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Spatial implications of the organization of production in the automotive industry in Turkey

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SPATIAL IMPLICATIONS OF THE ORGANISATION OF PRODUCTION IN THE
AUTOMOTIVE INDUSTRY IN TURKEY

Paper to be submitted at the 38th Congress of the European Regional Science Association, 28
August-1 September 1998 Vienna

by Aysenur OKTEN, Betul SENGEZER, Nazire CAMLIBEL, Yigit EVREN

SUMMARY : This paper attempts to analyse the spatial implications of production organisation as part of a global network in a less developed country, on the basis of data collected in the automotive industry in Turkey. The aim of the paper is to find out whether global restructuring of capital results in the localisation or re-polarisation of growth.

INTRODUCTION

Since the 1980s, the restructuring tendencies of capital have been calling for the reorganisation of production, reshaping of enterprises and reconsideration of geographical space.

Globalisation and japanisation emerged as the new concepts of the post-Fordist production era, the former implying the geographical enlargement of economic operations and markets while the latter representing a certain managerial model which has come to be considered a crucial element of the globalisation process in the post-Fordist organisation of production. “Globalisation” in the Fordist sense consisted of economies of scale, oligopolistic negotiations, locational choices of parent companies and the import substitution incentives which the Third World countries offered to assembly industries. Fordist production organisation was carried out at giant plants which produced masses of a single type of product for an undifferentiated world market. However, these giant, centralised organisations remained too slow, inflexible, and incompetitive in the face of strong market dynamics which were evoked by the economic crises of the 1970s. New types of competition required diversity in products, quality of goods, responsiveness to changes in demand, and innovating capacity (Veltz, 1994).

Thanks to new technologies of production and quality control, the manufacturing process could be broken down into its simplest phases. Technological developments in the processing, management, transportation, and information technologies made drastic geographical shifts feasible. Radical improvements in transportation and communication technologies resulted in the reduction of associated costs which, in turn, made resources and markets all over the world accessible. Thus each phase of a manufacturing process could be realised at a different location with minimum cost. Consequently, a new type of proximity became important because the re-organisation of production required intense interaction and co-operation inside firms, between various phases in the production cycle, between firms and their suppliers (Thisse, 1994). Decrease of the effect of geographical restrictions, increasing necessity of

producing in small amounts for differentiated markets all over the world changed the criteria of locational decisions. Such decisions were focused on comparative local advantages rather than economies of scale which, according to Moulaert and Salinas (1983), resulted in peripheralisation and greenfielding of many manufacturing industries. These criteria were not limited to local optimisation factors; rather, they were based on global optimisation policies. Some investments of Toyota in USA are considered to be decisions of this kind, because they are argued to have been made solely to make the parent Toyota firm's entrance into the American market possible (Elger and Smith, 1994:88; Williams et.al. 1994:88). Similarly, some automotive investments in Turkey are considered to be locational choices targeting at emerging markets.

The automotive industry presents the most striking examples of globalisation, spatial restructuring of the manufacturing sector and reorganisation of the production process. The earliest examples of post-Fordism emerged in the Japanese automotive industry, in the 1950s. In the crisis years of 1970s the Japanese "miracle" re-drew attention as a possible alternative to Fordist production organisation. Following the Japanese principles of management, the post-Fordist production organisation has been based on four concepts: flexible specialisation, lean production, JIT and "kanban" which were associated with vertical disintegration of production, decrease of plant scale, and new management techniques.

In flexible specialisation, each phase of production is delegated to a firm/plant which specialises in that phase of the production process. These supplier plants are smaller in size and use highly computerised production technologies which increase their flexibility and enable them to make very quick adjustments in design and shipment amounts, in response to demand. Lean production is a complementary scheme of flexibility whereby parts are produced in small lots by suppliers to the assembler. These suppliers produce within a subcontracting network which is based on a hierarchy of firms ranging from large- or medium-size producers with hundreds of workers to small family enterprises with less than 10 employees.

THE POLARISATION DEBATE

Several questions are raised concerning the geographical re-organisation of industrial capital: Will the big cities be increasingly interlinked in a global urban network? Will small towns, which are not well linked to the network, be facing increasing degeneration and poverty?

There are antithetical answers to those questions as far as urban hierarchy and local development is concerned. Some authors argue that the new form of competition would be to the detriment of traditional subcontracting networks based on proximity because of “world sourcing”. Meanwhile, it would increase urban polarisation because the new criteria of competitive survival and the need for flexibility against escalating uncertainty require location in large metropolises. Other authors argue that “global toyotatism, in comparison to global Fordism, localises more of the production process and therefore seems to be more conducive to local development in host nations” (Fujita&Hill, 1995).

One of the arguments focuses on the effects of the developments in communication and transportation technologies and at the geographical flexibility achieved through them. The assumption that distance has little or no impact on the organisation of production implies that agglomeration tendencies of industries may disappear. It concludes that communication and information technology will be decentralised from centre to periphery and de-concentrated at the metropolises (Warf, 1996). In other words, technological and economic development and industrialisation are localised through post-Fordist production organisation.

The other argument focuses on the social dimension of production organisation. Post-Fordism (and Toyotatism in automotive industry) is expected to create a re-polarisation of growth for two reasons. First, the growing importance of automation and communication technologies in production requires well developed infrastructure and highly skilled labour in design, production techniques, and marketing. Second, lean production and flexible specialisation require continuous communication between the assembly industry and a hierarchy of supplier industries. Larger range of products, short time of processing, small lots of production, and just-in-time deliveries require a multi-lateral and well-timed co-operation. In less developed countries, infrastructure as well as education, health and other services are far more developed in metropolises than in smaller cities. Thus, it would be less risky and less costly to invest in large metropolises than in medium or small-size cities (Veltz, 1994).

THE AIM AND METHOD OF RESEARCH

This paper is based on several in-depth interviews, SIS¹ statistics, AAI² statistics and the results of a small sample of 20 interviews with first-tier supplier industries. The sampling framework for that survey was the list of supplier industries published by the AAI in 1996.

This paper attempts to analyse the spatial implications of the production organisation as part of a global network in a less developed country, on the basis of data collected in the automotive industry in Turkey. The aim of the paper is to find out which of the above arguments hold for the geographical organization of the Turkish automotive industry- or rather, for the geographical organization of the global automotive industry in Turkey.

THE TURKISH AUTOMOTIVE INDUSTRY

The first automotive industry was a plant for tractor production (1954) in Ankara. The production of automobiles was started in 1960s via licensing agreements with Ford, Renault and Fiat. Automotive supplier firms started to be established in early 1960s and their number reached at 350 in 1970. Main automotive plants were organised as Fordist mass production plants who subcontracted some production to smaller industries. The automotive industry had a growingly dual structure consisting of modern mass producers on one hand and small workshops producing with traditional methods, on the other. The supplier companies were small workshops producing rubber and steel parts and components like filters and electrical equipment.

In 1987, the import substitution and the associated tariff protection policies were replaced by economic liberalisation policies. As a result, the amount of foreign investments and their structural attributes changed. The number of foreign companies operating in Turkey increased from 13 in 1980 to 98 in 1995. Most of these companies are suppliers of component parts. According to AAPM³ (1995), “the wave of new investments is introducing the latest production technologies involving computer integrated manufacturing and new work organisations to the Turkish automotive industry. Subsequently, the import substituting industrial structure has been transforming into an internationally competitive structure and it is being integrated into the global production and distribution networks”.

At present, there are 17 automotive firms, producing various kinds of vehicles⁴, and 1306 supplier industries listed on the catalogue of AAI (1996) who produce all kinds of components with the exception of a few. These are declared by the AAI as first-tier suppliers who produce directly for the assembly firms and who make up the top category of a stratified network of producers of component parts.

All of the assembly firms operate with licences of foreign companies such as Isuzu, Chrysler, Peugeot, M.A.N., Mercedes Benz, Opel, KHD/Land Rover, Ford, Iveco-Fiat, Renault, Mitsubishi, Fiat, Toyota, Universal, New Holland N.V., and M.Ferguson/Perkins. Six assembly firms operate with domestic capital, only. The share of foreign capital in eleven firms range from 0.01% to 100% (AAI,1997). Some of these firms are organising their Turkish branches as local assembly points of a global suppliers network.

The automotive manufacturers have mainly two targets in Turkey: the Turkish domestic market and the regional market which comprises the Middle East and the former Soviet republics (Bugdayci, 1997). Turkey is also regarded as a potential producer of component parts for assembly plants in other areas of the world. Fiat (Tofas), for example, has started the production of a new car (Fiat Palio) in 1996, in Turkey, as part of a new global project which they call "178". This project consists of two phases. In the first phase, Fiat "178" is planned to be manufactured for the Turkish domestic market, in Bursa. The second step includes the organisation of the supply of parts by the Turkish Fiat/Tofas to other assembly plants of 178 in other parts of the world (Bugdayci, 1998).

As of 1996, the total production of the assembly plants in Turkey amount to 329 337 units of all vehicle types which equal 3 billion US Dollars of total sales. 19.17% of this amount is exported to various countries (Map1).

SPATIAL ORGANISATION OF THE TURKISH AUTOMOTIVE INDUSTRY

Since 1950s, industrial investments have been concentrated in the Marmara Region. In the beginning, Istanbul was the main focus of investments; later on, industrial development expanded over Kocaeli to Bursa in the east, and to Tekirdađ in the west. In 1996, the Marmara Region produced 36.63% of the GDP, 83.6% of the national value added, and 52.7% of the total production in the manufacturing branch. As of 1998, the Marmara Region has 26% of total population and 44.7% of the Turkish manufacturing labor force. The industries are located mainly in the metropolitan areas of Istanbul, Ýzmit (capitol of Kocaeli) and Bursa, three of the largest metropolises of the country (Map 2).

The primary determinant of the locational choice of automotive industries in Turkey has been the quality of infrastructure and suppliers. Therefore, this branch of industry preferred Istanbul for plant location, as well as for the head office. Bursa was next favorable location because of

its proximity to Istanbul. Three plants came to be located in Bursa, in the years 1966(Peugeot) and 1971(Renault and Fiat), following the establishment of an “industrial park” with adequate infrastructure in Bursa. Some firms chose Ankara, Ýzmir, Adana and Eskisehir⁵ for location of their productions of tractors, busses, and trucks. The assembly plants are located in eight provinces such as Istanbul (5), Bursa (3), Izmir (2), Kocaeli (2), Sakarya(2), Eskisehir (1), Ankara(1), Aksaray(1), and Adana(1). These provinces⁶ comprise 31.6% of the national population which is estimated to be 64,786,000 in 1998. Six of these provinces have the country’s six largest metropolises⁷.

The industry, as a whole, is clustered in and around the most industrialised and most developed region of the country, namely the Marmara Region in the north-west. Over 80% of the supplier industries are also located in this region while the remaining 20% are in 15 other provinces in the country (Map3).

An assembly industry is supplied by 20 to 305 smaller industries. When the assembly firms are attached to their first-tier suppliers on a map showing plant locations, a three-level spatial network can be recognized. The first level network is within a triangle connecting Istanbul-Sakarya (Adapazary)-Bursa. 60% of assembly plants and 86.4% of all first-tier suppliers are condensed in these three provinces. 59.8% of all the first-tier suppliers are located in Istanbul). The second level network is located in an area between Istanbul- Kocaeli-Izmir-Ankara. 13% of supplier industries are in Izmir, 4.6% are in Ankara, and 2.6% are in Kocaeli. The third level network is less concentrated, spreading into the southern and central parts of the country. 6.4% of suppliers are located in various provinces outside the above networks (Map 4).

One of the main problems of the Turkish automotive industry is inefficient capacity usage. Overall capacity usage in the production of all types of vehicles has been less than 50% in the assembly industries, since 1994. Similarly, most of the suppliers complain about the undercapacity problem. Therefore, the suppliers prefer to work with 4-6 assembly industries and within an industrial agglomeration, because such an agglomeration would provide them market flexibility. The number of second-tier suppliers of a first-tier supplier firm varies between 1-48. The average distance between the first and second-tier suppliers is 25.3km. This distance may range from 0.5 km to 240 km., depending on the size of the subcontractors and of its supplier. In our sample, the interviewed industries have their suppliers with 1-9

employees within a distance of 45 km. Their suppliers with 25-100 employees lie within a distance of 240 km. The correlation coefficient of these two variables (size and distance) is 0.62.

CONCLUSIONS

The automotive industry in Turkey is concentrated in the most developed areas of the country. The assembly plants and their suppliers are mostly located on the peripheries of largest metropolises. Assembly plants are expected to choose similar locations in the future because they can have larger supply of skilled labor force, variety of high quality services and international access. Larger enterprises among first-tier suppliers may be located as far as 1000 km away from their clients. However, their suppliers (second-tier) tend to cluster within a distance of 25 km. Thus, we can assume that assembly plants would continue to be located on the peripheries of the most developed metropolises in Turkey. The first-tier suppliers may be expected to be more dispersed in the future; i.e. they may be located on the peripheries of larger cities outside the Marmara Region. Their suppliers (the second-tier), however, should be expected to cluster around them. Considering that the suppliers industry may be producing more for international markets in the future, these authors believe that spatial development of the automotive industry may be conducted away from the Marmara Region on the basis of a well-constructed strategy. First-tier suppliers would be the key actors of the localisation of development.

¹ SIS : State Institute of Statistics (DİE Devlet İstatistik Enstitüsü)

² AAI : Association of Automotive Industries (OSD Otomotiv Sanayicileri Derneği)

³ AAPM : Association of Automotive Parts Manufacturers (TAYSAD Taşıt Araçları Yan Sanayi Derneği)

⁴ In addition, three foreign firms were given permits for investment and production.

⁵ All of these provinces are comparatively well developed with respect to infrastructure, production services, and labor force supply.

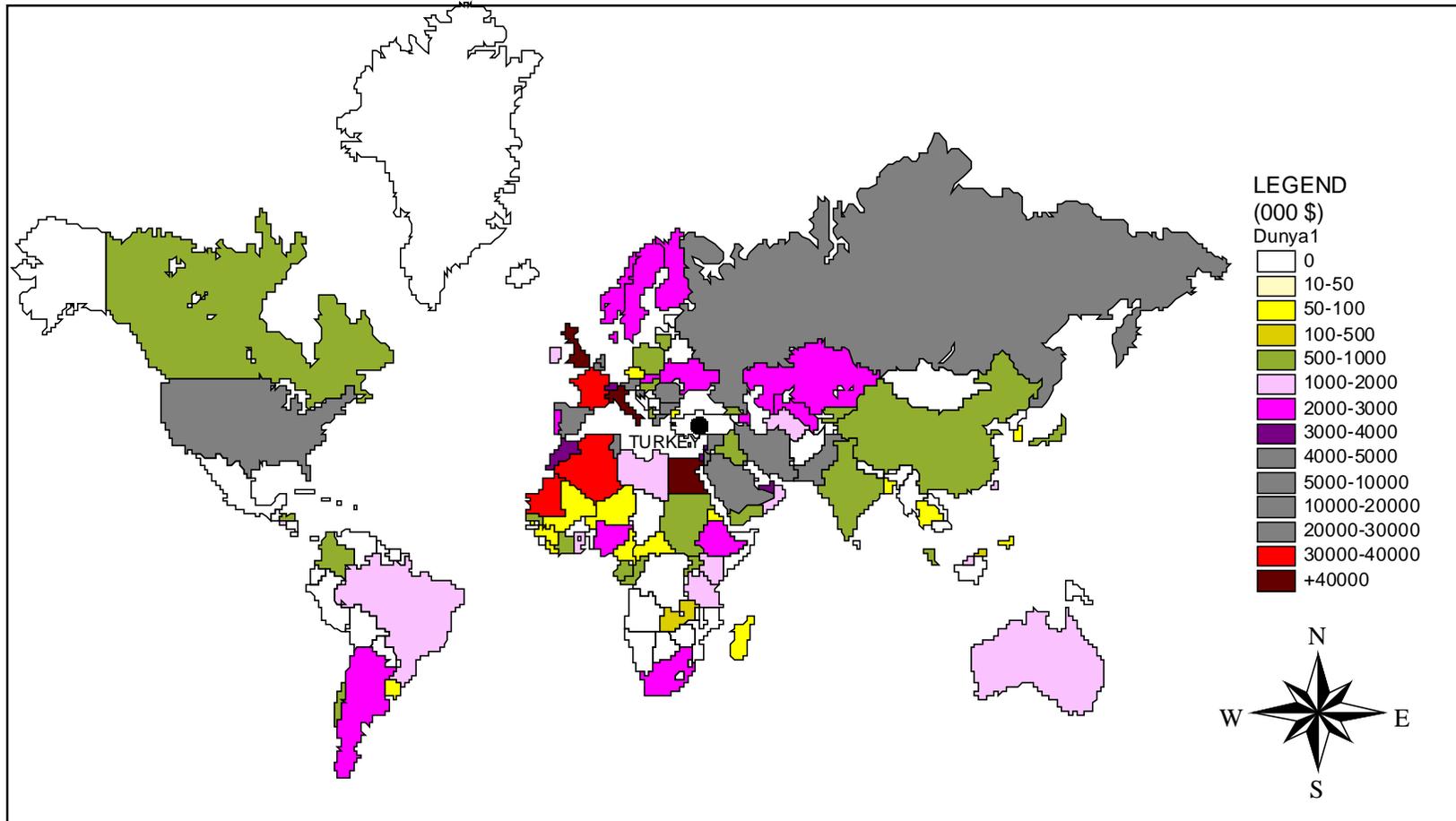
⁷The central cities of these provinces are administered in the status of "Municipality of Greater City" (Büyük Şehir Belediyesi); i.e. the municipalities of those areas comprise several smaller municipalities.

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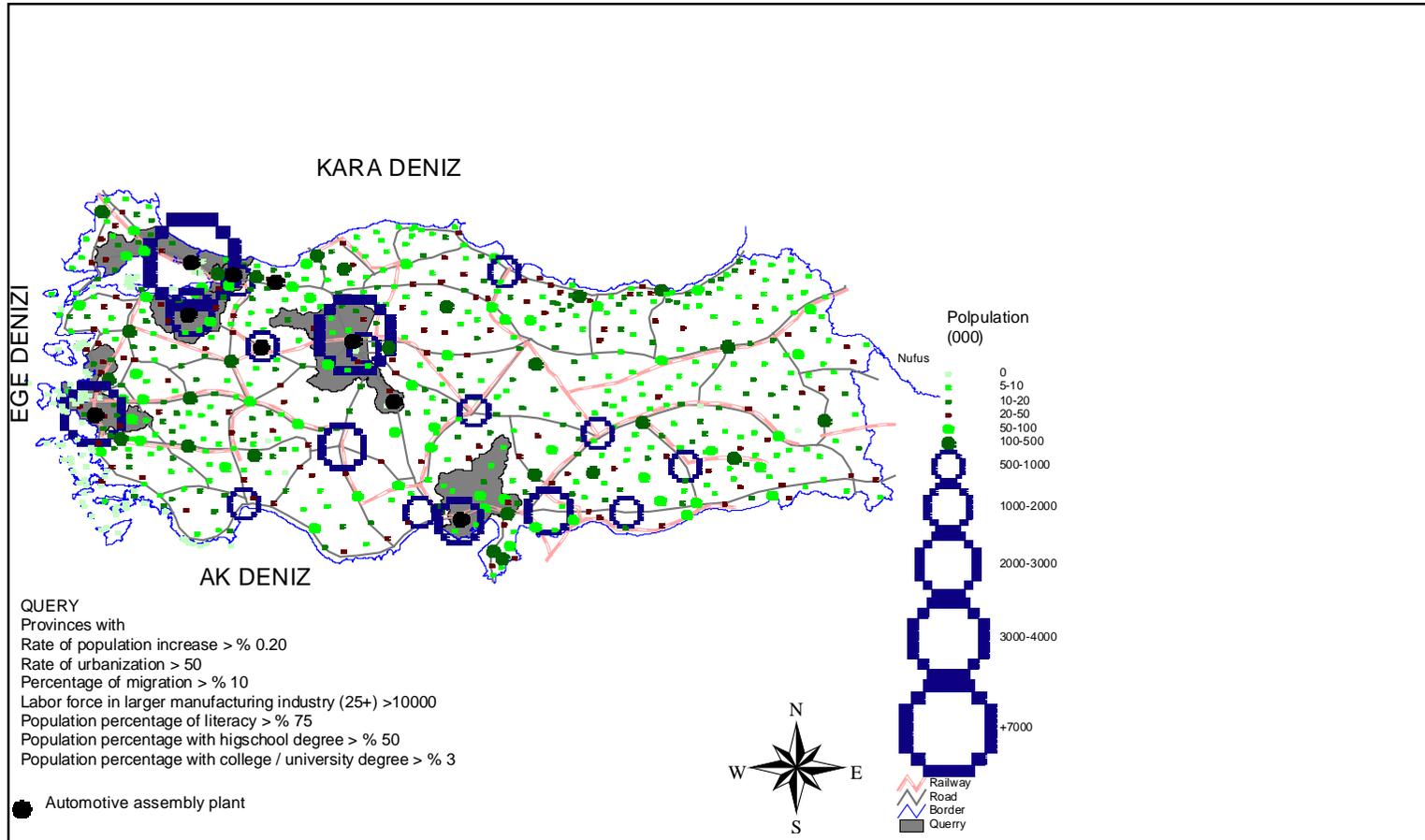
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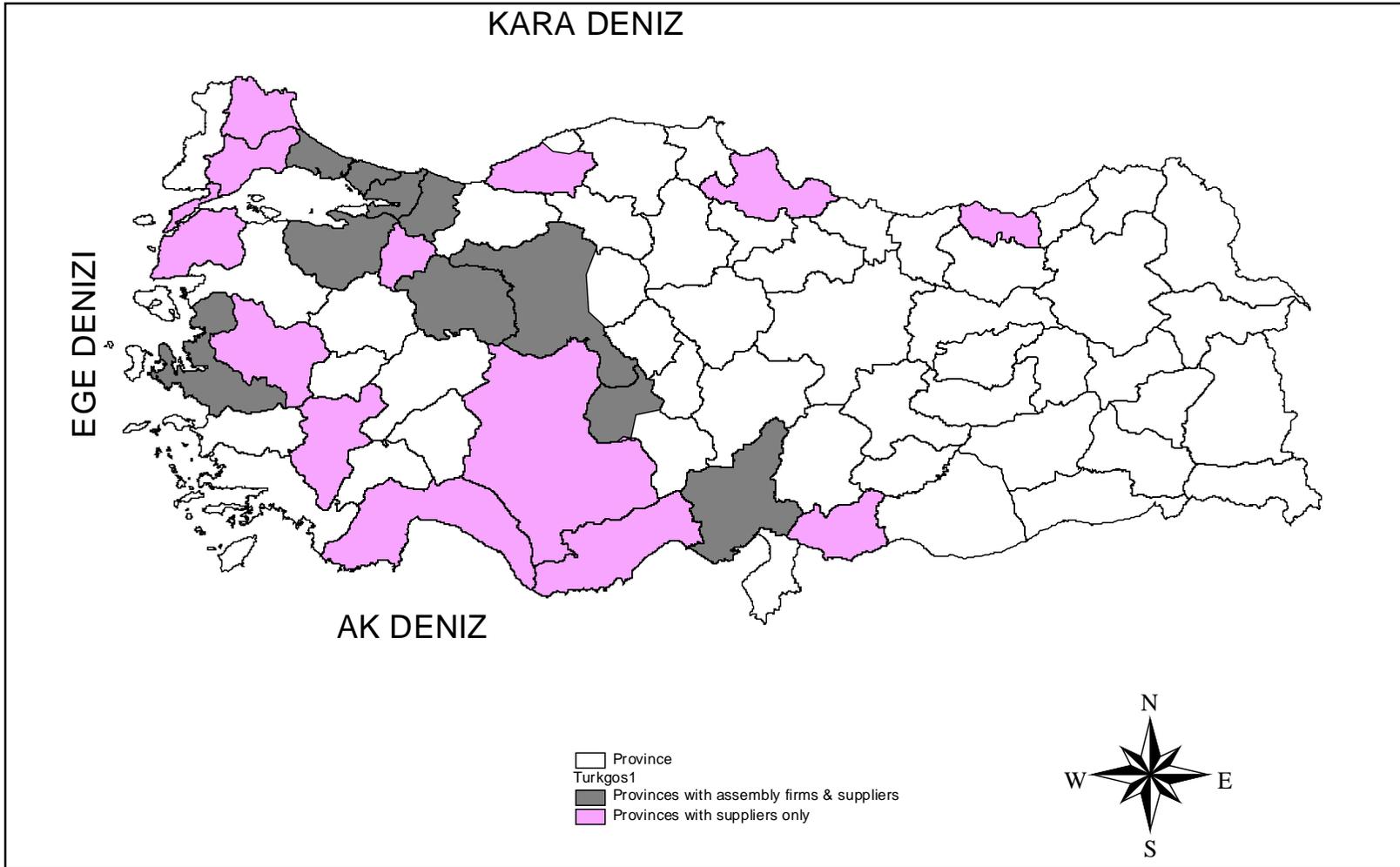
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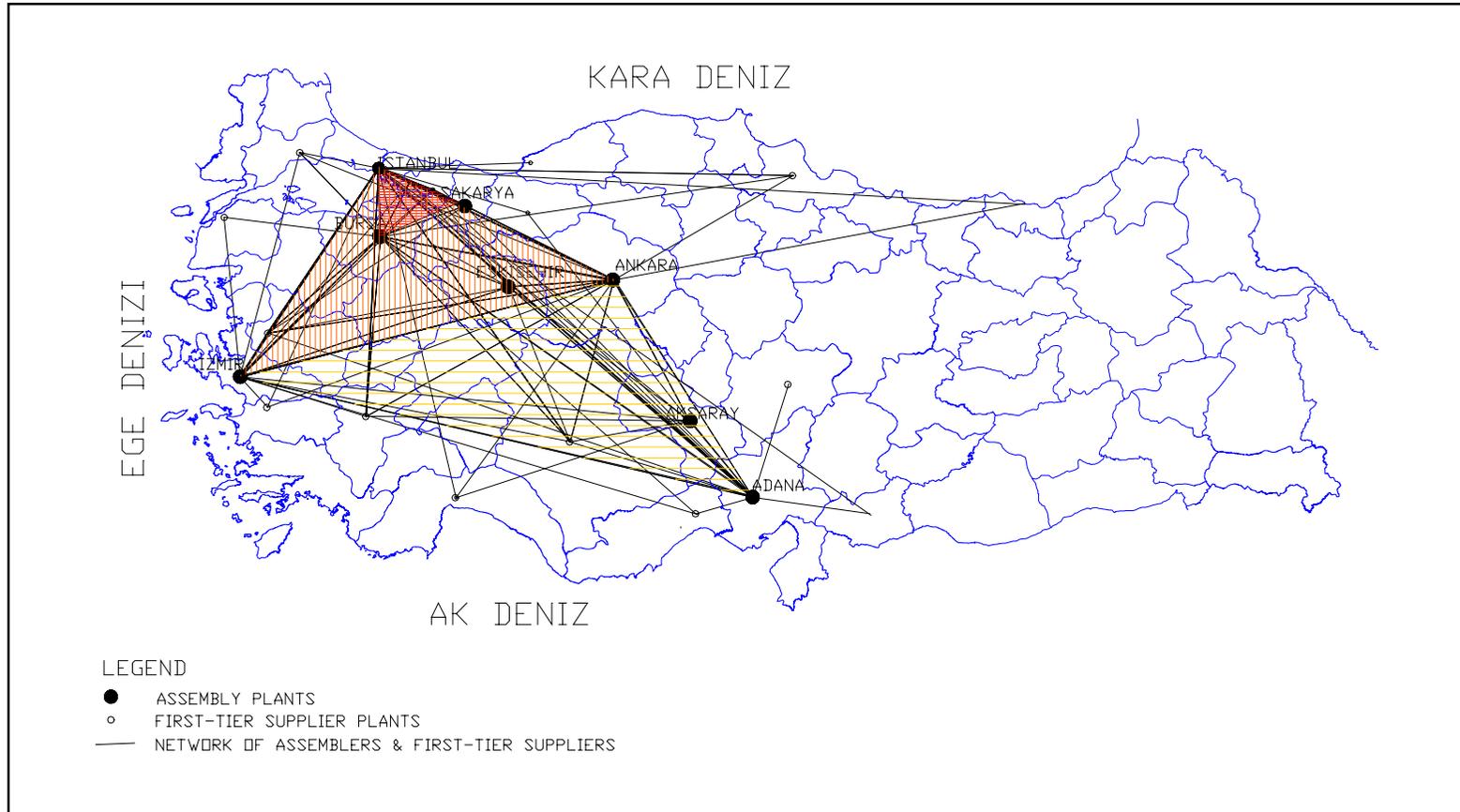
Map 1: Distribution of Turkish automotive exports



Map 2:Provinces with respect to selected development indicators



Map 3:Provinces with assembly firms &suppliers



Map 4: Network of assembly and first-tier supplier plants in automotive industry in Turkey

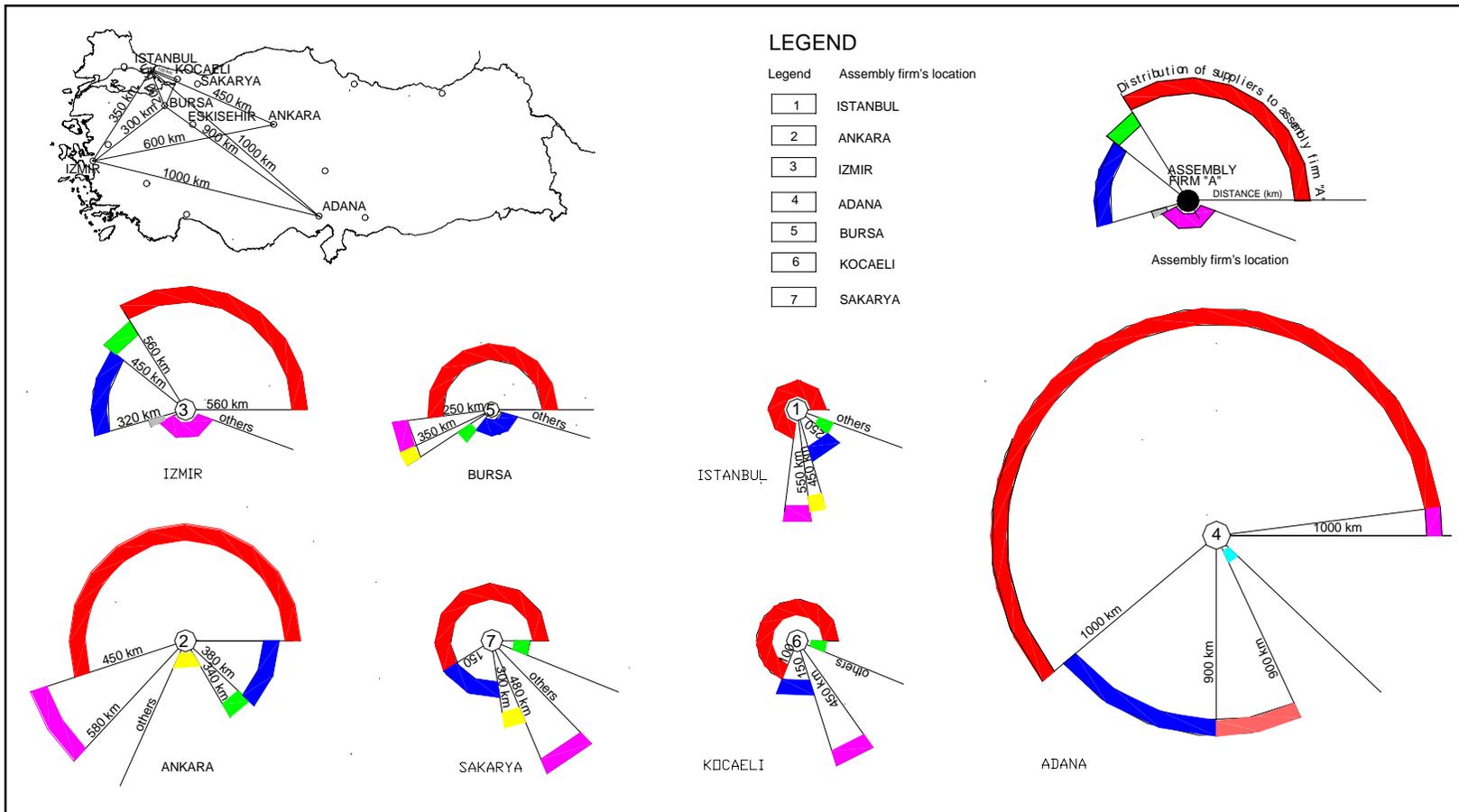


Figure 1: Geographical distribution of the suppliers to assembly firms in Turkey