Regional Wage, Productivity Differences and Location Choice of Manufacturing Sector in Turkey[*]

Türkiye'de Bölgesel Ücret, Verimlilik Farklılıkları ve İmalat Sanayinin Mekan Seçimi

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ABSTRACT

Theoretical models and empirical studies focus on, in general, local characteristics such as centripetal or centrifugal forces to explain regional differences in economic activities. However, how the technological characteristics of the economic activities affect the location choice are critical issues. The paper defines four types of industries based on the relation between regional distribution and selected technology indicators to explore the changes in industrial structure of the regions over the periods before and after 2008. The findings reveal that, in spite of the short period covered, it is possible to observe some changes using the industry types we defined.

Keywords: wage differentials, labor productivity, location decision, Turkey, technological indicators

ÖZ

Ekonomik faaliyetlerin bölgesel farklılıklarını açıklamak için teorik modeller ve ampirik çalışmalar genellikle "*centripetal*" ya da "*centrifugal*" güçler gibi yerel karakteristiklere odaklanırlar. Ancak ekonomik faaliyetlerin teknolojik özelliklerinin mekan seçimini nasıl etkilediği önemli bir konudur. Çalışma 2008 öncesi ve sonrası iki dönem boyunca bölgelerin sanayi yapılarındaki değişimi bölgesel farklılaşma ile seçilmiş teknoloji göstergeleri arasındaki ilişkiye dayalı dört sanayi tipi ile tanımlıyor. Sonuçlar kapsanan çok kısa zaman aralığına rağmen tanımlanan sanayi tipleri ile bazı gözlemler yapılabileceğini gösteriyor.

Anahtar kelimeler: ücret farklılıkları, işgücü verimliliği, mekan kararı, Türkiye, teknolojik göstergeler

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1. Introduction

The main idea of the paper was striving to identify the fuzzy link between the technological characteristics of an economic activity and location choice. Theoretical models and empirical studies focus on, in general, local characteristics such as centripetal or centrifugal forces to explain regional differences in economic activities. However, how the characteristics of the economic activities affect the location choice are ignored. The paper focuses on the technological properties of the manufacturing activities and investigates the links between regional distribution of manufacturing and using some basic technological indicators such as labor productivity and wages. Therefore, the paper intends to explore the relationships between the technological characteristics of an economic activity and location choice. The relation is employed to defined four types industries in the paper.

Technology indicators are sectoral wage and labor productivity at regional level. TurkStat aggregated annual manufacturing data are employed for the analysis. The analysis covers the periods of 2003-2008 and 2010-2014. We consider sectoral classifications based on two - digit industry and NUTS2 level regions. Some basic descriptive statistics are used due to limited and discontinuous time dimension of the data. Therefore, regional variations in economic activities and regional variations in wages and productivities of sectors are measured by dispersion ratio (DR).

Following section covers a brief discussion on spatial economics and location choice. Section 3 presents the data and indicators used in the analyses. Industry types that we define based on the relation between regional distribution variations in technology indicators explained in Section 4. Section 5 displays the results of descriptive analyses. The last section concludes the paper.

2. Spatial Economics and Location Choice

The paper mainly asks whether the technological characteristics of an economic activity have an effect on its location choice. However, the location theory has a perplexing characteristic and has many facets. The interdisciplinary characteristics of the theory complicate to discover which approach could be suitable to examine location choice. Economics and geography are the leading fields related to this issue. Each field has own model and tools. Therefore, the new question is which model could comprehensively elaborate location choice. The section takes a brief tour from the roots of spatial economics to the Krugman's New Economic Geography Model. Thus, we aim to provide a brief theoretical background for spatial economics and regional concentration of manufacturing. Special attention paid on spatial externalities which are crucial in manufacturing concentration through affecting the location choice of the firms.

Spatial characteristics of economic activities and location choice have been important concerns during the last two centuries. There is a rich literature starting from Johann Heinrich von Thünen's book. *The Isolated State* of von Thünen (1826/1966) is the first considerable work on spatial economics. Novelty on special characteristics of location choice has clarified "where, when, why and how" an economic activity is in a specific place. Clark (1967, p. 370) emphasizes that "*Von Thünen's work has been unduly neglected by economists, it has on the other hand suffered from rather excessive attention by geographer*". Von Thünen was a farmer and his model was created with the examination of rural production. Clark (1967) tells that *"[it was] interesting study of a rural economy in the days of horse transport, but seek evidence to prove that the location patterns described by him are still applicable in the present-day world*". Von Thünen's main contribution to the literature is to reveal transport cost and rent concepts

by observing the facts, i.e., distance from the market for different products.[1] Therefore, he has achieved to convert "the facts" related to the spatial characteristics to "concepts".

In the neoclassical economics, the location choice has been marginalized and remained on the boundary of mainstream approach a long time. The problem is that spatial economy contains some incompatibilities with neoclassical economic models. Beckman draws our attention to this issue and says that:

> integrating location theory into neoclassical economics is not as straightforward as it may seem. For space brings with it two phenomena that raise difficulties and are therefore often ignored in neoclassical economic theory: economies of scale as the prime cause of "localization" and externalities or "neighborhood effects", the cause of so-called agglomeration. (Beckman, 1999, p. vii)

Sometimes spatial economists make clear an uncertain issue related location decision of firms and this incorporated to the theory. Yet especially the models of neoclassical approach have been far from capturing all issues which are nested in the location decision. Therefore, an economic activity "where, when, why and how" locates in a specific place has remained unanswered question without a holistic approach over the decades. Typically, neoclassical economic theory does not consider space, and tends to ignore externalities and increasing returns due to the modeling difficulties. Krugman (1991b) is the first attempt to construct an economic model which can capture externalities.

Alfred Marshall (1890/1920) is the first economist who mentions about spatial externalities. Marshall identifies three external economies with the concentration of many firms in the same place in an industry (Krugman, 1991a, pp. 36-37): First, an industrial center lets existence of "a pooled market for workers with specialized skills" and workers and firms both gain from this type market; second, an industrial center lets facility to access for inputs which the industry needs; and third, an industrial center generates technological spillovers and the movement of information at local level is easier considering great distance. These are the forces that promote spatial concentration, and they are called as centripetal forces; on the other hand, the forces that resist such concentration represent centrifugal forces (Fujita, Krugman and Venables, 1999, p. 9). The centripetal forces, which are Marshallian sources of external economies, are listed as market size effects, thick labor markets and pure external economies while the centrifugal forces are immobile factors, land rents and pure external economies (Krugman, 1999, p. 143). In the paper, we emphasize the externalities (Marshallian sources of external economies) as spatial characteristics of regions. However, we also focus on the technological characteristics of an economic activity beyond these externalities which stem from the characteristics of the region.

3. Data and Indicators

The analysis covers two periods: First period is 2003-2008, and second period is 2010-2014. It is known that economic crises have significant temporary effects on the regional distribution of the economic activities.[2] Therefore, the data for the year 2009 is excluded. Since the data for the year 2005 is missing, for the first period only the data for the years 2003-2004 and 2006-2008 are used. TurkStat aggregated annual manufacturing data are employed for the analysis.

We consider manufacturing sectors at two-digit sectoral classifications of NACE Rev. 1.1 for the first period and of NACE REV. 2 for the second period. The paper covers 26 NUTS2 level regions in Turkey.[3] Some basic descriptive statistics are used due to limited and discontinuous time dimension of the data.

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[1] "Von Thünen's great achievement was to point out that transport costs were the cause, and rents the consequence, of important differentiations of agricultural, dairy, and forest production, according to distance from the market" (Clark, 1967, p. 371).
[2] See for example Doğruel and Doğruel (2003, p. 313).
[3] List of the NUTS 2 level regions in Turkey is given in Appendix 4.

Regional distribution of manufacturing sector is defined as the labor share of region in total employment of each sector. We use two technological indicators to define the characteristics of the sectors: Average sectoral wage in each region and average labor productivity of sectors in the region. "Average wage" is defined as the ratio of "wage and salaries" to "number of workers." "Average productivity" is calculated dividing "turnover" by "number of workers".

Variations in sectoral average wage and sectoral labor productivity across region can be measured by standard deviation. If a sector is absent in a region number of labors is taken as zero for the calculation of variance of sectoral distribution. These sectors are excluded in the calculation of the standard deviations for wage and productivity Average wage and productivity may significantly differ between sectors. Additionally, levels of these indicators change due to price variations in time and between regions. In order to eliminate price effects standard deviation is normalized through dividing by mean. As a result, dispersion ratio is obtained:

$$Dispersion\ ratio\ (DR)\ =\ standard\ deviation\ /\ mean$$

Although each period covered in the paper corresponds relatively stable years of the Turkish economy, dispersion ratio is still subject to variation over time due to short-run macro-economic fluctuations. To eliminate short-run fluctuations, the average of dispersion ratios for each period employed as the variation indicator. These calculations produce three variation indicators of the manufacturing sectors for each period: Variation of sector share across regions, variations wage differences between regions and variations of labor productivity between regions for each manufacturing sector at two-digit classifications. Higher (average) dispersion ratio indicates uneven distribution of manufacturing sector between regions and higher variations in wage and productivity of the sectors across regions.

4. Characterization of Industry Types

Spatial externalities are the important determinants of the location choice of the firms. Externalities as the outcome of the characteristics of the region have significant implications on the technological properties of the firm. Advantages and disadvantages provided by the region have effects on the productivities and efficiencies of the firm. On the other hand, the technological characteristics of an economic activity may have an effect on its location choice. Therefore, regional variations in location choice technological variations across region are interrelated. Whatever the main source of the variations in wage and productivity of the sectors across regions, it is plausible to expect that if the wages and productivity vary across the regions firms prefer the regions where wages are low, and productivity is high. In this case it is possible to assume that the variations in productivity may be also an outcome of the location choice of the firms. If there is no variation in productivity and wages between regions space is not important for the location choice. Therefore, regional characteristics dominate the location choice (centrifugal and centripetal forces). However, multi-dimensional dynamics behind the location choice of the firms, we observe differentiated relation between variations in these technology indicators and regional distribution.

Considering the relation between technological variations across regions and variation in regional distribution, it is possible to define four types of industries. Table-1 presents the how we construct the structure framework to classify the sectors based on the relation between these variation indictors. Degree of variations, level of period's average of dispersion ratios, ranked from low to high, and the sectors which have value below the median labeled as low and those above the median as high. Four-cell chart displays types of industries in terms of variations in technological indicators and regional variations. Type-3 industries do not display high variations in terms of technological variations across regions and they are distributed between regions relatively evenly. In other words, these industries are indifferent in location choice due to variations in the opportunities provided in the region. As the opposite case, Type-2 industries concentrated in smaller number of the regions and the variations in technology indicators are

relatively high. It is possible to expect that the firms prefer the regions where productivity is higher, and/or wages are lower. At this point it is necessary to emphasize one property of the labor market in Turkey. Minimum wage rule is implemented in Turkey without differentiation at the regional base. Therefore, we can assume that the wage level for the unskilled labor is roughly same for all regions. Determinants of variations in wage level are either variations in wages of skilled labor or average skill level in the region, or both. High correlation between variations in wages and variations in productivity imply that variation in wages across regions largely related with the skill level in the region employed by the industry. Considering these discussions on wage and productivity Type-2 industries also significantly differ in terms of technology across the regions where agglomerated.

Table 1. Industry Types

				Regional variations	
			.	Low	High
Technological variations	Productivity differences	Wage differences	High	Type-1	Type- 2
			Low	Type- 3	Type- 4

For the Type-1 and Type-4 industries, dynamics of location choice is much more complicated and regional and sectoral characteristics may be relatively dominant. Although Type-4 industries have low variations in wage level and productivity, they are concentrated in some regions. Partly this may be outcome of the intra industry linkages which create externalities other than the factors directly related with the production costs. Despite the high variations in wage and productivity Type-1 industries distributed relatively evenly across regions. For this type of industries, it is possible to conclude that the location choice of the firms deeply affected by the environment provided by the region. Among others, we may emphasize transportation costs and access to markets.[4]

Employing the approach to define industry types manufacturing sectors are classified based on the technology indicators separately. Although we have found high correlations between variations in wage and variations in productivity during the period of 2003-2008 and 2010-2014, the results slightly differ between classification based on wage variations and productivity variation. Lists of the sectors under four types of industries are given in Appendix-1 and Appendix-2. Industry types are used for assessing the industrial characteristics of the regions and observing the changes in these structures over two periods covered in the paper.

Creating a conceptual typology for sector groups naturally subjects to distortions in the empirical results found. One reason is the explanatory power of the data. More important reason may be the lack of the determinants that we considered in the paper other than the technology indicators on location choice: Particularly time dependency on location choice may be crucial one, and to evaluate it require an analysis over longer time span.

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[4] Transportation cost is one of the prominent factors to explain location choice in the literature. Karahasan, Doğruel and Doğruel (2016) found that the access to market has significant role to explain regional differences.

5. Changes in the Manufacturing Structure in the Regions

This section discusses the changes in the manufacturing structure of the regions in terms of the industry types defined in the previous section. In order to present the result more clearly, we focus on only sector which high regional share. We also grouped the regions for simplicity. To this end we employed regional distribution of total manufacturing sector. Table-2 displays the shares of regions in total manufacturing and cumulative shares of the regions ranked from high to low share. During two periods share of Istanbul is higher than 30 percent. Second 30 percent of total manufacturing employment is concentrated in four major industrial regions of Turkey: TR41, TR31, TR42 and TR51. Five regions hold more than 60 percent of the Turkish manufacturing employment. The lowest share in top five regions is about 5.5 percent. Considering the regional distribution characteristics of the total manufacturing sector, we choose 5 percent share as the threshold to determine the sectors to define as important sectors of the region. Share of the sector is calculated considering the ratio of employment in the region to total employment of the sector. Referring to the regional distribution of total manufacturing sector, it is possible to conclude that the region's share is above 5 percent it is in the top region group which have at least 50 percent of total employment of the sector.

Table 2. Regional Distribution of Manufacturing Sector
(Number of Workers)

	2003-2008 average			**2010-2014 average**	
Regions	Share (%)	Cumulative share (%)	Regions	Share (%)	Cumulative share (%)
TR10	33.92	**33.92**	TR10	30.41	**30.41**
TR41	10.03	**43.96**	TR41	9.85	**40.26**
TR31	7.60	**51.56**	TR42	7.81	**48.07**
TR42	6.61	**58.17**	TR31	7.01	**55.08**
TR51	5.53	**63.70**	TR51	5.64	**60.72**
TR32	3.97	67.67	TR21	4.35	65.07
TR21	3.97	71.64	TR33	4.09	69.16
TR33	3.58	75.21	TR32	3.72	72.88
TR62	2.87	78.08	TRC1	3.20	76.08
TR72	2.56	80.64	TR62	2.88	78.96
TRC1	2.53	83.17	TR72	2.81	81.77
TR52	2.47	85.64	TR52	2.72	84.49
TR63	2.17	87.81	TR63	2.71	87.20
TR83	1.87	89.68	TR61	1.98	89.18
TR61	1.80	91.49	TR83	1.85	91.03
TR90	1.59	93.07	TR90	1.65	92.68
TR22	1.54	94.61	TR22	1.49	94.17
TR81	1.29	95.91	TR81	1.16	95.33
TR71	1.02	96.93	TR71	1.11	96.44
TRB1	0.87	97.79	TRB1	1.00	97.44
TRC2	0.70	98.49	TRC2	0.73	98.17
TR82	0.52	99.02	TR82	0.69	98.86
TRA1	0.30	99.31	TRC3	0.39	99.25
TRB2	0.29	99.60	TRA1	0.30	99.56
TRC3	0.22	99.82	TRB2	0.30	99.85
TRA2	0.18	100.00	TRA2	0.15	100.00

Source: Calculated using TurkStat data

In this section we focus on the change in industrial characteristics of the regions from first period to the second period. The year 2008 is a benchmark in terms of some important transitions in the world economy due to the Financial Crisis at global level. In the aftermath of the crisis, we observe increasing trend in protectionism and slowdown in the globalization. The new international environment may have some impacts on total production structure at national level as well as regional level. Additionally, in the years 2009 the Turkish government introduced a new program to reduce regional differences and to encourage the manufacturing

investments in the lagged regions. Although time dimension of the second period covered in the paper is short, the new program may generate some deviations in the regional allocation of the manufacturing activities. The changes over periods are the combined outcome of these two events.

One difficulty related with the data employed in the paper is that sector classifications are not same for the first and second periods. Therefore, it is not possible to trace the changes at the sectoral level. To overcome this problem, we label each manufacturing sector by the sector types defined in the previous section using the result presented in Appendices -1 and 2. Table-3 and Table-4 display the number of sectors for four types of industries in the regions for two period covered in the paper. In Table-3 sector types are defined using productivity variations and in Table-4 using wage variations. The regions in the first- and second-30 percent group are shown separately, the result for the remaining regions (rest of the regions) are combined.

Table 3. Manufacturing Structure in the Regions (Productivity Base)

2003-2008

TYPE 1			TYPE 2		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	6	30%	TR10	5
30%	TR31	5	30%	TR31	5
	TR41	6		TR41	1
	TR42	5		TR42	2
	TR51	3		TR51	4
40%	Rest of Reg.	6	40%	Rest of Reg.	1

TYPE 3			TYPE 4		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	5	30%	TR10	5
30%	TR31	3	30%	TR31	4
	TR41	4		TR41	2
	TR42	3		TR42	3
	TR51	2		TR51	1
40%	Rest of Reg.	11	40%	Rest of Reg.	3

2010-2014

TYPE 1			TYPE 2		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	5	30%	TR10	7
30%	TR31	4	30%	TR31	5
	TR41	4		TR41	3
	TR42	4		TR42	5
	TR51	2		TR51	4
40%	Rest of Reg.	9	40%	Rest of Reg.	3

TYPE 3			TYPE 4		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	6	30%	TR10	5
30%	TR31	6	30%	TR31	4
	TR41	6		TR41	1
	TR42	5		TR42	2
	TR51	4		TR51	1
40%	Rest of Reg.	7	40%	Rest of Reg.	5

Wage base data shows that the localization of Type-1 industries in the major industrial regions do not display similar pattern from one period to another (Table-4). The number of Type-1 industries increased in TR31 and TR42 and decreased in TR10 and TR41 while did not change in TR51. The Type-1 industry number increased in the group of "rest of the regions". Type-3 industries increased in the major industrialized regions, except the TR42 region, which has displayed no change. TR42 region has the same pattern for Type-4 industries: The number of Type-4 industries did not change in both periods. Type-2 industries increased in all type regions.

Table 4. Manufacturing Structure in the Regions (Wage Base)

2003-2008

TYPE 1			TYPE 2		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	6	30%	TR10	5
	TR31	5		TR31	4
30%	TR41	6	30%	TR41	2
	TR42	5		TR42	3
	TR51	3		TR51	3
40%	Rest of Reg.	4	40%	Rest of Reg.	1

TYPE 3			TYPE 4		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	4	30%	TR10	6
	TR31	3		TR31	6
30%	TR41	4	30%	TR41	2
	TR42	3		TR42	2
	TR51	2		TR51	2
40%	Rest of Reg.	11	40%	Rest of Reg.	4

2010-2014

TYPE 1			TYPE 2		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	5	30%	TR10	7
	TR31	6		TR31	5
30%	TR41	5	30%	TR41	3
	TR42	6		TR42	5
	TR51	3		TR51	4
40%	Rest of Reg.	5	40%	Rest of Reg.	3

TYPE 3			TYPE 4		
Share of region	Region	Number of sectors	Share of region	Region	Number of sectors
30%	TR10	5	30%	TR10	5
	TR31	4		TR31	4
30%	TR41	5	30%	TR41	1
	TR42	3		TR42	2
	TR51	3		TR51	1
40%	Rest of Reg.	11	40%	Rest of Reg.	5

6. Conclusion

Regional economics and particularly location choice of the firms are blurred field in economics. Time length of two periods covered in the paper are very shorts and can provide limited access to capture the change in the regions. 2008 Financial Crisis in between two periods and introduction of policy package to reduce regional differences at the beginning of the second

period shifted the discussion into a much more complicated atmosphere. However, using industry types defined in the paper can permit us to obtain some fairly clear results. Despite the loose relations between regional variations and technological variations employed for the definition of the industry types, the concept can capture externalities and transportation costs as well as the technological characteristics of the sector related with the location choice.

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Appendices

Appendix 1. Productivity Base Classification of Turkish Manufacturing Sectors[5]

2003-2008

			Regional variations	
			Low	High
Technological variations	Productivity differences	High	**Type-1 industries:** 20 Wood products except furniture 27 Basic metals 28 Metal products 29 Machinery and equipment 34 Motor vehicles 36 Furniture and other manufacturing	**Type-2 industries:** 22 Publishing and printing 23 Coke and refined petroleum 31 Electrical machinery and apparatus 32 Radio, television and communication 33 Medical, precision and optical instruments
		Low	**Type-3 industries:** 15 Food and beverages 17 Textiles 19 Leather 25 Rubber and plastic 26 Other mineral products	**Type-4 industries:** 16 Tobacco 18 Wearing apparels 21 Paper and paper products 24 Chemicals 30 Office machinery and computers 35 Other transport equipment

2010-2014

			Regional variations	
			Low	High
Technological variations	Productivity differences	High	**Type-1 industries:** 11 Beverages 13 Textiles 16 Wood products, except furniture 20 Chemicals 24 Metals	**Type-2 industries:** 18 Printing 19 Coke and petroleum 27 Electrical equipment 29 Motor vehicles 30 Other transport equipment 32 Other manufacturing 33 Repair and installation
		Low	**Type-3 industries:** 10 Food products 22 Rubber and plastic 23 Other mineral products 25 Fabricated metal products 25 Fabricated metal products 28 Machinery and equipment 31 Furniture	**Type-4 industries:** 14 Wearing apparel 17 Paper 21 Pharmaceutical products 26 Computer, electronic and optical products

Source: Calculated using TurkStat data

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[5] To enhance the visibility of tables in Appendix 1 and 2, the names of the sectors are abridged. Complete definitions of the sectors are given in Appendix 3.

Appendix 2. Wage Base Classification of Turkish Manufacturing Sectors

2003-2008

			Regional variations	
			Low	High
Technological variations	Wage differences	High	**Type-1 industries:** 20 Wood products except furniture 25 Rubber and plastic 28 Metal products 29 Machinery and equipment 34 Motor vehicles 36 Furniture and other manufacturing	**Type-2 industries:** 23 Coke and refined petroleum 31 Electrical machinery and apparatus 32 Radio, television and communication 33 Medical, precision and optical instruments 35 Other transport equipment
		Low	**Type-3 industries:** 15 Food and beverages 17 Textiles 26 Other mineral products 27 Basic metals	**Type-4 industries:** 16 Tobacco 18 Wearing apparels 19 Leather 21 Paper and paper products 22 Publishing and printing 24 Chemicals 30 Office machinery and computers

2010-2014

			Regional variations	
			Low	High
Technological variations	Wage differences	High	**Type-1 industries:** 11 Beverages 16 Wood products, except furniture 20 Chemicals 22 Rubber and plastic 24 Metals 25 Fabricated metal products	**Type-2 industries:** 19 Coke and petroleum 26 Computer, electronic and optical products 27 Electrical equipment 29 Motor vehicles 30 Other transport equipment 32 Other manufacturing 33 Repair and installation
		Low	**Type-3 industries:** 10 Food products 13 Textiles 23 Other mineral products 28 Machinery and equipment 31 Furniture	**Type-4 industries:** 14 Wearing apparel 15 Leather 17 Paper 18 Printing 21 Pharmaceutical products

Source: Calculated using TurkStat data

Appendix 3. NACE Rev.1.1 and NACE Rev.2 Sector Names

NACE Rev.1.1

Section D: Manufacturing (23 sub- sectors)	
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of pulp, paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office machinery and computers
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling

NACE Rev.2

Section C: Manufacturing (24 sub- sectors)	
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
22	Manufacture of rubber and plastic products
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment
31	Manufacture of furniture
32	Other manufacturing
33	Repair and installation of machinery and equipment

Source: TurkStat

Appendix 4. NUTS2 Level Regions in Turkey

TR10 (İstanbul)
TR21 (Tekirdağ, Edirne, Kırklareli)
TR22 (Balıkesir, Çanakkale)
TR31 İzmir
TR32 (Aydın, Denizli, Muğla)
TR33 (Manisa, Afyonkarahisar, Kütahya, Uşak)
TR41 (Bursa, Eskişehir, Bileik)
TR42 (Koaeli, Sakarya, Düze, Bolu, Yalova)
TR51 Ankara
TR52 (Konya, Karaman)
TR61 (Antalya, Isparta, Burdur)
TR62 (Adana, Mersin)
TR63 (Hatay, Kahramanmaraş, Osmaniye)
TR71 (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir)
TR72 (Kayseri, Sivas, Yozgat)
TR81 (Zonguldak, Karabük, Bartın)
TR82 (Kastamonu, Çankırı, Sinop)
TR83 (Samsun, Tokat, Çorum, Amasya)
TR90 (Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane)
TRA1 (Erzurum, Erzinan, Bayburt)
TRA2 (Ağrı, Kars, Iğdır, Ardahan)
TRB1 (Malatya, Elazığ, Bingöl, Tuneli)
TRB2 (Van, Muş, Bitlis, Hakkari)
TRC1 (Gaziantep, Adıyaman, Kilis)
TRC2 (Şanlıurfa, Diyarbakır)
TRC3 (Mardin, Batman, Şırnak, Siirt)

Source: TurkStat