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RESTRUCTURING AND NEW SPATIAL TENDENCIES IN ANKARA FURNITURE SECTOR (1)

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1. This study is based on the results of the master's thesis titled "Restructuring of the Furniture Industry and Its Spatial Consequences: The Case of Ankara" conducted by Tuğba Öndağ at Gazi University, Institute of Science and Technology, Department of Urban and Regional Planning in 2019. Based on the comments of the referees, the paper has been substantially revised. During this revision process, the method, data used, and findings have been extensively renewed. Thus the resulting article has evolved into a significantly different study. The results of the original research can be seen in the following papers: Erdoğanaras and Öndağ (2016), Erdoğanaras and Öndağ (2018).

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INTRODUCTION

The implementation of export-led growth policies in the 1980s engendered the growth of local industries in Turkey. Among the beneficiaries of the policies was the Turkish Furniture Industry. The Turkish Furniture Industry has since experienced remarkable growth according to Eastern Mediterranean Development Agency Report (2014). For instance, Wang (2019) indicated that among the countries that exported furniture to less developed countries between 2009 and 2013, the Turkish Furniture Industry ranked third only behind Mexico and China. Overall, the industry's growth trend as captured by Trade Map (2016) showed an upward progression from 29th amongst exporter countries in 2005 to 14th in 2015. As a result of this growth, the Turkish Furniture Industry employed 229,915 individuals in 2016 and made a 3.6% contribution to global furniture production, amounting to US$12.5 billion in the same year. As Türkiye continues to consolidate its position as a strong actor in the global furniture industry, the need to document the trend of production and spatial change engendered by the industry's transition to new technologies, arises.

Large metropolitan areas provide significant competitive advantage to industries with a high degree of uncertainty and product diversity such as furniture (Erdil et al., 2008; Scott 2008a, 2014; Müderrisoğlu and Korten, 2015). In the Turkish scenario, the furniture industry has developed in areas such as Istanbul, Bursa, İzmir, Kayseri, Ankara, etc. This is because, innate to these large metropolitan areas is their propensity for technologically-driven restructuring, access to raw materials, and high market concentration (TÜİK, 2017). Figures from TÜİK (2017) show that in 2017, İstanbul (13%) and Ankara (6%) ranked 1st and 2nd in the furniture industry apropos the numbers of firms in Türkiye. Additionally, in terms of employment, İstanbul (20%), Bursa (14%) Kayseri (12%) and Ankara (8%) ranked 1st, 2nd, 3rd and 4th respectively in Türkiye's furniture industry. However, regarding technological inauguration, the Ankara Furniture

Industry has experienced notable increase in the number of firms that have introduced computer-aided design and manufacturing systems in their production process since the mid-2000s.

This achievement sets Ankara Furniture Industry apart from its counterparts in Türkiye's furniture industry. For this reason and among others earlier mention, Ankara is considered for this study.

The Ankara Furniture Industry has experienced significant restructuring in recent decades. As with other aspects of human society, factors like globalization, information, communication and technological advancement, and expansion in global market precipitated the change. Yet, while the industry has experienced an increase in productivity over the years, it did not escape the negative externalities of urbanization due to its location within Ankara. Needless to say, the furniture industry in Ankara became predisposed to urbanization's fallouts, such as rising demand for land, increased value of land, congestion, and environmental problems. Plagued by these developments, coupled with their growth, the industry retreated production activities to less populated (un)organised city peripheries of Ankara leaving only retailing activities behind. These locational shifts effectuated obvious changes in spatial reformation within and around the city of Ankara. However, documentation of such changes remains sparse in literature.

Inspired by the scarcity in literature on the impact of technology-based restructuring process on spatial projections/reflections within Türkiye's furniture industry, this study analyses spatial restructuring resulting from the adoption of new technologies underscoring Ankara Furniture Industry. More precisely, this study investigates furniture firms in the agglomeration areas of Siteler, Sincan and Akyurt in Ankara that either renewed or failed to renew their technologies to obtain information of the use of new technology on spatial area. Accordingly, this study takes a discursive and qualitative approach to understanding the phenomenon under study. Data gathered included an in-depth interview conducted on 80 firms that renewed their technology in Sincan, Akyurt and Siteler, and 40 firms that failed to renew theirs in Siteler.

The paper has four substantive sections after this introductory part. Section II presents a conceptual framework summarizing the role and spatial effects of new technologies in restructuring processes specific to developing and developed countries. Section III explains the methodology adopted for the study. Section IV presents the dynamics of restructuring based on technological development in Ankara Furniture Industry. The focus was to establish a link between production organisations, labour processes and labour market, and the effects of these processes on spatial projections. Finally, Section V concludes the study by offering the spatial tendencies of the restructuring process of Ankara Furniture Industry based on the research findings.

THEORETICAL AND CONCEPTUAL FRAMEWORK: INDUSTRIAL RESTRUCTURING PROCESS BASED ON NEW TECHNOLOGIES

Theoretical and Conceptual Overview

Evolutionary Economic Geography (EEG) reveals the spatial development and transformation of firms, industries, networks, cities, and regions through the processes of establishment, development, closure, and

relocation of firms (Frenken and Boschma, 2007). In an earlier declaration, Martin and Sunley (2006) argued that EEG recognises that current economic geography abets the future development and transformation of past industrial and institutional growth. Boshma and Martin (2007) identified two basic concepts in contemporary economic geography that explains the transformation process of the production, distribution and consumption spaces of economic geography over time; Path dependency and Lock-in. Furthermore, they emphasised the subservience of 'Lock-in' to 'Path dependency,' indicating that large firms, research institutions and human capital constitute the core determinants of breaking outs from lock-in. Evident from related literature is that arrays of trajectories and strategies are deployed within these two basic concepts during the restructuring processes.

According to Kalleberg (2003), two main trajectories, which can be used separately or in combination, dictate how firms realise restructuring strategies in the global competitive environment. Firstly, firms adopt a 'high path' trajectory during restructuring by renewing their technologies and implementing high-performance business organisations to increase competitiveness. As against the first, 'low path' –being the second trajectory– rouses competitiveness of firms by reducing labour costs without investing in technology. To sidestep lock-in situation by firms during restructuring, firms employ various strategies such as new technological investments, investing in new units and facilities, expending on machinery and other equipment, mergers and acquisitions, downsizing, and building strategic industrial and commercial alliances. Beside these strategies, Hudson (2005) also stakes a claim for information technologies as another potent strategy since it facilitates firms' networking capacities and improve their ability to coordinate between geographically dispersed firms. In sum, knowledge and technological innovations are indeed key factors in the development of industrial firms. Still, it is worth stating that industrial restructuring strategies vary considerably across industries and countries.

To exemplify Faust et al.'s (2004) elicitation that "continuous reproduction and diffusion of innovation throughout the economic processes are important for the development of industries and regions," the economic geographies of developing countries reflecting restructuring processes based on new technologies and spatial transformation are spotlighted. For example, Hassink and Shin (2005) in an empirical study of the steel and coal mining complex in the Ruhr Region, Germany, used path dependency and lock-in to explain the negative aspects of clusters underlining the decline (loss of competitiveness) of old industrial areas. Additionally, the researchers defined spatial relocation as another alternative restructuring strategies against economic lock-in. Similar studies like Schamp (2005), Hadjimichalis (2006), Yuan et al. (2014) and Zhang et al. (2018) laud relocation as one of the most dynamic components of industrial zone restructuring

Since the 1970s, "economic restructuring and spatial transformation" has been an important area of discussion in literature. Especially after 2000, economic geographers have become increasingly interested in economic transformation and industrial restructuring. In economics literature, spatial patterns of industrial activity are usually shaped by economies of agglomeration and scope, economic diversification, and incentives in industrial policies. Since industrial areas are integral parts of urban

structure, geographers emphasise that they are affected by myriad of factors at different spatial scales. For example, institutions and government policies, land availability and prices, accessibility, proximity to labour, and market size. Granted, the restructuring of regional economies has a long tradition in Europe (Bull, 1978; Imrie, 1989; Glasmeier, 1994; Norton and Rees, 2007; Hassink, 2007; Bertacchini and Borrione, 2013; Miller, 2017; Bellandi et al., 2018), it is a relatively new phenomenon in developing countries, especially in Asia (Balaban, 2001; Kaplinsky et al., 2002; Shen and Wu, 2013; Gao and Yuan, 2017; Yuan et al., 2017; Wu et al., 2018; Zhang et al., 2018; Fu et al., Yang, 2012,2020; Li et al., 2022).

The spatial restructuring of industrial production areas has been characterised by the Post-Fordist transformation of cities. This manifests in the decisive shift from material-intensive manufacturing to high-tech production, management, logistics, service, design, and cultural industries in both Europe and the United States since the 1970s (Gereffi, 1997; Scott and Storper, 2015). This process, according to Scott (2001), results to a dense clustering of capital, labour, and social life in urban areas. Typical of the dense clusters are complex connections that facilitate capital flow and firm migration. And with accelerating industrialisation and urbanisation, industrial development has been migrating towards the suburbs from city cores. Suburbs have become attractive locations for capital, technology, and global production networks (GPNs) due to cost advantages (Yeung, 2009; Yeung and Coe, 2015; Coe and Yeung, 2015). Consequently, peripheral suburbs are assuming the roles of new production areas for firms migrating from city centres.

This shift from city centres within metropolitan areas to peripheral suburbs in the process of industrialisation is what is termed restructuring of production areas. In the world over, metropolitan areas that underwent the processes of industrialization characterized by a shift in production areas from city centres to peripheral suburbs have been largely restructured to exhibit significant urban and regional dimensions. For example, the major driver of restructuring in Western economies has been the dynamics of local investing firms and the development of their domestic markets (Renski, 2008). However, in their Asian counterparts, the development of global markets has significantly imparted cities' restructuring. This is because since the early 1980s, Asian cities have been important recipients of foreign investment (Firman, 1998; Li et al., 2022). Moreover, these developments in Asian countries are more state-oriented than in their Western counterparts. To put it rather succinctly, Yang (2012) enounced that the proliferation of suburbanisation of industry in developing countries has fostered the relocation of firms from their first agglomeration areas in cities; and export-oriented firms are leading the process. Although, it is the large firms using new technologies that are mainly determining the restructuring process (Doms et al., 1995; Martin and Sunley, 2006).

In view of the aforementioned concepts, figure 1 illustrates restructuring process based on new technologies. Thereafter, the subsequent paragraphs discuss the globalisation of the furniture industry premising restructuring triggered by new technologies as well as the spatial consequences of the restructuring processes.

Globalization of the Furniture Industry and New Technologies

In recent years, the use of new technologies in traditional labour-intensive and high-tech industries have intensified. For clarity, high-tech

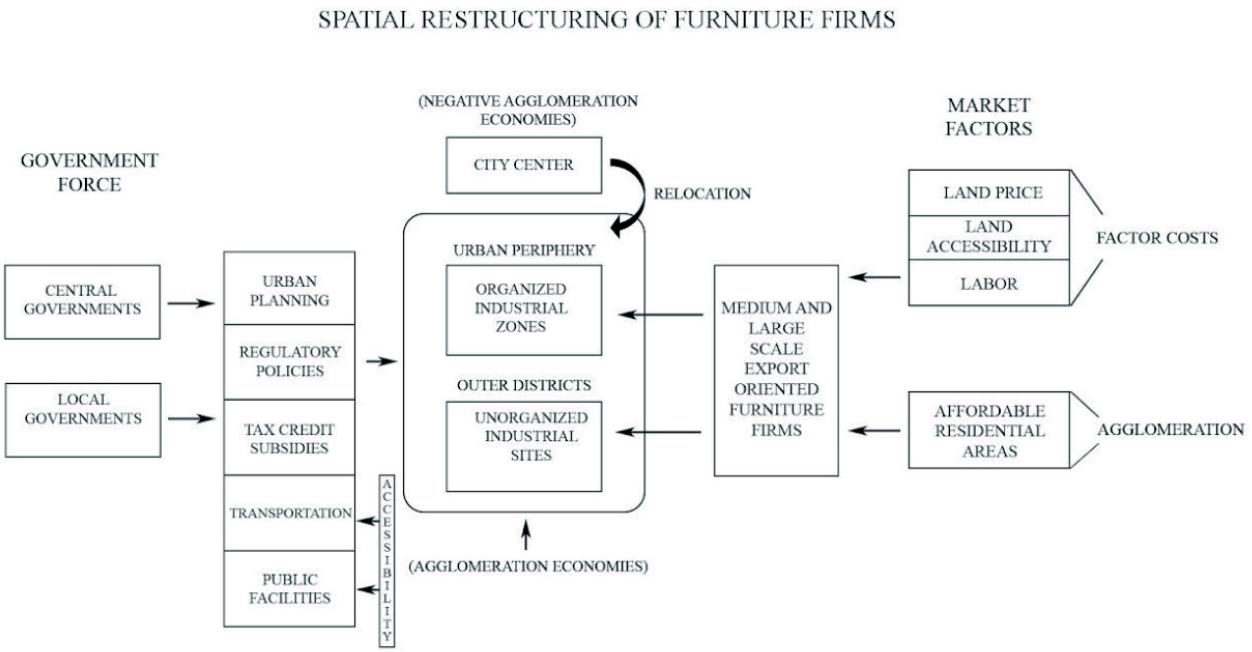

Figure 1. Restructuring process of industrial areas based on new technologies (prepared by authors)

industries are manufacturing industries with Research and Development R&D intensity above 3% of total output value (equivalent to high-tech and medium-high tech manufacturing industries in the OECD (2005) classification). Paradoxically, these traditional industries are the biggest customers of technology-producing high-tech industries (Hansen and Winther, 2014). The 1970s marked the inception of using new technology in the restructuring process for industries in developed countries (Wang, 2019). Moreover, the quantum leap accelerated in the 1990s and more recently, resulting in a high level of mechanization and automation that extends to various industries, including the furniture industry. This include the intensive use of Computer Numerical Control (CNC) machines and artificial intelligent robots in the global furniture industry. Attaining this feat has made furniture products modern and industrialized. Yet, revelations from existing literature are that furniture production is less globalised compared to other labour-intensive industries like footwear, clothing, etc. This, citing Wang (2019), is due to factors like low value-to-mass ratio, cumbersomeness and heaviness in comparison to value, high cost of transport, easy susceptibility to damage during transport, and cultural product.

Notwithstanding, the introduction of new technologies in the industry has aided the emergence of innovative products that can keep pace with the ever-changing styles and diverse demand (Wang, 2019). For example, changes in demography and lifestyle in the world (increase in single-person families), industrial shifts in production (i.e. from manufacturing to services), increase in home-office workers, and advertising of furniture as a lifestyle and value are all factors that catalysed the adoption of new technology in the industry. Additionally, new technologies through advertisement campaigns that displays the eclectic composition of furniture have aided manufactures to transform furniture from commodity to fashion (Leigh, 2000, Leslie and Remier, 2003; 2006). Computer-aided

design (CAD), computer-aided engineering (CAE) and computer-aided manufacturing (CAM) constitute the predominant technologies used in the furniture industry. While CAD/CAM software helps in programming machines to perform specific tasks, CAD/CAE software aid products' design, and improve the quality and performance of machines as well as products.

Other technologies include CNC machines, local or wide area computer networks (LAN/WAN), manufacturing resource planning (MRP) software. As per functions, LAN/WAN facilitates the flow of information while MRP manages inventory, procurement and production logistics. Furniture firms also use computers to guide movement of parts and products during production phase thereby increasing automation in the process. This reduces the cost of production by enabling quick changes to production lines within the shortest time possible (Drayse, 2011). As observed in literature, furniture firms in developed countries (for example, Canada, United States, etc.) especially large ones in the furniture industry, has had their standard furniture parts made overseas in countries like, China, Taiwan, Malaysia, Vietnam, etc., during the course of their restructuring process. Typically, the firms in the overseas countries are subcontracted by parent firms in the developed countries to produce imports in a strategic alliance characterized by a flow of support to the delegated firms. Pondering on the arrangement between parent and subcontracted firms, a mutually beneficial relationship is said to take place. The small-scale firms using advanced technology and improved skilled labour force produce high value-added products for niche markets dominated by the parent firms (Robb and Xie, 2003; Carpona et al., 2006; Hirsch-Kreinsen, 2008, Robb et al., 2008; Scott, 2008b; Drayse, 2011) while the parent firms keep production request coming.

Spatial Effects of the New Technologies in the Furniture Industry

Depending on the scale of firms, organisation, and the of development level of countries in which the firms are located, restructuring processes based on new technologies produce different spatial results. These outcomes are particularly inspired by industries with low-technology and low-skill industries such as furniture. For instance, while technology-intensive and fashion-oriented industries seat within the internal production areas in developed countries, their traditional manufacturing counterparts are either confined to lower tier cities in urban hierarchy or sited in other countries offering cheap labour (Scott, 2009). Industries in developing countries mobilise the advantage of new technologies and restructuring to get more share from the new international division of labour in the furniture industry. Their strategy of export-oriented production ensures they remain competitive in the furniture industry. Therefore, as developing countries increase production capacities, simultaneously, production becomes concentrated in new agglomerating and clustering areas in metropolitan (Scott, 2006).

As foregrounded earlier, spatial behaviours of firms vary under the influence of new technologies. To underline this variation, the study examine small-scale, labour-intensive, and vertically disintegrated firms, as well as, large-scale, capital-intensive, and vertically integrated firms. In small-scale, labour-intensive, and vertically disintegrated firms, spatial agglomeration and clustering tendencies are mostly notable. Low-tech and low-skilled industries like the furniture industries, regardless of the countries' level of development, manifest agglomeration tendencies. This,

in large part is because the interrelated production with dense production networks allows for product diversification during production process. Production is relatively small-scale and prone to vertical integration, and the firms constituting the networks are composed of highly specialised and complementary firms. Besides, the endogenous economies of scale in the industry are limited due to the high uncertainty in end-product markets. In production centres where such networks are concentrated, firms are located at the centre of gravity of the labour pool (Scott, 1988; Storper, 1997).

Spatial agglomerations are also intensified by the combination of institutional arrangements that provide social coordination and management, and interactive learning among producers. These factors generate positive externalities that offers competitive advantage (Fan and Scott, 2003). Even though spatial agglomeration is explained by firms locating in the same place, the cluster approach in Porter (2000) stressed that such spatial coexistence is not just enough. Accordingly, Porter (2000) argued that there should be complementarity and partnership relations between specialised firms, through infrastructure and information flow that supports the success of firms. In other words, the cluster concept refers to local relationships between small and medium-sized firms specialised in different stages of the production chain. In essence, agglomeration and clustering are considered to be spatial strategies that increases the competitiveness of furniture firms in the globalising world while also enabling their success (Scott, 2006; Wang, 2019).

In contrast to small-scale, labour-intensive, and vertically disintegrated firms, their large-scale, capital-intensive and vertically integrated counterparts develop internal economies of scale. The efficiency attain through this therefore allows standardisation in these firms. Since large producers are less dependent on firms they are linked with in comparison with small and medium-sized firms, they can move to other preferred areas that offer significant advantages. Scott (2006) identified cheap land, low-wage labour force, and access to transportation facilities as some of the advantages. Hence, due to the low variability of their external relations, the large firms migrate production to locations outside the existing agglomeration areas (Scott, 2006).

To sum up, production in low-technology and low-skill industries is predominantly carried out by small, medium-sized and large-scale firms, which can be either organisationally and spatially separated or integrated with other firms in both developing and developed countries. Generally, they are organised and clustered in a network that indicates agglomeration informed by new production technologies for the purpose of competitiveness and solidarity (Scott, 2006). The spatial distribution of firms shaped by the impact of new technologies exhibits great diversity across different parts of the global geography. In the case of Canada, design and sales-oriented stores are located in city centres while their production sites are located in the suburbs. For cities in Italy like Milan for example, furniture industries have developed in small settlements with a design-oriented and craft background outside the metropolitan areas (Bertacchini and Borrione, 2013). Also, in the case of Danish industries, while sales stores are located in big cities, production firms choose to locate in small towns in the metropolitan areas (Wang, 2019).

METHODOLOGY

This study examined the changes in the spatial demands of new technologies by transforming the labour force and firm structures, production organisations, and labour processes of firms. The research designed is two-staged. In the first stage, quantitative data from relevant institutions and organisations were obtained in order to reveal the structural characteristics, and general characteristics of the labour force structures of the firms in the furniture industry. The second stage entails a detailed analysis of the firms in the furniture industry where new technology has entered and diffused into. The field study was carried out in Siteler, Akyurt, and Sincan, which are the agglomeration areas of the firms renewing their technology in Ankara Furniture Industry. In a bid to provide comparisons, research questionnaires and/or interviews were also administered to non-technological firms in Siteler –a traditional production area where these firms are concentrated.

Siteler, one of the selected agglomeration areas, is among the most important furniture industry regions of Türkiye. In Siteler, firms are distributed in three neighbourhoods, 80% of which are located in Önder Neighbourhood, while the other firms are located in neighbouring Ulubey and Güneşevler Neighbourhoods (**Figure 2**). Sincan and Akyurt, where furniture firms are widely located, are the administrative districts of Ankara.

For the field study carried out in Siteler, Akyurt and Sincan, a database for the research subject was created from data at different levels and

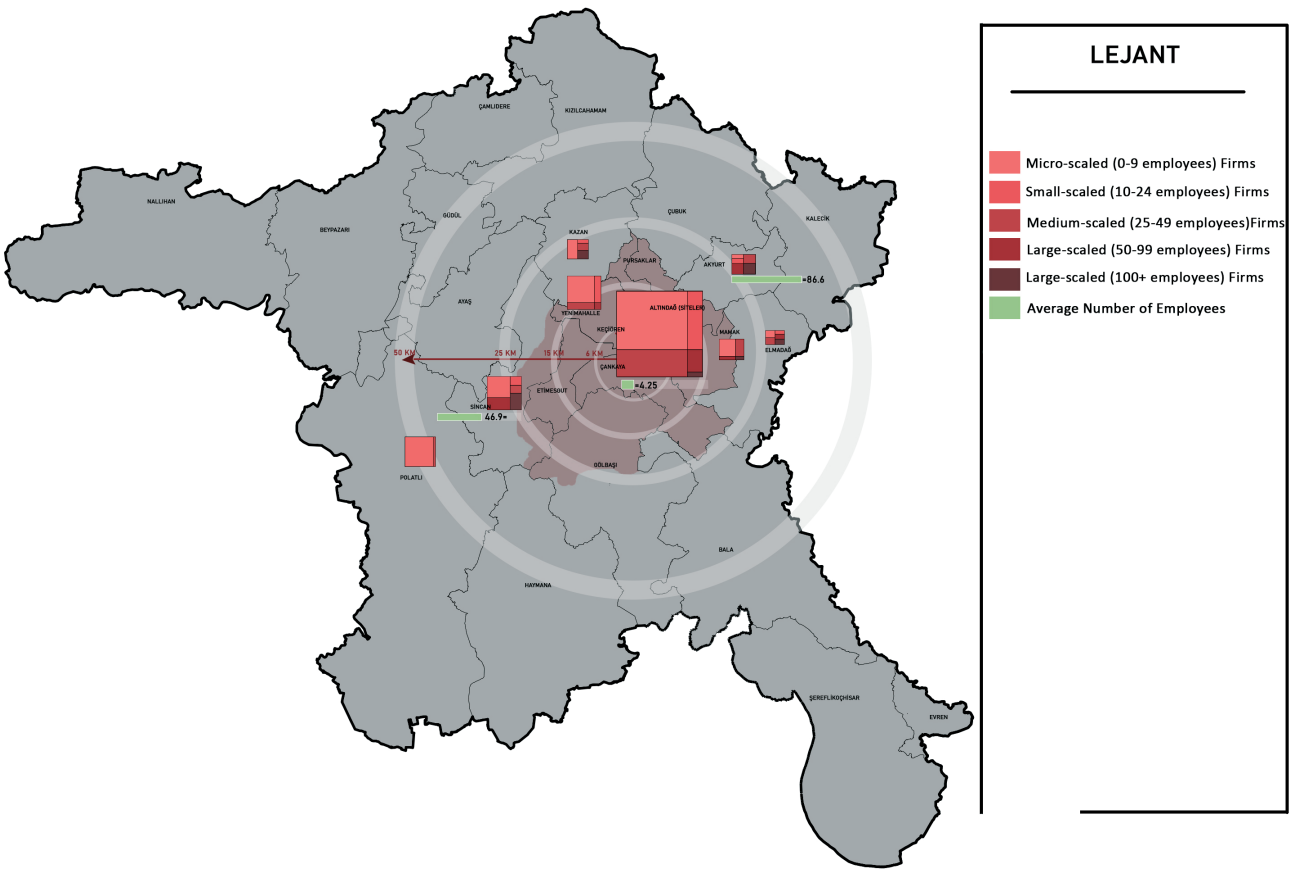

Figure 2. Spatial distribution of firms and average number of employees (prepared by authors)

qualifications from various institutions. Firstly, industry-wide evaluations were conducted on the Ankara Furniture Industry using data from the Provincial Directorate of Science, Industry and Technology for the year 2015. This data included information on the number of firms, the number of employees categorized by their qualifications (masters, foremen, apprentices, workers, etc.), and the addresses of the firms. This information was evaluated to reveal the labour force, firm demand and labour market characteristics, and spatial distribution of the industry. The data set reveals that within Ankara Furniture Industry, which is dominant by a small firm structure (with an average firm size of 8.23), 87% of the total 1726 firms are categorized as micro-scale, while 7% are classified as small-scale firms (**Table 1**).

In recent years, new furniture production sub-regions have developed in the Ankara Metropolitan Area with their restructuring process ongoing. However, as of 2015, 80% of the total firms and 41.5% of the employees are located in Siteler. Apart from Siteler, Akyurt accounts for 1% of the total firms and 15% of the employees. Akyurt is primarily occupied by large-scale firms using new technology. Similarly, Sincan accommodates 3% of the firms and 17% of the employees, with a concentration of large firms. The remaining 13% of the furniture firms and 25% of the employees in Ankara are dispersed across other districts (**Table 2**).

Since firms and employees are predominantly located in the Ankara Metropolitan Area, the field study was conducted in three specific locations: Siteler, known as the traditional production location area, and, Akyurt and Sincan, which are both the new agglomeration areas where technology renewal firms are concentrated. At the beginning of the field study, interviews were conducted on: (1) the stages of the production process within the industry, and (2) the traditional and new technologies used (**Table 3**). The information obtained guided the formulation of the interview style that was conducted on the firms. In line with this, interviews were conducted on key industry players including Ankara Chamber of Furniture and Lacquer Makers, Chamber of Carpenters, Tradesmen, and Craftsmen, as well as prominent firms such as Lazzoni,

Table 1. Spatial distribution of furniture firms in Ankara (Provincial Directorate of Science, Industry and Technology, 2015)

Districts	Total	%	Micro-scaled Firms (1-9 employees)	%	Small-scaled Firms (10-24 employees)	%	Medium-scaled Firms (25-49 employees)	%	Large-scaled Firms (50-99 employees)	%	Large-scaled Firms (100+ employees)	%
Siteler	1381	80	1251	84	92	80	30	48	7	21	1	5
Altındağ	55	3	51	3	3	2	0	0	1	3	0	0
Yenimahalle	53	3	40	3	7	6	5	8	1	3	0	0
Sincan	50	3	28	2	4	4	3	5	8	24	7	33
Polatlı	47	3	46	3	1	1	0	0	0	0	0	0
Mamak	33	2	23	1	0	0	7	11	3	9	1	5
Akyurt	25	1	3	0	2	2	7	11	6	18	6	29
Kazan	21	1	11	1	2	2	4	7	4	12	0	0
Elmadağ	16	1	4	0	3	2	4	7	2	6	3	14
Others	45	3	38	3	1	1	2	3	1	3	3	14
Total	1726	100	1495	100	115	100	62	100	33	100	21	100

Districts		Number of Firms	Total Number of Firms	%	Number of Employees	Total Number of Employees	%
Akyurt	Akyurt	15			686		
	Çankırı Boulevard	9			1360		
	Esenboğa Axis	1	25	1	119	2165	15
Altındağ	Altındağ	55	1436	83	195	6096	43
	Siteler	1381			5901		
	Industrial Site	3			7		
	Lalahan	2			65		
Sincan	OIZ/Industrial Site	20	50	3	2088	2345	17
	Sincan	28			100		
	Ayaş Axis	2			157		
Other		215	215	13	3598	3598	25
Sum Total		1726	1726	100	14204	14204	100

Table 2. Number of firms and employees in Ankara furniture industry by districts (Provincial Directorate of Science, Industry and Technology, 2015)

Ersa, Kelebek, NURUS, DOĞTAŞ, and Tepe Home. This involved a total of 25 firms in the study.

Firms that have changed their technology at every stage of production were identified in the second stage of the field research in line with the information obtained from the interviews. Then, in-depth interviews were conducted with firms in the identified agglomeration areas to gather detailed information about the use of new technologies, as well as the effects the technologies has had on firms, employees, and space. The structural and spatial effects of new technologies on the firms are considered to be clearly revealed in a comparative manner by including the firms that do not renew their technology in the research. In order to explore the effects of new technologies in Ankara Furniture Industry, qualitative research methods were preferred, specifically using non-probability purposive sampling method. In-depth interviews were conducted with the selected firms. During the interviews, various aspects of the firms were explored, including general firm information, production details, technological infrastructure, the impact of technology changes on the firm, spatial characteristics relocation processes, and factors related to competition. .

An important and primary criterion in the selection of the firms for the interview was to ascertain whether or not they had adopted the new technologies. In order to present a holistic picture within the scope of the study, firms were identified by snowballing method to represent all differences, richness, and diversity. The field study was conducted in June and August 2018. In-depth interviews were conducted on a total of 120 firms: 80 of these firms had renewed their technology (45 in Siteler, 20 in

Table 3. Machines used in the furniture industry before and after the new technology (data obtained from interviews with professional chambers and firms in 2018)

Pre-Production (R&D, design, planning)		Production (Scaling, Cutting, Skeleton, Furnishing, Coating, Banding, Dyeing)		Post-Production (Assembly and Packaging)	
Before new tech	After new tech	Before new tech	After new tech	Before new tech	After new tech
Masters preparing the prototype with elbow grease	Licensed drawing software	-Circular saws with scriber -Planers -Routers -Sandpaper -Spindles -Horizontal Circles -Thicknesses	-CNC Scaling Machine -CNC Punching Machine -Computer Aided Edge Banding -Dyeing and Drying Machines (Robots)	-Manual assembly and packaging	-Computer Aided Packaging and Stretching Machines -Robots

Akyurt and 15 in Sincan), and 40 firms in Siteler that had not renew their technology.

To obtain quantitative data on the firms, and labour force, as well as qualitative data on the structural and spatial dynamics of restructuring, a semi-structured interview form was used. In addition to standard questions, open ended questions were posed during the interview (each interview lasted approximately an hour and personal observations were made where necessary in the course of the field work. The data obtained at the end of the research were subjected to content analysis, as such, similar and related data were combined and interpreted within the framework of certain concepts and themes (Yıldırım and Şimşek, 2018, 242).

SPATIAL RESTRUCTURING BASED ON THE NEW TECHNOLOGIES IN ANKARA FURNITURE INDUSTRY

This chapter discusses the site selection, spatial development process of the industry in Ankara, and findings from the field study. The furniture sector –which started to develop with the establishment of Siteler in Ankara in 1959– came to the fore in the 1980s, and started to restructure with the intense use of new technologies since the mid-2000s. Due to this, the spatial distribution of firms have been reshaped with the transformation of production organizations, labour processes, and labour market relations. However, as time went by, the negative externalities experienced in Siteler reduced the competitiveness of the furniture industry. Simultaneously, spatial arrangement by the 1990 Master Plan Decisions of the local/central government to decentralize the city commenced in earnest. This resulted in the creation of industrial areas in Sincan and Akyurt. Today, both Sincan and Akyurt have emerged as attractive and concentrated locations for medium to large-scale furniture companies that have undergone technological changes. Consequently, decentralization and agglomeration have been the most fundamental features of the spatial processes.

Location Selection and Spatial Development Process of the Furniture Industry in Ankara

The 1950s witness the emergence and widespread of co-operative in small industrial sites such as Yeni, Büyük, Ata, Demir etc. This trend led to the establishment of Siteler in 1959 by the Keresteciler Co-operative along Samsun road. After the addition of furniture manufacturers in 1969 and marble manufacturers in 1978, Siteler gradually transformed into an important furniture production hub over the years (ABB, 2007). During this time, the development of industries that support furniture production (for example, construction, wholesale and retail trade) in Ankara also contributed to the specialisation of Siteler as a furniture production area. Additionally, the demand for public industry in Ankara together with its locational centrality and climate, paved the way for the development of the furniture industry in Ankara. Apparently, this was because Ankara is the capital of Türkiye. There on, with furniture production in Siteler from early 1980s, Ankara consolidated its position as a furniture manufacturing hub (Beyhan, 2006).

Until recent years, Siteler not only served as a production hub, it also doubled as an incubation centre where skilled labour force are honed and spread across Türkiye (Beyhan, 2006). Quoting one business owner on his thoughts about Siteler, he said; “Siteler’s mentees are all over Türkiye, which is why no matter how big a factory is, you will always find ex-

mentees from Siteler. Therefore, the workshops in Siteler ought to be protected." Another business owner is quoted as saying "Siteler is not just a location, it is a brand. It is a name. And it is a culture." The perspectives shared by these entrepreneurs show that Siteler is a highly regarded brand across the country, reifying the importance of production workshops in Siteler for ensuring skill agglomeration. Introducing spatial dimension into the fold of Siteler furniture industry, the rapid development of Siteler bred the spread of squatter settlements in Ankara, especially around Siteler. Hence, a strong correlation was observable.

After World War II, there was a significant movement of skilled labour to Siteler from Bolu, which at the time had dense forest areas, and a well-developed forest products industry in Türkiye. The migrant workers in Siteler, which where predominantly from Bolu, created the shantytowns in the immediate surroundings of Siteler. This was followed by the movement of unskilled labour from the provinces surrounding Ankara such as Yozgat, Çorum, Çankırı, Kırıkkale and Kırşehir. After arriving Siteler, the unskilled migrants acquired skills on furniture production (Beyhan, 2006). Until the second half of 1980s, Siteler attracted scattered furniture industries and the necessary labour force to cater for them. In the period following that, attention started to shift to other provinces in the Eastern Anatolia Region. Therefore, industrial sites in the Ankara Metropolitan Area, and industrial areas in Akyurt became attractive for the furniture industry.

In the 1990s, with the intensification of the labour mobility of the furniture industry, the process of decentralization from Siteler to the outer zones and other industrial sites in Ankara started to intensify. In later years, Siteler has served as the starting point for the expansions towards Ostim, İvedik, Sincan Organized Industrial Zone, Pursaklar, Akyurt, and industrial areas in the north-eastern part of the Ankara Metropolitan Area. In all, Siteler houses over 13,000 workshops (furniture, upholstery, painting, skeletons, chairs, joinery, etc.) and many furniture retail stores (Ankara İl Sanayi Durum Raporu, 2020). On a flip side, when negative economies of urbanization emerge in big city clusters like Siteler, being located within the city limits expansion opportunities of the clusters (Öz, 2004). At present, Siteler has remained within residential areas which is in parallel with urban development, thus the restriction to expand.

With the decrease in furniture manufacturing in Siteler and the transformation of production units into sales units, problems cutting across urban transportation, environment, and energy have increasingly materialized. Above all, production firms in Siteler clustered together in the city centre face developmental constraints from reaching their natural limits. As such, they cannot be modernize with new technologies that require expansive production areas (Ankara Development Agency, 2012). Faced with such difficulties, the firms restrict retailing to their current locations, and move production that requires more space to areas around Akyurt or other industrial zones within the Ankara Metropolitan Area (Sincan 1st OIZ).

Sincan is the second area where the furniture industry in Ankara is agglomerated. As observed, both medium and large-scale furniture firms have chosen to locate in Sincan 1st OIZ. Sincan 1st OIZ was realized with the 1990 Ankara master plan decision. In 1975, an area of 425 hectares in Sincan Osmaniye was expropriated in line with the 1990 master plan projections, and transferred to Ankara Chamber of Industry in 1982. The industrial area was proposed for a location accessible by highway and

railroad, akin to the development strategy on the western axis of the city in the Master Plan. In addition, 177 hectares of development area was added to the existing industrial area in 1996. In Sincan 1st OIZ, there are firms operating in the furniture industry, and firms belonging to many sub-sectors (ABB, 2007). Totalling around 281, the firms range in size between 5000-100,000m^2.

Akyurt district, which houses the third industrial production zone where the field study was conducted, is located in the northeast of Ankara. Siteler's proximity to Akyurt industrial corridor has supported the leapfrog development of the furniture industry towards the north-eastern axis of the Ankara Metropolitan Area. The 1990 Ankara Master Plan visualised the area to be an industrial and warehousing area. Staying the course, industrial development intensified in the metropolitan area boundaries around Esenboğa and Akyurt. In this region where 15,000 people were employed on an area of approximately 400 hectares (ABB, 2007), the incentives for investments after 1980 aided the uncontrolled and rapid development of industry in Pursaklar, Saray-Altınova municipalities, and around Akyurt. These include the incentive attraction for being located outside the Metropolitan Municipality boundary (ABB, 2017), and the cooperative attitudes of the municipalities of the towns at that time. The location of Esenboğa Airport also encouraged industrial establishments like technology-intensive industries, logistics activities, and more recently, large industrial furniture industries, to choose a location in Akyurt (ABB, 2007).

Two main trends are observed in the spatial formations in Ankara Furniture Industry. Firstly, relocation (moving away from the centre) and secondly, agglomeration /clustering. Bianchi and Mariotti (2003) and Kronenberg (2013) defined relocation as the migration of firms to another place where they can meet their needs more easily in the process of spatial adaptation that is designed to create desirable situations in the future. With the impact of new technologies, these trends have been widely experienced in Ankara Furniture Industry since the mid-2000s. When the spatial distribution of Ankara Furniture Firms was evaluated as of 2015, 85% of the firms and 45% of the employees were located within the first 6km from the city centre to the periphery. Although the number of firms decreases towards the periphery due to the location of large firms in the periphery, the number of employees and average workplace size increased due to the new agglomeration areas (Akyurt, Sincan) at 25km and 50km distances.

Furthermore, Siteler, which is the traditional agglomeration area within the first 6km still contribute other important externalities through supply, service, customer, and production relations. As an incubation centre for newly established furniture firms, Siteler has the highest number of young firms (firms less than 5 years old) in the industry (**Table 4**).

The analysis of employee spatial distribution based on qualifications uncovered two distinct trends: (i) Traditional labour force, including craftsmen, apprentices, journeymen, and other workers, predominantly found in small firms, tended to locate within the first 6km radius, extending up to a maximum of 25-50km radius. (ii)Qualified labour force, consisting of engineers and technicians responsible for using the new technologies were concentrated in the outer peripheries where large firms are located (**Table 5**).

Distance	Number of firms	%	Total Number of Employees	%	Average Workplace Size	Average Firm Age	Percentage of firms younger than 5 years (%)
6km	1464	85	6432	45	4,39	30,75	80.5
15km	71	4	1287	9	18,13	32,34	3.2
25km	77	4	1679	12	21,81	23,51	4.8
50km	60	3	4722	33	78,7	17,75	11.5
50+Km	54	3	84	1	1,56	19,52	-
TOTAL	1726	100	14204	100	8,23	29,69	100

Table 4. Spatial distribution characteristics of Ankara furniture industry (2015) (Provincial Directorate of Science, Industry and Technology (2015))

	Total No. of Employees	%	No. of white collars	%	No. of Engineers	%	Other Technicians	%	No of Technicians	%	No. of masters	%	No. of Blue collar	%	No. of apprentices	%	No. of foremen	%
0-6km	6432	45	885	50	41	21	36	26	34	14	1221	57	3304	42	63	50	132	43
6-15km	1287	9	104	6	12	6	17	12	86	35	232	11	690	9	18	14	14	5
15-25km	1679	12	201	11	45	23	29	21	37	15	200	9	936	12	16	13	80	26
25-50km	4722	33	537	30	96	49	58	41	90	36	478	22	2995	38	29	23	84	27
TOTAL	14204	100	1767	100	194	100	140	100	247	100	2145	100	7945	100	126	100	310	100

Table 5. Spatial distribution of workers in Ankara furniture industry by qualifications (Provincial Directorate of Science, Industry and Technology (2015))

Findings from the Field Research

Technological Restructuring Process in the Industry and Dynamics of the Restructuring Process

Even though the use of new technologies in Ankara Furniture Industry started in the 1990s, interviews conducted on firm owners/managers revealed that it was not until the mid-2000s that the use penetrated nearly all production stages (**Table 6**). Technological innovations in the industry started with the use of CNC, followed by the integration of robots. Their deployments were in the production and post-production stages, in an effort to adapt to accelerated production process. Acquisitions of the new technological machineries by the firms (75%) were mostly through dealers in machineries and other production paraphernalia. They established these trading relationships mainly in foreign trade fairs and exhibitions (**Table 7**). Additionally, the study revealed that firms acquire technology through their own R&D activities 61% of the time, and 59% the time, through domestic and foreign partners. Generally, during acquisitions, large companies in the sector work alongside TUSAŞ (Turkish Aerospace Industries), TÜBİTAK (Scientific and Technological Research Council of Türkiye) and TSE (Turkish Standards Institution). Together with the CNC and robotic technologies widely used in the industry, large companies also consider "new process" as a part of technological innovations, which s they mostly access in R&D centres.

New Technologies	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	Total	Germany	Italy	Ankara	İstanbul
CNC	0	1	18	51	9	79	18	15	45	1
Robotics	0	0	0	6	45	51	22	20	9	0
Computer Aided Planning	1	5	3	2	2	13	1	1	5	6
Automated Assembly	0	0	1	2	15	18	4	8	4	1
Total	1	6	22	61	71	161	45	44	63	8

Table 6. Years of Acquisition of New Technologies and Place of New Technology Purchase by Firms (Data Obtained in 2018 from Firm Interviews)

Places Where New Technologies are Sourced	Number	%
Firm's own R&D activities	49	61
University Cooperation	3	4
Transfers	8	10
Domestic and international partners	47	59
Machinery and equipment dealers	60	75
Purchases of trademarks, patents, licenses, etc.	14	18

Table 7. Ways to Acquire New Technologies (Data Obtained in 2018 from Firm Interviews)

Firms mainly procure CNC machines from dealers in Ankara, while robots, and mass assembly equipment are purchased from Germany and Italy (**Table 6**). In general, the new machines are purchased as first-hand. This suggests that the use of second-hand machines are limited. Firms that have renewed their technologies have facilitated the adaptation process of their employees to recent technological changes through training supports. In addition to local trainings providers such as Beltek, İki Teknik, Ankara Tasarım, and others, firms also collaborate with suppliers of machineries and other paraphernalia to receive on-site training for their employees on the operation of the new technologies. For example, employees from 18% and 5% of the firms interviewed have received on-site trainings from Italian and German firms respectively. Also revealed in the study is that the technological changes have impacted cost, quality, and efficiency of production in the industry. It has enabled the production of high value-added products (**Table 8**).

Socio-economic and institutional factors such as firms' size, structure of firms, demand structure and workforce structure have impacted the emergence of technological changes in the Ankara Furniture Industry. Among these are seasonal changes in demand structure of the industry, and demand-driven production. Furthermore, the structure of small firms within the industry has been strengthened as they extensively engage in subcontracting to access specialised services for various stages of the production process. The average firm size in Ankara Furniture Industry

Changes in Production	Min	Max.	Average	Standard Deviation
Added Value of Products Increased	4	5	4,82	0,357
Scrap and Waste Rates Decreased	4	5	4,62	0,363
Unit Cost Reduced	4	4	4,62	0,472
Quality of Products Improved	2	5	4,43	0,609
Yield Increased	1	5	4,30	0,716
Production Automated	1	4	4,10	0,844
Delivery Speed Increased	1	4	4,10	1,112
Products Diversified	1	3	4,02	1,253

Table 8. Novelties experienced with technological developments (data obtained in 2018 from firm interviews)

is 8.23. The fact that the industry is largely composed of micro and small firms makes it difficult to adopt and spread new technologies throughout the industry. This is in line with Erdoğanaras's (2002) study on the İstanbul Printing and Publishing Industry and Kepenek's (2018) study on the Ankara Furniture Industry in Siteler. The two studies emphasized that small firms are more limited in capacity to invest and adopt new technologies when compared with large firms. To show this, Kepenek (2018) reported that approximately 62% of small and medium-sized firms in Siteler had not effected any changes in their technology.

The demand structure of the industry is another factor affecting technology renewal. According to this study, 70-80% of production in the industry takes place between April and September. The furniture industry experiences intensity in production within this period of six months. However, some firms noted that the seasonality of furniture has gradually decreased in recent years due to the popularization, and mainstreaming of new furniture types. Quoting a firm owner; "in the past, customers only change their furniture few times throughout their lives. Now, they change it every two to three years and if they cannot afford to change it completely, they change the fabrics or colours of their furniture."

Another factor affecting technology change in the industry is shortage of skilled labour. This is because new technologies require firms to employ labour with the technical know-how. However, workers in Ankara Furniture Industry are mostly trained through apprenticeship system, and have no prior technical knowledge. A study in 2015 showed that 59% of the employees in Ankara Furniture Industry were unskilled manual labourers, with the percentage for engineers and technical personnel standing at 1.37% and 2.72% respectively (Ministry of Science, Industry and Technology, 2015). Alas, increase in quality and productivity requires well-trained technical personnel.

Summarily, the use and adoption of new technologies in the Ankara Furniture Industry are hindered by various factors such as small firm sizes, family business ownership, limited capital opportunities, shortage of skilled labour, and inadequacy of technical education in schools. These constraints significantly affects the spatial distribution and operation dynamics of the Industry.

Effects of New Technologies on Production Organizations, Labour Processes and Labour Market

The introduction of new technologies into Ankara Furniture Industry has transformed production organizations, labour processes, and labour market relations. Also, it has reshaped the spatial demands and distribution of firms. In this section, these changes were discussed.

During the restructuring period in the industry, radical changes were observed in the organization of production when the most rational combination of labour and capital were applied. Notable results for the firms that renewed their technologies were 58% vertical integration, and 94% growth in size. Increased production capacities and large space requirement impacted the change. Contrary to the Post-Fordist restructuring period, when some production processes in developed countries where moved to external firms to increase flexibility, the Ankara furniture industries' restructuring period led to decreased outsourcing. This was majorly due to increase in capacity and the quest to maintain product quality. Putting it in figures, while 70% of the firms that did

not renew their technology outsourced aspects of productions, this rate decreased to 42% in firms that renewed their technology.

The study observed that non-technology-refurbished firms that specialized mainly in only one stage in the production process subcontracted more: the nature of their business together with the need to complete the production process made outsourcing a must. In contrast, firms that upgraded their technology to increase their market share, and incorporate new designs carried out contract manufacturing for foreign firms leaving out their own brands. In addition, the rate of innovation per firm increased by 0.28 for firms that did not renew their technology, and 0.53 for firms that did. It is worthy of mention that technology renewal strengthens the innovation potentials of firms. Moreover, product innovation is most common in the industry where copying is very high. While the rate of product innovation increased to 86% in firms that renewed their technology, it remained at around 45% for firms that did not renew their technology (**Table 9**).

The use of new technology also reshapes labour processes thereby leading to significant changes in the quality, and quantity of employees in the industry. The most radical changes in the production process (pre-production, production, and post-production stages) have occurred in the pre-production stage. The pre-production stage that was previously part of the production process has experienced new technological developments. As a result, this stage now requires high technical skills to use the new technologies.

In an interview, a firm owner also said that "customers now make their decisions by seeing a computerised version of their preferences." In R&D-design and planning department, education and technology-based skills have gained importance, consequently leading to increase in the education levels and wages of employees, and office-type jobs (see **Table 10**). For context, R&D-design and planning department is were intended product are described, and the designs made with Computer Aided Programming before their transfer to CNC machines for the products to take final shape. Reflecting on this, the proportion of college/university graduates in firms where technology were upgraded rose to 14%, while the rate remained at 3% for firms yet to upgraded their technology. Beyhan's study of Siteler supports this finding as it showed that only 6.31% of the employees were university/college graduates, and that the workers' educational level was predominantly below university/college level (Beyhan 2006).

The Skills-Driven Technological Change Approach emphasizes that technological innovations complements highly skilled workforce and that their wages increase due to increasing productivity (Weiss and Garloff, 2005). Also, technological development reduces the impact of the need for labour and enable women take part in production mechanism a lot easier (Autor et al., 2003; Gibbs, 2017). 75% of firms in the industry that

Table 9. Number of Innovations in the last 5 years (data obtained in 2018 from firm interviews)

	Firms Renewing Technology			Firms Not Renewing Technology		
	Total	%	Innovation per Firm	Total	%	Innovation per Firm
Product Innovation	36	86	0,45	5	45	0,13
Process Innovation	5	12	0,06	0	0	0
Organizational Innovation	0	0	0	2	18	0,05
Marketing Innovation	1	2	0,01	4	36	0,10
Total	42	100	0,53	11	100	0,28

Level of Education	Siteler	%	Akyurt	%	Sincan	%	Firms Renewing Technology	%	Firms Not Renewing Technology	%
Primary School	21	25	17	14	37	23	23	21	31	33
Secondary School	19	23	34	28	44	28	28	26	28	30
High School	17	20	33	27	32	20	25	23	24	26
Vocational High School	15	18	18	15	27	17	18	17	8	9
University or Higher	12	14	20	16	19	12	15	14	3	3
Total	84	100	122	100	159	100	109	100	94	100

Table 10. Educational status of employees in ankara furniture industry (data obtained in 2018 from firm interviews)

failed to innovate technologically stated that women did not work, yet, the rate decreased to 11% for firms that innovated technologically. Other observations were that increase in office-type jobs with new technologies has prepared an easier and better work environment for women. Therefore, it has made women that work upholstery jobs, where manual skills are only sought, gain access into production process with possession of higher education. In other words, women's labour is no longer the unskilled labour force used in traditional industries but a skilled labour force that uses information technologies (**Table 11**).

The impact of new technologies also affects labour markets, and the shortage of skilled labour is underlined as one of the main problems developing countries face as a result of their adoption. The lack of investment in the quality of labour in these countries creates a need for skilled labour that uses new technologies. In Ankara Furniture Industry, 59% of the labour force are unskilled, and 68% of firms face difficulties in finding qualified labour.

Similarly, since the mid-1980s, there has been a gradual decline and aging of the qualified young labour force in Siteler (Beyhan, 2006). Affiliates of firms stated that before compulsory education was introduced in the 90s, they used to work with craftsmen who were trained through apprenticeship. However, as vocational high schools have lost prestige in the education system recently, everyone is focused on university education. In fact, students attending vocational high schools have shifted to departments such as computer science etc. over time, instead of dusty-grimy furniture education. In Siteler, the population of craftsmen has significantly dwindled, and currently, their numbers are limited, with the youngest among them being in their 40s. If the current trend continues, there might not be any craftsmen available to do the job in the next 15-20 years because new craftsmen are not being trained. This is leading to shortage of personnel in the furniture industry today. Collectively, the trends threatens the future of the Siteler Furniture Cluster. The trend

Table 11. Departments of the female labour force in Ankara furniture industry (data obtained in 2018 from firm interviews)

Department of Employment	Siteler	Akyurt	Sincan	Firms Renewing Technology		Firms Not Renewing Technology	
				Number	%	Number	%
Dining	10	0	2	12	15	4	10
Furnishing	18	1	4	23	29	1	3
Sales	8	7	4	19	24	5	13
Engineering	1	7	3	11	14	-	0
Administrative	0	5	1	6	8	-	0
No Female Employees	8	0	1	9	11	30	75
Total	45	20	15	80	100	40	100

started in the early 1980s with the exclusion of the young labour force from the labour market. One of the main factors that brought about this situation was the legal reforms in national education policy in 1997.

The new education law expanded the scope of compulsory education to encompass secondary education in addition to the previously mandatory primary school education. The change has since been negatively affecting apprenticeship training. As a result, the labour capacity in Siteler has decreased significantly in recent years. For the first time in its history, the Siteler Furniture Cluster has become dependent on external labour mobility (Beyhan, 2006). Unfortunately, the defectiveness of educational curriculum to match new technologies has prevented the problem from being overcome. The President of the Ankara Chamber of Furniture Manufacturers (ANKAMOB) stated that students in vocational high schools should be trained on new technological machines, stating further that there are problems in the industry in that sense. Therefore, there is a need to enhance the desirability of vocational high schools through the improvements of the education system. According to one firm owner; 'qualified personnel are extremely important to achieve high value-added furniture productions. In the past, individuals that went through the master-apprentice hierarchy to become masters were the most important people in the business. Nowadays, it has become extremely difficult to find employees in the training process who have achieved or are a level away from attaining mastery. Consequently, the importance of vocational high schools to the industry cannot be overemphasized, thus, vocational schools need to be supported on a very large scale".

The prevalence of small and medium-sized firm structure in Ankara Furniture Industry has led to a prevalence of family businesses. This has made informal employment to increase, thereby jettisoning increasing labour costs from limited institutionalization and financial constraints. Today, Syrian refugees are concentrated in areas with worse working conditions in the industry (for example, paint shops, machining, and dusty cutting workshops, etc.), and in jobs only needing manual skills like carving. Generally, such areas are avoided by Turks. Momentum in the industry has amplified in recent years especially since Syrians became mostly preferred for jobs due to their high level of manual skills together with their willingness to accept low wages out of desperation (Savran, 2020). The statements "immigrants have a serious employment potential in the furniture industry," and "10 years from now, when the services of a master is needed, a Syrian master will be called," by a corporate industry representative, and another firm owner, respectively, show the substantial role that immigrants have gained in the industry's production.

Spatial Effects of the New Technologies in Ankara Furniture Industry

An export-oriented production model has been adopted in Türkiye, to the effect that it has increased the demand for production abroad. Consequently, workshop-type production units in the furniture industry are emerging and taking roots within the city of Ankara. Not only that, they are going through a process of transformation into larger and more efficient firms. This transformation process is not without its challenges. Öz (2004) for example, argued that negative externalities such as congestion costs, inability to expand, and rising land prices in the furniture industry, reduces the competitiveness of the Siteler furniture cluster, and leads to its economic decline. To this effect, new spatial arrangements were made with the planning decisions of the local/central government to

decentralize the city. The industrial areas created in Sincan, and Akyurt with the 1990 Master Plan decisions are notable examples. As observed, the Ankara Furniture Industry has undergone a significant and intensive restructuring process since the mid-2000s. As a result, new agglomeration areas have emerged in Sincan and Akyurt, complementing Siteler that is the traditional production location. Locations of the industrial areas were informed by cheap land, industrial infrastructure, tax reductions, and financial subsidies. Medium, and especially large-scale furniture firms that have changed their technology and are mainly export-oriented, are concentrated in these areas.

The pandemic in recent years has also contributed to this restructuring process relying on new technologies. Here is how: since the breakdown of the Far East supply chains due to the pandemic, there have been new demands from the USA and Europe. To meet these demands, horizontal factory areas capable of producing large amounts of furniture in a short time are needed; as opposed to vertical production workshops. To corroborate this logic, a business owner recounted that "today, our guests come from America, and want one container of a model a week." The business owner continued, noting that, "if all Siteler worked for us in these buildings, we still would not meet this demand, we need to switch to horizontal production factories as soon as possible." In essence, in the Ankara Furniture Industry, new technologies have brought about two spatial tendencies: Relocation Processes and Agglomeration/Clustering.

Relocation processes

When the new spatial locations of the firms that upgraded their technology were evaluated, results showed that 75% of the firms (60 firms) chose central locations within the city, 14% (11 firms) chose locations in the periphery and 11% (9 firms) chose locations outside the city (**Table 12**). Siteler mainly produces for the Ankara Metropolitan Area (**Table 13**). It is centrally located, and has a large number of small firms with close input-output relations. These firms are organized horizontally, with firms specializing in single branches of production such as turners, upholsterers, skeletonists, polishers, lacquers-painters, and coaters coming together. At the same time, the existence of widespread subcontracting relationships supports the tendency to coexist in Siteler. On a different note, medium-sized firms that renew their technology and specialize in a single production stage are still predominantly located in central locations (in Siteler). Another observation from the study was that firms, whose subcontracting relations decrease with new technologies, vertically integrate in their production processes, and thus grew larger, diversified their markets, and expanded abroad. These firms are now relocating to the city periphery (such as Sincan), and outside the existing urban spot (such as Akyurt). A summation can thus be made that the housing market characteristics of Sincan and Akyurt, where low-income housing areas are located, provide an advantage in accessing the unskilled labour needed.

The interviews with 80 firms that upgraded their technology in this industry in 2018 showed that, except for mobility within the same district, mostly, large firms moved from Siteler to Sincan and Akyurt districts. In a sense, it was gathered that 100% of the firms that renewed their technology changed their location, and the average mobility per firm was 1.3. Furthermore, it was observed that a total of 103 relocations occurred by 80 technology upgrading firms. When the years in which these relocations occurred were analysed, findings were that 47% of the

Location of the relocating firms	Firms Renewing Technology		Firms Not Renewing Technology	
	Number	%	Number	%
Inner-City	60	75	40	100
Periphery	11	14	-	-
Outer-City	9	11	-	-
Total	80	100	40	100

Table 12. Distribution of relocated firms according to their new spatial locations (data obtained from the firm interviews conducted in 2018)

Firm Size	Firms Renewing Technology					Firms Not Renewing Technology				
	Ankara	İstanbul	Domestic	Foreign	Total	Ankara	İstanbul	Domestic	Foreign	Total
1-9	65	10	25	-	100	85	15	-	-	100
10-24	40	25	35	-	100	65	35	-	-	100
25-49	30	30	35	5	100	60	40	-	-	100
50-99	35	15	25	25	100	-	-	-	-	100
100+	25	20	35	20	100	-	-	-	-	100

Table 13. Market shares of firms in Ankara furniture industry by size (%) (data obtained from the firm interviews conducted in 2018)

relocations happened between 1990 and 2018 – when new technologies started to enter the industry and 24% of the relocations took place after 2000 – when intense technological changes took place (**Table 14**). In other words, relocations in the industry are realized individually rather than by acting together.

In the relocation processes in the Ankara Furniture Industry, changes in firm structures with new technologies make it difficult for firms to locate in the centre, and the current locations prevent firms from physically expanding **(Table 15)**. In addition to the sites reaching their natural limits and having no potential for development, the fact that the land on which the sites were located is now worth more than the land in suburban locations (Ankara Development Agency, 2012) makes it difficult to switch to new technologies due to space constraints and high financing costs. Thus, making cheaper and larger industrial areas on the periphery and outside the city becomes attractive. Accordingly, when the average cost of industrial lands in Siteler, Sincan, and Akyurt are compared over the Kent95 data, the land costs in Sincan were lower (by more than 50%), and in Akyurt, the costs were reduced to almost a tenth**.** Average land prices in these neighborhoods are as following: Siteler (Ulubey, Önder) is 579,5TL/ M²; Siteler (Güneşevler) is 710,3TL/M²; Sincan 1st Organized Industrial Zone (Ahi-Evran Neighborhoods) is 232,0TL/M²; Akyurt (Büğdüz-Çankırı Street) is 59,0TL/ M² (Source: Kent95 2021 Data).

These land costs provide an advantage for firms that will locate horizontally with new technologies. A firm owner who is considering to relocate from Siteler stated that "the place to be relocated should be within easy access of the suppliers, and within easy access of the employees. It should be at a maximum distance of 15-20 km from Siteler". Moreover,

Period of Relocation	Number of Firms Renewing Technology	%
Before 1980	42	41
1981-1990	12	12
1991-2000	24	23
2001-2010	21	20
2011-2018	4	4
Total	103	100

Table 14. Number of relocation of technology renewing firms by periods (data obtained from the firm interviews conducted in 2018)

Factors	Siteler	Sincan	Akyurt	Firms Renewing Technology	Firms Not Renewing Technology
High Financing Costs	13	27	10	15	35
Velocity of Change of Technology	4	20	25	13	0
Unconsciousness in Technology Selection	0	0	10	3	0
Insufficiency of Expert Staff	18	0	15	14	10
Lack of Compatible Technology with Suppliers	4	7	0	4	0
Technical Support and Service Problem	7	0	10	6	8
National Infrastructure Cost	4	13	0	5	0
Inadequacy of R&D Activities	4	7	15	8	0
Lack of Market Research	0	0	5	1	0
Failure to Benefit from Loans	4	0	10	5	0
Shortage of space	24	20	0	18	48
Expensive Service and Maintenance	7	7	0	5	0
No Barriers	9	0	0	5	0
Total	100	100	100	100	100

Table 15. Factors affecting the transition to new technology (%) (data obtained from the firm interviews conducted in 2018)

the success stories of the relocated firms also point to the positive effects of moving from Siteler to another region and overcoming geographical problems. Similarly, the spatial relocation behaviour of the manufacturing industry in Ankara between 1988 and 2007 is mainly influenced by spatial problems caused by growth (Bostan et al., 2010).

Changes in some qualitative and quantitative characteristics of firms in the Ankara Furniture Industry have been observed along with the decentralization process. It was observed that the number of employees and the number of machines of the firms increased, and their outdoor and indoor spaces expanded **(Table 16; Figures 3-6)**. The logic is that the production spaces of firms are mostly located on the ground floor, where they locate their machineries and equipment. In the event that the size of machinery and equipment increases, it inevitably increases the requirements for indoor spaces (spaces for loading and unloading for example), which ultimately increases the firm's requirement in terms of outdoor spaces. In fact, due to the large volume of products generated by the industry and the increase in production speed enabled by new technologies, firms express their need for large areas. They emphasized that "if the production of a few days cannot be delivered to the customer, we become unable to work due to lack of space". In addition to these, with the change in technology, production is based more on machine power, and diversification of production that increases competitiveness was observed.

Table 16. Structural and spatial characteristics of firms before and after relocation (data obtained from the firm interviews conducted in 2018)

	Firms Renewing Technology			Firms Not Renewing Technology		
	Second Former location	Former location	Current Location	Second Former location	Former location	Current Location
Avr. Nr of Employees	31	60	304	-	6,5	43
Avr. Outdoor Space (m^2)	250	1500 m^2	2500 m^2	-	-	150 m^2
Avr. Indoor Space(m^2)	4500 m^2	6500 m^2	15000 m^2	-	1250 m^2	1200 m^2
Production Methods	10% machinery 90% manual	30% machinery 70% manual	99% machinery 1% manual	-	5% machinery 95% manual	15% machinery 85% manual

Figures 3-6. Views of large scale furniture factories

Furthermore, the introduction of strategic incentives provided by central and local governments in and around the city is also a determining factor for relocation. It is also evident that the firms that moved to Sincan 1st OIZ and Akyurt, are mostly large-scale and export-oriented firms, hence, they possess the capacity to easily benefit from such government incentives (**Table 17).** An effective illustration of this is the national brand-building incentive program called "Turquality" implemented by the central government. This program, functioning as an accreditation system, not only aims to elevate the beneficiary companies to international benchmarks but also create awareness of internationally accepted values like quality and novelty that are actually carried by these brands. The program aims to create 10 world brands in 10 years, and its impact has been noteworthy. Some large companies (NURUS, ERSA, etc.) have benefited from these incentives with the inclusion of the furniture sector in the program, which did not include the furniture sector at the beginning. Moreover, the active role of Akyurt's local government in assigning land to firms based on the decisions of the Metropolitan Development Plan, which aims to be a developed district in the industrial sector outside the existing urban area, has been decisive. At the beginning of the relocation process, furniture firms relocated to Akyurt, based on partial development plans, settling on agricultural lands bought from villagers at significantly cheap prices.

Over time, as the demand for relocation and new space requirements of the firms in Siteler intensified around Akyurt, the local governments approved the 1st and 2nd phase industrial plans in 2008 and 2012, respectively, in order to respond to this demand. The smallest parcel in the industrial area with approximately 300 parcels was determined as 3,000 m^2. Bureaucratic procedures (construction permits, etc.) for industrial firms were completed in a short time such as a week, and the procedures were facilitated. Specifically, the availability of cheaper and larger land, proximity to Siteler, and the urban centre characteristic are the major factors in the relocation. Besides them, the proximity of Akyurt to the Esenboğa Airport in terms of logistics, its location on an intercity axis, and Kastamonu and Çankırı axis where wood is obtained, the presence of a furniture fair area, and the incentives of the local government, all play an attractive role. Additionally,

the fact that many of the employees in Siteler have their housing areas in Akyurt and its surrounding settlements (Çubuk, Pursaklar) with affordable houses also facilitates access to the work. By the end of 2022, the construction has begun on the arrangement of 50 hectares of public property on Çankırı Street, into 3,000 m^2 and about 140 parcels, to be transferred to firms relocating from Siteler. This indicates that the process of relocation of furniture firms, which has been taking place individually so far, has now shifted to a cooperative process of location change.

In Sincan, the advantages provided by the organized industrial zone, such as proximity to suppliers, the presence of educational institutions, cheaper energy, water, and other expenses, and the excellent IT infrastructure, are attractive to furniture firms. The fact that Sincan 1st OIZ is a brand for growing businesses, and serves as the first point of contact with customers from foreign countries also makes it stand out. Nevertheless, the lack of shared infrastructure in Akyurt has led to difficulties, especially in energy and waste management, causing some large-scale furniture firms (such as NURUS) to move to Sincan 1st OIZ in order to increase their productivity. In recent years, the centr-dependent structure of the Ankara Furniture Industry has started to change, albeit partially (Erdoğanaras and Erol, 2016). It can be said that the planned industrial areas also support this process of relocation.

In Ankara Furniture Industry, it was observed that the relocation process within the metropolitan area occurred only within short distances. For context, the average distance of firm mobility in the industry is 17 km. The average relocation distance in the industry is higher than the average distance (13.6 km) of the manufacturing industry firms that relocated between 1988-2007 in the Ankara Metropolitan Area (Bostan, 2008; Bostan et al., 2010). On the other hand, firms that renewed their technology choose locations in the periphery and outside the city due to the need for large

Figure 7. Spatial distribution of furniture firms in Sincan 1st OIZ. Source: Google Earth Pro Images, 2023

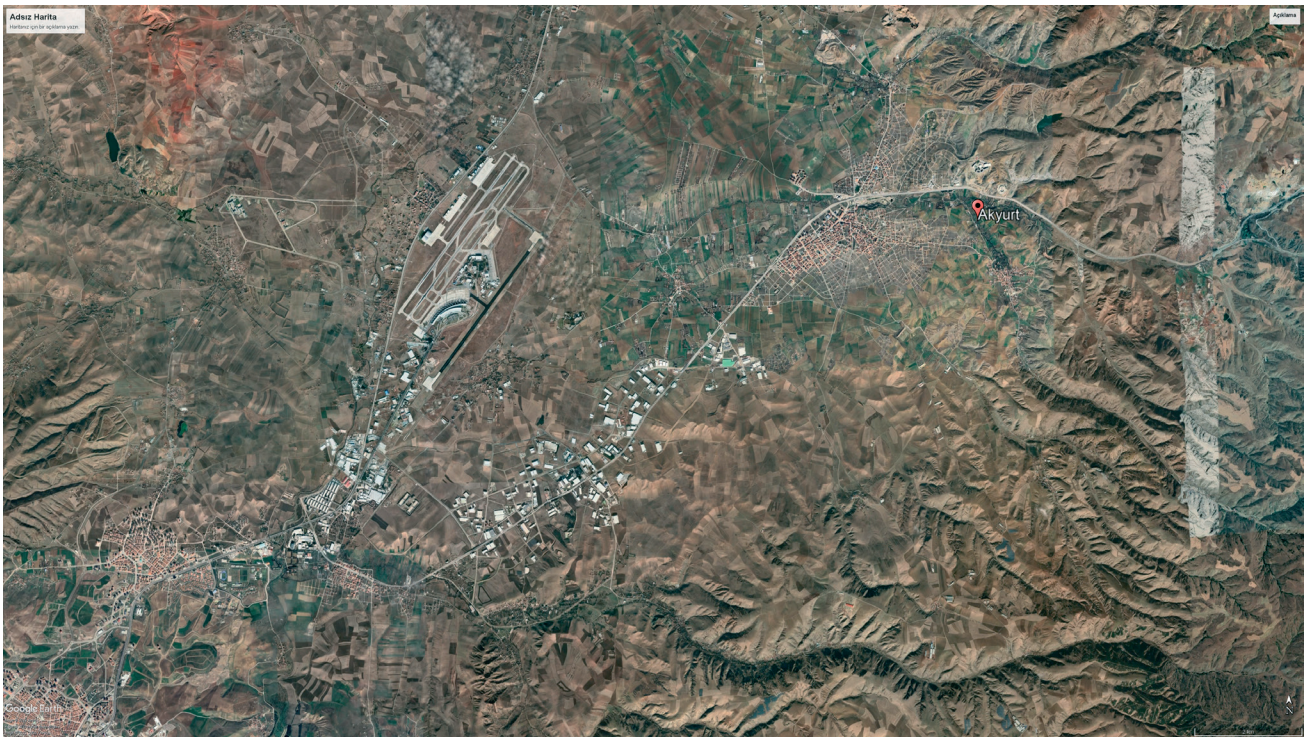

Figure 8. Spatial distribution of furniture firms in Akyurt. Source: Google Earth Pro Images, 2023

space, in other words, farther away from the customer, while leaving their branches for display purposes in the centre. Thus, 94% of the firms that renewed their technology, which solved their problems in customer relations within the city, stated that they were satisfied with their new locations.

Firms that did not renew their technology were located in Siteler, close to raw materials andintertwined with subcontracting firms. Also they easy to access, and accessible to customers. However, during the interviews, it was mentioned that small business areas, parking problems, the need to conduct production and display in the same place (with display on ground floor and production on upper floors), lack of elevators causing problems in equipment, machinery, and transportation, as well as other infrastructure challenges, have negative impact on these firms. In particular, firms that do not renew their technology want to be close to firms specialized in single

Table 17. Structural characteristics of firms renewing technology (data obtained from the firm interviews conducted in 2018)

	Siteler		Sincan 1st. OIZ		Akyurt	
Average Size of Firm	51		131		123	
Average Age of Firm	45		15		20	
Average Indoor Space(m2)	3.000		10.000		7.500	
Average Outdoor Space(m2)	80		3.750		2.250	
Average Total Space(m2)	3.080		13.750		9.750	
Sizes of Firms	Number of Firms	%	Number of Firms	%	Number of Firms	%
Micro-Scale Firms (1-9)	9	20,0	0	0	0	0
Small Scale Firms (10-24)	11	24,4	0	0	0	0
Medium Scale Firms (25-49)	3	6,8	4	26,7	5	25,0
Large Scale Firms (50-99)	16	35,5	4	26,7	6	30,0
Large Scale Firms (100+)	6	13,3	7	46,6	9	45,0

Figure 9. Siteler industry zone (Google Earth Pro Images; 2023)

line production, which is why they concentrate in Siteler. To quote one of the firm owners - "despite all the negativities, we are located in the heart of the industry" (**Figure 9**). The desire to be close to other specialized firms makes spatial proximity a necessary condition for location choice, and firms in Siteler survive with the externalities of agglomeration economies despite the increasing complexity and congestion caused by spatial agglomeration.

Agglomeration/Clustering

One of the important spatial findings of the study is that the tendency of agglomeration/clustering in the restructuring process has come to the fore in both traditional (Siteler), and new production areas (Akyurt, Sincan). Among the firms using new technology, 77% (79 relocations) of the relocations were to organized areas, and 23% (24 relocations) were to unorganized areas **(Table 18).** This shows that planned industrial areas offer attractive conditions for relocating firms, direct the relocation process, and support the tendency towards agglomeration and clustering. In addition, it was observed that firms that renew their technologies, while moving away from the centre after some structural changes, started to agglomerate on the urban periphery and outside the city, either in organized industrial areas due to the externalities offered, or in new locations without being organized (Akyurt example). Unlike the literature on agglomeration and clustering based on small and medium-sized firms, large-scale independent firms are concentrated in these new agglomeration areas.

Besides, the fact that the majority of relocations in the Ankara Furniture Industry happened within the same district (59.2%) clearly reveals the tendency of agglomeration/clustering **(Table 19).** The largest share is accounted for by relocations within Siteler (40.8%), followed by relocations within Sincan (12.6%) and Akyurt (5.8%). Intense subcontracting relations

Size of Firm	Mobility to an organized zone		Mobility to a non-organized zone		Total Mobility	
	Number	%	Number	%	Number	%
Micro Scale Firms	18	100	0	0	18	100
Small Scale Firms	14	100	0	0	14	100
Medium Scale Firms	22	69	10	31	32	100
Large Scale Firms	14	64	8	36	22	100
Large Scale Firms (with more than 100 employees)	11	65	6	35	17	100
Total	79	77	24	23	103	100

Table 18. Spatial distribution of mobility of relocated firms according to firm size (data obtained from the firm interviews conducted in 2018)

Table 19. Distribution of relocation patterns of firms renewing their technology (data obtained from the firm interviews conducted in 2018)

Relocation Pattern	Number of Relocations	%
Relocation from outside the province	9	8.7
Relocation between Districts	33	32.1
In-district Relocation	61	59.2
Total	103	100

and input-output structure in the industry support staying in the same district, in other words, in the same cluster.

While the firms operating in Ankara mainly relocate to organized areas, the firms operating outside Ankara and abroad mainly relocate to unorganized areas **(Table 20).**

Highlighted in literature is that complementary and competitive relationships between agglomeration areas are common in the industry. In this framework, Siteler appears to maintain its traditional role in its relations with other firms. Siteler is largely self-sufficient as 44% of the relationships (supply, service, customer, and contract manufacturing) established by firms are done within Siteler itself. While Akyurt and Sincan fulfil 13% and 27% of total relations respectively, 24% of firms in Akyurt and 22% of firms in Sincan complete their production relations with Siteler **(Table 21).**

In this context, Siteler plays an important role in the new spatial organization of the industry and supports new production areas in almost all types of relationships. However, although the literature emphasizes the prevalence of complementary and competitive relationships between

Table 20. Active markets of the relocated firms (data obtained from the firm interviews conducted in 2018)

Product Market	Firms relocating to an organized zone (%)	Firms relocating to a non-organized zone (%)	All firms relocating (%)
Ankara Centre	46	38	42
İstanbul	15	15	15
Domestic	23	33	28
Foreign	10	20	15
Total	100	100	100

Table 21. Spatial distribution of relationships between firms renewing technology (%) (data obtained from the firm interviews conducted in 2018)

Districts	Inner-city								Inner-city	%	Foreign	%	Total	%
	Siteler	%	Akyurt	%	Sincan	%	Other	%						
Siteler	225	44	0	0	1	0	102	20	136	27	48	9	512	100
Akyurt	122	24	63	13	0	0	56	12	206	42	45	9	492	100
Sincan	125	22	0	0	154	27	107	18	129	22	65	11	580	100

agglomeration areas in the industry, it was observed that no relationship has been established between the new production agglomeration areas of Akyurt and Sincan. Additionally, the relationships established by Akyurt and Sincan with Siteler are one-way, with limited interaction and reciprocity. This can be partly explained by the requirement for institutional arrangements and time for the development of existing networks in the new agglomeration areas. Furthermore, it can be attributed to the characteristics of firms in these areas, such as their large size, vertically integrated, high export capacity, and low dependency on other firms.

DISCUSSION AND CONCLUSION

The labour-intensive and low-tech furniture industry is, without doubt, going through a rapid restructuring process, which in recent years has been made possible through the opportunities offered by new technologies in making furniture more efficient and advanced, not only in Ankara, but globally. These new technologies, the article argued offers significant opportunities too numerous to mention But when taken together, these opportunities engender high employment and wage increase in traditional industries like furniture. In this study, [we] sought answers to 'the kind of spatial behaviours that arises due to new technologies utilized in the Ankara Furniture Industry to transform the production and organization processes.' In other words, what characteristics embody and animate these spatial behaviours? To do this, the spatial effects of new technologies in the restructuring process in Ankara Furniture Industry were evaluated together with the transformations in firm and labour force structures. Following that evaluation, the begging question was not necessarily that of differences, if any, that existed between firms that have renewed their technology and those that haven't. That is somewhat obvious, far from it, the question that needed answering was that of the effects the new technologies had in the furniture industry, particularly how these effects could be understood comparatively between firms that have renewed their technology and those that haven't.

With new technologies in the industry, firms tend to vertically integrate and grow, and outsourcing practices decrease in order to meet capacity increment, whilst overcoming quality bottlenecks. Also, new skills are acquired with the introduction of new technologies in the design and production processes, so much that it increases the demand for office-type jobs for highly educated female labour force who possessed the requisite technical knowledge. From the foregoing, it needs restating that on the one hand, the demand for human capital and capacity increased; which implied that employees were not substituted with technology, and firms did not downsize. On the other hand, the problem of skilled labour shortage persisted due to the lack of adequate technical training opportunities in the industry dominated by unskilled labour.

In this process, striking differences between firm structures within the industry are noteworthy with the use of technology. For context, firms that renew their technology are: export-oriented, innovative, capital-intensive, medium, and more often than not, large-scale firms; while firms that do not renew their technology are mainly domestic market-oriented, labour-intensive, and small-scale firms. These differences in firm structures are also observed in terms of space, that is, the spatial demands and agglomeration areas of firms that renew and did not renew

their technology. In the Ankara Furniture Industry, firms that did not renew their technologies are clustered in Siteler, which is the current agglomeration area for small labour-intensive firms with high mutual interaction due to the intensive input-output relations between them. At the same time, some medium-sized firms that specialize in a single branch of production have chosen to locate in this area in order to complete the production process with other firms by continuing their traditional production while renewing their technology. At the risk of not rehashing the issues of firms being confined to small spaces, expansion challenges, and rising land prices in Siteler. It is worthy to note that attractive conditions such as incentives offered by central and local governments, as well as organized industrial zones in suburban and rural areas with appealing planning strategies and low land prices, are the primary factors driving the relocation of furniture firms away from Siteler. Despite all these, Siteler still remains an incubation centre for new small firms due to the externalities it provides.

Firms that renew their technology choose to locate outside the existing agglomeration areas with growing firm scales, in newly developing areas with efficient transportation and infrastructure systems, cheap industrial land and easy access to labour force. This agglomeration somewhat contradicts the sentiments in the literature that: 'new technology firms that produce high value-added products and focus on niche markets in developed countries are small-scale firms and cluster in central areas in developed countries.' In the case of Ankara Furniture Industry, unlike the examples of developed countries, large firms that renew their technology tend to cluster in organized industrial zones (Sincan) or in new areas (Akyurt) that develop spontaneously without any organization. This points to a different structure, away from the literature on agglomeration and clustering of small and medium-sized firms. The advantages provided by the organized industrial zone in Sincan, alongside the active role and encouraging attitudes of the local government in Akyurt have been decisive in this agglomeration behaviour of large-scale firms.

Central and local governments (Sincan and Akyurt) encouraged suburban industrial development, and they used proactive planning interventions as an incentive. In terms of market forces, up to recent years, industrial land was low priced in order to attract industrial investment which facilitated furniture industry relocation to Sincan and Akyurt together with the suburbanization of Ankara since 1985. At the same time, firms that upgrade their technology relocate due to the impact of new technologies, and relocation distances differ depending on firm size and vertical integration levels, due to capacity increases in these firms. In this process, medium-sized firms specializing in a single production stage are mainly relocated within the same district (within Siteler itself) for short distances, while vertically integrated large firms are relocated to long distances towards the periphery, and outside the city.

While the clustering cum agglomeration pattern that increases competitiveness in the Ankara Furniture Industry is observed in small and medium-sized firms within the city, large firms gain weight in agglomeration areas in the periphery and outside the city. Siteler, which is currently going through a transition process, will continue to be one of the centres of the furniture industry with its history of more than half a century, its production culture and skill agglomeration, and its location in Ankara. How long Siteler maintains and retains its historical and cultural

significance in the furniture industry remains unclear. What is clear however is that, this cluster will undergo a structural transformation as its competitiveness decreases; amongst other things, due to problems such as density of work, transportation problems, and infrastructure deficiencies.

In this framework, instead of continuing as a production focus, steps should be taken to support the design and retail identity of Siteler. Not only that, another strategy that ought to be considered is to move production to new production areas outside the city, because these areas offer larger and healthier production conditions. In the event that latter strategy isn't pursued, some form of high-value added artisanal production combined with technology can be sustained in Siteler for niche markets.

In conclusion, the traditional furniture industry, which is without doubt going through some form of revival, with new technologies, will take its place in the country's economy as a soaring potential in the coming years. In order to facilitate this, it is important to make more effective and widespread use of new technologies that play an active role in industrial and spatial restructuring processes, to develop cooperation with other institutions and organizations, and to expand activities on new technologies. It is also crucial that decision-makers examine the spatial formations caused by new technologies in terms of the furniture industry and to proffer recommendations where and when necessary, throughout this process. Thus, the findings of the study show that the spatial dynamics of the restructuring process based on new technologies are experienced differently by developed countries and developing countries such as Türkiye, depending on the international spatial division of labour and firm structure. Instead of focusing on mass production options, firstly, design intensive products with a diversification can be supported, contrary to the roles of developing countries in international division of labor. Secondly, by increasing specialization and customization, it becomes possible for firms to focus on high value-added niche markets.

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ANKARA MOBİLYA SEKTÖRÜNDE YENİDEN YAPILANMA VE YENİ MEKANSAL EĞİLİMLER

Mobilya sektörü ulaşım ve iletişim alanındaki gelişmeler, küreselleşme, yeni üretim teknolojileri ve esnek üretim örgütlenme biçimlerinin etkisiyle, 1980'lerden sonra hem gelişmiş hem de gelişmekte olan ülkelerde yeniden yapılanmaktadır. Mobilya sektörünün sıradan üretimleri gelişmekte olan ülkelere kaydırılırken; tasarım ağırlıklı, katma değeri yüksek üretim gelişmiş ülkelerde tutulmakta ve yeni teknolojilere yapılan yatırımlarla niş pazarlara yönelik olarak gerçekleşmektedir. Gelişmekte olan ülkeler ise gelişmiş ülkelerin sıradan üretimlerini kaydırma sürecinden daha fazla pay kapabilmek için ihracat ağırlıklı üretim ve tasarıma yönelmekte, teknolojiye yatırım yaparak ve üretim altyapılarını geliştirerek yeniden yapılanma sürecine girmektedir. Yeni teknolojilerin belirsiz/değişken talep koşullarına uyum sağlamada sunduğu olanaklar, üretimde verimliliği ve kaliteyi artırarak rekabetin sağlanmasında önemli rol oynamaktadır.

Bu çalışmanın amacı, yeni teknolojilerin mobilya sektörünün mekânsal yeniden yapılanma sürecindeki etkilerini ortaya koymaktır. Alan çalışmasında 2000'in ortalarından itibaren yoğun olarak bilgisayar destekli tasarım ve imalat sistemlerinin üretim sürecine girdiği Ankara Mobilya Sektörü ele alınmıştır. Yeni teknolojilere dayalı yeniden yapılanma süreci sektörün Ankara Metropoliten Alanındaki mekânsal yapısını da dönüştürmektedir. Çalışmada olasılıklı olmayan amaca yönelik örneklem yöntemi kullanılmış, teknolojisini yenileyen 80 firma ile ve karşılaştırma imkanı vermesi açısından teknolojisini yenilemeyen 40 firma ile derinlemesine görüşmeler yapılmıştır. Firmalarla yapılan derinlemesine görüşmeler, yeni teknolojilerin firmalarda üretim organizasyonu ve işgücü süreçlerini değiştirerek yapısal ve mekânsal olarak yeniden yapılanma süreçlerini ortaya koymaktadır. Çalışma bulguları yeni teknolojilerin bir taraftan firmaların yer değiştirme ve yığılma/kümelenme eğilimlerini desteklediğini ortaya koyarken, diğer taraftan teknoloji yenileyen büyük firmaların önemli bir kısmının, küçük ve orta büyüklükteki işletmelere dayalı yığılma ve kümelenme alanlarına ilişkin yazından farklı olarak, kent çeperi ve dışındaki yeni yığılma alanlarında yer seçtiğini göstermektedir. Bu süreçte, organize sanayi sitelerinde sunulan dışsallıkların; organize olmayan alanlarda ise yerel yönetimin uygun arsa sunumlarını içeren teşviklerinin belirleyici olduğu görülmektedir.

RESTRUCTURING AND NEW SPATIAL TENDENCIES IN ANKARA FURNITURE SECTOR

The furniture industry has been restructured in both developed and developing countries after the 1980s with the impact of developments in transportation and communication, globalisation, new production technologies and flexible production methods. While the conventional production of the furniture industry is moved to developing countries, design-oriented, high value-added production is kept in developed countries and realised for niche markets through investments in new technologies. Developing countries, on the other hand, are turning towards an export-oriented production and design, investing in technology, and developing their production infrastructures to acquire a larger share in the process of moving the conventional production to developing countries. The opportunities offered by new technologies in adapting to uncertain/variable demand play an important role in ensuring competitiveness by increasing productivity and quality in production.

The purpose of this study is to reveal the effects of new technologies on the spatial restructuring process of the furniture industry. In the field study, the Ankara Furniture Industry, where computer-aided design and manufacturing systems have been intensively introduced into the production process since the mid-2000s, is taken into consideration. The restructuring process based on new technologies also transforms the spatial structure of the industry in Ankara Metropolitan Area. In the study, non-probability purposive sampling method was used, and in-depth interviews were conducted with 80 firms that have renewed their technology and 40 firms that have not renewed their technology in order to provide a comparison. In-depth interviews with firms reveal the structural and spatial restructuring processes of new technologies by changing the production organisation and labour processes in firms. While the findings of the study reveal that new technologies, on the one hand, support the relocation and agglomeration/clustering tendencies of firms, on the other hand, it indicates that a significant portion of large firms that renew technology have chosen to locate in new agglomeration areas in and outside the urban periphery, unlike the literature on agglomeration and clustering areas based on small and medium-sized firms. In this process, it is seen that the externalities offered in organised industrial zones and the incentives of the local government including the provision of suitable land in unorganised areas are decisive.

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