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# HIGH POINT INDUSTRIES OF THE AEGEAN REGION OF TURKEY

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## ÖZET

Endüstriyel kümeler üzerine teorik çalışmalar geliştikçe pek çok araştırmacı farklı ulusal ekonomilerin farklı bölgelerindeki kümeleri tanımlamaya odaklanmışlardır. Genel vurgu, üzerinde sürdürülebilir kalkınma politikaları oluşturulabilecek potansiyel kümeleri saptamak üzerinedir. Bu çalışma, Türkiye’de bölgesel kümelerin saptanmasına olanak sağlayacak bir temel oluşturmayı amaçlamaktadır. İmalat sanayi için 1995 ve 2000 yılı verileri kullanılarak bölgesel istihdam payı ve yoğunlaşma oranları hesaplanmış ve Ege Bölgesi’nin “yüksek nokta”ları saptanmıştır. Daha sonra saptanan endüstriler üzerine odaklanılıp Ege Bölgesi kümelerinin saptanması için bir öncü çerçeve sağlanmaya çalışılmıştır.

## ABSTRACT

As theoretical studies on industrial clusters have progressed, many researchers have focused on identifying clusters in various regions in different national economies. The emphasis has generally been to identify potential clusters, upon which a policy of sustainable development can be formulated. This paper aims to provide a basis to enable the identification of the regional clusters in Turkey. Using manufacturing industry data for years 1995 and 2000, regional high points of the Aegean Region have been identified by calculating shares of regional employment and concentration ratio. Then the identified industries have been focused upon to provide an initial framework to identify Aegean Region’s clusters.

## INTRODUCTION

It is generally agreed upon that a transition from an international to a global economic order took place in the early 1970s, with the collapse of the Bretton Woods system. Some of the most important aspects of this new era are; a deep integration of production at a global level, replacement of nation states by TNCs as the most important economic actors of the world and the global division of labour that has come to take place between regions (Amin and Thrift, 1996:2; Asheim and Dunford, 1997; Levy and Dunning, 1993).

Such events have increased the importance of the concept of “industrial agglomeration and specialisation” in formulation of regional policies aimed at the creation of sustainable competitive advantage. Even though the concept has been in use for more than a hundred years (Marshall, 1890), it’s current importance is mostly due to Porter’s popularisation of the concept of clusters, which is a version of growth pole theory (Cooke, 2001a). The growth-pole theory (Perroux,1955) states that economic development takes place by the expansion of networks of interconnected firms at various locations. Constituting the focal points of networks of principal firms, growth poles are thought to form the driving force of economic growth. Economic relations within this framework are regarded to be more dependent on the nature of market relations in economic space rather than physical space (Perroux,1970; Lambooy and Boschma, 2001). However, Porter has emphasised the importance of local concentration and defined clusters as:

“...geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate” (Porter, 1998).

Even though a generally accepted definition of clusters does not exist, a point of common understanding between researchers is that the clusters are an opportunity for moving towards a more knowledge-based economy which may increase the chances for attaining a sustainable development path (Cooke, 2001b). The learning process involves absorption, generation and diffusion of new knowledge and clusters provide the social milieu in which especially tacit knowledge, created by learning-by-doing, can be exchanged. Drawing on daily routines, on the tacit experience of using capital goods, producing, interacting with both customers and other manufacturers do the informal exchange channels operate and enable access to highly localised specific learning processes and external and internal tacit knowledge which are very important for increasing returns to scale (Krugman, 1991; Antonelli, 1998; Antonelli, 1999; Amin and Wilkinson, 1999; Gertler, 2001; Gregerson and Johnson, 1997; Keeble and Wilkinson, 1999).

Thus, the cluster theory has become the standard concept in a new field, even if it is widely debated to be considered as standard, and policy-makers all over the world have seized upon the concepts of the cluster model as a tool for promoting national, regional and local competitiveness, innovation and growth. (Martin and Sunley, 2003).

## PURPOSE

This article’s aim is to identify the manufacturing high point industries across the Aegean Region, and provincial locations of these industries. The identification of manufacturing high point industries, will provide a starting point for an industrial cluster study for the Aegean Region development policy.

## METHODOLOGY

The methodology used to identify high points can be characterised as follows:

- Boundaries of Aegean Region have been identified in accordance with the definition of the region by the State Planning Organisation (SPO), which is basically geographical in nature. According to this definition, the region consists of

8 provinces, namely Izmir, Manisa, Denizli, Aydın, Mugla, Manisa, Afyon and Kutahya.

- Firm level four-digit ISIC Rev 3 data of Aegean Region manufacturing industries have been obtained from State Institute of Statistics (SIS). The analysis encompasses all manufacturing industries of economic activity and is Aegean Region-wide.

- The analysis is firm-based, using data for years 1995 and 2000 on more than 21309 firms relating to their type of activity, employment, location, value-added, size and regional exports and imports of industries.

- Employment data has been used to identify regional “high points” which are defined as industries that account for at least 0.2 per cent of the regional workforce and at least 25 per cent more concentrated than the national average (that is, with an LQ value over 1.25). Location Quotient (LQ) values have been calculated as follows:

$$LQ = \{(E_{ij} / \Sigma_i E_{ij}) / (\Sigma_T E_{iT} / \Sigma_i \Sigma_T E_{iT})\} \quad (1)$$

where E stands for employment and subindex i stands for 4 digit SIC Rev 3 industry, subindex j stands for the studied unit of analysis (Aegean Region or provinces in this case) and subindex T stands for all the provinces of Turkey. Thus;

$E_{ij}$  stands for employment of a given industry (i) in a given region (j),

$\Sigma_i E_{ij}$  stands for total industry employment in a given region (j),

$\Sigma_T E_{iT}$  stands for total national employment of a given industry (i) and

$\Sigma_i \Sigma_T E_{iT}$  stands for total national employment of all industries.

## EMPIRICAL RESULTS

### The Aegean Region

Turkey consists of 7 geographical regions. According to State Planning Organisation (SPO) data for the year 2000, Marmara Region has the highest value of GDP with a value of \$74 billion and Aegean Region has the third value, \$30,5 billion.

**Table 1: Provincial Profile of the Aegean Region Manufacturing Industry**

SOURCE: State Institute of Statistics Manufacturing Industry Database

	Number of Firms	Number of firms As Percentage of Aegean Total	Employment	Employment Percentage of Aegean Total	Value Added	Value Added As Percentage of Aegean Total
Afyon	104	5,28	6161	3,29	182695589	2,83
Aydin	89	4,52	7706	4,11	158653160	2,46
Denizli	416	21,13	40756	21,76	722598307	11,21
Izmir	1021	51,85	94353	50,38	4428508034	68,67
Kutahya	50	2,54	8096	4,32	117933368	1,83
Manisa	194	9,85	22552	12,04	770307391	11,95
Mugla	28	1,42	1984	1,06	17847283	0,28
Usak	67	3,40	5684	3,03	50057328	0,78
Regional Overall Totals	1969	100	187292	100	6448600462	100

The region stands for about %15 of national GDP. In terms of per capita GDP, Marmara Region again takes the lead with a value of \$3060 whereas Aegean Region is the second with \$20610. The Aegean Region ranks fourth as recipient of public investment expenditures; a value of \$550 million out of a national total of \$10,5 billion.

Manufacturing industry of Aegean Region concentrates mostly in the provinces of Izmir, Manisa and Denizli. In the Aegean Region, 82,83% of the firms, 84,18% of employment and 91,83% of created value added in manufacturing are accounted for by these three provinces. Among these three provinces, Izmir accounts for more than half of the region's firms, employment and created value added in manufacturing.

### High Points Industries of the Aegean Region

24 high point industries have been identified in the region, which account for 25% of firms, 36,7% of employment and 55,3% of created value added from the Aegean Region manufacturing industry. In terms of the number of firms, non-refractory clay and ceramic products sector is a leader where as in terms of employment the tobacco sector is the first. And in terms of created value added, the refined petroleum products sector is the most important.

Considered in terms of number of firms, structural non-refractory clay and ceramic products (ISIC 2693) takes the lead. However, between 1995 to 2000 this industry has shrunk by about a ratio of 1/5. The second, is the processing and preserving of fruit and vegetables (ISIC 1513), which has shrunk by about 1,56% in the same time period. The third

largest industry in terms of the number of firms is cutting, shaping and finishing of stone (ISIC 2696), which has, unlike the above mentioned industries, has grown by 12,96% within the considered time period.

The largest decrease in the number of firms within the considered time period is 50% in refractory ceramic products (ISIC 2692) and the next largest decrease in firms is the case of casting of non-ferrous metals (ISIC 2732), with a percentage of %25. The largest increases in number of firms are 166,67% in refined petroleum products (ISIC 2320), 100% in fertilizers and nitrogen compounds (ISIC 2412) and 50% in bicycles and invalid carriages (ISIC 3592). But these three industries do not account for a large number of firms, none of them having more than 10 firms in the year 2000. The number of firms in these industries was very low in 1995 as well. And these industries contain mostly SMEs, the firms employing on the average 10 to 49 employees annually.

Regionally significant High Points: Within the group of identified high point industries, the highest shares in regional employment are; processing and preserving of fruit and vegetables (ISIC 1513) with a share of 4.79%, tobacco products (ISIC 1600) with a share of 4.97%, and structural non-refractory clay and ceramic products (ISIC 2693) with a share of 3.52%.

*Declining High Points:* In terms of largest decreases in employment between 1995-2000, the following industries stand out: malt liquors and malt (ISIC 1553) with a decrease of 47.30%, fertilizers and nitrogen compounds (ISIC 2412) with a decrease of 24.77%, and machinery for textile, apparel and leather production (ISIC 2926)

**Table 2: Firm Number and Firm Size**  
**SOURCE: State Institute of Statistics Manufacturing Industry Database**

ISIC Rev 3	Number of firms in 1995	Number of firms in 2000	Percentage Change in Number of firms	Number of Firms According to Employment		
				10 to 49	50 to 199	200+
1513	64	63	-1,56	31	18	14
1514	26	21	-19,23	10	9	2
1520	18	21	16,67	13	7	1
1553	3	3	0,00	0	1	2
1554	20	20	0,00	15	4	1
1600	15	13	-13,33	0	2	11
1721	41	51	24,39	34	10	7
2101	14	11	-21,43	4	2	5
2320	3	8	166,67	6	0	2
2412	2	4	100,00	1	2	1
2413	6	6	0,00	4	1	1
2422	11	12	9,09	8	0	4
2691	14	12	-14,29	5	1	6
2692	2	1	-50,00	0	0	1
2693	139	110	-20,86	75	28	7
2696	54	61	12,96	44	16	1
2732	4	3	-25,00	1	0	2
2812	13	14	7,69	7	5	2
2892	4	5	25,00	4	0	1
2926	16	14	-12,50	12	2	0
3000	1	1	0,00	0	0	1
3140	3	3	0,00	2	0	1
3230	10	10	0,00	8	1	1
3592	4	6	50,00	4	0	2
High Point Totals	487	473		288	109	76
Aegean Region Totals	1944	1969		1298	464	207

with a decrease of 19.27%. However, despite the decreases in employment, these industries display significant increases in created value added.

*Increasing High Points:* Between years 1995-2000, the largest increases in employment were observed in office, accounting and computing machinery industry (ISIC 3000) with an increase of 5836.36%, refractory ceramic products industry (ISIC 2692) with an increase of 1751.72%, and the industry of treatment and coating of metal; general mechanical engineering on a fee or contract basis (ISIC 2892) with an increase of 666.20%. These industries also display considerable increases in created value added.

*Locally concentrated High Points:* The industry with the highest LQ value is plastics in primary forms and of synthetic rubber (ISIC 2413) with a value of 4.79. The percentage change of LQ value of this industry is positive between 1995 and 2000

with a rate of 0.33%. However, within the same time period, the employment level of this industry has decreased by 15.47%. The industry with the second highest LQ value is bicycles and invalid carriages (ISIC 3592), with a value of 3.82. The LQ change in this industry has been very high, a value of 36.45% between the years of 1995 and 2000. The third largest LQ value belongs to non-structural, non-refractory ceramic ware (ISIC 2691); an LQ value of nearly 3.4. The 54.69% change in LQ value in this industry may be considered as very high.

The largest share of created value added within the region belongs to refined petroleum products (ISIC 2320) industry. This industry accounts for nearly a quarter of the regional value added created (26.38%). Considered in terms of exports from the region to other countries, it has been observed that out of these 24 industries, 13 have import values much less than their export values. Only 9 of these

industries are able to pay for their imports through the Aegean Region.

The proportion of regional imports covered by regional exports, based on the high point industries's trade through the region, has been calculated by using the following formula:

$$(X_{ij}/M_{ij}) * 100, \quad (2)$$

where X stands for exports, M stands for imports, subindex i stands for 4 digit SIC Rev 3 industry and subindex j stands for the studied region. According to regional export and import figures, the industries with the best performance in international trade are; made up textile articles; except apparel (ISIC 1721), processing and preserving of fruit and vegetables (ISIC 1513) and malt liquors and malt (ISIC 1553)

## ISIC Based Clusters from High Point Industries

When high point industries are grouped according to ISIC codes, concentrations in three groups are observed. These ISIC based clusters are; food products and beverages (ISIC 15), chemicals and chemical products (ISIC 24), other non-metallic mineral products (ISIC 26).

### *Manufacture of food products and beverages (ISIC 15)*

This group is composed of a total of 5 high point industries. These high point industries are processing and preserving of fruit and vegetables (ISIC 1513), vegetable and animal oils and fats

(ISIC 1514), dairy products (ISIC 1520), malt

ISIC Rev 3	Value Added 1995	Value Added 2000	Percentage Change in Value Added	Share of Regional Value Added	Import	Export	Proportion of Imports Covered by Exports
1513	-2324015	139571131	6105,60	2,16	23115472	562168926	2432,00
1514	164035108	96833462	-40,97	1,50	413838572	161717804	39,08
1520	86062558	122833768	42,73	1,90	33737251	18108399	53,67
1553	140284886	57961092	-58,68	0,90	796252	12625852	1585,66
1554	104557363	101427962	-2,99	1,57	5768860	13963399	242,05
1600	662010472	248546621	-62,46	3,85	46252795	128469543	277,76
1721	16656005	196393444	1079,11	3,05	29354609	1010154047	3441,21
2101	116841298	79271578	-32,15	1,23	979378905	47598246	4,86
2320	1594157211	1701329727	6,72	26,38	2520971767	296912633	11,78
2412	30033832	31914256	6,26	0,49	482595087	6174196	1,28
2413	853596777	150106441	-82,41	2,33	1652771361	106140971	6,42
2422	122332687	73491347	-39,93	1,14	202527967	64675671	31,93
2691	154020157	86751084	-43,68	1,35	35777197	83286916	232,79
2692	222723	42911548	19166,82	0,67	57035985	16926192	29,68
2693	30756592	41035350	33,42	0,64	14636029	199952629	1366,17
2696	13370525	44858135	235,50	0,70	37229862	152596011	409,88
2732	13893956	15330812	10,34	0,24	0	0	NA
2812	15880663	38473018	142,26	0,60	22630900	11531765	50,96
2892	1104824	17473157	1481,53	0,27	0	0	NA
2926	6486830	6351250	-2,09	0,10	936638084	46126393	4,92
3000	1608972	45351537	2718,67	0,70	1594844962	63095621	3,96
3140	7777799	13076551	68,13	0,20	69037414	29480129	42,70
3230	107899447	207697585	92,49	3,22	415295551	843198294	203,04
3592	11825394	8735554	-26,13	0,14	27192578	10285526	37,82
High Point Total	4253092061	3567726412			9601427460	3885189163	
Aegean Region Total	7106137871	6448600462			5111344378	4540240154	

liquors and malt (ISIC 1553), soft drinks, production of mineral waters (ISIC 1554).

This group accounts for 23,14% of employment, 14,54% of value added and 27% of existing firms within the high points of the Aegean Region. The firms also have been classified according to the number of annual average number of employees. According to this classification, 53,90% of the firms within this group employ 10 to 49 workers, 30,47% of them employ 50 to 199 workers and 15,63% of them employ more than 200 workers annually on the average. In other words, about 84,37% of the firms in this group employ less than 200 workers.

### ***Manufacture of Chemicals and Chemical Products (ISIC 24)***

Within this cluster are three industries, namely fertilizers and nitrogen compounds (ISIC 2412), plastics in primary forms and of synthetic rubber (ISIC 2413), paints, vernishes and similar coatings, printing ink and mastics (ISIC 2422). The employment share of this cluster within Aegean high points is 12,03%, value added share is 7,16% and existing firms share is 4,65%. 59,09% of these firms employ 10 to 49 workers, 13,64% of these firms employ 50 to 199 workers and 27,27% of these firms employ more than 200 workers on average per year.

### ***Manufacture of Other Non-Metallic Mineral Products (ISIC 26)***

Within this group, which is composed of 4 high point industries, are non-structural non-refractory ceramic ware (ISIC 2691), refractory ceramic products (ISIC 2692), structural non-refractory clay and ceramic products (ISIC 2693), and cutting, shaping and finishing of stone (ISIC 2696). The employment share of this group within the high points of Aegean Region is 23,55%, its share of value added is 6,04% and its share of existing firms is 38,9%. Of the firms within this ISIC based cluster, 67,39% employs 10 to 49 workers, 24,46% employs 50 to 199 workers and 8,15% employs more than 200 workers annually on the average. In other words, the ratio of SMEs in this group is 91,85%.

### **Provincial Location of the High Point Industries**

Mapping enables one to visualise the degree of relative spatial concentration of industries across the Aegean Region.

It is observed from the map that the manufacturing industries are concentrated in the provinces of Izmir and Manisa. The two industries with the highest provincial LQ values have been focused on. These industries have been presented to be able to evaluate their regional importance in terms of changes in regional concentration and export performance through the region.

*Izmir:* The industry with the highest provincial LQ value is the manufacture of plastics in primary forms and synthetic rubber (ISIC 2413) has the value of 9,32. and displays an Aegean Region LQ change of 0,33. The proportion of imports covered by exports in this industry is 6,42%. The next industry is manufacture of bicycles and invalid carriages (ISIC 3592) with a provincial LQ value of 7,58. Regional LQ change for this industry has been 36,45% and the 37,82% of imports have been covered by exports through the region.

*Manisa:* The manufacture of soft drinks and production of mineral waters (ISIC 1554) takes the highest value in this province: 13,63. The regional LQ change for this industry v-between 1995 and 2000 has been 13,81%. Proportion of imports covered by exports in the region has been 242,05% of imports. The second highest value of LQ is displayed by the manufacture of television and radio receivers, sound and video recording and or reproducing apparatus (ISIC 3230) and has a value of 20,68. LQ change in this industry has been 16,57% for the region. Exports of this industry through the region have been able to cover 203,04% of imports of the same industry.

*Kutahya:* For this province, the highest LQ value has been calculated to be 58,10 and belongs to the industry of non-structural non-refractory ceramicware (ISIC 2691). The LQ change for this industry has been 54,69% for the region and the proportion of imports covered by exports is calculated to be 232,79%. The next industry has the provincial LQ value of 26,37 and is the industry of fertilizers and nitrogen compounds (ISIC 2412). LQ change for this industry has been 0,41% and 1,28% of imports of this industry have been covered by the exports of the same industry through the region.

*Uşak:* The industry of made up textile articles except apparel (ISIC 1721) has the highest LQ value, 21,18 and the regional LQ value for this industry has increased by 69,85%. This industry has performed outstandingly, being able to pay 3441,21% of its imports by its exports through the region. Next is the industry of structural non-refractory clay and ceramic products (ISIC 2693). This industry displays an LQ decrease of 5,33% but

was able to pay 1366,17% of its imports in the year 2000.

*Afyon:* Cutting, shaping and finishing of stone (ISIC 2696) has a provincial LQ value of 24,62. The LQ change of this industry, according to the regional data, has been 18,63%. This industry also performs well in terms of being able to pay for imports by exports: a ratio of 409,88%. With the second highest provincial LQ value is the industry of pulp paper and paperboard (ISIC 2101) with a value of 9,61. The LQ increase has been 16,89%. However the proportion of imports covered by exports has been low for this industry: a mere 4,86% according to regional data.

*Denizli:* The manufacture of made up textile articles except apparel (ISIC 1721) has the highest provincial LQ value: 5,69. The LQ change of this industry in the Aegean Region has been 69,85%; a relative high rate of change. The proportion of imports covered by exports is 3441,21%, stating that the industry has performed well considered at the scale of the Aegean Region. The next highest value of provincial LQ comes from cutting, shaping and finishing of stone (ISIC 2696) and is calculated to be 3,13. Regional change in LQ has been 18,63% and the proportion of imports covered by exports of this industry is 409,88% for the region.

*Aydin:* The industry of structural non-refractory clay and ceramic products (ISIC 2693) has a provincial LQ value of 6,55. The regional LQ change in this industry has been a decrease of 5,33%. The proportion of imports covered by exports of this industry has been 1366,17%. The next highest provincial LQ value is 3,52 and belongs to the industry of machinery for textile, apparel and leather production (ISIC 2926). The regional LQ decrease has been calculated as 14,82% between years 1995 and 2000. The proportion of imports covered by exports of this industry through the region in the year 2000 has been 4,92%.

*Mugla:* The industry of pulp paper and paperboard (ISIC 2101) has a very high provincial concentration displayed by an LQ value of 47,67. The LQ change in this industry has been a 16,89% increase and the proportion of imports covered by exports has been 4,86%. Next highest provincial LQ value is 40,46 and belongs to the industry of cutting, shaping and finishing of stone (ISIC 2696). The LQ change has been 18,63%. The proportion of imports through the Aegean Region covered by exports of this industry through the Aegean Region in the year 2000 has been 409,88%.

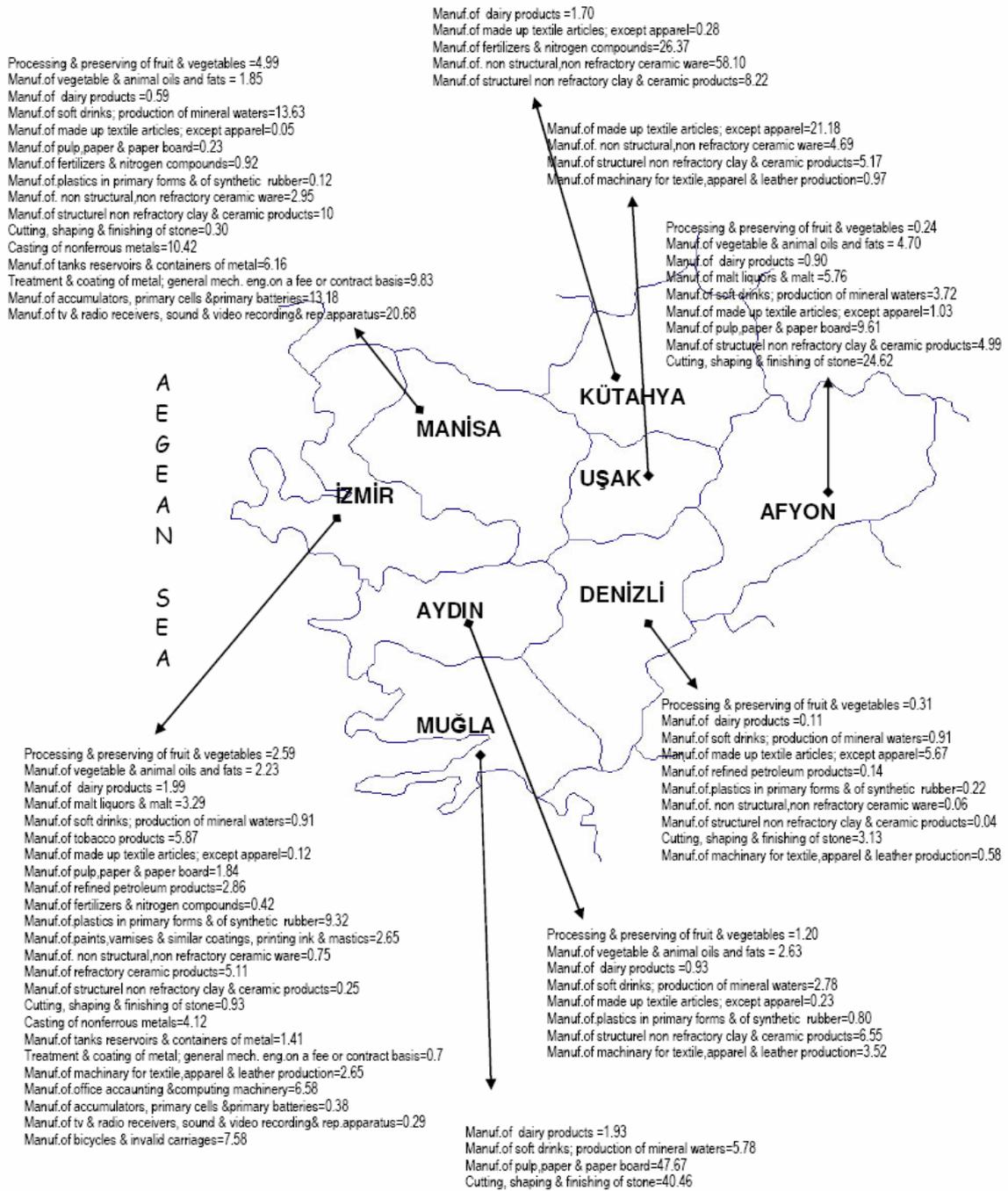
## CONCLUSION

In this study we used a methodology similar to DTI's application on UK data to identify clusters. In the Aegean Region, 24 high point industries have been identified by using employment data to calculate location quotient as the main technique to determine the degree of localisation in a given sector. We have two major conclusions concerning the Aegean Region.

First, out of the considered 24 high point industries 6 stand out with positive regional LQ changes and high proportion of regional imports covered by exports. The LQ value increases displayed by these industries means that they have concentrated more locally in the last 5 years. They also have export values more than twice of their import values regionally, thus are able to bring foreign exchange to the region. These industries are manufacture of soft drinks and production of mineral waters (ISIC 1554), tobacco products (ISIC 1600), made up textile articles; except apparel (ISIC 1721), non-structural, non-refractory ceramic ware (ISIC 2691), cutting, shaping and finishing of stone (ISIC 2696) and manufacture of television and radio receivers, sound and video recording and or reproducing apparatus (ISIC 3230).

Second, out of these 24 high point industries, those with relatively higher concentration rates have been classified according to their ISIC codes to form three clusters; namely food products and beverages (ISIC 15), chemicals and chemical products (ISIC 24) and other non-metallic mineral products (ISIC 26). However, these three manufacturing clusters that have been made up only on the basis of employment data can't be identified as "real" clusters. Interlinks between industries under focus in terms of customer-supplier relations, shared knowledge, infrastructure and labor markets need to be revealed to identify clusters specifically. Thus, this analysis should be taken as an initial identification and it should be kept in mind that it only aims to provide a starting point for a deeper analysis and a strategy of development for the Aegean Region. Such a starting point is crucial for such a point of view has never been used to formulate a cluster-based development policy for the Aegean Region.

**Figure 1: Provincial Location of High Point Industries**



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## **INTERNATIONAL STANDARD INDUSTRIAL CLASSIFICATION OF ALL ECONOMIC ACTIVITIES (ISIC Rev.3) MANUFACTURING CLASSIFICATION**

- D        MANUFACTURING
- 15      Manufacture of food products and beverages
- 151     Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats
- 1511    Production, processing and preserving of meat and meat products
- 1512    Processing and preserving of fish and fish products
- 1513    Processing and preserving of fruit and vegetables
- 1514    Manufacture of vegetable and animal oils and fats
- 152     Manufacture of dairy products
- 1520    Manufacture of dairy products
- 153     Manufacture of grain mill products, starches and starch products, and prepared animal feeds
- 1531    Manufacture of grain mill products
- 1532    Manufacture of starches and starch products
- 1533    Manufacture of prepared animal feeds
- 154     Manufacture of other food products
- 1541    Manufacture of bakery products
- 1542    Manufacture of sugar
- 1543    Manufacture of cocoa, chocolate and sugar confectionery
- 1544    Manufacture of macaroni, noodles, couscous and similar farinaceous products
- 1549    Manufacture of other food products n.e.c.
- 155     Manufacture of beverages
- 1551    Distilling, rectifying and blending of spirits; ethyl alcohol production from fermented materials
- 1552    Manufacture of wines
- 1553    Manufacture of malt liquors and malt
- 1554    Manufacture of soft drinks; production of mineral waters
- 16      Manufacture of tobacco products
- 160     Manufacture of tobacco products
- 1600    Manufacture of tobacco products

- 17 Manufacture of textiles
- 171 Spinning, weaving and finishing of textiles
- 1711 Preparation and spinning of textile fibres; weaving of textiles
- 1712 Finishing of textiles
- 172 Manufacture of other textiles
- 1721 Manufacture of made-up textile articles, except apparel
- 1722 Manufacture of carpets and rugs
- 1723 Manufacture of cordage, rope, twine and netting
- 1729 Manufacture of other textiles n.e.c.
- 173 Manufacture of knitted and crocheted fabrics and articles
- 1730 Manufacture of knitted and crocheted fabrics and articles
- 18 Manufacture of wearing apparel ; dressing and dyeing of fur
- 181 Manufacture of wearing apparel, except fur apparel
- 1810 Manufacture of wearing apparel, except fur apparel
- 182 Dressing and dyeing of fur ; Manufacture of articles of fur
- 1820 Dressing and dyeing of fur ; Manufacture of articles of fur
- 19 Tanning and dressing of leather ; Manufacture of luggage, handbags, saddlery, harness and footwear
- 191 Tanning and dressing of leather ; Manufacture of luggage, handbags, saddlery and harness
- 1911 Tanning and dressing of leather
- 1912 Manufacture of luggage, handbags and the like, saddlery and harness
- 192 Manufacture of footwear
- 1920 Manufacture of footwear
- 20 Manufacture of wood and of products of wood and cork, except furniture; Manufacture of articles of straw and plaiting materials
- 201 Sawmilling and planing of wood
- 2010 Sawmilling and planing of wood
- 202 Manufacture of products of wood, cork, straw and plaiting materials
- 2021 Manufacture of veneer sheets; Manufacture of plywood, laminboard, particle board and other panels and boards
- 2022 Manufacture of builders carpentry and joinery

2023 Manufacture of wooden containers

2029 Manufacture of other products of wood; Manufacture of articles of cork, straw and plaiting materials

21 Manufacture of paper and paper products

210 Manufacture of paper and paper products

2101 Manufacture of pulp, paper and paperboard

2102 Manufacture of corrugated paper and paperboard and of containers of paper and paperboard

2109 Manufacture of other articles of paper and paperboard

22 Publishing, printing and reproduction of recorded media

221 Publishing

2211 Publishing of books, brochures, musical books and other publications

2212 Publishing of newspapers, journals and periodicals

2213 Publishing of recorded media

2219 Other publishing

222 Printing and service activities related to printing

2221 Printing

2222 Service activities related to printing

223 Reproduction of recorded media

2230 Reproduction of recorded media

23 Manufacture of coke, refined petroleum products and nuclear fuel

231 Manufacture of coke oven products

2310 Manufacture of coke oven products

232 Manufacture of refined petroleum products

2320 Manufacture of refined petroleum products

233 Processing of nuclear fuel

2330 Processing of nuclear fuel

24 Manufacture of chemicals and chemical products

241 Manufacture of basic chemicals

2411 Manufacture of basic chemicals, except fertilizers and nitrogen compounds

2412 Manufacture of fertilisers and nitrogen compounds

- 2413 Manufacture of plastics in primary forms and of synthetic rubber
- 242 Manufacture of other chemical products
- 2421 Manufacture of pesticides and other agro-chemical products
- 2422 Manufacture of paints, varnishes and similar coatings, printing ink and mastics
- 2423 Manufacture of pharmaceuticals, medicinal chemicals and botanical products
- 2424 Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- 2429 Manufacture of other chemical products not elsewhere classified
- 243 Manufacture of man-made fibres
- 2430 Manufacture of man-made fibres
- 25 Manufacture of rubber and plastics products
- 251 Manufacture of rubber products
- 2511 Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres
- 2519 Manufacture of other rubber products
- 252 Manufacture of plastics products
- 2520 Manufacture of plastics products
- 26 Manufacture of other non-metallic mineral products
- 261 Manufacture of glass and glass products
- 2610 Manufacture of glass and glass products
- 269 Manufacture of non-metallic mineral products not elsewhere classified
- 2691 Manufacture of non-structural non-refractory ceramic ware
- 2692 Manufacture of refractory ceramic products
- 2693 Manufacture of structural non-refractory clay and ceramic products
- 2694 Manufacture of cement, lime and plaster
- 2695 Manufacture of articles of concrete, cement and plaster
- 2696 Cutting, shaping and finishing of stone
- 2699 Manufacture of other non-metallic mineral products not elsewhere classified
- 27 Manufacture of basic metals
- 271 Manufacture of basic iron and steel

2710 Manufacture of basic iron and steel

272 Manufacture of basic precious and non-ferrous metals

2720 Manufacture of basic precious and non-ferrous metals

273 Casting of metals

2731 Casting of iron and steel

2732 Casting of non-ferrous metals

28 Manufacture of fabricated metal products, except machinery and equipment

281 Manufacture of structural metal products, tanks, reservoirs and steam generators

2811 Manufacture of structural metal products

2812 Manufacture of tanks, reservoirs and containers of metal

2813 Manufacture of steam generators, except central heating hot water boilers

289 Manufacture of other fabricated metal products; metal working service activities

2892 Treatment and coating of metals; general mechanical engineering on a fee or contract basis

2893 Manufacture of cutlery, hand tools and general hardware

2899 Manufacture of other fabricated metal products not elsewhere classified

29 Manufacture of machinery and equipment not elsewhere classified

291 Manufacture of general purpose machinery

2911 Manufacture of engines and turbines, except aircraft, vehicle and cycle engines

2912 Manufacture of pumps, compressors, taps and valves

2913 Manufacture of bearings, gears, gearing and driving elements

2914 Manufacture of ovens, furnaces and furnace burners

2915 Manufacture of lifting and handling equipment

2919 Manufacture of other general purpose machinery

292 Manufacture of special purpose machinery

2921 Manufacture of agricultural and forestry machinery

2922 Manufacture of machine-tools

2923 Manufacture of machinery for metallurgy

2924 Manufacture of machinery for mining, quarrying and construction

2925 Manufacture of machinery for food, beverage and tobacco processing

2926 Manufacture of machinery for textile, apparel and leather production

2927 Manufacture of weapons and ammunition

2929 Manufacture of other special purpose machinery

293 Manufacture of domestic appliances not elsewhere classified

2930 Manufacture of domestic appliances not elsewhere classified

30 Manufacture of office, accounting and computing machinery

300 Manufacture of office, accounting and computing machinery

3000 Manufacture of office, accounting and computing machinery

31 Manufacture of electrical machinery and apparatus not elsewhere classified

311 Manufacture of electric motors, generators and transformers

3110 Manufacture of electric motors, generators and transformers

312 Manufacture of electricity distribution and control apparatus

3120 Manufacture of electricity distribution and control apparatus

313 Manufacture of insulated wire and cable

3130 Manufacture of insulated wire and cable

314 Manufacture of accumulators, primary cells and primary batteries

3140 Manufacture of accumulators, primary cells and primary batteries

315 Manufacture of electric lamps and lighting equipment

3150 Manufacture of electric lamps and lighting equipment

319 Manufacture of other electrical equipment not elsewhere classified

3190 Manufacture of other electrical equipment not elsewhere classified

32 Manufacture of radio, television and communication equipment and apparatus

321 Manufacture of electronic valves and tubes other electronic components

3210 Manufacture of electronic valves and tubes other electronic components

322 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy

3220 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy

323 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods

3230 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods

- 33 Manufacture of medical, precision and optical instruments, watches and clocks
- 331 Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments
- 3311 Manufacture of medical and surgical equipment and orthopaedic appliances
- 3312 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
- 3313 Manufacture of industrial process control equipment
- 332 Manufacture of optical instruments and photographic equipment
- 3320 Manufacture of optical instruments and photographic equipment
- 333 Manufacture of watches and clocks
- 3330 Manufacture of watches and clocks
- 34 Manufacture of motor vehicles, trailers and semi-trailers
- 341 Manufacture of motor vehicles
- 3410 Manufacture of motor vehicles
- 342 Manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers
- 3420 Manufacture of bodies (coachwork) for motor vehicles, manufacture of trailers and semi-trailers
- 343 Manufacture of parts and accessories for motor vehicles and their engines
- 3430 Manufacture of parts and accessories for motor vehicles and their engines
- 35 Manufacture of other transport equipment
- 351 Building and repairing of ships and boats
- 3511 Building and repairing of ships
- 3512 Building and repairing of pleasure and sporting boats
- 352 Manufacture of railway and tramway locomotives and rolling stock
- 3520 Manufacture of railway and tramway locomotives and rolling stock
- 353 Manufacture of aircraft and spacecraft
- 3530 Manufacture of aircraft and spacecraft
- 359 Manufacture of transport equipment not elsewhere classified
- 3591 Manufacture of motorcycles
- 3592 Manufacture of bicycles and invalid carriages
- 3599 Manufacture of other transport equipment not elsewhere classified

- 36 Manufacture of furniture, Manufacturing not elsewhere classified
- 361 Manufacture of furniture
- 3610 Manufacture of furniture
- 369 Manufacturing not elsewhere classified
- 3691 Manufacture of jewellery and related articles
- 3692 Manufacture of musical instruments
- 3693 Manufacture of sports goods
- 3694 Manufacture of games and toys
- 3699 Other manufacturing not elsewhere classified
- 37 Recycling
- 371 Recycling of metal waste and scrap
- 3710 Recycling of metal waste and scrap
- 372 Recycling of non-metal waste and scrap
- 3720 Recycling of non-metal waste and scrap