aimed to be achieved by identifying knowledge networks among the firms in the TDZ as their interaction in series of settings are considered to be important indicators for innovation and creativity expected from a cluster. The section on Nilüfer district aims to identify in which ways the district appeals to the qualified workforce by its provision of high quality built environment. By its attractive features, the district can support the development of not only the TDZ but also the other industries which can benefit from talented individuals. Lastly, an evaluation is undertaken on the studies on the TDZ and the district.

5.1. The Transition Period (1923-1970): Towards the New Industrial Order

Bursa has held an important place in the Anatolian geography since ancient times. Tekeli (1999, p.2) credits geographical location of the city, which provided the inhabitants with fertile lands, a defensible hillside settlement and water resources from the mountain which is conducive to an industrial production. The city has played an important role as a trade center for Bithynia between the 3rd century BC and 1st century BC, which later continued to be the same for the East Roman Empire (Byzantine) period. After its invasion in late 13th century, the city had become the capital of the Ottoman Empire for a period of time in addition to the same trade center characteristics due to its connection to Silk Road. Despite losing the capital

status in the 14th century to Edirne, the city has always held an influential position among the rest of the cities of the Empire.

After the foundation of the Republic of Turkey, new industries emerged and increased in activity as the city became one of the major industrial centers of the country eventually. In parallel with these developments, significant changes took place in the urban growth. The city had been a major destination for migrations from rural to urban areas. These developments are covered in detail in the following subsections. The developments are mostly examined decade by decade.

5.1.1. Industrial Landscape

Sericulture had been the basis of Bursa's industrial prominence as it can be traced back to 6th century A.D. as an economic activity (Tekeli, 1999). However, some of the current industrial heritage of Bursa date back to 15th and 16th century when it was one of the most eminent silk fabric production centers around the world (Kaplanoğlu & Balkan, 2009). This influential position ended in the beginning of the 17th century parallel to the overall decline of the Ottoman Empire and advancements in technology in Europe. However, by the 19th century, transforming global production and trade systems revitalized and transformed the sericulture industry in Bursa along with it (Tekeli, 1999). Increased gold and silver stocks resulting from the discovery of America, and subsequent increase in welfare and product demand led to the increased demand for raw materials, towards which Bursa's sericulture was rearranged (Kağıtçıbaşı, 2016). Filature factories emerged mostly as private investments with most ownership belonging to foreigners and the economy of Bursa became a resource based one connected to the demands from foreign economies (Kağıtçıbaşı, 2016). The industry declined significantly by the end of the 1st World War, since most factories belonged to foreign or non-muslim investors of the Empire.

In this setting, sericulture and textile industries in Bursa are noted to be built from the scratch with the foundation of the Republic (Oral, 2004; Kaplanoğlu & Balkan, 2009). Sericulture industry was revitalized by means of state intervention and the sector started to operate in an export oriented way. However, the emergence of

global economic depression by the late 1920s hit the export oriented industry (Pınarcıoğlu, 2000). Domestic demand towards silk products, which were luxury items, was low as well. Therefore, the first transformation on the development path of Bursa took place in favour of textile industry.

The investments during this period set foundations for the dominance of textile industry activity in Bursa in the following decades. Initially, private sector was encouraged during the 1920s as per the decisions taken in the “İzmir Economics Congress” in 1923. 7 textile mills were founded between 1925 and 1926 (Oral, 2004). İpekiş Textiles Turk Co. Inc. was opened in 1925 in parallel to the importance put on liberal policies. Another specific investment was the opening of Turkish-Japanese Silk Weaving and Paint Factory in 1928 (Kuter, 2010). This company was one of the first companies established with foreign partnership after the foundation of the Republic. In the following decades, more partnerships with Japanese investors on textile and sericulture industries was developed following this investment. Employment data on textile industry in 1927 in Bursa is shown in the Table 6. (as cited by Oral, 2004). On the other hand, the amount of raw silk produced in Bursa is displayed in the Figure 7 (as cited by Oral).

Table 6. Employment and Number of Firms in Textile Industry in Bursa in 1927

Districts	Number of firms	Number of employees
Central District	303	2625
Orhaneli	1	1
Orhangazi	-	-
İnegöl	25	108
Karacabey	9	9
Gemlik	13	29
Mustafa Kemalpaşa	37	64
Mudanya	5	10
Yenişehir	15	26
TOTAL	408	2872

Source: (Oral, 2004, p.45)

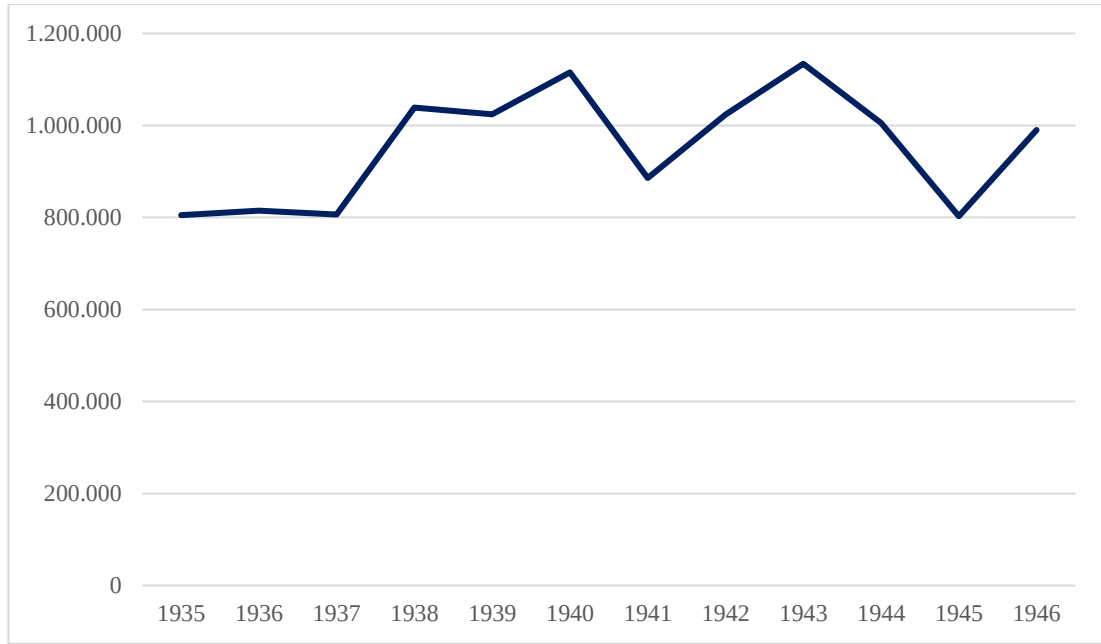


Figure 7. Amount of Cocoon Produced in Bursa between 1935 and 1946 (kg)

Source: Adapted from (Oral, 2004, p.52)

The global economic depression also affected the development of textile industry as the state was forced to take a more active role in investments in the textile industry during the 1930s. As part of this increased role, Sümerbank emerged as an important actor in the realization of new investments in textile industry during this early period. The investments were made as part of 1st Five Year Industrial Development Plan (1933-1937). As a result, Merinos Wool Weaving Factory and Gemlik Rayon Factory were opened in 1938 by Sümerbank (Kuter, 2010). The factory in Merinos was such an investment that there were more than 3000 employees working in the factory (Kaplanoğlu & Balkan, 2009). In comparison, 62 private firms in Bursa employed 1878 workers around the same time (as cited by Pınarcıoğlu, 2000). On the other hand, Gemlik factory introduced an alternative material to silk in the local production.

Sümerbank, in this context, not only contributed to local economy by investments on textile factories but also on the development of human capital by providing scholarships for this field in universities abroad. The recipients of these scholarships contributed to the whole country's engineering tradition with their returns to their

assigned stations in Sümerbank factories around Anatolian cities (Denizer et al., 2016). In the case of the factory in Merinos, engineers from Europe in this field also contributed to the development of the factory and its workers (Merinos Textile Industry Museum, 2017).

Following the transition of state policies from etatism to liberalism, state-led industrial development trajectory on textile industry has started to change after the 1950s. Nevertheless, the development of private sector was brought about by a state factory. As the factory in Merinos modernized its machinery, private sector bought the older ones as these old weaving looms were still more than what they had (Pınarcıoğlu, 2000). Following this transition, private sector increased its activity in the textile industry. Istanbul was the main market for these manufacturers as they became the recipients of subcontracting orders from this province (Pınarcıoğlu, 2000).

At the same time, sericulture industry was lagging in development due to the lack of technological advancements (as cited by Oral, 2004). Older technology machinery was replicated by local artisans for the sericulture industry. The availability of these cheaper options and lack of incentives towards modernization contributed to the late introduction of modern equipment in sericulture (as cited by Oral, 2004). Following the World War II, silk was started to be replaced by rayon and synthetic fibres during the 1950s and 1960s (Jirousek, 1998; Oral, 2004). Attempts were made to break out of potential lock-ins for the sericulture industry by introducing polyhybrid silkworm stocks (Jirousek, 1998; Oral, 2004). This successfully gave another push for the industry in the following decades.

Based on the machinery needs of textile and sericulture industries, machinery industry started to emerge (Kaplanoğlu & Balkan, 2009). Later, this also opened up new opportunities for the industry and branched up the products towards home appliances and other occupational devices (Kaplanoğlu & Balkan, 2009) (Figure 8.). By the end of this period, expertise in this industry would have greater influences on the designation of development trajectory of Bursa.

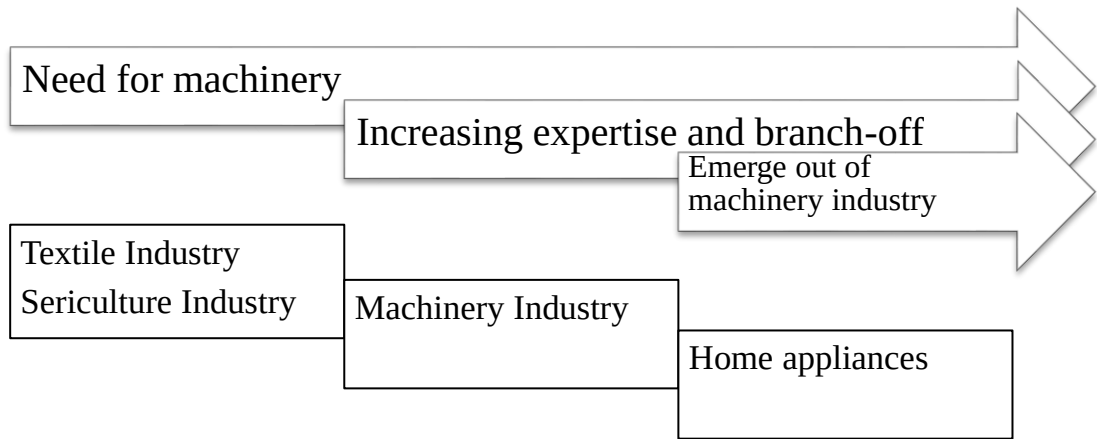


Figure 8. The Effect of Relatedness in the Emergence of Machinery Industry

During the 1960s, foreign investments slowed down in the city as a result of import substitution policies (Bursa Ticaret ve Sanayi Odası, 2006). In turn, domestic industry flourished and the city has performed strongly as an important economic sub-center along with the other metropolitan cities on a national-scale. The private textile industry had been operating successfully and this success was met with the threat of shortcomings in the supply of rayon (Pınarcıoğlu, 2000). Therefore, several more factories were established to produce synthetic and nylon yarns with aims to diversify usage potentials compared to rayon (as cited by Pınarcıoğlu, 2000).

On the other hand, the state investments focused on heavy manufacturing industries such as automotive manufacturing. In parallel with the performance of textile and aims to develop automotive manufacturing, the first Organized Industrial Zone (OIZ), under the name of Bursa OIZ (BOSB), was established in the province in 1962 and became operational in 1966. This zone became a flourishing ground for textile, machinery and automotive industries. Subsequently, the increase in employment in the form of a sudden peak during the 1960s can be seen in Table 7. and Figure 9. In this context, textile industry composed more than *one-thirds* of manufacturing employment in 1970 with 10.136 employees (Kaplanoğlu and Balkan, 2009). The role of manufacturing in the economy can also be seen in the Figure 9.

Table 7. General and Economic Activity Based Employment Numbers in Bursa

Employment Numbers during 1927-1970		Distribution of Amount of Employment during 1970 According to Economic Activities		
Years	Total Employment	Activities	Population	Ratio
1927	6.252	Agriculture	16.659	17.8
1950	38.365	Manufacturing	29.983	32.0
1955	46.137	Construction	7.010	7.5
1960	50.142	Trade-Tourism	12.707	13.6
1965	66.935	Transportation	4.593	4.8
1970	93.647	Services	18.593	19.4
		Others	4.593	4.9
		Total	93.647	100

Source: (Kaplanoğlu and Balkan, 2009, p. 281)

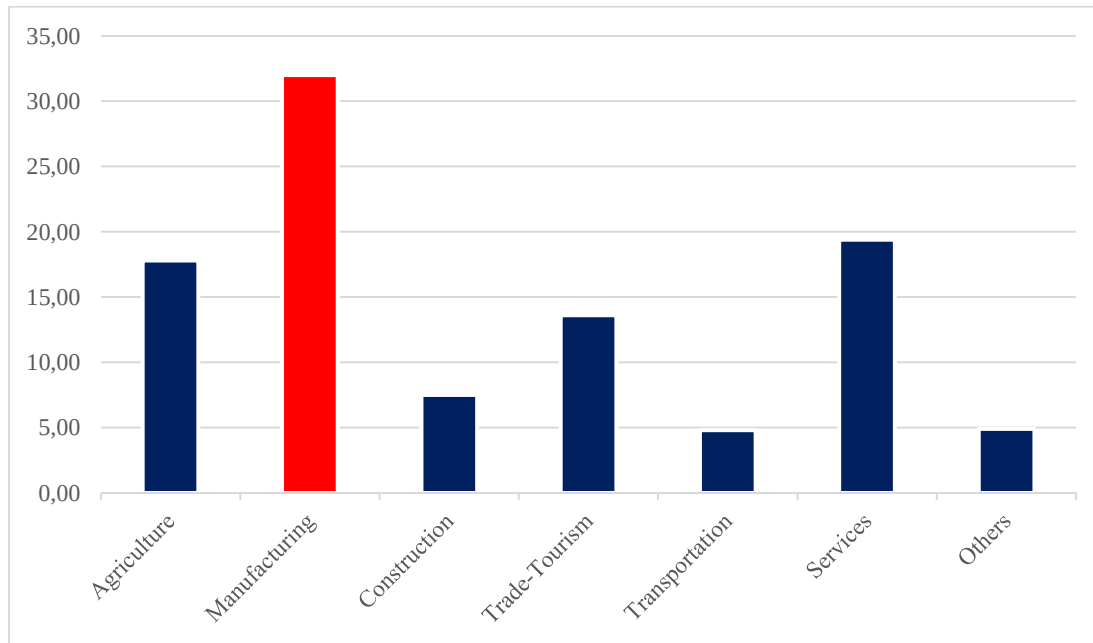


Figure 9. Distribution of Amount of Employment in 1970 according to Economic Activities in Bursa

Source: Adapted from (Kaplanoğlu and Balkan, 2009, p. 281)

5.1.2. Urban Space

In interrelation with these developments, the city has seen considerable urban development as part of the dynamic processes of population generation and mobility. Migration since the early 20th century due to variety of reasons ranging from wars, diplomatic agreements to industry-based employment opportunities have mixed up and expanded the population numbers. In addition, migrations due to population exchange agreements made with Greece and Bulgaria drew further Turkish population from these Balkan countries and Bursa had been a major destination during their relocation period. The migrations from Bulgaria during the 1950s provided low cost, qualified labour to the manufacturing industries (Kağıtçıbaşı, 2016). In turn, lack of adequate housing and overcrowded population led to urban sprawl on the urban space (Kağıtçıbaşı, 2016).

The city was spatially limited to modern day Osmangazi district during the start of this period. During these early years of Republic, it was Henri Prost who drew plans for Bursa. His plans were put into motion in 1940. The highlights of the plan include suitable roads for automobile usage and location of industrial areas along the sections of Gemlik Road (Tekeli, 1999). At the same time, the increased industrial activity especially after the 1960s, was not foreseen. The city was not planned to be an industrial center. As a result, factories and workshops existed within neighbourhoods which also affected these production units negatively in terms of costs of moving goods (as cited by Oral, 2004). On a discussion regarding production spaces, Merinos Wool Weaving Factory should be noted for its contributions to the urban life of Bursa as well. The factory did not simply function as a factory as it also provided cultural, social and sports facilities to urban dwellers within its boundaries (Merinos Textile Industry Museum, 2017).

The textile and sericulture industries were also effective in transportation decisions concerning the city. One of the major results of the industrial potential of the city was Mudanya – Bursa railroad which was planned to be part of a larger railroad route among Mudanya, Bursa, Kütahya, Afyonkarahisar and Konya (Kağıtçıbaşı, 2016).

This route was realized owing to the export aims regarding silk fibres to Lyon by sea and it was in operation until 1953 (Kağıtçıbaşı, 2016).

In consideration of the world wars as exogenous shocks, economic centers in Turkey experienced growth in their aftermath. Bursa was one of the leading candidates, made possible by its industrial heritage. As domestic industry flourished, so did the population size through migrations in line with the increasing employment opportunities. Initially, the city grew towards east where Yıldırım district grew further with the addition of migrations noted above. On the other hand, the first OIZ was established within the present-day boundaries of Nilüfer district in 1962 and became operational in 1966. The OIZ became a solution for the factories and workshops that had been located among neighbourhoods in the city center. Later, first residential places for the workers in the OIZ formed up the initial urban settlement in the boundaries of Nilüfer district. This signalled the trend of the urban growth towards the west which is still continuing today.

5.2. The Growth Period (1970 – 2001): Development of New Industries and Specialization

The industrial and urban landscape of the pre-1970s Bursa has seen considerable change in the subsequent period, which spans from the 1970s to the early 2000s. The period is considered to start in 1970 owing to two factors.

- Economic crisis period based on exogenous shocks which challenge the development of textile industry (Reyhan, 1990)
- The start of the operations of automotive industry in Bursa OIZ (BOSB) and in future Demirtaş OIZ (DOSAB) area near Gemlik Road, which represents the major development path in the next period.

Significant investments by foreign capital in automotive industry set foundations for the future industrial landscape. On the other hand, the expansion of globalization in Turkey started with January 24th policy decisions in 1980 which involved comprehensive and structural changes in the previously protectionist economy. These changes included ease of imports and promotion of foreign investments.

Throughout this period, textile industry experienced two more potential lock-ins through technological and input change. However, the ending year of this period, 2001, marks a decisive change in which investments towards textile slowed down and automotive industry overtook textile sector as the dominant economic activity. These developments are detailed in this section.

5.2.1. Industrial Landscape

Tekeli (1999) points out that Bursa's industrial growth had been the same as other similar sized cities in Turkey before 1970s whereas it strongly became distinct after that period. He attributes the decentralization process of industry from Istanbul as well as credits given towards industrial development on the national scale. This was the source for the creation of a new path for Bursa's industrial and urban development (Tekeli, 1999). Automotive industry increased in importance and became more decisive in designating development trajectory by the end of this period. However, the textile industry also enjoyed its peak performances during this period. Clothing industry was not a preferred investment area in the preceding periods as there was no national market towards its products (Pınarcıoğlu, 2000). Their emergence took place after the 1980s and the industry enjoyed strong exports during the 1990s. On the other hand, automotive industry constantly increased its activity, became the dominant industrial activity by the start of the millennium and in the subsequent period, constituted the main development path of Bursa. Both textile and automotive industries are examined in this section with reference to their role in affecting the development trajectory of Bursa's local economy.

While the import substitution policies during the 1960s and 1970s enabled growth of domestic industries, it also caused setbacks in the long-run. The lack of competition from global scale led domestic brands to put less emphasis on quality in products through innovation (Kağıtçıbaşı, 2016). Moreover, studies on textile firms in Bursa OIZ reveal that the firms did not invest on marketing strategies but rather preferred to produce based on demand from Istanbul and Izmir where there were also clothing industries (Gökay & Çelikçapa, 1989). Despite the identification of these shortcomings, the industry did not experience significant decline during the 1970s

except for a setback in 1975, potentially as part of debates and actions surrounding the issues in Cyprus (Table 8.). Production process was restructured as firms started to integrate production of intermediary goods within their processes (Reyhan, 1990).

Table 8. The Employment and Number of Firms in the City

	Number of firms	Number of employees
1971	198	12.453
1974	221	22.159
1979	187	17.184
1982	192	18.365

Source: Reyhan, 1990

In the case of sericulture industry, the sector was still active in Turkey and Bursa as well during the 1970s owing to the search for revitalizing the industry with changes in the type of silkworm being used (Jirousek, 1998; Oral, 2004). However, at the same time, the use of rayon and synthetic fibres was increasing due to their cheaper costs. Figure 10 displays the decline in amount of cocoon produced in this period compared to the previous one.

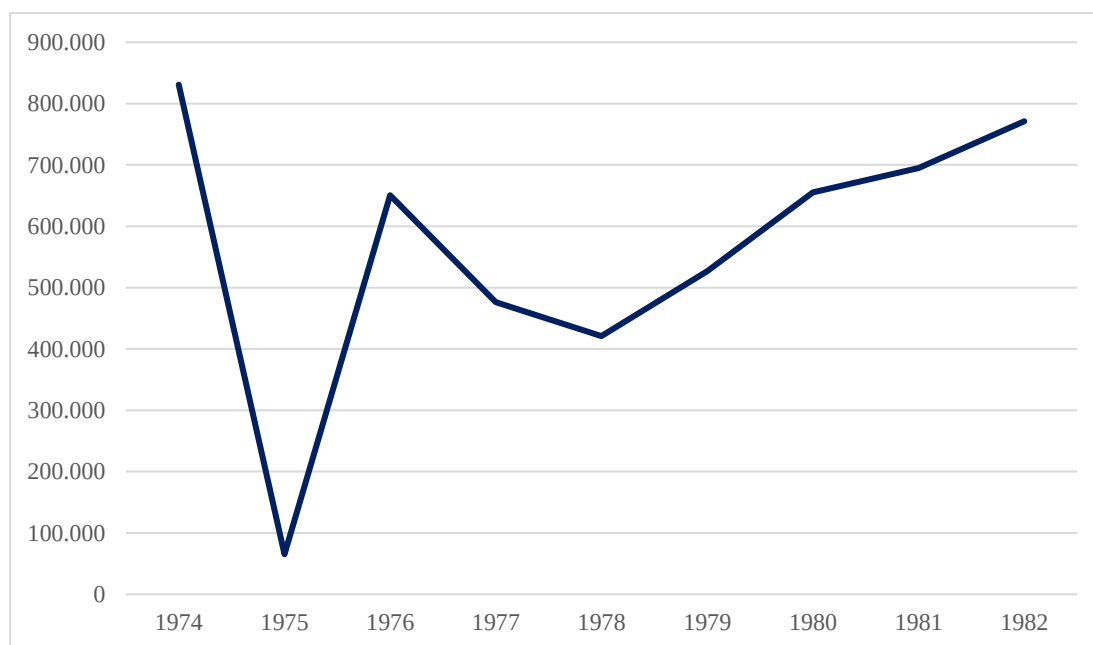


Figure 10. Amount of Cocoon Produced in Bursa between 1974-1982 (kg)

Source: Adapted from (Oral, 2004, p.57)

The emergence of the automotive industry in its modern form is connected to the foreign investment towards vehicle assembly industry in Turkey. Establishment of manufacturing factories by globally well-known brands and their knowledge transmission to local industrial knowledge base started the development of the sector in Bursa during the early 1970s (TAYSAD, 2017).

By this global relocation phase, knowledge flow towards local industries took place. The development of automotive industry in the country was initially based on several mutual partnerships between pairs of local and global brands (TSKB, 2017, p. 27). This is the striking point in development of Bursa's industry as the foreign companies had preferred to locate their vehicle assembly factory when the import substitution policies were in effect. Local investors were aiming for knowledge transfer and risk reduction which would support their plans to establish a brand and technology of their own in the same field (Darby, 2009). This was also beneficial for global brands as the partnership would enable them to manage variety of local communications as well as entrance to a protectionist market with low number of cars per capita (Darby, 2009; TSKB, 2017, p. 27).

OYAK-Renault and Koç-FIAT partnerships were born out of this process. OYAK-Renault was located in BOSB. On the other hand, TOFAŞ was located in an area where Demirtaş OIZ (DOSAB) would be established in the future. The location decision process of TOFAŞ was finalized based on a report by Ergun Kağıtçıbaşı on why Bursa is a more feasible choice for such an investment (Kağıtçıbaşı, 2016). The report highlighted the industrial inventory, machinery factories, qualities of labour force and coachwork manufacturing in Bursa (Bursa Ekonomi, 2011). Following the establishment of the main industry, local automotive supplier industry flourished in Bursa as well; however, the plans for a national brand and technology in the main industry never did so.

The case of investment of automotive industry in Bursa highlights the additional agency factor in the designation of Bursa's development path. However, the role of textile industry as well as machinery industry should also be noted in this context since the factors highlighted by the report in question was made possible by the

experiences in these fields (Figure 11). As highlighted in the previous sub-section, assignment of Sümerbank scholarship recipients in Sümerbank factories in Anatolian cities is argued to contribute to the engineering culture in the country. Similarly, automotive industry is also attributed to do the same for the country in the following decades (Denizer et al., 2016).

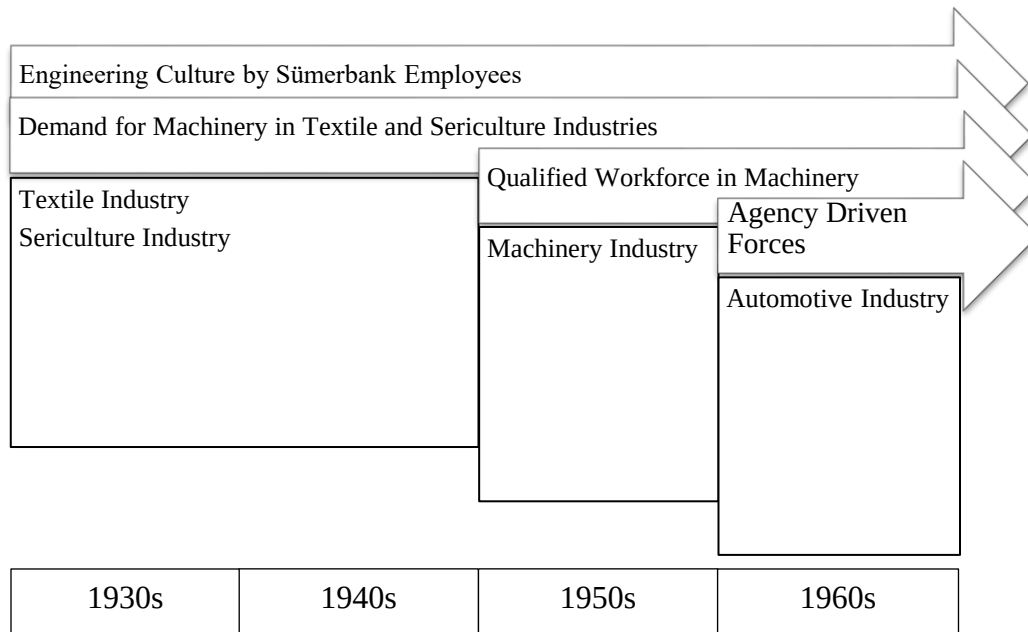


Figure 11. The Effect of Relatedness in the Emergence of Automotive Industry in Bursa

Moving on to the 1980s and beyond, Bursa's industrialisation could now be regarded as a combination of both increasing globalization processes and the convergence of national policies along with its development. The free trade policies starting with this decade had two distinct effects on sericulture and textile industries. In Turkey, sericulture industry entered into a decline due to the competition with China and Japan in the same field (Jirousek, 1998; Oral, 2004).

On the other hand, textile industry in Bursa grew once again during the 1980s. While the import substitution policies led to shortcomings in attempts towards innovation and marketing among the firms, the field found success in the export oriented era. However, the state investments experienced losses due to the new, free trade focused state policies and substantially increased wages of workers by the end of the decade

(Pınarcıoğlu, 2000). As for the reason behind the success of the private sector, all textile manufacturers in Turkey made use of the low cost of qualified labour force and raw materials as well as the geographical location of the country which reduced delivery times (Erarslan et al., 2008). The industry also took a turn towards different fabrics in this decade in the face of Chinese competition (Oral and Ahunbay, 2005).

The threat to the development path by textile industry was the requirement for modernization of machinery. The high inflation numbers during the late 1980s caused the industry to lag behind in realizing rapid technological advancements taking place globally. Some of the small and medium sized private manufacturers were noted to use the replicates of old weaving looms from the 1930s' technology (Evcimen et al., 1991) which are likely to be bought from Sümerbank during its modernization efforts in 1950s. As the manufacturers were restricted from importing textile machinery older than 5 years, some of the small and medium sized ones were able to update their old machinery with "relatively" old machinery through underhanded methods (Pınarcıoğlu, 2000). This gave them the push required to survive this decade and these manufacturers also continued on to the 1990s. Clothing industry also emerged during the 1980s and started its growth by the end of this decade (Figure 12.).

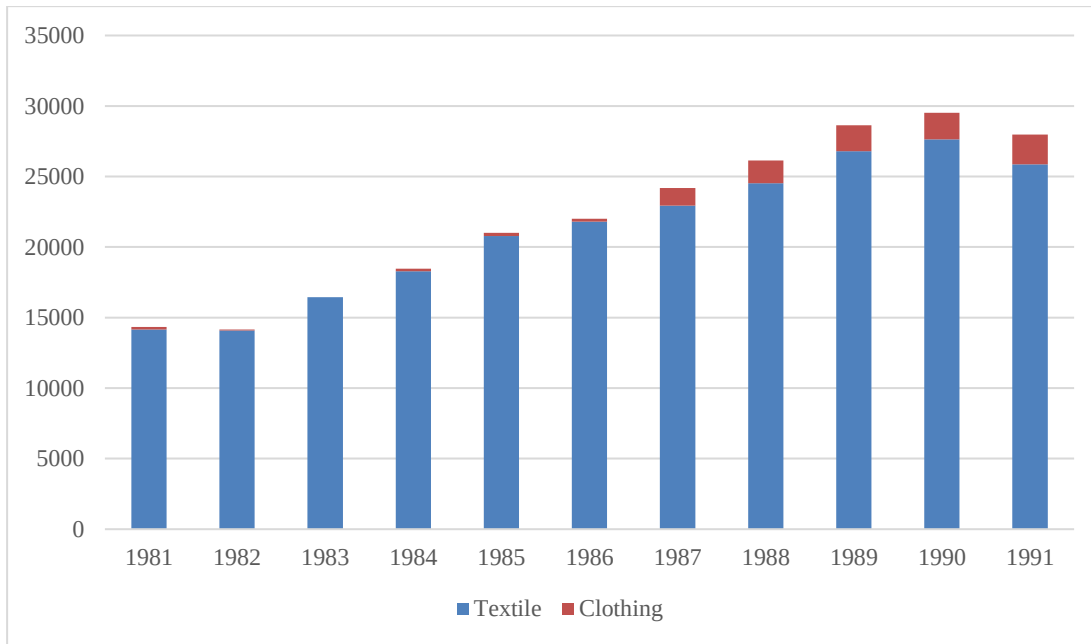


Figure 12. Employment Numbers of Firms with more than 10 Employees in Textile Industry in Bursa

Source: Adapted from (Pınarcıoğlu, 2000, p.164)

As the country was embracing globalisation and leaving protectionist policies behind, the automotive industry did not experience a tumultuous period owing to its ownership pattern based on partnership between a pair of local and global actors: As the market was opened to global competition, the direct presence of global actors prevented new competition conditions to devastate the existing industries (TSKB, 2017). In fact, this pattern boosted exports as the global trade system matured into the 2000s (TSKB, 2017). The growth of automotive industry can be seen in the employment and firms numbers (Figure 13.).

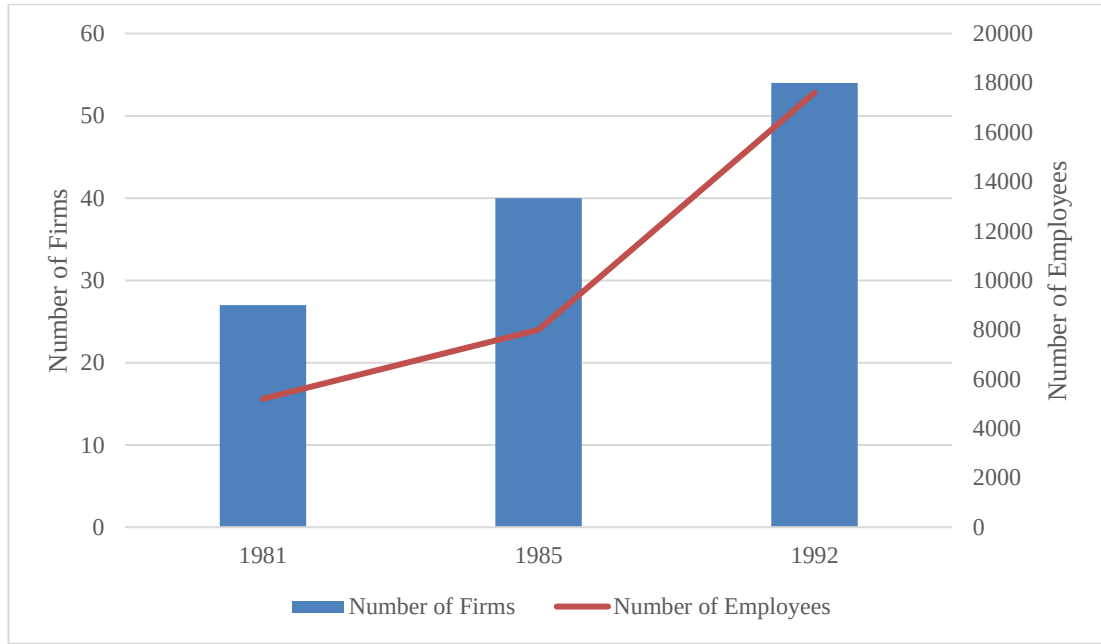


Figure 13. Number of Firms and Employees in the Automotive Industry in Bursa

Source: Adapted from (Pınarcıoğlu, 2000, pp.169-170)

Starting with the end of the 1980s and the start of the 1990s, textile industry has started to give its leadership position in manufacturing to automotive. Lack of up-to-date machinery to compete on a global scale has been a recurring issue since the start of the 1990s (Başer & Işık, 1991). Clothing production surged during this period along with meagre home furnishing, towel and knitting production in Bursa as well as in Turkey (Pınarcıoğlu, 2000). Moreover, institutions to coordinate local industrial activity, such as Chamber of Commerce and Industry, were noted to be inefficient in this role at the time (Pınarcıoğlu, 2000). This can be argued to have reduced the sector's ability to deal with the tumultuous 1990s in which series of shocks took place such as 1997 crisis in Southeast Asia, 1998 crisis in Russia and, lastly, China's accession to WTO in 2001 led to problems in finding export markets. Overinvestment on the national scale in the expectations of Customs Union (CU) agreement with European Union led to financing problems for investors as well. On the other hand, automotive industry was able to benefit from the CU agreement as will be observed in the following period. It was especially effective in influencing

the rise of this field as the new development trajectory in the industrial landscape of Bursa which will be scrutinized in the following period as well.

5.2.2. Urban Space

Urban development also took a significant turn for the city during this period. Starting from the 1970s, the significantly emphasized industrial characteristics of Bursa required larger spaces to accommodate the investments. Two development axes had emerged out of this need: The first OIZ of Turkey, Bursa OIZ, along Mudanya Road, and Demirtaş OIZ, which is established in 1990, along Yalova Road. The development of the latter was directed by the locational preference of TOFAŞ car manufacturing factory which was followed by several textile firms (Tekeli, 1999, p 27). Nilüfer OIZ (NOSAB) was established later in 2000.

In parallel with these investments in textile and automotive industries and their strong performances, population numbers surged in the city as well. The population in the province have shown remarkable growth as by 2000, the population surpassed 2 million people (Figure 14.). In the central district of the province, while the population was 266.000 in 1960, this number increased to 607.000 in 1980 and to 901.000 in 1990 (Pınarcıoğlu, 2000). The growth was fuelled by internal migrations besides the fertility rates.

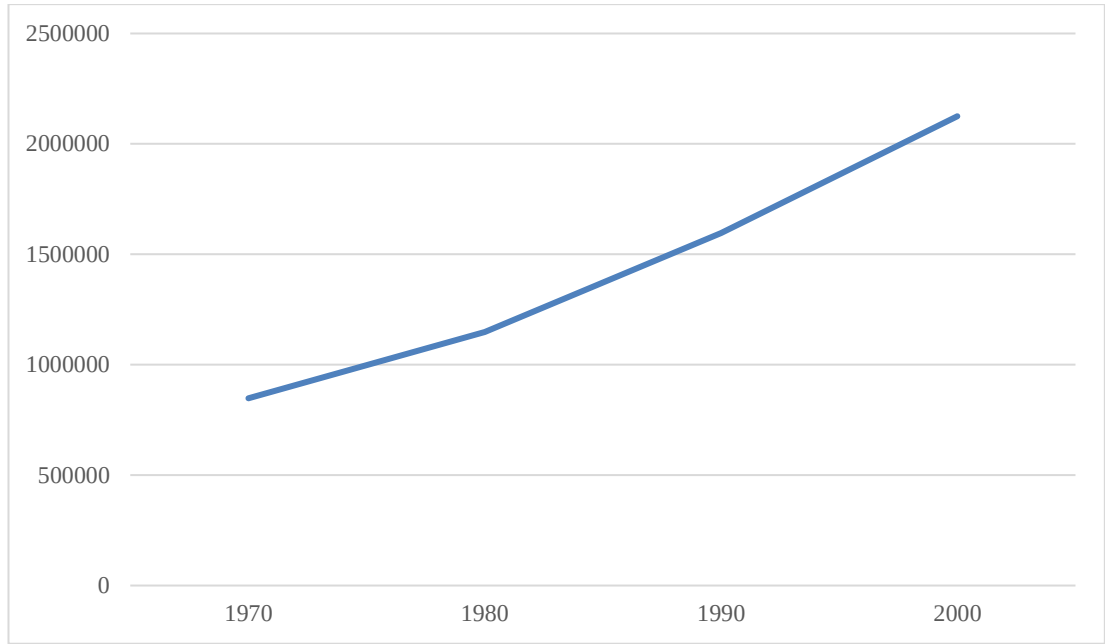


Figure 14. Population Numbers in Bursa between 1970 and 2000

Source: (Kocaman, 2008, p. 69)

As noted, the strong industrial performance resulted in remarkably increased population numbers. As an answer to the existing, crowded urban settlement area at the time, Nilüfer was declared as the third central district during this period along with Osmangazi and Yıldırım with the enactment of law number 3391 in 1987. In combination with the law number 3194 on Land Development Planning and Control, which gave increased autonomy to local governments, Nilüfer experienced significant urban growth during the 1990s. The district provided a new, high quality built environment in contrast to the aging housing stock in the other districts. Previously, Çekirge neighbourhood had been home to the wealthy segment of the city's inhabitants and they started their relocation trend towards Nilüfer during this period. The growth noted above can be observed on urban macroform in Figure 15, 16 and 17 with present-day municipality borders in urban areas for comparison.

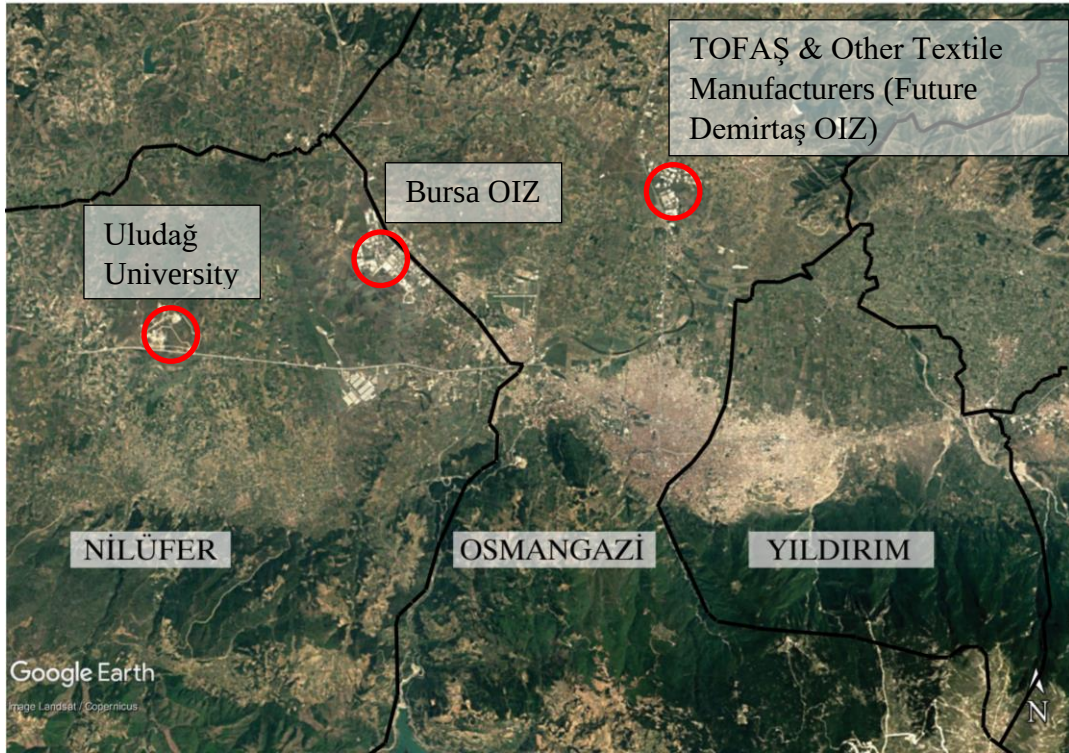


Figure 15. Urban Macroform of Bursa in 1987

Source: Adapted from Google Earth (2017)

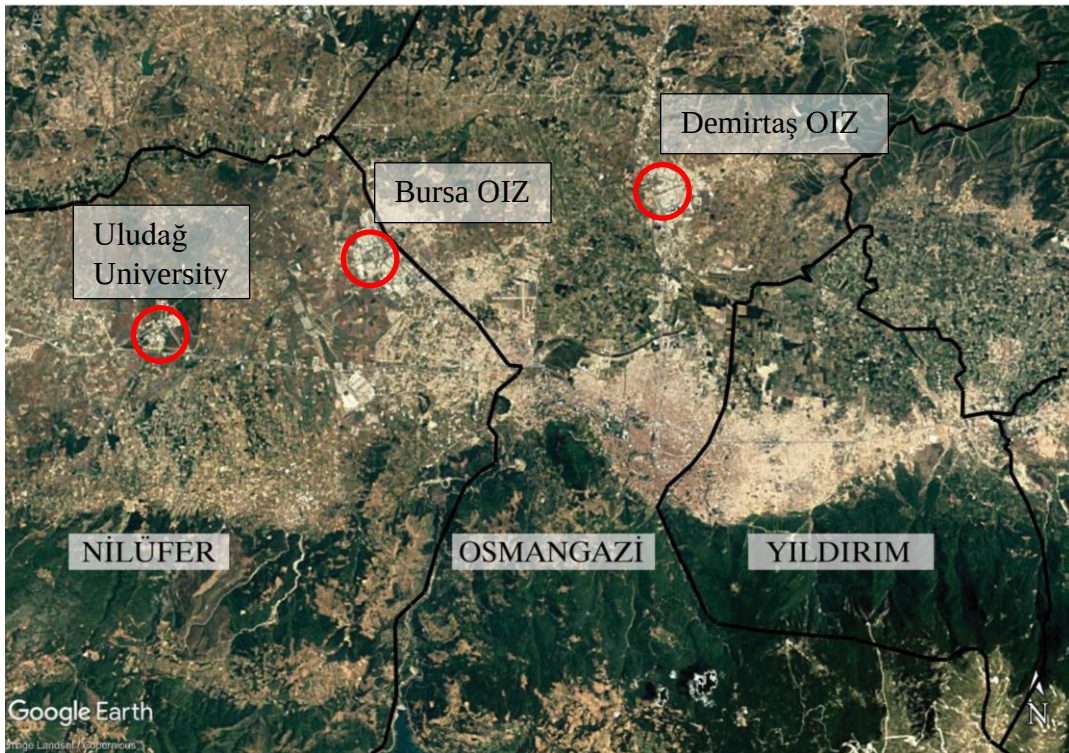


Figure 16. Urban Macroform of Bursa in 1995

Source: Adapted from Google Earth (2017)

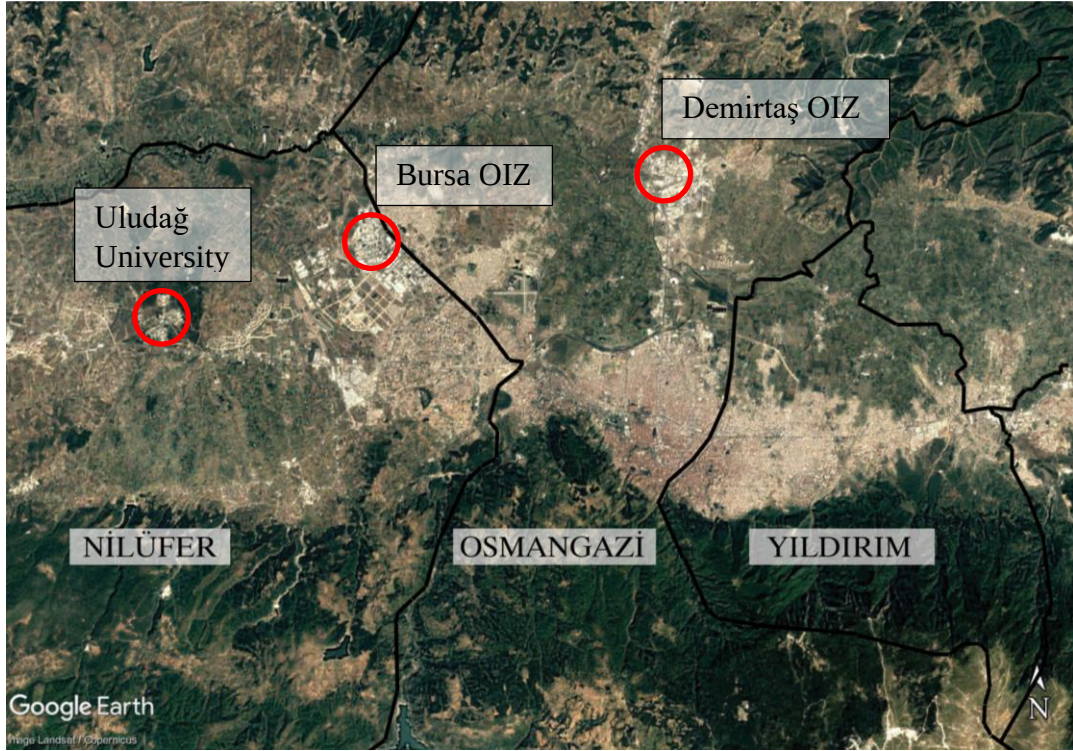


Figure 17. Urban macroform of Bursa in 2000

Source: Adapted from Google Earth (2017)

Aside from the production based growth nodes, urban space experienced an additional significant growth factor. In 1989, another migration wave from Bulgaria took place and Bursa was once again a major destination. The major destinations in the city were Hurriyet and Kestel neighbourhoods for the migrants (Nichols et al., 2003). The location of Hurriyet was advantageous for employment opportunities as the neighbourhood is located close to BOSB and future DOSAB area. The migrants were noted to be more hard-working, productive and compliant compared to the local labour force (Nichols et al., 2003). This led local factory managements to prefer migrant workers to the detriment of local workers. At the same time, the migrants shared a sense of solidarity among themselves which led them to have closer ties with each other in terms of social, economic and cultural sphere of life. These reasons led to alienation, hostility and suspicion towards the migrants in the local population (Nichols et al., 2003).

As can be understood from the structure of this period, the urban development of Bursa has been directed by agglomeration based forces shaping the industrial areas.

Moreover, it is during this period that the rural population stopped to increase for the first time while urban population surpassed rural population.

Notable events and decisions on various scales regarding both industrial and urban landscape of Bursa during this period are highlighted in the Table 9.

Table 9. Effects of Events on Multiple Scales on Industrial Development and Built Environment of Bursa

Industrial Development	Scale of Events	Built Environment
•Expansion of globalization policies (1970 -)	Global	•Expansion of globalization policies (1970 -)
• Untapped Potential of Protectionist Market for Global Investors (1960s - 1990s) • Finalization of Customs Union with EU (1996) • Ownership Pattern between International and National Investors in Automotive Industry (1966 -) • 2002 Economic Crisis	National	• Enactment of Law No. 3391 on Establishment of Three Central Districts in Bursa (1987) • Enactment of Law No. 3194 on Land Development Planning and Control
• Tofaş-Fiat and Oyak-Renault Partnerships in Automotive Industry (1968 & 1969 -)	Provincial	• Designation of the first OIZ of Turkey in Bursa (1961) • Increasing global and national scale industry based networks in the city • Designation of Bursa as a Greater Municipality (1987)
• Modernization of Textile Machinery (1985-1995)	Local	• Operationalization of the first OIZ of Turkey in Bursa, Nilüfer (1966) • Establishment of Uludağ University within the boundaries of Nilüfer (1975) • Designation of Nilüfer as one of the central districts (1987)

Source: Author's Analysis

5.3. The Period of Uncertainty (2001-present): New Ways to Eliminate Lock-in

As per the several crises during the 1990s, and the admission of People's Republic of China to the World Trade Organization (WTO) in 2001, slowed down the textile industry in Turkey severely. On the other hand, the automotive industry started to

reap the benefits of Customs Union agreement with the EU as its exports started to rise remarkably. Nonetheless, none of the sector were safe from the mortgage crisis in 2008 as the exports on both sectors have been lagging around similar levels. However, the stagnation cannot be simply limited to exogenous factors as each prominent sector in Bursa has its own shortcomings as well, with some of them existing since previous periods.

5.3.1. Industrial Landscape

In the context of production and existing knowledge economy conditions, a lock-in trajectory is possible to be identified in the city's local economy. The stagnation in the textile and clothing industries requires attention. However, automotive and its supplier industries also display stagnation for the last few years as well, which is even more signalling for the local economy considering these industries' role in it. This period covers initial conditions shaped up in the span of the past decade, in which ULUTEK's emergence has also occurred. Therefore, these conditions are far more in interaction with the development of ULUTEK under path dependence framework.

Bursa has been regarded as an innovative growth region in previous studies concerning the networks among small and medium enterprises (SMEs) (Armatlı-Köroğlu, 2005). When looking at the export numbers in the pre-2008 period, this classification could have been justified for that period as well. However, realization of that growth has been experiencing shortcomings for some time now according to sectoral reports. Textile, clothing, and automotive and its supplier sectors have all been boasting growth before 2008, whereas afterwards, stagnation has come up which can be traced in the exports (Figure 18.). Naturally, mortgage crisis in U.S. in 2008 as well as its global echoes in economies around the world has brought considerable consequences in that regard.

Regardless of their gravity, these exogenous factors are not the only elements that led to the bottleneck in these economic sectors. Despite the eminent role and export numbers of these industries, there have been endogenous insufficiencies arising in

these sectors as noted by Bursa Chamber of Commerce and Industry (BCCI) reports. Textile industry is suffering from structural problems concerning contract based manufacturing in which the competition with Asian firms is resulting in negative outcomes due to the production costs difference (Bursa Ticaret ve Sanayi Odası, 2014). Without innovation to side-track lock-in, stagnation becomes inevitable on the existing path in the global knowledge economy.

In the case of automotive and automotive supplier industry, the case displays similar results to textile and clothing industries. In the case of Bursa, both the automotive industry and its supplier industries have been on a remarkable growth trajectory until 2008. However, that steady growth is replaced with stagnation in the last decade according to exports (Figure 16.). It should also be noted that, the lack of innovation intensive production can be seen in the example of automotive supplier industry (Bursa Ticaret ve Sanayi Odası, 2015a, p. 15). The exports over the years for textile and clothing, and automotive and its supplier industries are highlighted in Figure 18.

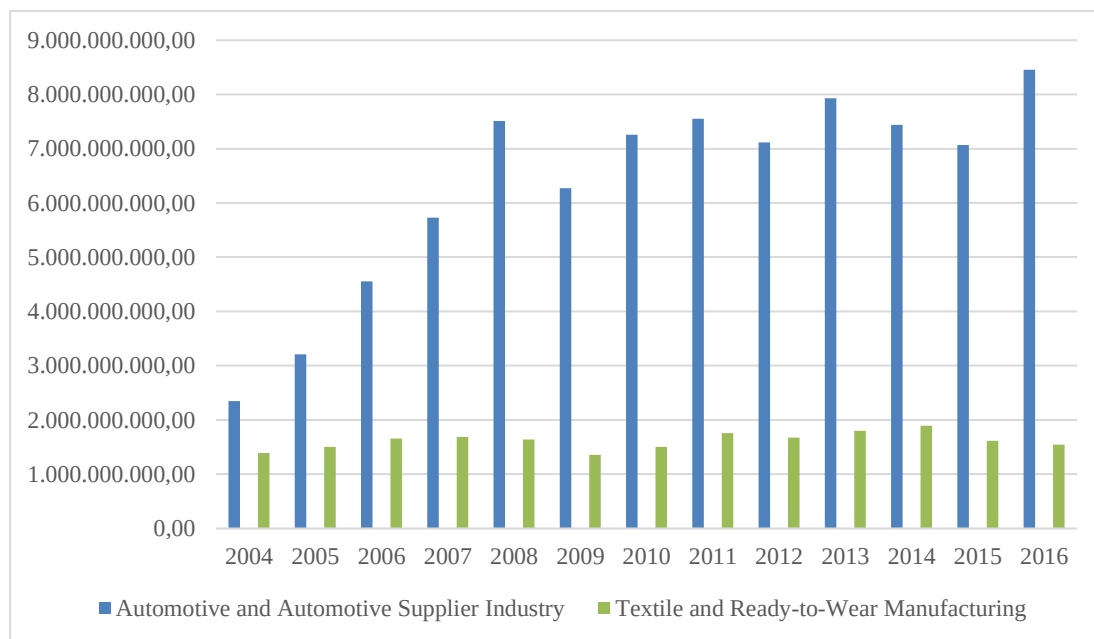


Figure 18. Amount of Exports by the Dominant Economic Sectors in Bursa between the years 2004-2016 (TRY)

Source: Turkish Exporters Assembly (2017)

The contrast between the early strong performance and current stagnation from these industrial fields is argued to be representative to a path dependent trajectory for the local economy of Bursa. The stronger performance of these sectors over the decades reinforced the continuation on the existing path. This led to lesser opportunities and efforts for the development of local economy compared to increasing diversity of industries in other provinces that may be argued to benefit from related variety towards innovation.

Shortcomings in regards to lack of innovative production in general is being addressed to some extent within private sector. Towards that end, the city shares the second place with Ankara on the national scale in terms of number of private R&D centers according to April, 2017 data (Table 10.) (General Directorate of Science and Technology, 2017). In the context of this case study, which focuses on the effect of place specific factors in the end, the percentage of Nilüfer should also be noted. 36 of R&D centers are located in Nilüfer out of 52 in Bursa which composes almost 70% in the province (Table 11.).

Table 10. Number of Private R&D Centers according to Provinces with More Than 10 R&D Centers

Province	Number of Private R&D Centers	% in total
Istanbul	157	0,35
Ankara	52	0,11
Bursa	52	0,11
Kocaeli	48	0,10
Izmir	40	0,09
Tekirdağ	15	0,03
Manisa	14	0,03
TOTAL	453	1

Source: Ministry of Science, Industry and Technology, April 2017

Table 11. Number of Private R&D Centers according to Districts and Their Share of Dominant Economic Sector

Districts of Bursa with R&D Centers	Number of R&D Centers	Share of R&D Centers in the Province	Share of Dominant Economic Sectors of R&D in the District	Share of Dominant Economic Sectors of R&D in the Province
Nilüfer	36	69%	•58% automotive supplier industry •11% machinery and equipment manufacturing	•40% automotive supplier industry •8% machinery and equipment manufacturing
Osmangazi	10	19%	•40% automotive supplier industry •40% textile	•8% automotive supplier industry •8% textile
Other Districts	6	12%	•33% automotive supplier industry	•4% automotive supplier industry

Source: (Ministry of Science, Industry and Technology, April 2017); (Author's Analysis)

More importantly, the local agency forces' investment decision on Industry 4.0 in the form of Technological Organized Industrial Zone (TEKNOSAB) presents a prominent improvement area for Bursa's economic development. The development of the zone is not only alluring to national companies, but also for international ones.

Combination of exogenous shocks as contingencies and insufficient endogenous qualities possessed by agencies brings threat of a lock-in for the local economy. The local manufacturers are facing challenges to bring necessary endogenous transformations in the face of recent global economic conditions. As for the case of automotive industry, supplier industry presents opportunities for introduction of innovation.

5.3.2. Urban Space

Today, Bursa displays a metropolitan characteristic with its three central districts: Osmangazi, Yıldırım and Nilüfer. Osmangazi is home to the oldest neighbourhoods and historical city center with its population more than 840.000 people (TUIK, Adrese Dayalı Nüfus Kayıt Sistemi, 2016). On the other hand, Yıldırım has been its successor in terms of Bursa's urban development history. The district is home to almost 650.000 people (TUIK, Adrese Dayalı Nüfus Kayıt Sistemi, 2016) as it has been drawing migration from inside as well as outside of Turkey as a result of strong industrialization.

Nilüfer, in this context, has been the latest of these districts to emerge. Today, the district is home to 415.000 people and it is the 6th district with the highest annual population growth rate among all settlements with population more than 250.000 in Turkey (Table 12.) (Figure 19.) (TUIK, 2016).

Table 12. Highest Population Growth Rates among Settlements with More Than 250.000 Population

Province - District	Total	Province and District Centers	Towns and Villages	Annual Growth Rate of Population (%)
İstanbul – Esenyurt	795 010	795 010	-	6,8
İstanbul – Sancaktepe	377 047	377 047	-	6,1
İstanbul – Beylikdüzü	297 420	297 420	-	6,0
Diyarbakır – Kayapınar	326 154	326 154	-	5,4
İstanbul – Başakşehir	369 810	369 810	-	4,6
Bursa – Nilüfer	415 818	415 818	-	4,6
Giresun	444 467	292 614	151 853	4,1
Aksaray – Merkez	293 631	213 088	80 543	3,7
Tekirdağ	972 875	972 875	-	3,7
Malatya - Yeşilyurt	304 369	304 369	-	3,3

Source: TUIK, 2016

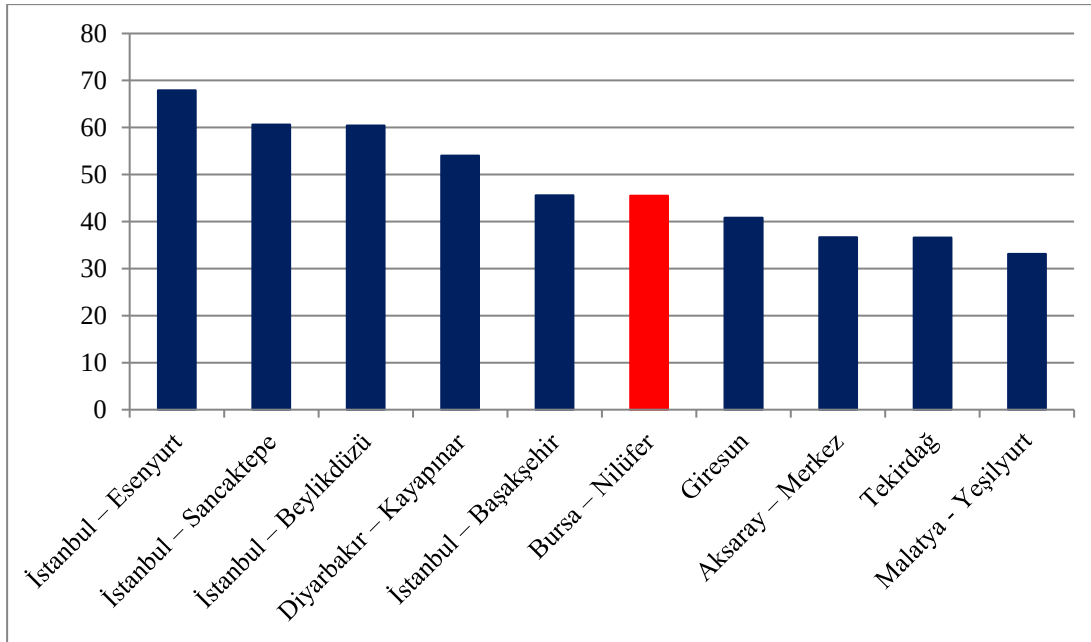


Figure 19. Highest Population Growth Rates among Settlements with More Than 250.000 Population

Source: TUIK, 2016

As the wealthy started to inhabit the Nilüfer district starting with the 1990s, the consumption preferences of those inhabiting the district have brought the increasing emphasis on components of higher quality of life as well as more sophisticated consumption preferences. Vibrant urban life, availability of wide range of service sector and lower crime levels have also become beneficial to the prospects of the district in terms of drawing talented individuals towards it.

The local policies have been supportive towards that future as well. Especially the district municipality's efforts on both hard and soft infrastructure towards that end can be seen. Hard infrastructure include provision of public land-uses such as green, open spaces; provision of bicycle roads; providing physical environment as well as being host to arts and cultural events, ultimately increasing the quality of life in the urban space.

An observation into the local policies involving soft infrastructure reveals differences compared to the remaining districts of the city as well. Some of them involve steps towards boosting arts and culture activity, developing societal equity policies as well

as establishment of an innovation center to accommodate project development and collaborations among entrepreneurs. In 2016, 1680 activities were organized to which 376,195 people attended (Nilüfer Municipality, 2017). International festivals are also being organized, which draw more than 80.000 attendees in total and draw attendees from other countries (Nilüfer Municipality, 2017). In social policies, the municipality pioneered to establish neighbourhood committees to increase participation in the decision-making processes at the local scale. The municipality has also created a Societal Equity Unit within its institutional structure, which aims to respond to all kinds of discrimination in the society. Ultimately, they are beneficial to creativity based aims and objectives which appear to be showing their effects in the strong growth rate of population numbers in the district (Figure 20.).

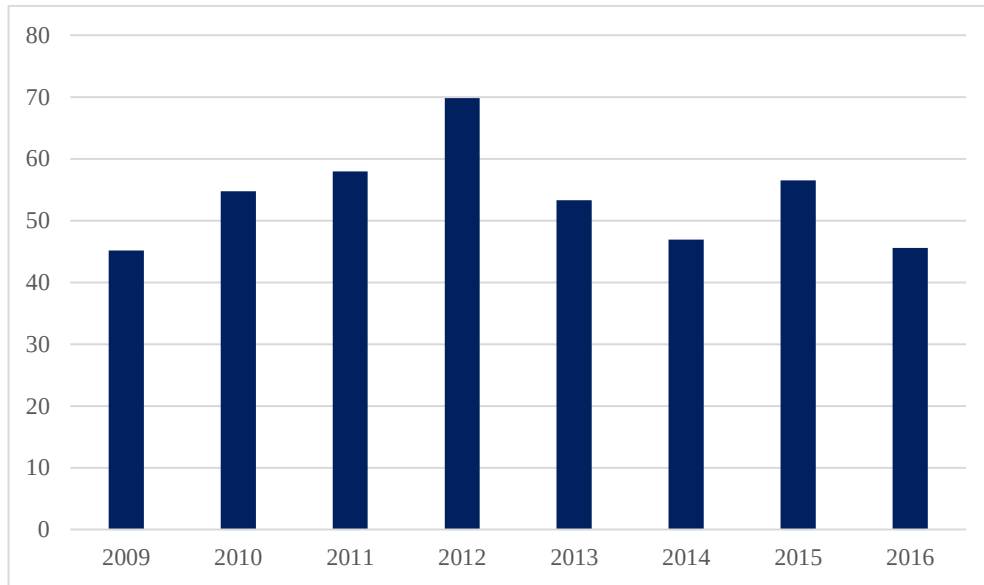


Figure 20. Population Growth Rates in Nilüfer between 2009 and 2016

Source: TUIK (2016)

Based on this population growth rates, urban macroform also expanded significantly. While Nilüfer's expansion with reference to previous period is significant, even within the 15 years in this period, the district has expanded considerably once again (Figure 21.) (Figure 22.) (Figure 23.). During this period, the development of vicinity around Yüzüncüyıl and Özlüce consist of one of the most noticeable changes.

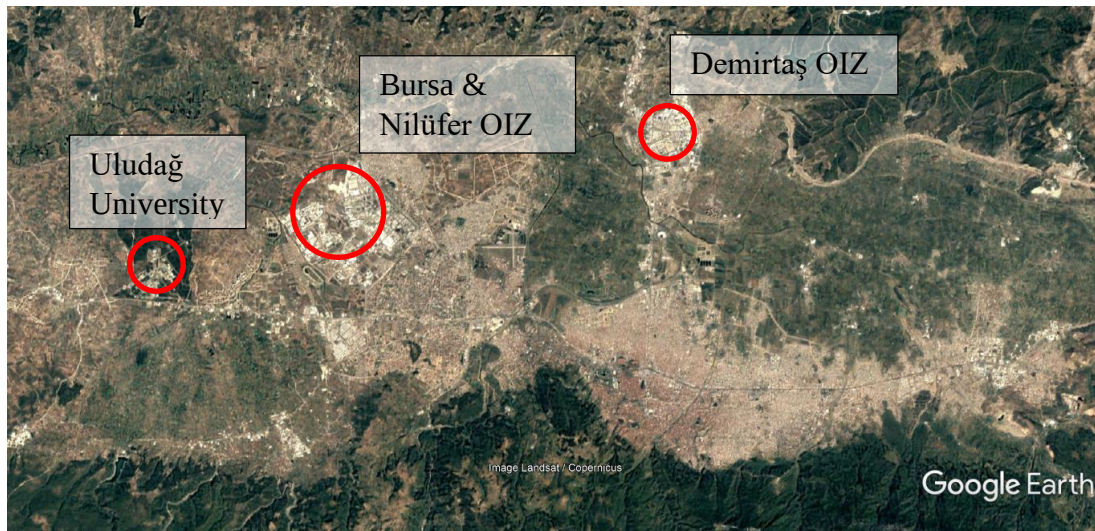


Figure 21. Urban Macroform of Bursa in 2005

Source: Adapted from Google Earth (2017)

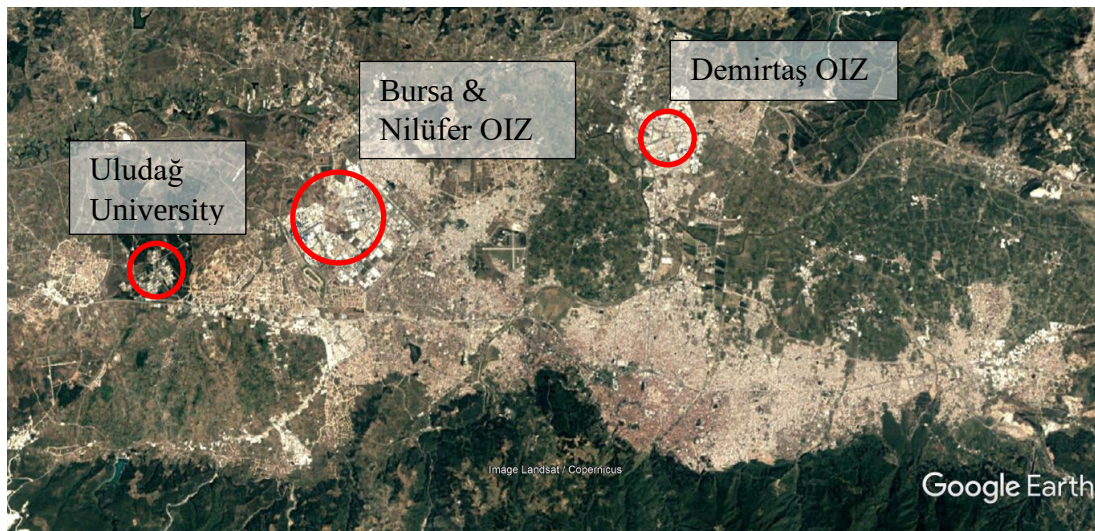


Figure 22. Urban Macroform of Bursa in 2010

Source: Adapted from Google Earth (2017)

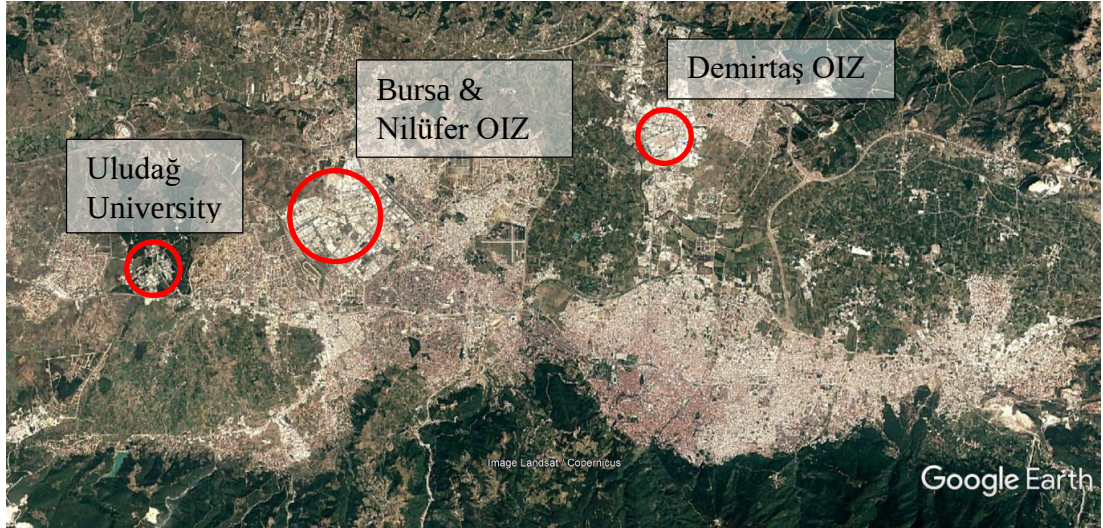


Figure 23. Urban Macroform of Bursa in 2015

Source: Adapted from Google Earth (2017)

With the information presented up to this point, it can be said that Bursa has gained some of the necessary dynamics to attract and maintain skilled labour force, especially in its Nilüfer district. Several factors can be counted among these dynamics: Industrial heritage, current industry and geopolitics based migration during 20th century, and potentially, increased quality of life indicators in the last decade to form up a metropolitan characteristic. Moreover, socio-economic development indexes carried out by Ministry of Development for the years 1996, 2003 and 2011 show that Bursa has always been one of the six provinces belonging to highest socio-economical level compared to the rest of the country (Dinçer, 1996; Dinçer et al., 2003; General Directorate of Regional Development and Structural Adjustment, 2013). As a result, population significantly boosted and in large population, highly skilled workers become an inevitable segment of society (de la Roca and Puga, 2017).

However, the effects of this have yet to produce returns to the production in the city, as highlighted by the previous section. The shortcomings from innovation in all industry powerhouses point towards need for new solutions. Therefore, the presence and development of ULUTEK TDZ is regarded as an opportunity in this study. The TDZ is a node for specifically high technology services and products which

essentially require innovation. Whether the TDZ is capable of diversification of Bursa's industrial landscape or act as a related industry that support the existing path in terms of innovation is evaluated in the following section.

5.4. Emergence of ULUTEK TDZ: A Gateway out of Potential Lock-ins

In the previous chapters, increasing automation and its skill-replacing outcomes have been highlighted succinctly. As the computing costs are being brought down by new technologies and, subsequently, machines replace low-skill jobs, competition is being carried onto a stage that requires higher creativity and innovation from human labour, such as high-technology industrial activities. This trend is a globally dictating force that requires nations and their regions active in global market economies to take necessary steps to ensure their competitive edge.

In response to these global developments, one of the important actions undertaken at the national scale has been the introduction of high technology industrial zones through legal framework. At the start of the millennium, Law Number 4691 on Technology Development Zones (TDZ) was enacted in 2001. The law foresees and enables increased partnerships between universities and production units as well as increased competition and innovation in the production of both goods and knowledge. The units to constitute these zones are clearly defined to be firms that can benefit from universities' facilities and high technology means to produce innovative high technology outputs. Before this framework, several technology centers under the name of TEKMER were operating nationally, which turned into the first technoparks in early 2000s as part of this national policy.

Aside from these global and national developments, there were also local reasons behind the emergence of a high technology cluster in the case of Bursa. Due to the lack of available land, the local government and the local Chamber of Commerce and Industry restricted the allocation of industrial land to investments from outside Bursa. Investments on high technology fields were exempt from this perspective as it was the intent of these local actors to advance high technology in the economic landscape of Bursa. While it lagged into the mid-2000s, ULUTEK TDZ was

established under the effect of these policies. It should also be noted that the emergence of the TDZ is in the same time period in which uncertainties exist on the growth of textile, automotive and automotive supplier industries in Bursa.

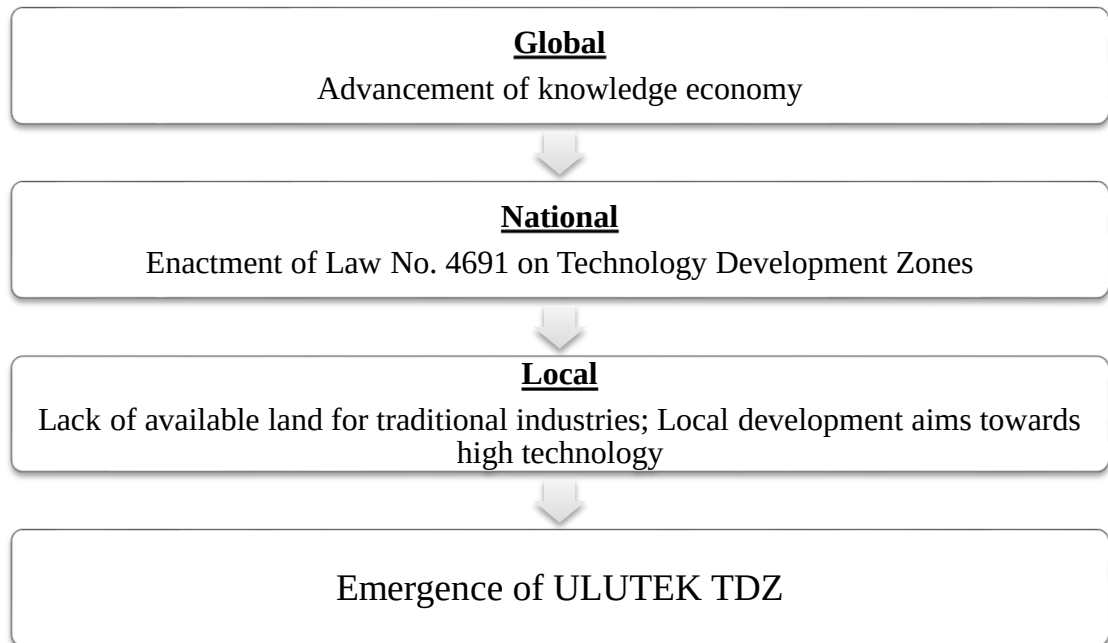


Figure 24. Reasons Behind the Emergence of ULUTEK TDZ

Moreover, Turkey has a youth population potential as the country has one of the lowest median ages in Europe (Eurostat, 2017a). This can be argued to contribute to a rapid increase in the amount of employment in knowledge intensive activities on the national scale compared to some of its European counterparts (Eurostat, 2017b). The difference in the rate of growth can be best seen in the Figure 25.

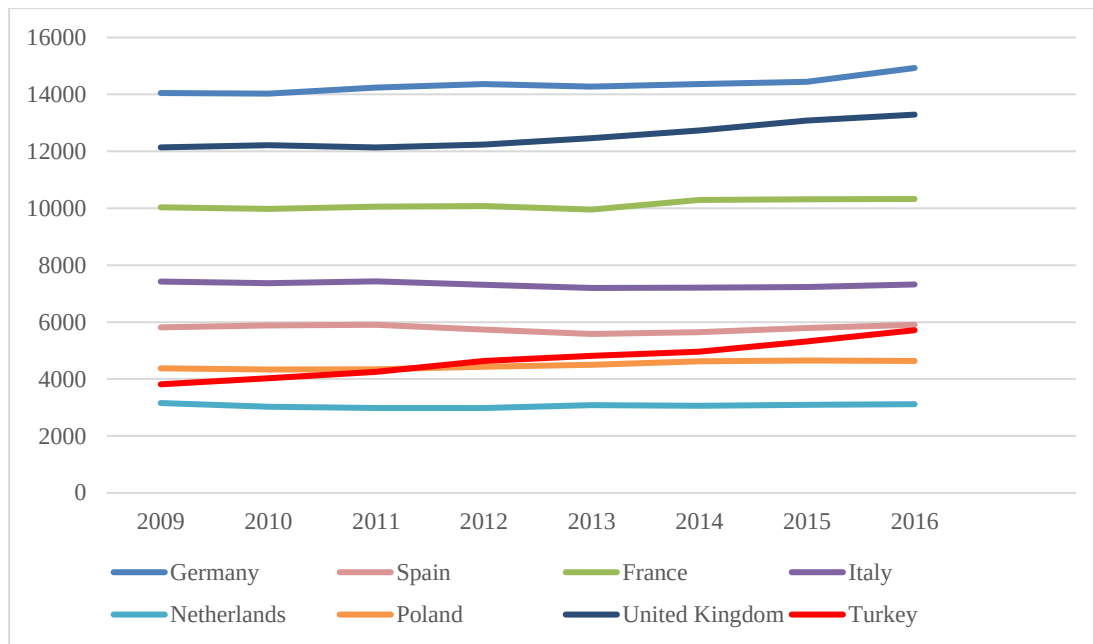


Figure 25. Change of Amount of Employment in Knowledge Intensive Activities in Europe between the Years 2009-2016

Source: Eurostat (2017b)

These global and national scale decisions and contingencies brought transformations to the industry in the province. ULUTEK TDZ is established by partnership of Uludağ University, Bursa Chamber of Commerce and Industry (BCCI), Bursa Greater Municipality and Uludağ Exporters Association General Secretariat with the main actors being the first two. The technopark is mainly focused on empowering production and research in high-technology and software fields. In an age of increased digitalization, the development of software industry represent significant relatedness for innovative development in other mid and high technology industry fields. One such branch off is aerospace and defence industry, towards which there are already investments being planned, signifying divergence from a middle technology firm dominated industrial landscape of the province (Bursa Ticaret ve Sanayi Odası, 2016).

An important decision taken on national scale influencing the development of ULUTEK and its software industry is Increasing the Competitiveness of Service Sector Project Project (HISER Project). Coupled with the “Soft_Away” project of

The Union of Chambers and Commodity Exchanges of Turkey (TOBB), various funding and expertise are aimed to be provided on firm activities to commercialize firms' products on the international scale (Ministry of Economy, 2015; TOBB, 2017). The project involves designation of software clusters among few technoparks around the country and ULUTEK TDZ has been chosen to be a beneficiary. 20 firms from the cluster became part of the project in this context.

Other contributions towards ULUTEK focus on strengthening the R&D and talent pool capacity of this agglomeration in the form of education. Department of Computer Engineering in Uludağ University has started its undergraduate and graduate programmes during the 2016-2017 academic year with first students accepted in 2017-2018.

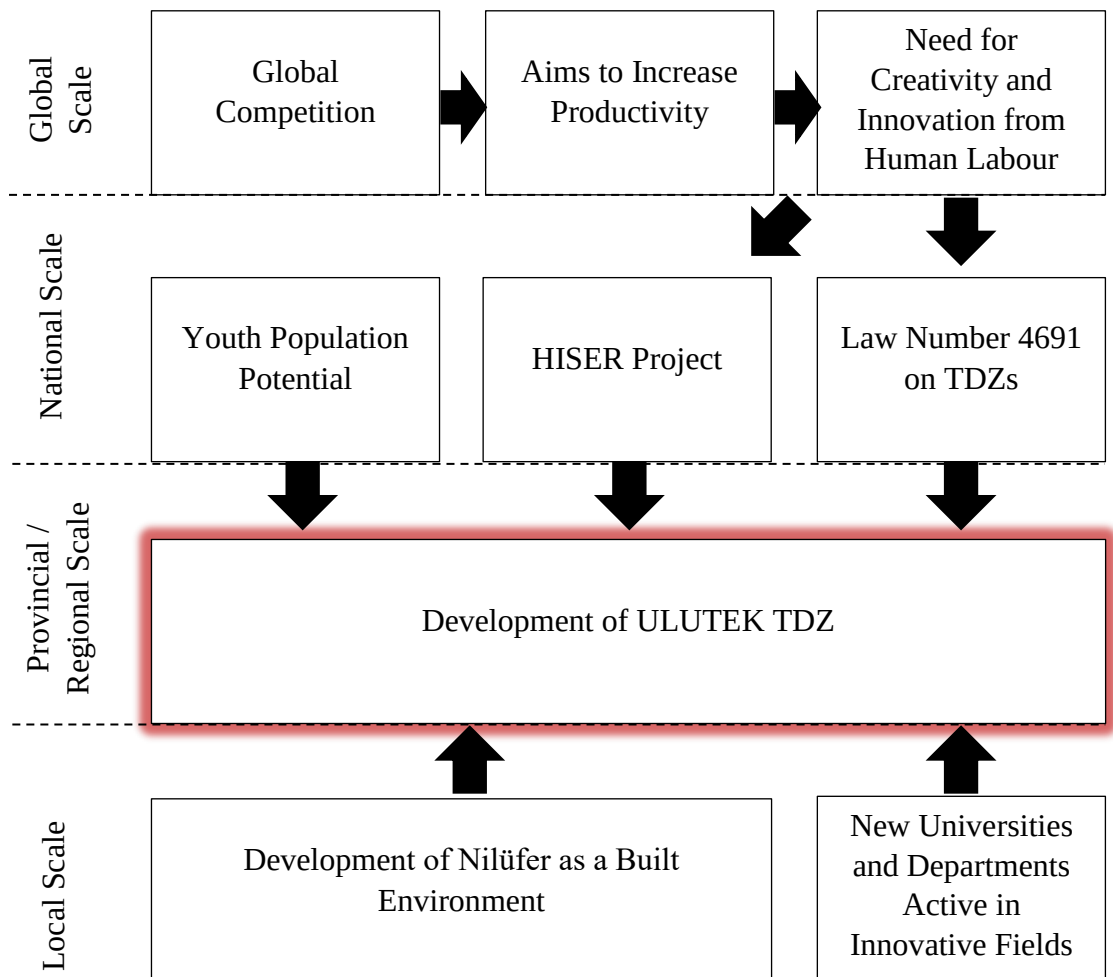


Figure 26. Influences from Multiple Scales on the Development of ULUTEK TDZ

5.4.1. Development of ULUTEK Ecosystem

Preliminary interviews and two types of questionnaires are implemented to analyse the path creation mechanisms at work in ULUTEK TDZ. Both the interviews and the questionnaires mainly focused on the local scale which consists of two areas to observe in the context of this study. The first is about the local ecosystem while the other is to highlight the built environment in which the constituents of the ecosystem are established and interact with each other. The local ecosystem is analysed based on the creative capabilities of the firms located in ULUTEK TDZ, which is measured through their interorganizational knowledge networks with each other, with the support institutions as well as with the firms outside the cluster. The second questionnaire measures the built environment in terms of its capability of providing urban amenities towards people working in creativity and knowledge intensive occupations within the firms in the TDZ.

This section puts emphasis on the functioning of ULUTEK TDZ ecosystem by analysing questionnaire results undertaken on the firms. Towards this goal, questionnaires and preliminary interviews are made use of in order to make inferences regarding the practices that give way for path dependency, increasing returns and lock-ins. First, preliminary interviews and associated data gathered along with interviews are taken into consideration to get descriptive characteristics of the firms in ULUTEK regarding their networking and the role of institutions in this context. Later, questionnaire results are analysed to provide insight into knowledge flows among firms; networks with institutions within the ecosystem; innovation and competition based activities of the firms. The knowledge flows are regarded to increase potential to combination of knowledge from different sectors or expertise which would lay out capability of the TDZ for creativity based production.

Preliminary interviews are focused on finding out how the networks are functioning among firms as well as between firms and support institutions. The interviews were carried out in September 2017 with staff from ULUTEK Management Company (M.C.) and Uludağ University Technology Transfer Office (UU TTO). ULUTEK M.C. and UU TTO are the institutions that oversee the most activities and fairs

organized. Besides the visibility purposes towards potential customers, these activities enable firms to establish new networks in a formal setting or enhance the existing ones which provide new collaboration opportunities and subsequent knowledge flows.

In addition to activities and fairs, there are other networking opportunities in formal settings for the firms as a result of zone-wide projects. One of these projects is HİSER, which is a national scale project in which ULUTEK M.C. is a beneficiary. The project aims to establish software clusters in three technoparks around the country. ULUTEK's Information Technologies (IT) cluster in the extent of the project is composed of 18 firms as of date, due to the departure of two firms from the TDZ since the start of the project.

The firms in ULUTEK TDZ are advantageous in terms of their location in Bursa where a prominent automotive industry and other industrial branches exists. This allows them to be able to actively pursue these industries' needs in the local scale and benefit from local networks or institutions to reach them. On the other hand, customer profile is also extended towards local public sector which mostly covers hospitals and municipalities. As the province is home to 4 million people, the Greater Municipality as well as district municipalities require e-municipality services and other software based solutions to provide services more efficiently. The presence of hospitals also enables further opportunities for development of software aimed for medical sector. However, commercialization is still noted to be the main shortcoming of the firms of the TDZ.

Another respondent identifies a follower role to Istanbul based firms in the case of software industry companies. The industrial landscape of Bursa is not helping these firms in pursuing customers actively either, because as noted by BCCI's sectoral reports, innovation levels are low in the extent of the existing firms which leave only several, highly dominant industry actors. As for the industry in Bursa in general, the meetings conducted by the support institutions reveal that there is a lack of talent in the field. As for the active employees, it is reported that there is an eventual brain

drain towards Istanbul as their experience in the field increases, which cripples the firms in Bursa's industrial landscape.

When an ecosystem is being analysed, not only the firms but also the institutions that support them should be identified in the study framework. The supporting institutions of the local ecosystem in this case can briefly be listed as ULUTEK M.C., UU Technology Transfer Office (TTO), and Turkish Exporters Assmebly-Turkish Economy Bank (TİM-TEB) Enterprise House. Other national organisations such as Small and Medium-Sized Enterprises Development Organization (KOSGEB) and Scientific and Technological Research Council of Turkey (TÜBİTAK) partake through variety of projects undertaken by ULUTEK TDZ.

ULUTEK M.C. is one of the institutions that enable production of new knowledge. It also connects that knowledge to industry where it becomes a surplus value. The nature of knowledge is considered to be high-technology which is aimed to keep regional and national competitiveness levels high. The support the company provides to the firms in the TDZ is outlined by Law Number 4691 and the institutions' own regulations. The law underlines that the management company has to provide everything involving infrastructure and built environment as well as institutional needs born out of firms' development processes such as establishment of incubators and TTOs. More specifically, the company provides education, visibility activities, networking opportunities to the firms it hosts which frees the firms and entrepreneurs to focus on their R&D and commercialization efforts to ensure realization of their ideas.

As the main institution to encourage interdisciplinary efforts, UU TTO is a support institution that embodies the aims to establish connections among academicians, firms and industry representatives. Similar to other institutions in the ecosystem, UU TTO provides its services to other local and regional actors as well. These services include supports and consultancy regarding project development and intellectual rights; entrepreneurship; and visibility and promotion activities.

While the previous institutions are also open to actors outside the local ecosystem, their existing aim group is mostly composed of local or regional actors. On the other hand, TİM-TEB Enterprise House is a partnership on a national scale between TİM and TEB, which aim to foster entrepreneurship and growth around the country. The institution has a branch for their operations in Bursa.

Moving on to the firms and the questionnaire results, some descriptive information can be provided first. According to data provided by ULUTEK, there are 134 firms in the TDZ, almost half of which active in software industry. The data on their type of economic activities was gathered in the form of 2-digit NACE Rev.2 classifications. Then, these data are aggregated into fewer classes by using Eurostat aggregations to better grasp on their economic activity (Eurostat, 2016). As a result of encompassing software industry, the knowledge intensive services lead all the other economic activities in the TDZ (Table 12.). Out of 134 firms, 22 are noted to be in incubation period.

Table 12. Number and Percentages of Firms in ULUTEK TDZ according to Eurostat Classifications

Eurostat Classification	Number of Firms	Percentage of Firms (%)
High-technology manufacturing	5	3,7
Medium-high-technology manufacturing	11	8,2
Medium-low-technology manufacturing	9	6,7
Low-technology-manufacturing technology	1	0,7
Knowledge intensive services	60	44,8
Knowledge intensive market services	24	17,9
High-tech knowledge intensive services	11	8,2,
Knowledge intensive financial services	-	-
Other knowledge intensive services	1	0,7
Less knowledge intensive services	8	6,0
Other less knowledge intensive services	2	1,5
Other manufacturing and services	2	1,5
TOTAL	134*	100

Source: ULUTEK M.C., Author's Analysis

*22 in incubation

15 firms out of 134 have answered the questionnaire. While the sample size represents a small percentage of the total, the questionnaires on innovation have been documented to be the case in similar research in which manufacturing firms' innovation performances were observed on a regional scale (Berger, 2005) (Table 13.).

Table 13. Response Ratios on Innovation Questionnaires from Manufacturing Firms in Europe

Region	Country	Year	Response Rate (%)
Baden	Germany	1995	15.8%
Hannover-Brunswick-Göttingen	Germany	1995	20.6%
Saxony	Germany	1995	26.7%
Alsace	France	1997	15.0%
Barcelona	Spain	1997	15.3%
Gironde	France	1997	12.7%
Slovenia	Slovenia	1997	31.2%
South Holland	Netherlands	1997	13.7%
South Wales	UK	1997	17.6%
Stockholm	Sweden	1997	24.0%
Vienna	Austria	1997	19.9%

Source: Berger (2005)

The sectoral distribution of the participants reveals that the two-thirds of the firms that answered the questionnaire are from software-ICT fields (Figure 27.) which falls into the boundaries of knowledge intensive services according to Eurostat classifications given at Table 12. Two open-ended answers were given under “Other” option, which are also noted in the Figure 27.

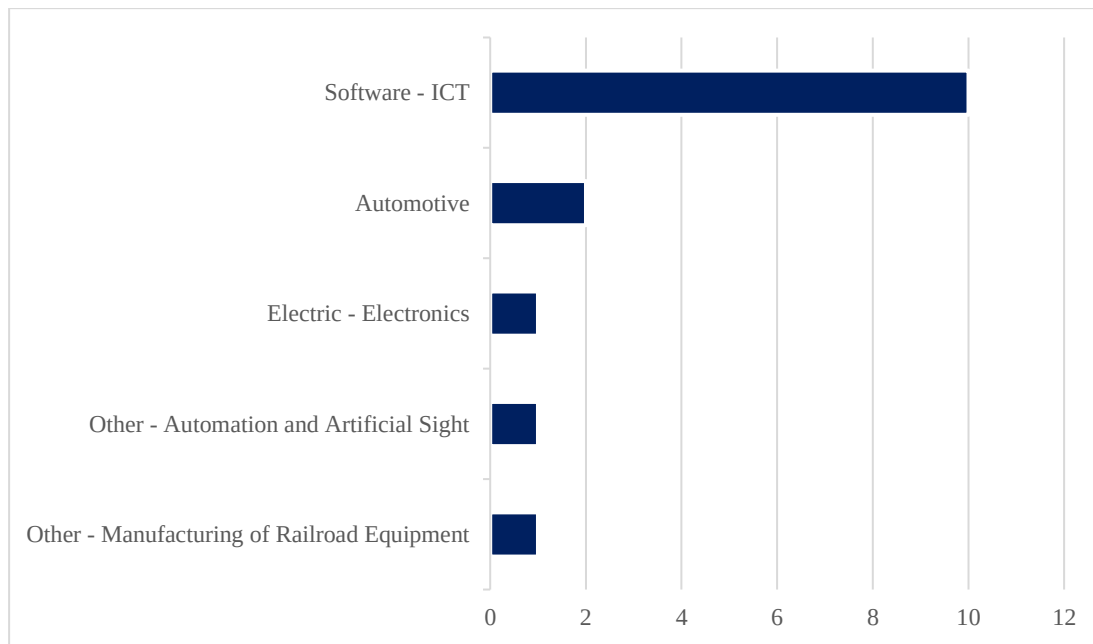


Figure 27. Sectoral Distribution of the Firms in the Questionnaire

The age of the participant firms turned out to be mostly below 10 years with the few reaching to almost 20 years of economic activity (Table 14.).

Table 14. Age Distribution of the Firms in the Questionnaire

Age	Number of Participant Firms	Ratio of Participant Firms in Total
1-5	6	40.00%
6-10	6	40.00%
16-20	3	20.00%
TOTAL	15	100.00%

The number of employees in the participant firms mostly point out small and medium enterprise dominated industrial landscape regardless of their age (Table 15.). This is in accordance with the Ministry dataset as well in which there are only a handful of firms with more than 50 employees out of 121 firms listed in the TDZ (Ministry of Science, Industry and Technology, 2016) (Figure 28.).

Table 15. Size Distribution of the Firms in the Questionnaire

Size (Number of Employees)	Number of Participant Firms	Ratio in Total
1-5	6	40.00%
6-20	9	60.00%
TOTAL	15	100.00%

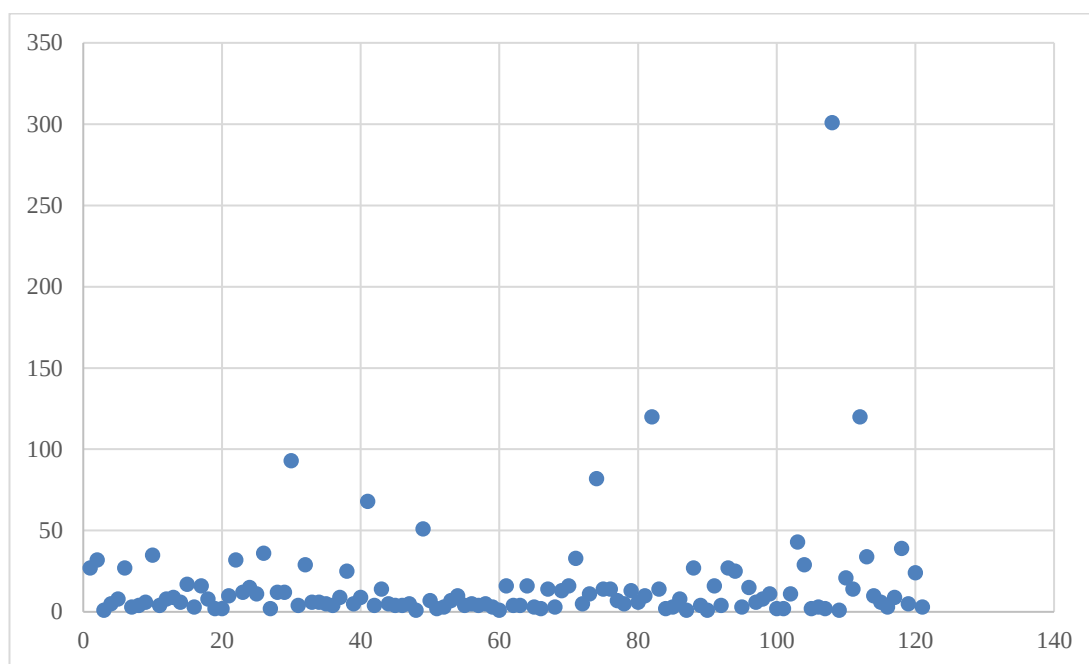


Figure 28. Size Distribution of the Firms in ULUTEK TDZ

Source: Ministry of Science, Industry and Technology (2016).

The structure of the firms' employee type is not limited to only their own employees but rather expand towards freelance workers as well (Table 16.). This flexible type of structure can support firms in adapting to different needs presented by different projects. Moreover, informal knowledge flows can also be argued to take place among employees through this structure as well.

Table 16. Employee Structure of the Firms

Employee Structure	Number of Answers	Ratio of Answers
Only firm employees	7	46.67%
Firm employees and freelance workers	8	53.33%
TOTAL	15	100%

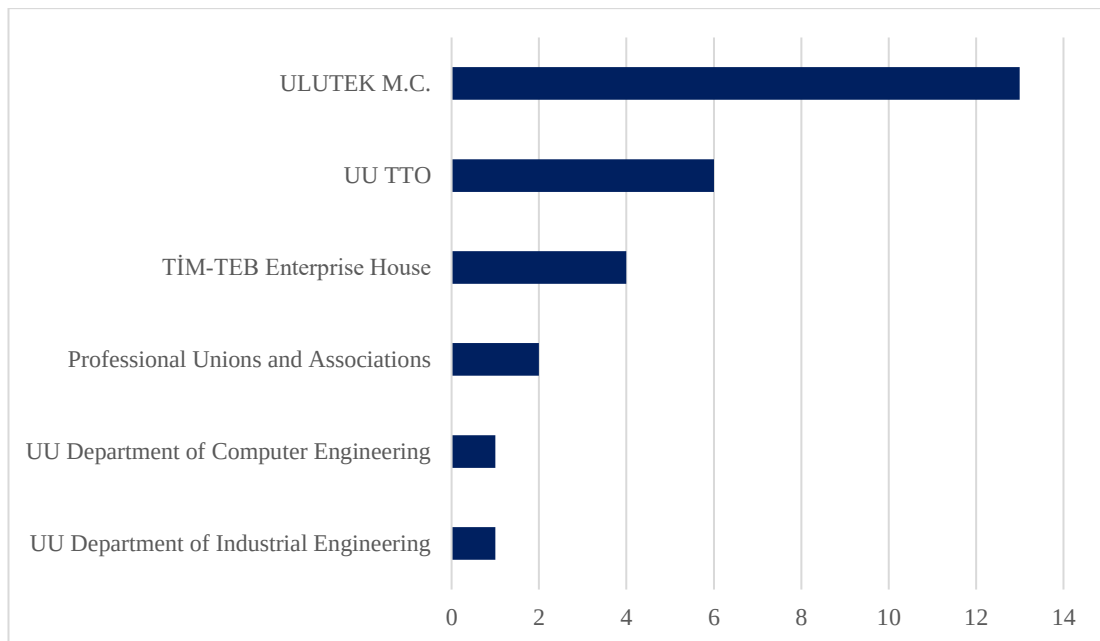
Innovation is expected from all of the firms that aim to benefit from the TDZ as it is one of the pre-requisites for the firms to be given opportunity to be located in the zone. However, there are different sources and ways to expend resources based on the type of knowledge for the achievement of novelties. In this aspect, the firms benefit from customer networks as well as their own market studies and research (Table 17.). One distinct answer also underlines the importance of European Union innovation policies in designating innovation area for the firm activity.

Table 17. Primary Innovation Source of the Firms

Primary Innovation Source	Number of Answers*
Feedback from Customers	13
Own Research and Observations	14
Other	1

***Multiple choices could be selected.**

In order to find out the role and activity of institutions towards firm activity, the participants were asked to make their selections among the support institutions in the TDZ (Figure 29.). While ULUTEK is the main institution that firms benefit from, UU TTO and TİM-TEB Enterprise House are secondary. It is natural for the management company to be the primary institution as per its wide range of duties in the TDZ; however, it may be argued that the connections to UU TTO is low considering its role in establishing connections between university and industry. Knowledge networks composed of such partnerships have been highlighted to be stronger in terms of innovation (Teece et al., 1997; Owen-Smith and Powell, 2004; Porter et al., 2005), therefore, the amount of connections to academic knowledge sources may be a potential improvement area in which the role of TTO is crucial.



***Multiple choices could be selected.**

Figure 29. Past Collaborations of the Firms with Support Institutions in the Local Ecosystem in Numbers

The type of service these firms get from the support institutions of the ULUTEK ecosystem covers a wide spectrum (Figure 30.). Support institutions are actively contributing to the provision of training and establishing networks as well as partnerships among firms. Consultancy in business and project management along with organisation of visibility activities represent secondary fields in this regard. While the primary role of network building activities is a directly beneficial aspect to the creativity in the cluster from the perspective of this study, the inclusion of visibility activities also point out the enabler role of ULUTEK in establishing networks outside the local ecosystem which would represent another, potentially strong source of creativity.



***Multiple choices could be selected.**

Figure 30. Type of Services Benefited from Institutions

In the context of measuring creativity from a network based perspective, social capital is an important measurement for the emergence of creativity and new knowledge. However, the term has become a controversial concept over the years as highlighted in the previous chapters. In a brief summary, studies highlight how it increases the mobility and accessibility of tacit knowledge among the agents in a cluster (Lorenzen and Frederiksen, 2008) while others argue that increased social capital would increase dependency on existing partners for creation of new knowledge and decrease receptiveness towards new partnerships (Molina-Morales & Martinez-Fernandez, 2009).

In the light of this background, the firms were asked four dichotomous questions which, together, scrutinize the nature of networks among the firms in the TDZ. The first of these questions is aimed to discover whether there is a signalling function in regards to employee mobility in the TDZ. This function would enable firms to evaluate the employees they hire better and, in the case of their change of job within the cluster, signal other firms on their performance. Therefore, firm activity becomes steadier and less likely to be negatively affected by internal dynamics. Firms in ULUTEK TDZ have been found to possess such a function among them (Table 18.)

Table 18. Confirmation from the Previous Firm of a Job Applicant

Would you get confirmation from previous firm of a job applicant?	Number of Answers	Ratio of Answers
Yes	13	86.67%
No	2	13.33%
TOTAL	15	100.00%

The answers to the next question highlight that the communication lines are open among the firms in regards to knowledge mobility (Table 19.). The presence of such mobility enables knowledge flows among the firms which would in turn lead to combination of different expertise fields. This increases chances of creativity and innovation or support various shortcomings arise in the firms' services.

Table 19. Presence of knowledge mobility in the cluster

There are firms to consult to in ULUTEK in the requirement of a new knowledge.	Number of Answers	Ratio of Answers
Yes	14	93.33%
No	1	6.67%
TOTAL	15	100.00%

Long-term partnerships with competing firms point out whether there is a common understanding of strategic cooperation among the firms. Knowledge flow based studies underline the strategic cooperation as generative to creative outputs (Kratke, 2011). The findings highlight the positive results for the case; however, the ratio for the answer "No" display small albeit notable increase compared to the other questions to observe social capital (Table 20.).

Table 20. Openness to Strategic Collaboration within the TDZ

Open to strategic collaborations with rivals in ULUTEK		
	Number of Answers	Ratio of Answers
Yes	11	73.33%
No	4	26.67%
TOTAL	15	100.00%

While the previous question evaluates strategic cooperation with rivals, the next question directly measures whether there is a trust based collaboration perspective among the firms. The results point towards a significantly collaborative cluster environment (Table 21.). The results for this question may also be interpreted together with the previous question. As noted above, the increased social capital among the firms may be inhibitive to collaboration with new firms or those from outside the cluster which would reduce exposure to the amount of new knowledge and experience. In the light of this perspective, the “No” answers to the previous question can also be interpreted to be positive as that may leave the open door for new knowledge sources from outside.

Table 21. Trust among the Firms for Long Term Partnerships

Are there firms in the TDZ to be trusted for long term partnerships?		
	Number of Answers	Ratio of Answers
Yes	14	93.33%
No	1	6.67%
TOTAL	15	100.00%

On the next two questions, visibility of the firms and their products are measured in the form of participation to international and national scale activities. Besides visibility purposes, the included activities also represent new network building opportunities. By these opportunities, the firms experience exposure to other knowledge sources; new markets; partnership and funding opportunities. As per the results, low level of participation in international scale activities can be seen among

the firms (Table 22.). In the specific case of software industry firms, only 1 in 5 firms has taken part in such visibility activities. On the contrary, participation to national scale visibility events is higher (Table 23.). The difference between the participation in national scale and international scale events can be explained with the role ULUTEK Management Company plays as enabler. According to data gathered from the institution, it has supported firms in 144 events, 95% of which have been national. Thus, ULUTEK Management Company can be argued to be one of the factors that positively increase the participation to such events. Another reason highlighted during the interviews was that the firms do not have confidence and strategy towards exports. Especially since the software industry is specialized on customized software, it is easier for them to deal with domestic demand which reduces their need and preference towards international visibility.

Table 22. International Scale Visibility of the Firms

Participation in international fairs and events	Number of Answers	Ratio of Answers
Yes	3	20.00%
No	12	80.00%
TOTAL	15	100.00%

Table 23. National Scale Visibility of the Firms

Participation in national fairs and events	Number of Answers	Ratio of Answers
Yes	9	60.00%
No	6	40.00%
TOTAL	15	100.00%

National support programmes represent important funding opportunities for firms, as the financing opportunities in the country has only been recently becoming more variable compared to more established counterparts on the international scale. The answers to the question are distributed almost evenly among no application

experience; unsuccessful application experience; lastly, successful application meaning benefiting from supports (Table 24.).

The firms with successful applications to national funding programmes are analysed further to understand mechanics behind their success. In that regard, first, the responses given to question regarding experience with national funding programmes are cross-analysed with responses given to descriptive questions previously. Cross analysis with the question on active fields reveal that majority of these successful applicant firms are active in software and ICT sectors. Cross-analysis with responses to age shows that 3 out of 6 successful applicant firms have been active for 16-20 years which displays that their experience in the field may be directly related to their success with applications.

Aside from descriptive questions, further cross-analysis is made on successful applicants' collaboration experience with support institutions in ULUTEK ecosystem. Most of them have worked with the support institutions, while the fields they benefit from is focused on training opportunities. Another cross-analysis shows that 5 out of 6 firms have worked with UU TTO and 4 out of 6 firms have worked with TIM-TEB Enterprise House. Striking findings are found when unsuccessful applicants are also evaluated based on their collaboration with institutions. Only 1 out of 4 unsuccessful firms have worked with UU TTO and collaboration with other institutions is either equally low or even non-existent. Therefore, closer bonds with institutions in the ecosystem can be regarded an important influence on success of applications to national funding programmes.

Table 24. Experience with National Funding Programmes

Level of experience with national funding programmes	Number of Answers	Ratio of Answers
No application experience	5	33.33%
Unsuccessful application experience	4	26.67%
Successful application experience	6	40.00%
TOTAL	15	100.00%

For the case of the international support programmes, most of the firms do not have application experience while those with experience have yet to be successful with their applications (Table 25.). The ones with application experience are mostly the same firms with successful application experiences at national scale. (Table 26.).

Table 25. Application Experience in International Funding Programmes

Level of experience with national funding programmes	Number of Answers	Ratio of Answers
No application experience	11	73.33%
Unsuccessful application experience	4	26.67%
Successful application experience	0	0.00%
TOTAL	15	100.00%

Table 26. Application Experience in International Funding Programmes by Firms Successful at National Funding Programmes

Level of experience with international funding programmes		Number of Answers	Ratio of Answers
No application experience		2	33.33%
Unsuccessful application experience		4	66.67%
Successful application experience		0	0.00%
TOTAL		6	100.00%

5.4.2. Built Environment as a Self-Reinforcing Mechanism for the Local Economic Development

The development of ULUTEK TDZ is parallel to the development of Nilüfer as a central district of Bursa. The roots of the urban development in Nilüfer can be based on the development of Uludag University and Bursa OIZ. However, the rapid growth in Nilüfer took place during the 1990s. The way Nilüfer's development supported the emergence of ULUTEK can be examined on two layers: First, infrastructure and high quality built environment, and second, soft infrastructure elements.

Nilüfer is the latest of the central districts to emerge. While there have been rural settlements previously, soon they turned into periphery of the city which later blossomed into one of the central districts. At the start of this process, it has come to house the first organised industrial zone of Turkey, BOSB, which historically strengthened the city's westward spatial growth trajectory and, subsequently, supported the emergence of Nilüfer as a central district. Second OIZ of the district, that is NOSAB, came up in the following years during the late 1990s - early 2000s. In addition to these zones, the location of Uludag University at Görükle neighbourhood of Nilüfer acted as an additional growth node in the westward urban growth trajectory of the city.

Following these growth nodes, Nilüfer, as a new and high quality, planned settlement area, also appealed to the wealthy segment of the city. Therefore, new residential places followed the location of work and education zones. After this emergence period of the district, its ongoing development period is strongly pointing towards a soft infrastructure based approach. As the new inhabitants' preferences from their urban environment had higher expectancies, especially the district municipality has come to increasingly take part in the cultural and social development of the district by actively bringing relevant activities as services and events in the district as part of its soft infrastructure.

In the light of the theories reviewed above, people oriented perspectives have also been favoured in the last two decades besides firm based ones which highlight the promising features of the built environment in drawing or keeping talent. Therefore, Nilüfer, where the TDZ is located, is observed by a questionnaire aimed at employees in ULUTEK TDZ in the light of the attractive features towards accommodation or expansion of the talent pool Bursa possesses. In order to cover a group as wide as possible, the questionnaire takes note of Storper and Manville (2006) on how much detail questions should contain regarding the preferences on urban amenities to discover a group with common needs with no loss in focus for their creativity and knowledge based production.

In this regard, 35 questionnaires are completed by the employees which is a small percentage compared to the total number of employed in the TDZ. Nonetheless, the results still reveal valuable output for the assessment of quality built environment in Nilüfer. Moreover, several cross analyses on the questions reveal deeper insight into the preferences of inhabitants regarding their living and working environment.

The descriptive qualities of the employees in the firms are observed with the initial questions. The age of the majority of the employees are ranging from 26 to 35 while it is followed by those in 18 to 25 range (Table 27.).

Table 27. Age Distribution of the Employees

Age Range	Number of Answers	Ratio of Answers
18-25	13	37,14%
26-35	21	60.00%
36-45	1	2,86%
TOTAL	35	100.00%

Considering the knowledge intensive and high technology nature of the economic activities undertaken, it is also natural to find out that the educational attainment levels point towards high levels of university graduates (Table 28.). There are also several postgraduates and postgraduate candidates as well.

Table 28. Levels of Educational Attainment of Employees

Level of Educational Attainment	Number of Answers	Ratio of Answers
High School	2	5,71%
Graduate	27	77,14%
Master's (Continuing)	4	11.43%
Master's	1	2,86%
PhD (Continuing)	1	2,86%
TOTAL	35	100.00%

As the occupations of participants may involve large variety, the question concerning this information was structured to be open-ended. The answers' classification is made according to the most given answers and the relevancy of the fields to each other (Figure 31..).

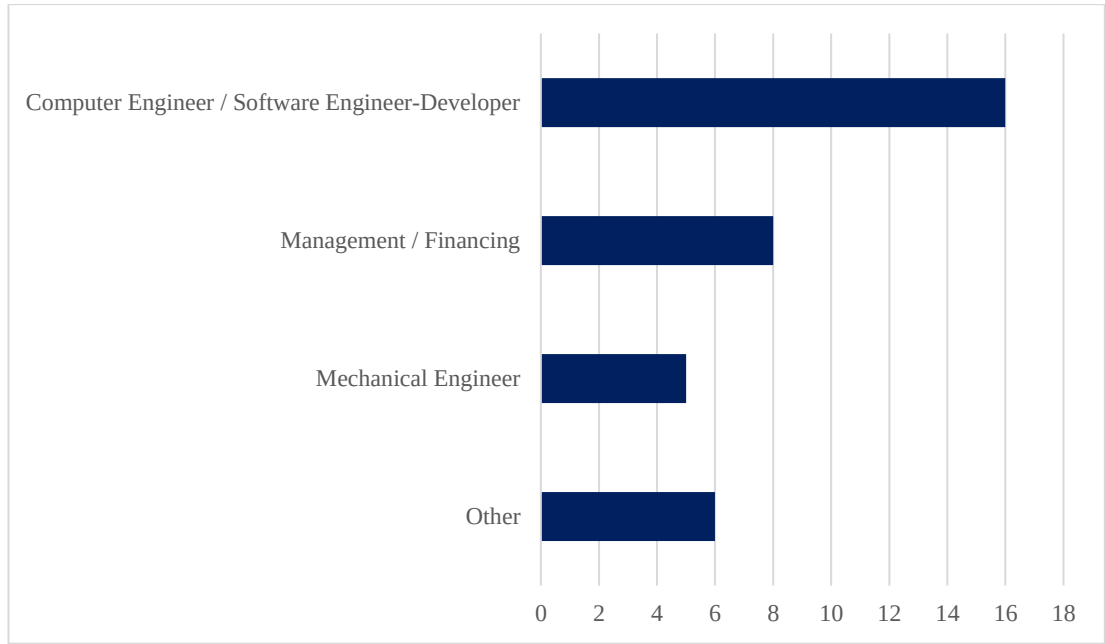


Figure 31. The Distribution of Occupations among the Employees in Numbers

As for the inhabited district of the employees, there is a 60-40 ratio on living in Nilüfer or out of it respectively. The positive effects of geographical proximity to working quarters can be seen in the answers for Görükle and Yüzüncüyıl / Özlüce neighbourhoods; however, the amount of those living outside Nilüfer is also notable and was unforeseen during the preliminary observations (Table 29.) (Figure 32.).

Table 29. Neighbourhoods Inhabited by the Employees

Neighbourhood	Number of Answers	Ratio of Answers
Görükle	8	22,86%
Yüzüncüyıl, Özlüce, ...	7	20,00%
North of İzmir Road, FSM Area (Ataevler, Barış, Esentepe, İhsaniye, ...)	4	11,43%
South of İzmir Road (Beşevler, Konak, Üçevler, ...)	2	5,71%
Not settled in Nilüfer	14	40,00%
TOTAL	35	100,00%

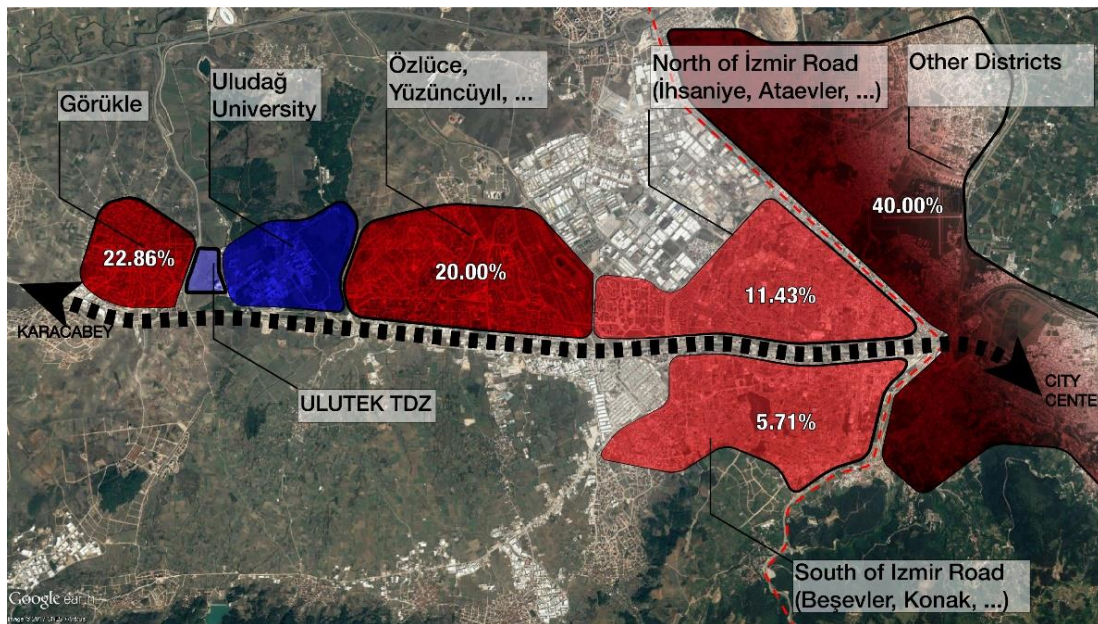
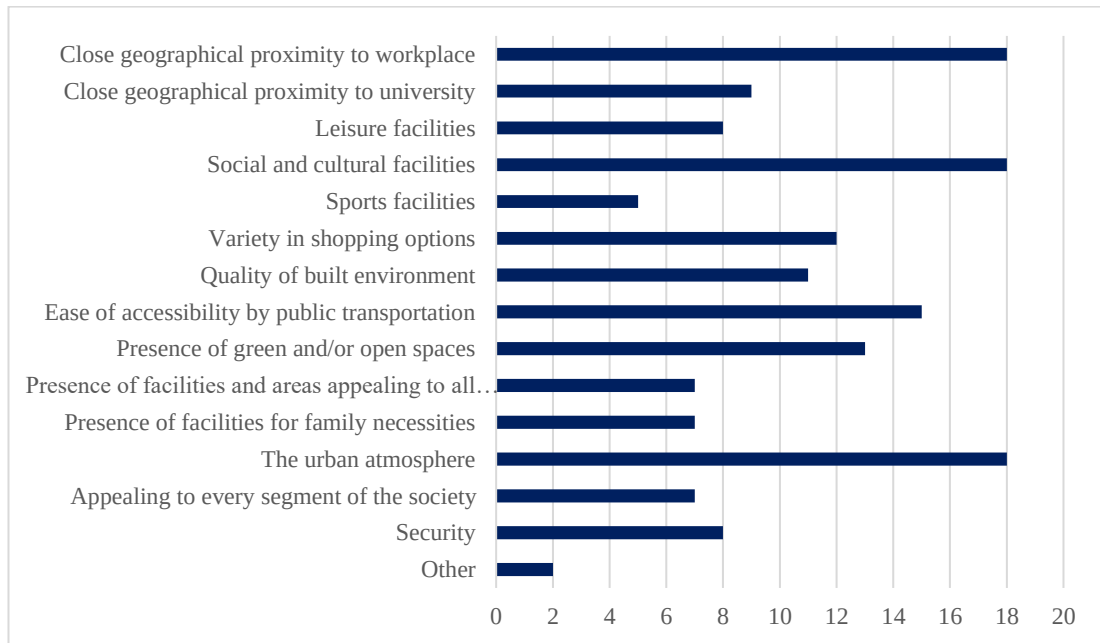


Figure 32. Distribution of Answers Based on Neighbourhoods

Source: Adapted from Google Earth (2017); Personal Drawing

The questionnaire also observes the inhabitants' location decision in terms of which indicators are affecting the process. In the multiple choice question, the most selected answers are based on close geographical proximity to work; social and cultural facilities and, conspicuously, the urban atmosphere of the neighbourhood and the

district (Figure 33.). The latter can be interpreted through a variety of perspectives as it may be formed out of both intangible and tangible factors interwoven in a complex setting; therefore, high amount of answers are remarkable for this answer. Succinctly, the concept may be argued to point out a neighbourhood to possess some kind of characteristics that make it distinct from others.



***Multiple choices could be selected.**

****32 out of 35 participants answered this question.**

Figure 33. Positive Factors on Quality-of-Life in the Inhabited Neighbourhood

The question regarding decision factors does not limit the participants' answers to any specific neighbourhood or the boundaries of Nilüfer but covers wherever they are settled in, since the preferences concerning each neighbourhood can be observed through cross analysis with the previous question. Carrying out such an analysis reveals distinct highlights for each neighbourhood.

The case for Görükle reveals that the close geographical proximity and the social and cultural opportunities are the most effective factors affecting the inhabitancy of the neighbourhood. Another option to be drawn attention to is the lack of selection on facilities aimed towards family use, which gives additional understanding on the characteristics of Görükle as a more dynamic place with young age demographics.

As for the next urban environment, Yüzüncüyıl-Özlüce, the age range is strictly limited to 26-35 among the participants, compared to a more homogenous age range in Görükle. A cross analysis on the preferences reveals the addition of increased importance given to the presence of high quality urban environment and urban atmosphere.

There are small numbers of answers to other Nilüfer choices; however, leisure facilities, social and cultural facilities, accessibility to shopping areas, public transportation and presence of green areas may still be drawn attention to as worthy of note, especially for neighbourhoods north of Izmir Road.

In terms of leisure, social, cultural and sport activities, the preferred major activity zones are FSM Area, its immediate environment and the shopping malls located in Nilüfer, while Görükle and Özlüce are minor nodes of activity (Table 30.) (Figure 34.). Neighbourhoods on the north and south of the Izmir Road are evaluated together in this case to extract more meaningful data. The majority of the users for the major activity locations live outside Nilüfer. On the other hand, the minor activity locations are mostly used by those living close to those areas (Figure 35.) (Figure 36.) (Figure 37.). Preferences for shopping malls are also given specific attention as well considering their increasing addition to Turkish urban landscapes. The results underline the importance of geographical proximity as a deciding factor for the participants.

		Participants according to Inhabited Neighbourhood					
		Görükle (n=8)	Yüzüncüyıl, Özlüce, ... (n=7)	North of Izmir Road (n=4)	South of Izmir Road (n=2)	Outside Nilüfer (n=14)	TOTAL (n=35)
Participants' Preferred Activity Zones	Görükle	0,75 (N=6)	0,14 (N=1)	0,33 (N=2)		0,36 (N=5)	40,00% (N=14)
	Yüzüncüyıl, Özlüce, ...	0,25 (N=2)	0,71 (N=5)	0,17 (N=1)		0,14 (N=2)	28,57% (N=10)
	FSM	0,38 (N=3)	0,29 (N=2)	1 (N=6)		0,71 (N=10)	60,00% (N=21)
	Shopping Malls	0,38 (N=3)	0,57 (N=4)	0,83 (N=5)		0,79 (N=11)	65,71% (N=23)



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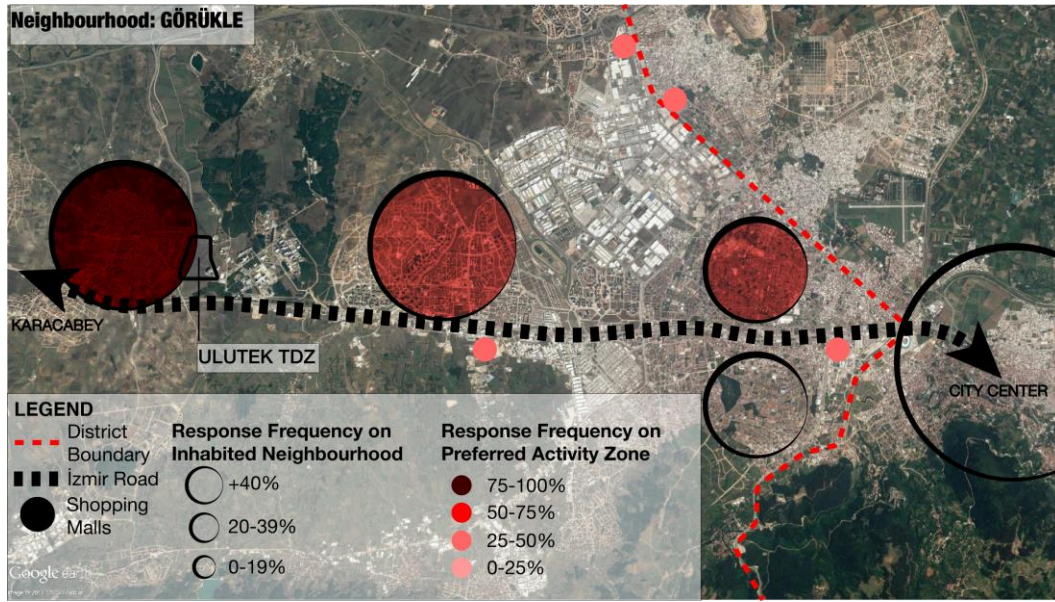


Figure 35. The Preferred Activity Zones by Görükle Inhabitants
Source: (Personal Drawing); Adapted from Google Earth (2017)

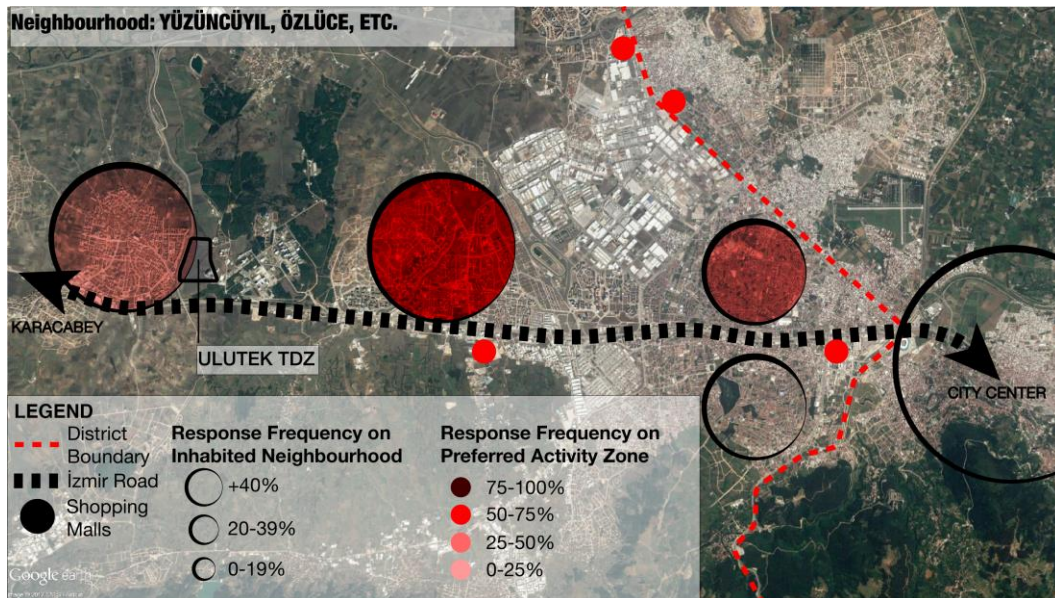


Figure 36. The Preferred Activity Zones by Yüzüncüyıl/Özlüce Inhabitants
Source: (Personal Drawing); Adapted from Google Earth (2017)

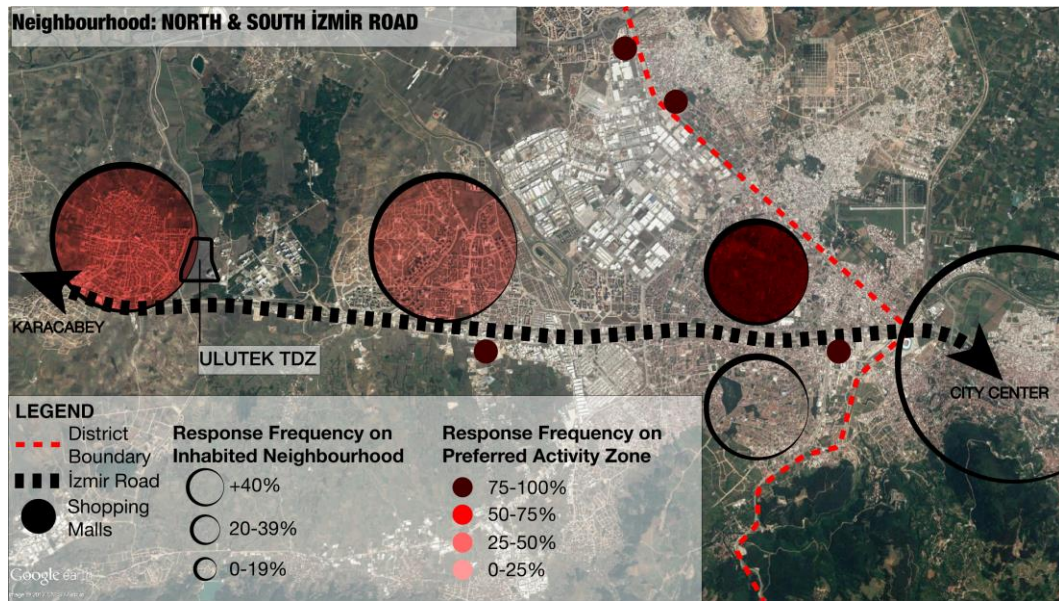


Figure 37. The Preferred Activity Zones by Inhabitants in Neighbourhoods North and South of İzmir Road

Source: (Personal Drawing); Adapted from Google Earth (2017)

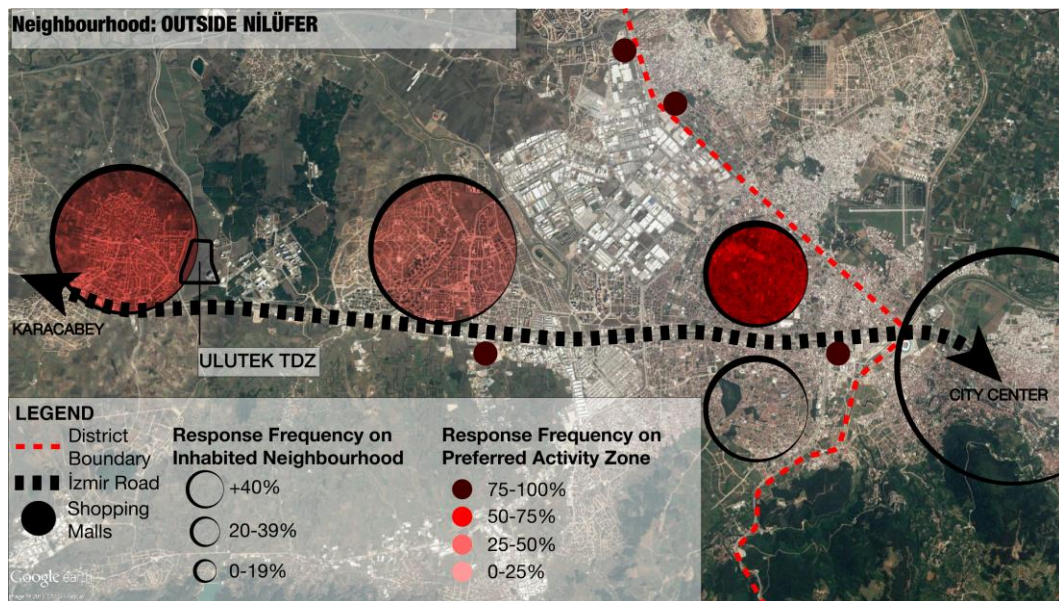


Figure 38. The Preferred Activity Zones by Inhabitants outside Nilüfer

Source: Adapted from Google Earth (2017); Personal Drawing

The next question is aimed to measure the decision factors affecting the users' preference of activity zones. In the results, while the social and cultural amenities

hold the priority over all the other choices, following set of choices are numerous. These choices range from close proximity to workplace and living area to ease of access by public transportation, suitable amenities for families and the atmosphere of the place. Shopping malls are mostly preferred due to the wide variety of social and cultural amenities they house in a close proximity; however they are also strongly connected to multiple nodes of public transportation and they provide services suitable for all members of a family. Same factors can be seen in the choice of FSM Boulevard.

Those preferring Görükle are also shown to frequently visit FSM Boulevard and the shopping malls which may be interpreted as the high levels of activity and demand for variety of options by these participants. The importance they give to the atmosphere of the place is comparably higher and search for green and open spaces is also influential in their decision process. On the other hand, while the choices for Özlüce show similarity to results of FSM Boulevard and shopping malls, the importance given to close proximity of living area is where it differs from the rest.

The next two questions evaluate knowledge mobility in the case of employees with both formal and informal settings taken into consideration. FSM and Özlüce are the two forerunners in the case of formal occasion that may enable or specifically involve transmission of knowledge (Table 31.). On the other hand, informal and daily interactions involving knowledge mobility is, again, largely preferred to take place around FSM with Görükle and the shopping malls compose the second options. (Table 32.)

On the other hand, an important result is how the context of knowledge transmission affects the preference of activity zone. Geographical proximity was given priority for activity zones in the context of daily leisure as shown in Table 30. However, FSM becomes the mainly preferred zone when formal and informal interpersonal knowledge transmission is taken into consideration, regardless of the living and working environment. This underlines that, there are different mechanisms behind the activity in spaces for knowledge mobility and daily activity zones.

Table 31. Preferred Activity Zones for Knowledge Transmissions in Formal Settings

Neighbourhood	Number of the Answers	Percentage of the Answers
Görükle	1	2,86%
Yüzüncüyıl, Özlüce, ...	10	28,57%
FSM Boulevard and Its Immediate Environment	16	45,71%
Shopping Malls	5	14,29%
Other (In and Out of Nilüfer)	3	8,57 %
TOTAL	35	100,00%

Table 32. Preferred Activity Zones for Knowledge Transmissions in Informal Settings

Neighbourhood	Number of the Answers	Percentage of the Answers
Görükle	7	20,00%
Yüzüncüyıl, Özlüce, ...	5	14,29%
FSM Boulevard and Its Immediate Environment	14	40,00%
Shopping Malls	6	17,14%
Other (In and Out of Nilüfer)	3	8,57%
TOTAL	35	100,00%

The evaluation of the location of ULUTEK from the perspective of employees in the light of both knowledge development and urban amenities is evaluated through a 5-point Likert scale question. The employees are found to value close proximity to other professionals in their field as well as to the university compared to relatively lesser importance put on leisure, social and other amenities in the urban environment

(Figure 39.). These findings highlight that the urban settlement and its variety of constituents hold secondary priority for the employees. The factors that are directly related to employees' professional life holds more importance in the extent of distance. The knowledge-intensive nature of these selected factors should be taken into consideration.

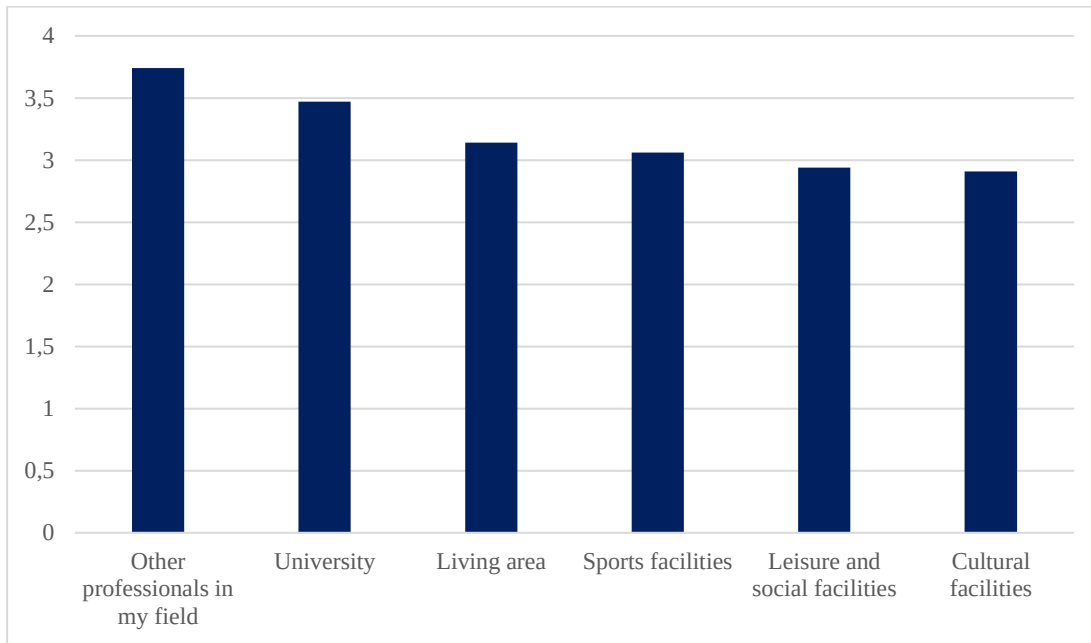


Figure 39. Importance of Close Proximity to Different Factors of Attraction

5.5. Evaluation

ULUTEK TDZ and Nilüfer district from Bursa were selected to be the cases in the light of the theoretical framework established in the previous chapters. In order to identify the conditions in which the zone and the district grew, the history of the city was investigated. When the aim of the thesis is considered the city has not only possessed the production and consumption forces required for the analysis but also strong historical roots that provide insight into these forces' evolution. Based on these aspects, the city was analysed in three periods with respect to the establishment or modification of path trajectories on urban space and economy. Industrial and urban development in each periods were analysed.

Knowledge Economy and ULUTEK TDZ

As per the importance put on creativity and innovation in the context of knowledge economy, the creativity capabilities of ULUTEK TDZ and Nilüfer district were evaluated. The questionnaire for the zone attempted to measure networks and institutions on interorganisational scale whereas the questionnaire for the district focused on provision of urban uses and amenities to appeal qualified workforce according to the human capital and quality-of-life discourses.

Based on the results of the questionnaires, it is inferred that, clustering of knowledge intensive firms in the TDZ contribute to high levels of collaborative and trust based relations as well as openness to strategic partnerships with their rivals. Additionally, cooperation with institutions was also shown to contribute to the firms' success in finding funding. Openness to new firms in the cluster may require further investigation while exposure to international knowledge sources can be highlighted as an improvement area. On the other hand, the employees of the TDZ were regarded as highly skilled human capital based on their occupational background. The results have highlighted accessibility to their working area, presence of social facilities and areas, and feel of a neighbourhood as the most important factors for decisions on their living environment. In addition, while daily leisure area options were based on close geographical proximity to living areas of employees, both informal and formal knowledge transmission scenarios display difference in choice of activity area.

Future Development Trajectories

Some evaluations can be made for the future development trajectory of the case as well. From the production perspective, ULUTEK TDZ provides a clustering zone for the ICT sector which only recently started to develop. The TDZ is not a path creative force yet. However, it represents an innovation source for the other industries of the city. For example, globally, software industries are increasingly collaborating with other industrial sectors such as automotive. Software industry provides increasing variety of electronics to new automobiles and, thus, cost of software in automobile

manufacturing is expected to rise (Parkin et al., 2017). Therefore, systematically, the TDZ can flourish by utilizing the strong industry presence.

In terms of consumption based viewpoint, growth of accommodating urban environment supports the development of the innovation cluster in its boundaries by acting as an appealing urban environment to draw talented individuals. In a path dependent context, the district may be regarded as supportive to the existing economic landscape rather than creating new development trajectories. Increased number of highly skilled labour force would increase the innovation capability of the existing industries. By this process, the possibility of negative lock-ins to a path can be reduced.

Spatial and Economic Development of the City

Both the development of the TDZ and Nilüfer, can be counted as effective forces in the overall spatial and economic development of the city. This is also seen in the existing, crucial investments. TEKNOSAB, as the first Technology OIZ with Industry 4.0 of Turkey, is being established to the west of Nilüfer in parallel with the westward growth of Bursa. The close geographical proximity with ULUTEK TDZ and Nilüfer can support the development of this OIZ in several ways. ULUTEK TDZ presents a knowledge production node which support start-ups and houses ICT industry in the city. On the other hand, Nilüfer provides an appealing built environment for highly skilled labour force to settle. While TEKNOSAB may increase urban development around its vicinity, Nilüfer can still be expected to act as the main living and leisure area for the workforce expected in this OIZ.

In addition to the points made above, increasing smart city and transportation initiatives and motives act as additional drivers for advancing the knowledge intensive services in ULUTEK TDZ. As an example for such motives, Nilüfer has been an observer member in the Horizon 2020 project REPLICATE, which aims to empower cities' smart infrastructure, in which sustainable mobility constitute one of the main objectives (Replicate, 2017). Demand towards smart city technologies born

out of these aims present opportunities for the existing and future firms in the TDZ to develop products and services along this field.

CHAPTER 6

CONCLUSION

6.1. Summary of the Research

The observations into the knowledge economy in the first chapter has highlighted that knowledge has become a central input within production processes over the decades of evolution since the early 20th century. By the end of the century, innovation and creativity became essential concepts based on their relation to knowledge. Higher productivity was sought after in the economy and competition is on the basis of innovation. Therefore, this setting required human labour to be allocated to the production of novelties rather than simple tasks which can be accomplished by automation. Therefore, the development of human capital towards creativity is essential in the global knowledge economy and today, this economy is increasingly based on competition among urban economies.

The cities have much bigger impact than ever before in the global economy. The characteristics of urban and industrial geographies are more influential in the prospects of development now. This influence is analysed with respect to both production and consumption forces within cities in the thesis. As a result, two urban development theories are regarded in development of new knowledge. Agglomeration theories were examined to scrutinize knowledge networks, social capital, and other interorganisational dynamics among the firms in a production space in which agents are exposed to one another as sources or carriers of different knowledge. These interactions lead to creative outputs and growth of local economy through production. On the other hand, human capital theory is observed to learn about the role human labour play in the growth of urban space and economy and, in turn, how cities can affect their growth. Presentation of quality-of-life options towards highly skilled human capital would be means to attract and retain this

valuable source of creativity and knowledge. Therefore, insight into quality-of-life indicators is made.

The thesis argues that analysis of production and consumption forces in the spatial and economic development of cities depends not only on existing conditions but also on historical settings of such spaces. Therefore, the study draws on evolutionary economic geography studies and uses path dependence framework. In this regard, various concepts under the framework are examined to develop a systematic perspective. In order to develop such a perspective, empirical studies undertaken towards the interpretation of these concepts are analysed to identify indicators for establishment and development of a path trajectory. The studies reviewed have been gathered under two groups. Those belonging to the first focused on the development of industries while the second group examined development of skilled labour force and city in path dependent contexts. The more systematic structure of studies in the first branch of empirical studies led to their use in this thesis for exploring the role ULUTEK TDZ can play in the development trajectory of Bursa and how Nilüfer district contributes towards its development by providing good quality-of-life options.

6.2. Main Findings and Discussion

The main findings are drawn from the example of ULUTEK TDZ and Nilüfer District in Bursa in this sub-section. Based on the effects of creativity on economy and urban growth, the study aimed to evaluate creative capabilities of an innovation cluster and a central district which can fuel local economic and urban development. Path dependence framework was undertaken to achieve this aim. The use of this framework allowed insight into the historical factors that shaped the current local spatial and economic conditions of the case. Later, it was also used to evaluate the future of Bursa's industrial landscape with the introduction of ULUTEK TDZ and the role it can play. In this context, development trends were analysed in terms of increasing returns and lock-ins. Moreover, the framework also provided insight into the dynamics behind the emergence of industries or urban growth trends. The

creative capabilities were evaluated with regards to interorganisational knowledge flows accordance in this framework.

The path dependence framework is still being developed over 20 years; however, concepts such as networks, institutions and related variety have become constantly referred as aspects of the framework. These concepts present the main indicators with which evaluations are undertaken. In particular, networks present an important research area in which systematic connections to creativity are questioned by a few studies. Therefore, the inclusion of this aspect in this study, which emphasized interaction, was necessary.

At the same time, the measurement of these concepts also set limitations on carrying out path dependence studies. In terms of measuring networks and the role of institutions, detailed mapping is difficult to undertake because it usually consists of sensitive information for the firms. Different indicators can be used albeit with their own shortcomings, such as co-patenting which may be unrepresentative to a population due to its low amount of preference. Moreover, the data gathering process in the case showed that, in a closed off setting of a TDZ, the firms were noted to be reluctant for face-to-face questionnaires and rather value formal channels of communication such as mails from the management company. Therefore, questionnaires had to be distributed through the management company in this study. The low turnout ratio for the questionnaires restrict the possibility of reaching decisive results. Nonetheless, the findings still provided important hints on the future development. As for the related variety concept, sectoral reports provide main information at this level of study. Discovery of the relatedness among different economic fields may require additional study over the subject in which surveys should cover representatives from those industry fields as well.

The findings of the thesis are evaluated with respect to the case's economic and spatial history. The first group of findings are based on firm centric viewpoint towards spatial and economic growth. This group discovers interorganisational networks among firms as well as institutions to measure potential for creativity. The second group of findings are evaluated with respect to human capital and quality-of-

life discourses. They focus on the role of the components of a city appealing to skilled human labour. Additionally, preferences on spaces for knowledge mobility on the interpersonal scale is also scrutinized in this group.

Starting with the first group, it can be pointed out that knowledge based service and manufacturing activities can take root in the cities with strong economic fields in their recent past. As a result of this strong presence, these activities may not be able to establish new paths by themselves. However, based on the relatedness, they may complement the needs of the existing fields, such as in the relation between software and automotive industries worldwide. In the regional context, this relatedness may differentiate the innovation cluster from its immediate neighbours in terms of specialization, which may be similar to Bursa's relation with Istanbul.

While these activities may not be able to establish new development trajectories, they can diversify the existing local economy, and provide innovative and creative solutions to the other fields in it. From the firm centric viewpoint, provision of this innovation and creativity can be systematically established through increased interaction among knowledge networks of these firms. Competitive, collaborative and trust based relations are indicators in measuring the potential of this systematic approach. Moreover, increased interactions with supporting institutions in a local ecosystem, such as Technology Transfer Office in this study's case, also contribute to the realization of goals, strategies and visions in this field.

The evaluation of the first hypothesis on the case is possible with these findings. The first hypothesis "ULUTEK cluster is providing an opportunity for Bursa's industry as an agency-based, path-creative force to diverge from a negative lock-in experienced in the local economic development." is only partially justified. While the TDZ does not represent a path-creative force, it has potential to provide innovation to the industrial landscape of Bursa by relatedness. Especially, automotive supplier industry can benefit from the zone in the context of increased collaboration among software and automotive sector worldwide. As innovation is identified as a counter strategy to lock-ins, more collaboration among actors in industries and the TDZ holds importance in future development of local economy.

In the second group of findings, the study also finds that the metropolitan characteristics of cities support the emergence of such knowledge based economic activities. In addition, the high socio-economic characteristic in the history of a city increases potential of establishing knowledge intensive economic activities as well. This brings qualified labour force along with their demands for higher quality-of-life options. As a result, the variety, quality and quantity of urban uses increase and, thus, appeal of the urban environment to qualified workforce increase. Moreover, higher socio-economic development coupled with metropolitan scale provides wider range of cultural consumption options based on diverse demands. The result of this is more options to increase cultural capital to empower human capital base with individual creativity. This makes valuable contribution to the labour pool which knowledge intensive firms seek.

In terms of expectations from a built environment, presence of social facilities, ease of accessibility to working place either by public transportation or walking and last but not least, the feel / atmosphere of a living area have composed the most preferred responses. The findings also point out that preference for urban spaces where formal and informal knowledge transmission takes place differ from areas preferred in daily leisure setting. The results also highlight being closer to knowledge production nodes such as professionals in one's field as well as university held priority over close proximity to living area, social and cultural facilities in the case of employees.

The second group of findings verify the second hypothesis "Urban policies and conditions of Nilüfer are favourable for flourishing and maintaining a talent pool required by the emergence of new, creativity and knowledge based industries.". While the geographical proximity to work area is an important aspect for decision of settling in Nilüfer, the district is also widely preferred for its variety of living environments and activity zones. However, talented workforce is also found to value their professional career over general quality-of-life options based on the value they put on reaching knowledge sources such as professionals in their fields and the university. The district hosts certain areas and uses in its activity zones, which enable

formal and informal knowledge transmission. Therefore, the role of the district is considered important for the future dynamism of local economic and urban growth.

6.3. Further Studies

This thesis focused on capability of promoting creativity from both production and consumption aspects of an urban environment. In this regard, knowledge flows among firms were scrutinized and how human capital was regarding the city and its constituents was observed. The analysis of these findings with respect to the historical conditions and background of Bursa made it possible to evaluate the role of ULUTEK TDZ in the development trajectory of the city.

Networks present one such potential research area. Combination of different knowledge expertise are highlighted in the literature as indicative to produce creative products and services. This composed the main approach towards the evaluation of ULUTEK TDZ in the wider industrial landscape of Bursa in this thesis and the study was undertaken at an interorganisational scale. Further results on evaluation of industries in their cities' industrial development can be achieved from identification of connections among knowledge intensive economic fields, and other manufacturing and service fields. Additionally, further insight into the role of universities as well as public and private research and development centers with market actors noted above would contribute to creativity and knowledge based urban development viewpoints.

In the 21st century, urban planning and development processes are expected to be more open to multi-actor decision making as part of increased information to be managed in planning. With respect to this increased emphasis on participation, individuals and organisations representative of creativity and knowledge intensive fields should be taken into consideration during decision making processes. These actors are the primary beneficiaries and contributors of technological entrepreneurship. Therefore, planning process of an urban environment should be informed of their needs and requests. In parallel with this case, entrepreneurial ecosystems are gaining importance, especially in metropolitan cities. Therefore a

research may question how urban planning can improve the conditions for better functioning ecosystems and local economies.

The advancement of technologies transform human labour and subsequently, urban space. As the role of human labour in economy moves towards formulation of new knowledge, new policy and planning approaches over urban space is also developed. The cities and their components are not passive entities but rather actively influence the creative capacity of human labour. Whether it is cultural, social or professional settings, urban environment contribute to the knowledge creation and transmission processes. Therefore, more insight into the knowledge and creativity based urban development is required in the planning field. The existing theories provide important foundations to conduct research. At the same time, their shortcomings also emphasize need for new approaches and evaluation methods. In this regard, the effects of historical attributes and contingencies on carrying out such policies remain an area yet to be explored in detail. Identification of trajectories can open up new options for local policy development or highlight need for radical interventions to break out of negative trends.

REFERENCES

- Acemoglu, D. (1998). Why do new technologies complement skills? Directed technical change and wage inequality. *The Quarterly Journal of Economics*, 113(4), 1055-1089.
- Acs, Z. J. (2002). *Innovation and the Growth of Cities*. Edward Elgar, Cheltenham.
- Anselin, L., Varga, A., & Acs, Z. (1997). Local geographic spillovers between university research and high technology innovations. *Journal of urban economics*, 42(3), 422-448.
- Armatlı-Köroğlu, B. (2005). *SME Networks as New Engines of Economic Development and Innovativeness* (Doctoral Dissertation). Retrieved from Middle East Technical University's Catalogue Database. (Accession No. metu.b1197799)
- Arora, A., Florida, R., Gates, G. J., & Kamlet, M. (2000). Human capital, quality of place, and location. *Pittsburgh: Richard King Mellon Foundation*. Retrieved October, 12, 2006.
- Arthur, W. B. (1989). Competing technologies, increasing returns, and lock-in by historical events. *The economic journal*, 99(394), 116-131.
- Asheim, B. (2012). The changing role of learning regions in the globalizing knowledge economy: A theoretical re-examination. *Regional Studies*, 46(8), 993-1004.
- Audretsch, D.). (1995). Innovation, growth and survival. *International Journal Of Industrial Organization*, 13(4), 441-457. doi:10.1016/0167-7187(95)00499-8
- Autor, D. H. & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *The American Economic Review*, 103(5), 1553-1597.

- Autor, D. H., Katz, L. F., & Krueger, A. B. (1998). Computing inequality: have computers changed the labor market?. *The Quarterly Journal of Economics*, 113(4), 1169-1213.
- Autor, D. H., Levy, F. and Murnane R. J. (2003) The Skill Content of Recent Technological Change: An Empirical Exploration. *The Quarterly Journal of Economics*. 118 (4): 1279-1333 doi: 10.1162/003355303322552801
- Barro, R. J. (1991). Economic Growth in a Cross Section of Countries. *The Quarterly Journal of Economics*, Vol. 106, No. 2. (May, 1991)
- Başer, G. & Işık, Y. (1991). 1991 Sanayi Kongresi Tekstil Sektör Raporu. *Tekstil ve Mühendis*. 30(5). 390-404
- Beaverstock, J., Derudder , B., Faulconbridge, J., and Witlox , F. (2010). *International Business Travel in the Global Economy*. Ashgate, Farnham.
- Belussi, F., Sammarra, A., & Sedita, S. R. (2010). Learning at the boundaries in an “Open Regional Innovation System”: A focus on firms’ innovation strategies in the Emilia Romagna life science industry. *Research Policy*, 39(6), 710-721.
- Berg, S. H., & Hassink, R. (2014). Creative industries from an evolutionary perspective: A critical literature review. *Geography Compass*, 8(9), 653-664.
- Berger, M. (2005). *Upgrading the System of Innovation in Late-Industrialising Countries-The Role of Transnational Corporations in Thailand's Manufacturing Sector* (Doctoral dissertation, Christian-Albrechts Universität Kiel). Retrieved from http://macau.uni-kiel.de/servlets/MCRFileNodeServlet/dissertation_derivate_00001722/d1722.pdf
- Biscontini, T. (2015). Taylorism. *Salem Press Encyclopedia*
- Boden, M.A. (2003). *The Creative Mind: Myths and Mechanisms*. Routledge, London.
- Bontje, M., & Musterd, S. (2008). The multi-layered city: the value of old urban profiles. *Tijdschrift voor Economische en Sociale Geografie*, 99(2), 248-255.

Bontje, M., & Musterd, S. (2009). Creative industries, creative class and competitiveness: Expert opinions critically appraised. *Geoforum*, 40(5), 843-852.

Boschma, R. (1996). *The window of locational opportunity-concept* (No. 260). Quaderni-Working Paper DSE.

Boschma, R. (2007). Path creation, path dependence and regional development. *Path Dependence and the Evolution of City Regional Economies, Working Paper Series*, (197), 40-55.

Boschma, R. A., & Frenken, K. (2006). Why is economic geography not an evolutionary science? Towards an evolutionary economic geography. *Journal of economic geography*, 6(3), 273-302.

Boschma, R. A., & Frenken, K. (2010). The emerging empirics of evolutionary economic geography. (ECIS working paper series; Vol. 201010). Eindhoven: Technische Universiteit Eindhoven.

Boschma, R. A., & Lambooy, J. G. (1999). Evolutionary economics and economic geography. *Journal of evolutionary economics*, 9(4), 411-429.

Boschma, R. A., & Wenting, R. (2007). The spatial evolution of the British automobile industry: Does location matter?. *Industrial and corporate change*, 16(2), 213-238.

Boschma, R., & Frenken, K. (2009). Some notes on institutions in evolutionary economic geography. *Economic Geography*, 85(2), 151-158.

Boschma, R., & Frenken, K. (2010). The spatial evolution of innovation networks. A proximity perspective. *The handbook of evolutionary economic geography*, 120-135.

Boschma, R., & Frenken, K. (2011). 14 Technological relatedness, related variety and economic geography. *Handbook of regional innovation and growth*, 187.

Boschma, R., & Martin, R. (2010). The aims and scope of evolutionary economic geography. *The handbook of evolutionary economic geography*, 3-39.

Boschma, R., Heimeriks, G., & Balland, P. A. (2014). Scientific knowledge dynamics and relatedness in biotech cities. *Research Policy*, 43(1), 107-114.

Bosma, N., Schutjens, V., & Stam, E. (2011). Regional entrepreneurship. *Handbook of regional innovation and growth*, 482-494.

Bower, J. & Christensen, C. (1995) 'Disruptive technologies: catching the wave', Harvard Business Review, January-February 1995, pp. 41-53. Retrieved from <https://hbr.org/1995/01/disruptive-technologies-catching-the-wave>

Brouder, P., & Eriksson, R. H. (2013). Tourism evolution: On the synergies of tourism studies and evolutionary economic geography. *Annals of Tourism Research*, 43, 370-389.

Brown, J., & Meczynski, M. (2009). Complexities: Locational choices of creative knowledge workers. *Built Environment*, 35(2), 238-252.

Brynjolfsson, E. and McAfee, A. (2011). *Race against the machine: How the digital revolution is accelerating innovation, driving productivity, and irreversibly transforming employment and the economy*. Digital Frontier Press Lexington, MA.

Bursa Ekonomi. (2011, March). "Bursa Artık İşin Hammallığını Bırakıp Kaymağını Yemelidir...". *Bursa Ekonomi*, 277. Retrieved from <http://www.bursaekonomi.com.tr/default.asp?page=newsdetail.asp&opennews=1929&qmshow=277>

Bursa Ticaret ve Sanayi Odası (2006). Bursa'nın Yabancı Yüzü.

Bursa Ticaret ve Sanayi Odası (2014). *Tekstil ve Hazır Giyim Sektör Raporu ve Yerel Strateji*.

Bursa Ticaret ve Sanayi Odası (2015a). *Otomotiv Sektör Raporu ve Yerel Otomotiv Stratejisi*.

Bursa Ticaret ve Sanayi Odası (2015b). *Makine Sektör Raporu ve Yerel Makine Stratejisi*.

Bursa Ticaret ve Sanayi Odası (2016). *Ortak Aklın Gücüyle Geleceğin Kentine (BTSO'nun Kente Değer Katan Çalışmaları)*

Carlaw, K., Oxley, I., Walker, P., Thorns, D. and Nuth, M. (2006). Beyond the hype: intellectual property and the knowledge society/knowledge economy. *Journal of Economic Surveys*, 20, pp. 633-690.

Castells, M. (2011). *The rise of the network society: The information age: Economy, society, and culture* (Vol. 1). John Wiley & Sons.

Charles, K.K., Hurst, E. and Notowidigdo, M.J. (2013). Manufacturing decline, housing booms, and non-employment. Tech. Rep., NBER Working Paper No. 18949, National Bureau of Economic Research.

Collinge, C. and Staines, A. (2009). Rethinking the Knowledge-Based Economy. *Built Environment*. 35 (2), Can We Plan the Creative Knowledge City?, pp. 165-172.

Comunian, R. (2011). Rethinking the creative city: the role of complexity, networks and interactions in the urban creative economy. *Urban Studies*, 48(6), 1157-1179.

Darby, J. (2009). Liberalisation and regional market integration: Turkish and Australian automotive sector experience compared. *The World Economy*, 32(3), 460-478.

David, P. A. (1985). Clio and the Economics of QWERTY. *The American economic review*, 75(2), 332-337.

De la Roca, J. & Puga, D. (2017). Learning by Working in Big Cities. *Review of Economic Studies*. 84, 106-142. doi: 10.1093/restud/rdw031

De Propriis, L., Chapain, C., Cooke, P., MacNeill, S., & Mateos-Garcia, J. (2009). *The geography of creativity*. National endowment for science, technology and the arts (NESTA).

Denizer, A. (Producer), İnce, S., Denizer, Ö. (Directors). (2016). *Sümerbanklılar: Bir Okudular Bin Dokudular*.

- Desmet, K., Greif, A., & Parente, S. L. (2017). Spatial Competition, Innovation and Institutions: The Industrial Revolution and the Great Divergence.
- Desrochers, P. (2001), Local Diversity, Human Creativity, and Technological Innovation. *Growth and Change*, 32, pp. 369–394. doi:10.1111/0017-4815.00164
- Dinçer, B., (1996). *İllerin sosyo-ekonomik gelişmişlik sıralaması araştırması*. State Planning Organisation.
- Dinçer, B., Özaslan, M. & Kavasoglu, T. (2003). *İllerin ve Bölgelerin Sosyo-ekonomik Gelişmişlik Sıralaması Araştırması*. State Planning Organisation.
- Drucker, P. F. (1968). Worker and Work in the Metropolis. *Daedalus*, 1243-1262.
- Drucker, P. F. (1969). *The Practice of Management*. Harper Press, New York .
- Drucker, P. F. (1993). The Rise of the Knowledge Society. *The Wilson Quarterly* (1976-), 17 (2), pp. 52-71
- Drucker, P. F. (2002). They're not Employees, They're People. *Harvard Business Review*. Retrieved from <https://hbr.org/2002/02/theyre-not-employees-theyre-people>
- Essletzbichler, J. (2015). Relatedness, industrial branching and technological cohesion in US metropolitan areas. *Regional Studies*, 49(5), 752-766.
- Eurostat (2016). Eurostat Indicators on High-tech Industry and Knowledge-intensive Services: Annex 3 – High-tech aggregation by NACE Rev.2. Retrieved from http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf
- Eurostat (2017a). *Population: Structure indicators*. Retrieved from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_pjanind&lang=en
- Eurostat (2017b). *Annual data on employment in knowledge-intensive activities at the national level, by sex*. Retrieved from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=htec_kia_emp2&en

- Evcimen, G., Kaytaz, M., & Cinar, E. M. (1991). Subcontracting, Growth and Capital Accumulation in Small-Scale Firms in the Textile Industry in Turkey. *Journal Of Development Studies*, 28(1), 130
- EY (2015). *Back to reality: Global venture capital trends 2015*. [http://www.ey.com/Publication/vwLUAssets/ey-global-venture-capital-trends-2015/\\$FILE/ey-global-venture-capital-trends-2015.pdf](http://www.ey.com/Publication/vwLUAssets/ey-global-venture-capital-trends-2015/$FILE/ey-global-venture-capital-trends-2015.pdf)
- Florida R. (2002). *The rise of the creative class*. New York, Basic Books, New York.
- Florida R. (2003). *Cities and the creative class*. New York, Routledge, New York.
- Florida R. (2005). *The flight of the creative class*. New York, HarperCollins, New York.
- Florida R. (2010). *The great reset: How new ways of living and working drive post-crash prosperity*. HarperCollins, New York.
- Florida, R. (2017). Fixing the New Urban Crisis. *CityLab*. Retrieved from <https://www.thecitylab.com>
- Florida, R. L., & Feldman, M. (1988). Housing in US Fordism. *International Journal of Urban and Regional Research*, 12(2), 187-210.
- Frenken, K., Van Oort, F., & Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional studies*, 41(5), 685-697.
- Frey, C. B., & Osborne, M. A. (2013). The Future Of Employment: How Susceptible Are Jobs To Computerisation? Retrieved from <https://www.fhi.ox.ac.uk/wp-content/uploads/The-Future-of-Employment-How-Susceptible-Are-Jobs-to-Computerization.pdf>
- Garud, R., Kumaraswamy, A., & Karnøe, P. (2010). Path dependence or path creation?. *Journal of Management Studies*, 47(4), 760-774.
- General Directorate of Incentive Implementation and Foreign Investment (2017). *Foreign Direct Investments in Turkey 2016*. Ministry of Economy. Retrieved from <https://www.ekonomi.gov.tr/portal/faces/home/yatirim/istatistiklerYayinlar>

General Directorate of Regional Development and Structural Adjustment (2013). *İllerin ve Bölgelerin Sosyo-ekonomik Gelişmişlik Sıralaması Araştırması (SEGE-2011)*. Ministry of Development. Retrieved from

General Directorate of Science and Technology (2017). *İstatistiki Bilgiler*. Retrieved from <http://btgm.sanayi.gov.tr/>

Gertler, M. (2008). Buzz without Being There? Communities of Practice in Context. In Ash Amin & Joanne Roberts (eds.), *Community, Economic Creativity, and Organization*. Oxford University Press.

Giuliani, E. (2005, July). The structure of cluster knowledge networks: uneven and selective, not pervasive and collective. In *DRUID Tenth Anniversary Summer Conference*, 27-29.

Glaeser, E. L. (2000). The new economics of urban and regional growth. *The Oxford handbook of economic geography*, 83-98.

Glaeser E. L. (2011) *Triumph of the city: How our greatest invention makes US richer, smarter, greener, healthier and happier*. Pan Macmillan.

Glaeser E. L., Kolko J., and Saiz, A. (2001). Consumer City. *Journal of Economic Geography*. Oxford University Press, 1(1), pp. 27-50

Glaeser, E. L., & Mare, D. C. (2001). Cities and skills. *Journal of labor economics*, 19(2), 316-342.

Glaeser, E. L. & Resseger, M. G. (2010), The Complementarity Between Cities and Skills. *Journal of Regional Science*, 50, pp. 221–244. doi:10.1111/j.1467-9787.2009.00635.x

Goldin, C., & Katz, L. F. (1998). The origins of technology-skill complementarity. *The Quarterly journal of economics*, 113(3), 693-732.

Grabher, G. (2005). Switching ties, recombining teams: Avoiding lock-in through project organization?. *Rethinking regional innovation and change*, 63-84.

- Hansen, M. T., Nohria, N., & Tierney, T. (1999). What's your strategy for managing knowledge?. *The knowledge management yearbook 2000–2001*, 1-10.
- Helbrecht, I. (2004). Bare Geographies in Knowledge Societies – Creative Cities as Text and Piece of Art: Two Eyes, One Vision. *Built Environment*. 30 (3)
- Hirst, P., Thompson, G., & Bromley, S. (2009). *Globalization in question*. Polity Press.
- HM Treasury (2005). “Cox Review of Creativity in Business: building on the UK's strengths” available at http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/coxreview_index.htm
- Hobsbawm, E. (1997). *The Age of Capital: 1848-1875 (2nd Ed.)*. London: Abacus
- http://www.tskb.com.tr/i/content/3081_1_Otomotiv%20Sektor%20Raporu.pdf
- https://www.ab.gov.tr/files/ardb/evt/2_turkiye_ab_iliskileri/2_2_adaylik_sureci/2_2_8_diger/tckb_sege_2013.pdf
- Jacobs J. (1969). *The economy of cities*. New York, Random House, New York.
- Jessop, B. (2000). The crisis of the national spatio-temporal fix and the tendential ecological dominance of globalizing capitalism. *International Journal Of Urban And Regional Research*, 24(2), 323-360.
- Jirousek, C. (1998). The End of the Silk Road: Implications of the Decline of Turkish Sericulture. *Textile History*, 29(2), 201-225.
- Joppke, C. (1987). The crisis of the welfare state, collective consumption, and the rise of new social actors. *Berkeley Journal of Sociology*, 32, 237-260.
- Kağıtçıbaşı, E. (200). Bursa'nın Sanayi Kenti Olma Serüveni. In Özdemir, N. & Bozkurt, V. (eds.) *Bursa'da Sanayinin Yönü ve Etkileşimleri*. pp.16-36.
- Kaplanoglu, R. & Balkan, N. (2009). 120 Yıllık Tarihi Bir Çınar BTSO.

- Karagül, A. A., & Özdemir, B. K. (2009). Mali Oranlar Aracılığıyla Finansal Kırılganlığın Tekstil Sektöründeki Etkilerinin Analizi: 1992-2003 Analizi. *Anadolu University Journal of Social Sciences*, 9(1)
- Karnøe, P., & Garud, R. (2012). Path creation: Co-creation of heterogeneous resources in the emergence of the Danish wind turbine cluster. *European Planning Studies*, 20(5), 733-752.
- Knudsen, B., Florida, R., Gates, G., & Stolarick, K. (2007). Urban density, creativity and innovation. Retrieved from <http://pdfs.semanticscholar.org/5364/2884d9973f122a69d2416c29a29be9604de9.pdf>
- Kratke, S. (2011). *The Creative Capital of Cities: Interactive Knowledge Creation and the Urbanization Economies of Innovation*. Oxford: Wiley-Blackwell
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of political economy*, 99(3), 483-499.
- Kuter, M. (2010). The City That Shapes the History: Bursa. Retrieved from <http://www.kuterpr.com/e-kitaplar/tariheyonverenkent/index.html#1/z>
- Lambooy, J. (2004). The transmission of knowledge, emerging networks, and the role of universities: an evolutionary approach. *European Planning Studies*, 12(5), 643-657.
- Lash, S., & Urry, J. (1987). *The end of organized capitalism*. University of Wisconsin Press.
- Lash, S., & Urry, J. (1994). *Economies of signs and space*. Sage.
- Leifer, R. (2000). *Radical innovation: How mature companies can outsmart upstarts*. Harvard Business Press.
- Leslie, D., Rantisi, N. M., Barnes, T. J., Peck, J., & Sheppard, E. (2012). The rise of a new knowledge/creative economy: Prospects and challenges for economic development, class inequality, and work. *The Wiley-Blackwell Companion to Economic Geography*, 458-471.

- Levit, G. S., Hossfeld, U., & Witt, U. (2011). Can Darwinism be “Generalized” and of what use would this be?. *Journal of Evolutionary Economics*, 21(4), 545.
- Levy, F. and Murnane, R.J. (2004). *The new division of labor: How computers are creating the next job market*. Princeton University Press.
- Lorenzen, M., & Frederiksen, L. (2008). Why do cultural industries cluster? Localization, urbanization, products and projects. *Creative cities, cultural clusters and local economic development*, 155-179.
- Lucas, R. E. Jr. (1988). “On the Mechanics of Economic Development.” *Journal of Monetary Economics*. 22, 3–42.
- Ma, M., & Hassink, R. (2014). Path dependence and tourism area development: the case of Guilin, China. *Tourism Geographies*, 16(4), 580-597.
- Manyika, J., Chui, M., Miremadi, M., Bughin, J., George, K., Willmott, P., & Dewhurst, M. (2017). *A future that works: Automation, employment, and productivity*. McKinsey Global Institute, New York, NY.
- Marshall, A. (1920). *Principles of Economics (8th ed.)*. MacMillan and Co., London. Retrieved from: <http://oll.libertyfund.org/titles/1676>.
- Martin, R. (2010). Roepke Lecture in Economic Geography—Rethinking Regional Path Dependence: Beyond Lock-in to Evolution. *Economic geography*, 86(1), 1-27.
- Martin, R., & Sunley, P. (2006). Path dependence and regional economic evolution. *Journal of economic geography*, 6(4), 395-437.
- Martin, R., & Sunley, P. (2015). Towards a developmental turn in evolutionary economic geography?. *Regional Studies*, 49(5), 712-732.
- Massey, D. B. (1995). *Spatial divisions of labor: Social structures and the geography of production*. Psychology Press.
- Mellander, C., & Florida, R. (2006). The Creative Class or Human Capital. *Explaining Regional Development in Sweden*. Retrieved from

https://www.creativeclass.com/rfcgdb/articles/The_Creative_Class_or_Human_Capital.pdf

Merinos Textile Industry Museum (2017). *Merinos Textile Industry Museum*. Retrieved from <http://tekstilmuzesi.bursa.bel.tr/museum/>

Ministry of Economy (2015). *2015/8 Sayılı Döviz Kazandırıcı Hizmet Ticaretinin Desteklenmesi Hakkında Karar'ın Uygulama Usul ve Esaslarına İlişkin Genelge*. Retrieved from <https://www.ekonomi.gov.tr>

Ministry of Economy (2017). *Uluslararası Doğrudan Yatırımlar 2016 Yılı Raporu*.

Ministry of Science, Industry and Technology (2016). *Teknoloji Geliştirme Bölgeleri (TGB)*. Retrieved from <http://teknoag.sanayi.gov.tr/Subpart/PartDetail?p=2>

Mokyr, J. (1992). *The lever of riches: Technological creativity and economic progress*. Oxford University Press.

Molina-Morales, F. X., & Martínez-Fernández, M. T. (2009). Too much love in the neighborhood can hurt: How an excess of intensity and trust in relationships may produce negative effects on firms. *Strategic Management Journal*, 30(9), 1013-1023.

Moretti, E. (2012). *The new geography of jobs*. Houghton Mifflin Harcourt.

Musterd, S., Bontje, M., Chapain, C., Kovács, Z., & Murie, A. (2007). *Accommodating creative knowledge: A literature review from a European perspective*. Amsterdam: AMIDSt, University of Amsterdam.

Neffke, F., Henning, M., & Boschma, R. (2011). How do regions diversify over time? Industry relatedness and the development of new growth paths in regions. *Economic Geography*, 87(3), 237-265.

Nelles, J., Bramwell, A., & Wolfe, D. A. (2005). History, culture and path dependency: origins of the Waterloo ICT cluster. *Global networks and local linkages: The paradox of cluster development in an open economy*, 227-252.

Nelson, R. R. (2007). Universal Darwinism and evolutionary social science. *Biology and Philosophy*, 22(1), 73-94.

- Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge, Mass.: Belknap Press of Harvard University Press, 1982.
- Theo Nichols, a., Nadir Sugur, a., & Serap Sugur, a. (2003). Muhacir Bulgarian Workers in Turkey: Their Relation to Management and Fellow Workers in the Formal Employment Sector. *Middle Eastern Studies*, (2), 37.
- Nilüfer Municipality (2017). *2016 Yılı Faaliyet Raporu*. Retrieved from <http://www.nilufer.bel.tr/i/pdf/38.pdf>
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*. 5(1), pp.14-37.
- Nordhaus, W.D. (2007). Two centuries of productivity growth in computing. *The Journal of Economic History*, vol. 67, no. 1, p. 128
- Oinas, P., & Malecki, E. J. (2002). The evolution of technologies in time and space: from national and regional to spatial innovation systems. *International regional science review*, 25(1), 102-131.
- Oral, E.Ö. & Ahunbay, Z. (2005). Bursa'nın ipekçilikle ilgili endüstri mirasının korunması. *itiüdergisi/a*. 4(2). 37-46.
- Owen-Smith, J., & Powell, W. W. (2004). Knowledge networks as channels and conduits: The effects of spillovers in the Boston biotechnology community. *Organization science*, 15(1), 5-21.
- Parkin, R., Wilk, R., Hirsh, E. and Singh, A. (2017). *2017 Automotive Industry Trends: The future depends on improving returns on capital*. Retrieved from <https://www.strategyand.pwc.com/media/file/2017-Automotive-Industry-Trends.pdf>
- Parr, J. B. (2002). Agglomeration economies: ambiguities and confusions. *Environment and planning A*, 34(4), 717-731.
- Petrov, A. N. (2007). A Look beyond Metropolis: Exploring Creative Class in the Canadian Periphery. *Canadian Journal of Regional Science*, 30 (3), 451-474.

Phelps, C., Heidl, R., & Wadhwa, A. (2012). Knowledge, Networks, and Knowledge Networks: A Review and Research Agenda. *Journal Of Management*, 38(4), 1115-1166. doi:10.1177/0149206311432640

Pınarcıoğlu, M. M. (2000). *Development of industry and local change : the rise of Turkish textiles and clothing since 1980, and transformation in the local economies of Bursa and Denizli*. Ankara : METU Faculty of Architecture Press, 2000.

Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American political science review*, 94(2), 251-267.

Pişkin, S. (2017). *Otomotiv Sektör Raporu: Türkiye Otomotiv Sanayii Rekabet Gücü ve Talep Dinamikleri Perspektifinde 2020 İç Pazar Beklentileri*. Türkiye Sinai Kalkınma Bankası. Retrieved from

Polanyi, M. (2009). *The tacit dimension*. University of Chicago press.

Porter, M. (1990). The Competitive Advantage of Nations. *Harvard Business Review*, March-April. Retrieved from <https://hbr.org/1990/03/the-competitive-advantage-of-nations>

Porter, M. (1998). *Competitive advantage of nations: creating and sustaining superior performance* (2nd Ed.). New York: Simon and Schuster.

Powell, W. W. and Snellman, K. (2004). The Knowledge Economy. *Annual Review of Sociology*. 30, p.199-220.

Replicate (2017). Objectives. Retrieved from <http://replicate-project.eu/about/objectives/>

Reyhan, N. (1990). *The Spatial Implications of Restructuring of Production and Organization: Bursa Textile Industry* (Unpublished master's thesis). Middle East Technical University, Ankara, Turkey.

Rodrigues, M. J. (ed.) (2003) *The New Knowledge Economy in Europe: A Strategy for International Competitiveness and Social Cohesion*. Cheltenham: Edward Elgar.

- Romer, P. (1986) Increasing returns and long-run growth. *Journal of Political Economy*, 94, pp. 1002-1037.
- Romer, P. (1987) Growth based on increasing returns due to specialisation. *American Economic Review*, 77, pp. 56-62.
- Romer, P. (1990) Endogenous technical change. *Journal of Political Economy*, 98, pp. 338-354.
- Runge, W. (2014). *Technology Entrepreneurship. A Treatise on Entrepreneurs and Entrepreneurship for and in Technology Ventures*. KIT Scientific Publishing, Karlsruhe
- Saxenian, A (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA.: Harvard University Press.
- Saxenian, A. (2007). *The new argonauts: Regional advantage in a global economy*. Harvard University Press.
- Schrage, M. 2000. *Serious Play*. Boston: Harvard Business School Press.
- Schumpeter, J. A. (1939). *Business cycles*. New York: McGraw-Hill.
- Schumpeter, J. A. (2003). *Capitalism, socialism and democracy (6th Ed.)*. Routledge.
- Schweizer, T. S. (2003). Managing interactions between technological and stylistic innovation in the media industries. *Technology Analysis & Strategic Management*, 15(1), 19-41.
- Scott, A. J. and Storper, M. (1987) High Technology Industry and Regional Development: A Theoretical Critique and Reconstruction. *International Social Science Journal*. 39, 215-232, May
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of management review*, 25(1), 217-226.

Shefer, D. & Frenkel, A. (2011). Regional innovation and incubation: The Technological Incubation Programme for Entrepreneurship and Innovation. *Handbook of Regional Innovation and Growth*. 514-525.

Smith, E. A. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of knowledge Management*, 5(4), 311-321.

Solow, R. (1957) Technical change and the aggregate production function. *Review of Economics and Statistics*, 39, pp. 312-320.

Storper, M. (1995). Resurgence of regional economies, ten years later: The region as a nexus of un-traded inter-dependencies. *European Urban and Regional Studies*, 2.

Storper, M. (1997). *The Regional World: Territorial Development in a Global Economy*. Guilford Press, New York.

Storper, M. and Scott, A. J. (2009). Rethinking human capital, creativity and urban growth. *Journal of Economic Geography*. 9 (2). 147-167.

Storper, M., & Manville, M. (2006). Behaviour, preferences and cities: Urban theory and urban resurgence. *Urban studies*, 43(8), 1247-1274.

Storper, M., & Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of economic geography*, 4(4), 351-370.

Storper, M., & Walker, R. (1989). *The capitalist imperative: Territory, technology, and industrial growth*. Blackwell.

Storz, C. (2009). *The emergence of new industries between path dependency and path plasticity* (No. 2). Frankfurt Working Papers on East Asia Series.

Strambach, S. (2008). *Path dependency and path plasticity: the co-evolution of institutions and innovation-the German customized business software industry* (No. 02.08). Working Papers on Innovation and Space.

Sydow, J., Lerch, F., & Staber, U. (2010). Planning for Path Dependence? The Case of a Network in the Berlin-Brandenburg Optics Cluster. *Economic Geography*, 86(2), 173-195.

TAYSAD (2017). *Türk Otomotiv Sanayi ve TAYSAD'ın Tarihçesi*. Retrieved from <http://www.taysad.org.tr/tr/sayfa/Turk-Otomotiv-Sanayi-ve-TAYSADin-tarihcesi>

Tekeli, İ. (1999). Bursa'nın Tarihinde Üç Dönüm Noktası. *International Building and Life Congress*.

The Work Foundation. (2007). *Staying Ahead: The economic performance of the UK's Creative Industries*. Department for culture, media and sport.

Thrift, N.J. (1997). The Rise of Soft Capitalism. *Cultural Values*, 1, pp. 29-57

Thrift, N.J. (1999). The Place of Complexity. *Theory, Culture and Society*, 16, pp. 31-69

Thrift, N.J. (2000). Performing Cultures in the New Economy, *Annals of the Association of American Geographers*, 90 (4), pp. 674-692, doi: 10.1111/0004-5608.00217

Thrift, N.J. (2001). 'It's the romance, not the finance, that makes the business worth pursuing': Disclosing a new market culture, *Economy and Society*, 30 (4), pp. 412-432, DOI: 10.1080/03085140120089045

TOBB (2017). TOBB'dan Yazılım Sektörünün Önünü Açacak Proje. Retrieved from <https://tobb.org.tr/Sayfalar/20160819-SoftAway.php>

Tödtling, F., Lehner, P., & Trippel, M. (2006). Innovation in knowledge intensive industries: The nature and geography of knowledge links. *European planning studies*, 14(8), 1035-1058.

Tolstoy, D. (2010). Knowledge combination in networks: Evidence from the international venturing of four small biotech firms. *International Entrepreneurship And Management Journal*, 6(2), 183-202. doi:10.1007/s11365-010-0148-x

TUIK (2016). *İl ve ilçelere göre il/ilçe merkezi, belde/köy nüfusu ve yıllık nüfus artış hızı*. Retrieved from http://www.tuik.gov.tr/PreTablo.do?alt_id=1059.

TUIK, Adrese Dayalı Nüfus Kayıt Sistemi (2016). *İBBS-Düzey1, İBBS-Düzey2, İl ve İlçe Nüfusları*. Retrieved from <https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr>

Tuncel, C.O. (2012). *İnovasyon Sistemleri ve Ekonomik Gelişme: Bursa Bölgesi İmalat Sanayinde İnovasyon Süreçleri Üzerine Bir Alan Araştırması*. Bursa, Türkiye: Nilüfer Akkılıç Kütüphanesi Yayınları.

Vallas, S. P., & Beck, J. P. (1996). The transformation of work revisited: The limits of flexibility in American manufacturing. *Social Problems*, 43(3), 339-361.

Van Den Berg, L., Pol, P.M.J., Van Winden, W. And Woets, P. (2005). *European Cities in the Knowledge Economy*. Aldershot: Ashgate

Veblen, T. (1898). Why is economics not an evolutionary science?. *The quarterly journal of economics*, 12(4), 373-397.

Vergne, J. P., & Durand, R. (2010). The missing link between the theory and empirics of path dependence: conceptual clarification, testability issue, and methodological implications. *Journal of Management Studies*, 47(4), 736-759.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications* (Vol. 8). Cambridge university press.

Waymo (2017). Journey. Retrieved from <https://waymo.com/journey/>

Weber, A. (1909). *Theory of the Location of Industries*. The University of Chicago Press.

Witt, U. (2003). *The evolving economy : Essays on the evolutionary approach to economics*. Cheltenham, Gloucestershire, England ;Northampton, Md : Edward Elgar

Zakrzewska-Półtorak, A. (2014). Evolutionary economic geography and its application in regional research. *Biblioteka Regionalisty*, (14), 91-99.

APPENDICES

APPENDIX A

THE QUESTIONNAIRE ON EXPECTATIONS OF SKILLED WORKERS FROM URBAN ENVIRONMENT AND THEIR INFLUENCE ON ULUTEK

Gelişmiş İşgücünün Kente Dair Tercihleri ve ULUTEK Üzerindeki Etkisi															
Gelişmiş İşgücünün Kente Dair Tercihleri ve ULUTEK Üzerindeki Etkisi															
Bu anket, Orta Doğu Teknik Üniversitesi, Şehir Planlama Programı Yüksek Lisans Tezi kapsamında, (1) ULUTEK bünyesinde faaliyet gösteren firmalardaki personelin Nilüfer ilçesi ile olan (varsa) bağlantılarını ve ilçedeki kullanımlara/imkanlara yönelik tercihlerini; (2) ULUTEK Teknoloji Geliştirme Bölgesi'nin, çalışma alanı olarak, kaliteli işgücünü çekmek temelinde bu ilçedeki kentsel kullanımların/imkanların varlığından olumlu etkilenip etkilenmediğini kısa ve öz biçimde ölçmeye yönelik hazırlanmıştır. Ankette toplanan veriler sadece akademik amaçla kullanılacaktır. Katılımınız için şimdiden teşekkür ederim. Arş. Gör. Arda Tuncer Bursa Teknik Üniversitesi, Doğa Bilimleri, Mimarlık ve Mühendislik Fakültesi, Şehir ve Bölge Planlama Bölümü * 1. Yaş aralığınızı belirtiniz. <table><tbody><tr><td>☐ 18-25</td><td>☐ 46-55</td></tr><tr><td>☐ 26-35</td><td>☐ 56-64</td></tr><tr><td>☐ 36-45</td><td>☐ 65+</td></tr></tbody></table> 2. Eğitim düzeyinizi belirtiniz. <table><tbody><tr><td>☐ İlköğretim</td><td>☐ Yüksek Lisans</td></tr><tr><td>☐ Lise</td><td>☐ Doktora (Devam ediyor)</td></tr><tr><td>☐ Üniversite</td><td>☐ Doktora</td></tr><tr><td>☐ Yüksek Lisans (Devam ediyor)</td><td></td></tr></tbody></table> 3. Mesleğinizi belirtiniz.		☐ 18-25	☐ 46-55	☐ 26-35	☐ 56-64	☐ 36-45	☐ 65+	☐ İlköğretim	☐ Yüksek Lisans	☐ Lise	☐ Doktora (Devam ediyor)	☐ Üniversite	☐ Doktora	☐ Yüksek Lisans (Devam ediyor)	
☐ 18-25	☐ 46-55														
☐ 26-35	☐ 56-64														
☐ 36-45	☐ 65+														
☐ İlköğretim	☐ Yüksek Lisans														
☐ Lise	☐ Doktora (Devam ediyor)														
☐ Üniversite	☐ Doktora														
☐ Yüksek Lisans (Devam ediyor)															

4. Çalıştığınız firmadaki göreviniz nedir?

* 5. Nilüfer ilçesinde aşağıdaki semtte/mahallede yaşıyorum.

- | | |
|---|--|
| ☐ Görükle | ☐ İzmir Yolu Güneyi (Beşevler, Konak, Üçevler,...) |
| ☐ Yüzüncüyıl, Özlüce | ☐ Nilüfer'de kalmıyorum. |
| ☐ İzmir Yolu Kuzeyi, FSM Çevresi (Ataevler, Barış, Esentepe, İhsaniye, ...) | |
| ☐ Nilüfer (Diğer) (Neresi olduğunu lütfen belirtin.) | |

6. Kaldığım yerleşim yerini aşağıdaki yönleri nedeniyle yaşam ve çalışma kalitem açısından olumlu bulurum. (Çoklu seçim yapılabilir.)

- | | |
|--|---|
| ☐ İş yerime yakınlık | ☐ Toplu taşıma ile ulaşım kolaylığı |
| ☐ Üniversiteye yakınlık | ☐ Açık ve/veya yeşil alanların varlığı |
| ☐ Eğlence imkanları | ☐ Ailecek faydalanılabilecek alan ve tesislerin varlığı |
| ☐ Sosyal ve kültürel imkanları | ☐ Aile ihtiyaçlarına hitap eden imkanların varlığı (Kreş, oyun alanları, eğitim kurumları ...) |
| ☐ Spor imkanları | ☐ Mahallenin/semtin sahip olduğu atmosfer |
| ☐ Alışveriş imkanlarındaki çeşitlilik | ☐ Her kesime hitap etmesi |
| ☐ Binaların ve çevrenin kalitesi | ☐ Güvenlik |
| ☐ Diğer (lütfen belirtin) | |

7. Nilüfer ilçesinde aşağıdaki merkezlerin eğlence, kültürel, sosyal ve spor imkanlarından faydalanırım.
(Çoklu seçim yapılabilir.)

- ☐ Görükle
- ☐ Yüzüncüyıl, Özlüce
- ☐ FSM Bulvarı ve Çevresi (PodyumPark, Tuna Cd.,...)
- ☐ Nilüfer'de yer alan AVM'ler (Korupark, Özdilek, Endülüs Park,...)
- ☐ Faydalanmıyorum
- ☐ Nilüfer (Diğer) (Neresi olduğunu lütfen belirtin.)

8. Tercih ettiğim merkezleri aşağıdaki yönleri nedeniyle yaşam ve çalışma kalitem açısından olumlu bulurum.
(Çoklu seçim yapılabilir.)

- | | |
|---|---|
| ☐ İş yerime yakınlık | ☐ Toplu taşıma ile ulaşım kolaylığı |
| ☐ Üniversiteye yakınlık | ☐ Açık ve/veya yeşil alanların varlığı (Parklar, meydanlar, ...) |
| ☐ Yaşama yerime yakınlık | ☐ Ailecek faydalanılabilecek alan ve tesislerin varlığı |
| ☐ Eğlence imkanları | ☐ Sahip olduğu atmosfer |
| ☐ Sosyal ve kültürel imkanları | ☐ Her kesime hitap etmesi |
| ☐ Spor imkanları | ☐ Güvenlik |
| ☐ Diğer (lütfen belirtin) | |

9. İşyeri, ofis gibi çalışma ortamları dışında gerçekleştirilecek, **resmi** nitelikte iş yemeği ve fikir alışverişi gibi aktiviteler için Nilüfer ilçesinde aşağıdaki yerlerden hangisini tercih edersiniz?

- ☐ Görükle
- ☐ Yüzüncüyıl, Özlüce
- ☐ FSM Bulvarı ve Yakın Çevresi (PodyumPark, vb.)
- ☐ Nilüfer'de yer alan AVM'ler (Korupark, Özdilek, Endülüs Park)
- ☐ Diğer (Nilüfer içi veya dışı) (Neresi olduğunu lütfen belirtin.)

10. İşyeri, ofis gibi çalışma ortamları dışında gerçekleştirilecek, **gayriresmi, gündelik** nitelikte iş yemeği ve fikir alışverişi gibi aktiviteler için Nilüfer ilçesinde aşağıdaki yerlerden hangisini tercih edersiniz?

- ☐ Görükle
- ☐ Yüzüncüyıl, Özlüce
- ☐ FSM Bulvarı ve Yakın Çevresi (PodyumPark, vb.)
- ☐ Nilüfer'de yer alan AVM'ler (Korupark, Özdilek, Endülüs Park)
- ☐ Diğer (Nilüfer içi veya dışı) (Neresi olduğunu lütfen belirtin.)

11. ULUTEK merkezli çalışmayı cazip kılacak bazı faktörleri size en uygun şekliyle değerlendirin.

	Hiç katılmıyorum	Katılmıyorum	Ne katılmıyorum ne katılıyorum	Katılıyorum	Kesinlikle katılıyorum
Evime yakınlık cazip kılar.	☐	☐	☐	☐	☐
Eğlence ve sosyal aktivite imkanlarına olan yakınlık cazip kılar.	☐	☐	☐	☐	☐
Kültürel aktivitelere olan yakınlık cazip kılar.	☐	☐	☐	☐	☐
Spor imkanlarına olan yakınlık cazip kılar.	☐	☐	☐	☐	☐
Üniversiteye olan yakınlık cazip kılar.	☐	☐	☐	☐	☐
Alanımda çalışan diğer profesyonellere yakınlık cazip kılar.	☐	☐	☐	☐	☐

12. Nilüfer ilçesini bir yaşama ve çalışma ortamı olarak başkalarına tavsiye eder misiniz?

- ☐ Evet
- ☐ Hayır

13. Bir yaşama ve çalışma ortamı olarak Nilüfer hakkında olumlu ve/veya olumsuz başka görüşleriniz varsa belirtiniz (Tercih)

APPENDIX B

THE QUESTIONNAIRE ON THE INTERORGANIZATIONAL KNOWLEDGE NETWORKS IN ULUTEK

ULUTEK Firmalar ve Kurumlar Arası Bilgi Ağlarının Ölçümü

ULUTEK Firmalar ve Kurumlar Arası Bilgi Ağlarının Ölçümü

Bu anket, Orta Doğu Teknik Üniversitesi, Şehir Planlama Programı Yüksek Lisans Tezi kapsamında, ULUTEK bünyesinde yer alan firmaların

- (1) Firmalar arası bilgi akışı ilişkilerini,
- (2) ULUTEK ekosistemindeki diğer kurumlar ile olan bilgi akışı ilişkilerini,
- (3) Yenilik ve rekabet temelinde bazı faaliyetlerini,

genel çerçevede, kısa ve öz biçimde ölçmeye ve anlamaya yönelik hazırlanmıştır. Toplanan veriler sadece akademik amaçla kullanılacaktır.

Katılımınız için şimdiden teşekkür ederim. Sorularınız için arda.tuncer@btu.edu.tr adresinden iletişime geçebilirsiniz.

Arş. Gör. Arda Tuncer
Bursa Teknik Üniversitesi
Doğa Bilimleri, Mimarlık ve Mühendislik Fakültesi
Şehir ve Bölge Planlama Bölümü

1. Firmanızın aktif olduğu sektörü belirtiniz.

- | | |
|---|--------------------------------------|
| ☐ Yazılım - Bilişim | ☐ Otomotiv |
| ☐ Elektrik-Elektronik | ☐ Enerji - Çevre |
| ☐ Makine | |
| ☐ Diğer (lütfen belirtin) | |

2. Firmanız kaç yıldır faaliyet göstermektedir?

- | | |
|-----------------------------|-----------------------------|
| ☐ 1-5 | ☐ 16-20 |
| ☐ 6-10 | ☐ 21+ |
| ☐ 11-15 | |

3. Firmanızdaki çalışan sayısı kaçtır?

- | | |
|-----------------------------|-------------------------------|
| ☐ 1-5 | ☐ 51-100 |
| ☐ 6-20 | ☐ 101-250 |
| ☐ 21-50 | ☐ 251+ |

4. Firmamızın projelerinde ...

- ☐ Sadece kendi firmamızda çalışanlardan faydalanılır.
- ☐ Kendi çalışanlarımıza ek olarak dışarıdan (freelance) çalışanlardan da faydalanılır.
- ☐ Sadece dışarıdan (freelance) çalışanlardan faydalanılır.

5. Firmamızın, hasılatın yanı sıra, çalışan sayısı açısından da büyümesini hedefliyoruz.

- ☐ Evet
- ☐ Hayır

6. Araştırma/üretim süreçlerinde inovasyon yönünü birincil olarak ... (Çoklu seçim yapılabilir.)

- ☐ müşterilerimizden gelen geri dönüşler belirler.
- ☐ kendi araştırma ve gözlem sonuçlarımız belirler.
- ☐ Diğer (lütfen belirtin)

7. ULUTEK ekosistemindeki aşağıdaki kurumların sunduğu hizmetlerden faydalanırsınız/faydalandık (Çoklu seçim yapılabilir.).

- ☐ ULUTEK
- ☐ ULUTEK TTO
- ☐ ULUKOZA
- ☐ TİM-TEB Girişim Evleri
- ☐ Mesleki Birlikler ve Dernekler
- ☐ Diğer (lütfen belirtin)

8. Yukarıda belirtilen kurumların hizmetlerinden aşağıdaki amaçlar doğrultusunda faydalanırsınız/faydalandık (Çoklu seçim yapılabilir.).

- | | |
|---|---|
| ☐ İş fikri geliştirme süreçlerinde danışmanlık almak | ☐ Fuar ve etkinlik katılımlarına yönelik sürecin yönetilmesi |
| ☐ Mentorluk hizmetlerinden yararlanmak | ☐ Proje geliştirme süreçlerinde danışmanlık almak |
| ☐ Başka firmalar ile tanışmak, bağlantı kurmak | ☐ Patent süreçlerinde destek/danışmanlık almak |
| ☐ Başka firmalar ile işbirlikleri kurmak | ☐ Pazarlama süreçlerinde danışmanlık almak |
| ☐ Akademisyenler ile bağlantı kurmak | ☐ Finansman üzerine danışmanlık almak |
| ☐ Eğitim faaliyetlerinden faydalanmak | ☐ Yönetim üzerine danışmanlık almak |
| ☐ Diğer (lütfen belirtin) | |

9. ULUTEK içerisinde bir çalışanın firmamıza iş başvurusu durumunda, önceden çalıştığı firmanın onayını alırsınız.

- ☐ Evet
- ☐ Hayır

10. Yeni bilgi ihtiyacında ULUTEK içerisinde başvurabileceğimiz firmalar bulunur.

- ☐ Evet
- ☐ Hayır

11. Uzun vadeli işbirliklerimizde ULUTEK içerisindeki rakiplerimizle çalışmayı düşünebiliriz.

- ☐ Evet
- ☐ Hayır

12. ULUTEK bünyesinde uzun vadeli işbirliği için güvenebileceğimiz firmalar bulunur.

- ☐ Evet
- ☐ Hayır

13. Yurt dışı fuar, etkinlik ve gezilere katıldık.

- ☐ Evet
- ☐ Hayır

14. Yurt içi fuar, etkinlik ve gezilere katıldık.

- ☐ Evet
☐ Hayır

15. Ulusal destek programları ile olan tecrübenizi belirtiniz. (Tecrübeniz yoksa veya destek almadıysanız 16. soruyu boş bırakınız.)

- ☐ Başvuru tecrübemiz yok.
☐ Başvuru tecrübemiz var; programlar kapsamında destek almadık.
☐ Başvuru tecrübemiz var; programlar kapsamında desteklerden faydalandık.

16. Ulusal programlar kapsamında faydalandığınız desteklerin niteliğini belirtiniz (Çoklu seçim yapılabilir.).

- ☐ Destek, Teşvik, Hibe ve/veya Kredi
☐ Eğitim
☐ Makine-Teçhizat
☐ Diğer (lütfen belirtin)

17. Uluslararası destek programları ile olan tecrübenizi belirtiniz. (Tecrübeniz yoksa veya destek almadıysanız 18. soruyu boş bırakınız.)

- ☐ Başvuru tecrübemiz yok.
☐ Başvuru tecrübemiz var; programlardan destek almadık.
☐ Başvuru tecrübemiz var; programların desteklerinden faydalandık.

18. Uluslararası programlar kapsamında faydalandığınız desteklerin niteliğini belirtiniz (Çoklu seçim yapılabilir.).

- ☐ Destek, Teşvik, Hibe ve/veya Kredi
☐ Eğitim
☐ Makine-Teçhizat
☐ Diğer (lütfen belirtin)