Thinking About a New Industrial Policy Framework for Turkey

Murat A. Yülek

1 Introduction

The positive and sustained association between the manufacturing sector and per-capita income, as well as their growth, suggests that manufacturing can act as an engine of growth, as Kaldor (1967) suggested. Figure 1 shows that there is a direct relationship between the levels of per-capita GDP and per-capita manufacturing value added even in developed countries, which have long become service-based economies. Thus one could infer that industrial policies may generate economic growth even in more developed, service-based economies. This is supported by the positive relationship between growth of per-capita GDP and growth of manufacturing value added (Fig. 2). Further, industrial policy can be instrumental

I thank Lorna Girayalp, Elif Tıpır, and Sena Nur Tozoğlu for their valuable assistance.

M. A. Yülek (✉)
Center for Industrial Policy and Development, Istanbul Commerce University, Istanbul, Turkey

A. F. Aysan et al. (eds.), *Turkish Economy*,
https://doi.org/10.1007/978-3-319-70380-0_13

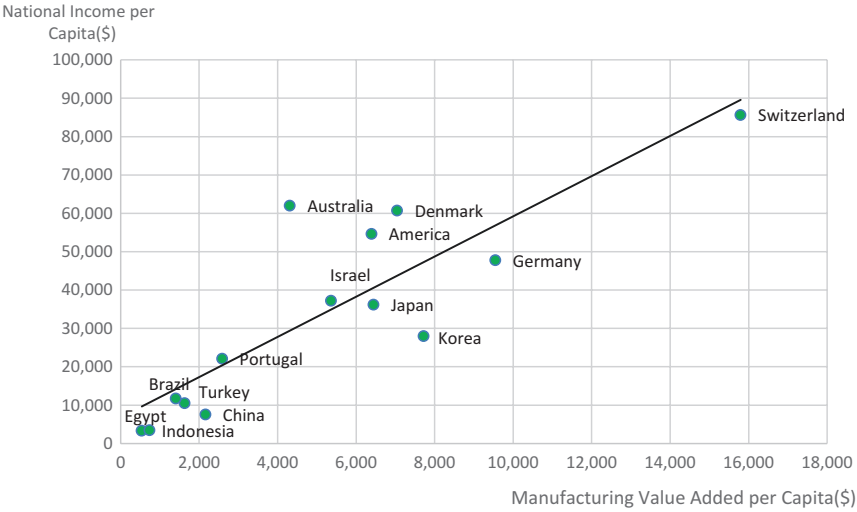

Fig. 1 Manufacturing value added and GDP per capita by country (2014) (Source: World Economic Outlook, IMF and World Bank)

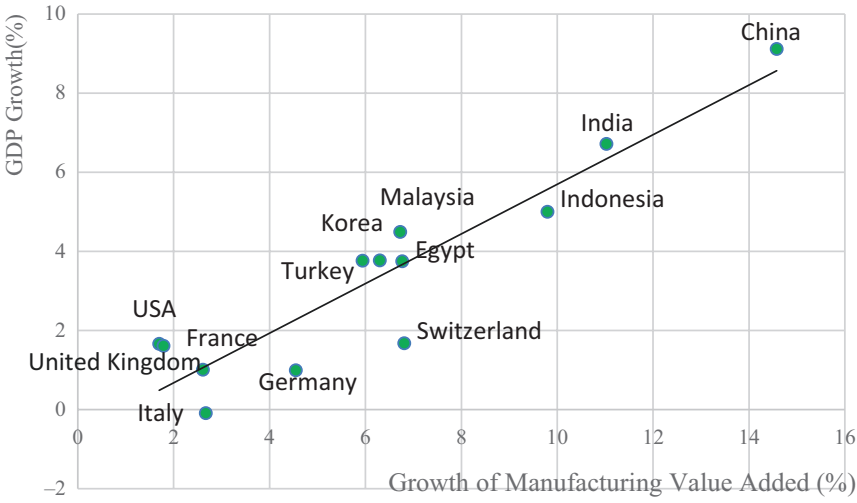

Fig. 2 Growth of manufacturing value added and GDP per capita by country (2000–2014) (Source: Çukurova Genç İşadamları Derneği 2016, IMF and World Bank)

in a country's breaking out of the middle-income trap (Yülek 2016a), which means reduced growth rates once the country reaches middle-income levels.

Turkey's industrialization process started in the late nineteenth century. Since then, with a volatile record, it has been among the relatively faster growing and industrializing countries. Meanwhile, however, other countries in the world have experienced their own industrialization processes determining the conditions of the global industrial and economic environment for Turkish firms and policies. Among these countries are newly industrializing East Asian countries, most importantly China, which have recorded phenomenal growth and development records more impressive than Turkey's.

More recently, administrations in developed and developing countries alike have been discussing the need for new industrial policies or science technology and innovation policies that have relevance to the industrial sector.[1] It is thus evident that there is a perceived need for strengthening the industrial sector in both sets of countries.

With this in mind, this chapter first reviews the industrialization process in Turkey. It then assesses Turkey's current level of industrialization and its features by implementing metrics of manufacturing value added and export sophistication. Next, it places Turkey and a set of comparators on a streamlined industrialization process map. Based on the findings and assessment, this chapter finally proposes the main features of an appropriate industrial policy for Turkey that would address the identified deficiencies. In doing so, the paper considers the policies as well as the administrative structure that would be conducive to the design and implementation of such policies.

2 Industrialization and Industrial Policies in Turkey: Background

Industrialization in the Ottoman Empire started in the late nineteenth century and was insufficient compared to UK or continental Europe. There were state-led attempts at industrialization and educational reform

with an emphasis on technical education. All in all, the newly established republic at the outset of the twentieth century did not inherit a significant manufacturing industrial base from the Ottoman Empire.

The early administrators of the republic, in particular Mustafa Kemal Atatürk, tried to find a way to accelerate economic development and industrialization. In the Izmir Economic Congress (1923), the necessity for industrialization was discussed, but no significant and specific policy measures were developed except, again, the discussion of the need to protect and encourage industries. In 1927, a significant move came with the enactment of the Industrial Encouragement Law (Teşvik-i Sanayi Kanunu) on 28 May 1927. The main objective of the law was to incentivize private-sector manufacturing investments. The implementation of the law was successful; in the first five years, the number of private industrial firms and industrial employment quadrupled (Sanayi ve Teknoloji Bakanlığı 1973). In the 1930s, the need for direct government intervention was felt more and more; in order to extend financing to the private sector, two state-owned banks (Sümerbank and Etibank) were established to support, primarily, textiles, mining, and metallurgical industries. Although both were officially deposit-collecting banks, their objectives related more to development banking by channelling financial savings into industrialization and development.

In the subsequent years of the 1930s, the statist tone in economic policy intensified as the private sector was rightly seen to be insufficient in bringing about the desired growth and development. In 1934, the First Five-Year Industrial Plan was launched. The plan included 20 specific industrial investments to be undertaken by the government in cotton and woolen textiles, paper and cardboard, and iron and steel sectors (Appendix 1 presents a list of the industrial facilities). At the background of the plan were (1) "The Report on Our Economic Situation" ("İktisadi Vaziyetimize Dair Rapor") prepared by the Ministry of Economics and (2) two separate economic reports by Russian and American experts (Yücel 2014). Etibank and Sümerbank also contributed to the plan. Total projected investment on the factories under the plan was quite large, 44 million Turkish lira (TL), while the actual investment cost reached TL 100 million (3 and 8 per cent of 1934 GDP, respectively). The plan was ultimately successful in the sense that the facilities were completed and became operative.

The plan was quite focused sectorally and carried a significant tone of import substitution, although it was not accompanied by protective measures. It had three principal strategic priorities. Firstly, the factories would be in sectors that used domestically produced raw materials; secondly, they would require high capital expenditures, scale, and technology; and thirdly, their capacities would be adequate in meeting domestic demand.

Following the first industrial plan, a second plan was formulated in the late 1940s. It was more comprehensive than the first one in terms of covering the mining, combustibles, energy, food, chemical, and machinery industries. The second plan, however, was never implemented because of the Second World War, during which industrialization almost stopped.

In the 1950s, a new and democratically elected government came to power with liberal economic policies. The key economic strategies of the new government were the encouragement of agriculture growth leading to self-sufficiency, infrastructure development, and private-sector-led industrial development. Banking and liberal foreign direct investment policies were introduced, aimed at supporting industrialization. An industrial development bank was established, with the World Bank as a shareholder. The Law to Encourage Foreign Investment was enacted in 1951. The liberal policies continued until the 1960s. During this period, private-sector-led industrialization (e.g. textiles, tiles) was achieved, though without a focused or sectoral policy.

Following the coup in 1960, the State Planning Organization was established in 1961. The subsequent period, 'the planned period' until the 1980s, was characterized by five-year development plans and a strong import substitution policy with significantly protectionist measures. The plans included macroeconomic general equilibrium models and carried compulsory policies for the state-owned companies and ministries. For the private sector they were 'indicative', which meant the industrial incentives and financial policies would be formed and implemented accordingly.

The protectionist import substitution policy aimed at directing the private sector principally towards consumption goods, such as food and textiles (Eşiyok 2004, 4) and the state enterprises towards heavier industry such as petrochemicals, iron and steel, and paper. During the 1960s, however, unlike Korea, Turkey did not simultaneously pursue export-led

growth (Yülek 2016b), although exports for some sectors were targeted. This policy (along with other policies such as in the financial sector) ultimately led to a balance-of-payments crisis in the late 1970s as sustained import dependency led to increasing demand for foreign currency, which was not balanced by the foreign currency earnings from exports.

During the 'planned period', a certain amount of sector targeting was conducted. In the first, second, and third plans (1963–1967, 1968–1972, and 1973–1977), residential construction, agriculture, manufacturing, and transportation were the high-level priorities. However, economic growth was predicated mainly on the industrial sector. In the manufacturing sector, machinery, metallurgy, and chemicals were emphasized. The protectionist policies meant that if a product was manufactured by domestic companies, its imports would be restricted or banned. In the assembly industries, local content would be increased with the aim of attaining complete domestic manufacturing in the future. However, with reference to international division of labor, 'not all products had to be manufactured domestically'.

The plans included detailed production and investment targets for selected manufacturing subsectors (Table 1). In some subsectors such as ceramics, some plans discouraged greenfield investments and limited new investments to the expansion of existing plants. In others, such as textiles and garments, in addition to import substitution, policies encouraged exports. The plans also included policies shaping the market structure with some measures aimed at regulating the market structure and preventing monopolistic tendencies and rents. On the other hand, in subsectors such as textiles and garments, achievement of scale by defragmentation of the many small enterprises in operation was targeted. The plans also targeted technological progress and development by firms, reduction of vulnerabilities to economic and technical external shocks, and increasing production of intermediate and capital goods. In this respect, the chemical, petrochemical, metal, and electronics industries were among the priorities.

In 1960, the new president following the coup, Cemal Gürsel, took an initiative to ensure local automobile manufacturing. While a prototype, 'Devrim' (Revolution), was successfully built, the initiative was not successful in establishing a commercial industry. The main reason was that

Table 1 Manufacturing subsector plans with production and investment targets

	Five-year development plans				
Industry	I	II	III	IV	V
Food, beverage, and tobacco	●	●	●	●	●
Textile and clothing	●	●	●	●	●
Paper	●	●	●	●	●
Tyre	●	●	●	●	●
Plastics processing	●	●	●	●	●
Chemicals	●	●	●	●	●
Glass	●	●	●	●	●
Chine and porcelain	●	●	●	●	●
Cement	●	●	●	●	●
Iron, steel, and metallurgy	●	●	●	●	●
Metalware and steel construction	●	●	●	●	●
Machine manufacturing	●	●	●	●	●
Vehicle repair and manufacturing	●	●			
Handicrafts	●	●			
Leather		●	●	●	●
Petroleum products		●	●	●	●
Electronics		●	●	●	●
Road vehicle manufacturing		●	●	●	●
Railway vehicle manufacturing		●	●	●	●
Ship manufacturing		●	●	●	●
Aircraft manufacturing and repair		●	●	●	●
Agricultural equipment and machinery manufacturing			●		●
Non-electrical machinery				●	●

Source: Turkey's Five-Year Development Plan text and author

the idea of industrialization did not win the confidence of the dominant actors in society. For example, well-known editors and columnists such as Nadir Nadi, Çetin Emeç, Esin Talu, and Çetin Altan, among others, wrote strong 'anti-automobile manufacturing' pieces in their newspapers (Sanır 2011, 148–157).

In the mid-1970s, narrowly targeted industrial policies were implemented under the leadership of Necmettin Erbakan, who acted as Deputy Prime Minister in the period 1974–1978. The main strategy was again state-led: a number of state enterprises were formed to make physical investments in electronics, heavy industry, aeronautics, and machinery industries (Table 2). The locations of the facilities were spread out around the country for regional development purposes. The results of the implementation of

Table 2 Industrial targeting in Erbakan period

State enterprise	Sector	Number of factories		Selected provinces of new factories
		In 1975	Additional by 1982	
TESTAŞ	Electronics	0	4	Pasinler, Erzurum, Aydın, Ankara
Turkish Iron Steel Co.	Iron and Steel	2	4	Karabük, Sivas, Divriği, İskenderun
TAKSAN	Machine Tools	0	4	Tokat, Kayseri, Erzincan, Yerköy
TÜMOSAN	Engine	0	5	Konya, Uşak, İzmit, Eskişehir, Bursa
TEMSAN	Electromechanics	0	11	Malatya, Diyarbakır, Elazığ, Yozgat
TUSAŞ	Aircraft	0	1	Ankara
MKE	Machinery and Chemicals	18	50	Yozgat, Kütahya, Kayseri, Konya
Turkish Cement Industry Inc.	Cement	13	33	Ergani, Kahramanmaraş, Lalapaşa
Turkish Sugar Factories	Sugar	17	31	Muş, Konya, Çorum, Niğde
Turkish Nitrogen Industry Inc.	Nitrogen	5	21	Mersin, Manisa, Şırnak, Mazıdağı
SEKA	Cellulose and Paper	4	10	Afyon, Balıkesir, Kastamonu

Source: Sanayi ve Teknoloji Bakanlığı (1977)

the programme were mixed largely owing to the volatile political environment. Some investments were successfully completed while others, such as aeronautics, were restarted and completed after a decade. Still others were cancelled in the initial phases owing to political problems of the government.

In January 1980, in a major shift of policies, the liberalization of the Turkish economy was launched under the leadership of Turgut Özal, who subsequently became Turkey's prime minister and president. The policies addressed the liberalization of state controls on prices, privatization, liberalization, financial sector liberalization, and the liberalization of capital movement (Yülek 1998). Under trade liberalization, the import substitu-

tion policy was abolished in favour of export promotion. Sector targeting was also abolished; industrial incentives were designed to achieve general industrialization without sectoral preference and to direct physical investments towards underdeveloped regions.

During the 1990s, Turkey had experienced a number of financial and economic crises as well as political instability. After 2001 political and economic stability was restored. Macroeconomic accounts strengthened, and inflation rates were reduced and fiscal balance improved. However, the current account deficit increased on the back of increasing income levels driving up imports. Industrial incentives were used increasingly as a tool of policy in the 2000s, and this pushed up exports; between 2002 and 2011 Turkey's exports multiplied five times. After 2001 the government supported manufacturing in defence industries. This led to the local production of military vehicles, aircraft, and ships. On the civilian front, government aimed at developing a locally designed and manufactured automobile, but there was little success in the actual implementation of the idea.

High current account deficits were also linked to high import dependency as Turkey's export and domestic manufacturing industries were dependent on intermediate and raw materials imported from abroad (Senesen and Günlük-Senesen 2003; Aydoğuş et al. 2015). Starting in 2011, the Ministry of Science, Industry, and Technology issued sectoral strategy documents for several sectors including automobiles, machinery, and textiles. The strategy documents included action plans that included measures to be taken by various ministries and governmental units. However, the action plans mostly lacked enforcement that would enable the ministry to take action in case the measures were not undertaken.

2.1 A Summary of Industrial Policies and Outcomes in Turkey

As a summary, various industrial policy approaches have been pursued since the founding of the republic (Table 3). These approaches aimed at addressing the challenges of the specific period. In general, however,

Table 3 Evolution of industrial policy in Turkey

Period	Industrial policy
1923–1933	General industrialization policies
1933–1940	Sector targeting supported by financial sector policies; state-led industrialization
1950–1960	General industrial policies supported by financial sector policies; increasing private-sector participation in physical investments
1960–1980	Economic planning; sector targeting; import substitution industrialization with very little export orientation
1980–2011	Export-led growth; trade liberalization; general industrialization policies
From 2011	Export led growth; trade liberalization; general industrialization polices; industrial strategy documents

Turkish industrial policies lacked the focus that some of the more successful industrializers, such as South Korea, pursued.

As a result, while Turkey has achieved some level of industrialization, its performance falls behind stars such as South Korea. The latter started with much more modest initial conditions but ended up with a more impressive outcome (Fig. 3). Turkey's per-capita GDP and its exports were significantly higher than South Korea's in 1960. Korea's industrial policies led to a rapid expansion of exports in absolute terms compared to Turkey, triggering the impressive growth of per-capita income. Korea's export orientation and focused industrial policies were instrumental in the achievement of sustained growth and industrialization (Yülek 2016b).

However, the GDP growth record has been quite volatile historically and falling more recently. Per-capita GDP time series in the last four decades show three plateaus that can be identified as middle-income traps. The first two were during 1980–1988 and 1990–2001 at around USD 1,500 and USD 3,000 respectively. The third one started in 2008 and continues to the present, at around USD 10,000 (Fig. 4). During these periods, per-capita GDP stagnated for relatively long periods of time.

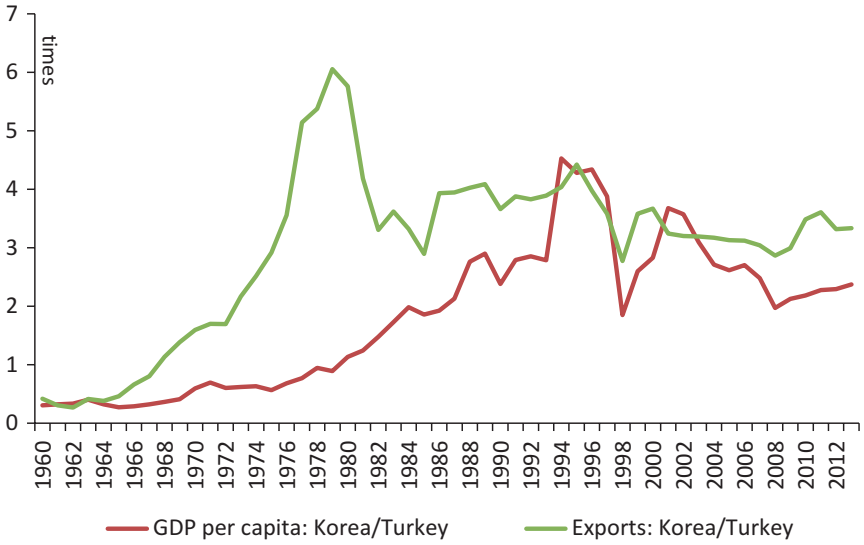

Fig. 3 Comparison of performances of Turkey and South Korea (Source: Yülek 2016b)

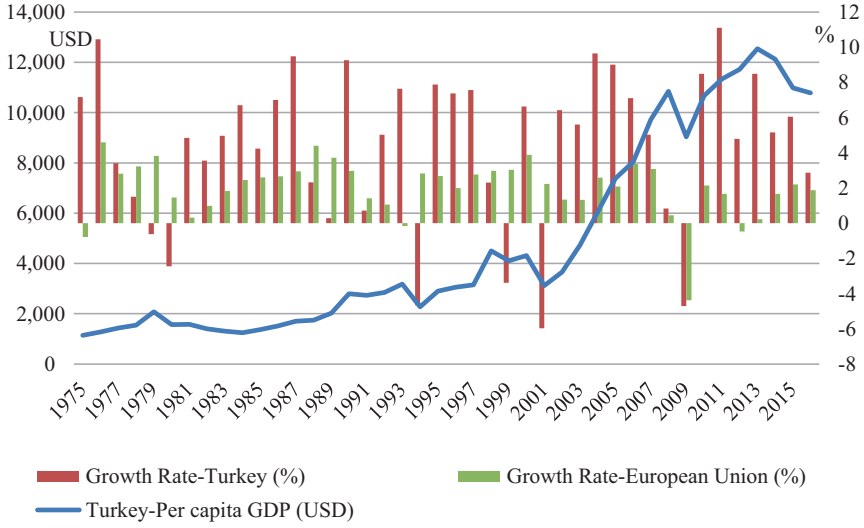

Fig. 4 Turkey: GDP growth rates and per-capita GDP (Source: IMF)

3 Current Level of Industrialization in Turkey

The preceding sections looked at past industrial policies; this section first discusses the level of industrialization in Turkey using some relevant metrics. Then it briefly discusses the effect of industrialization process on Turkey's exports, its export diversification and sophistication. It then introduces a streamlined process of industrialization for developing countries with a view to classifying Turkey and some other countries.

3.1 Manufacturing Value Added: Turkey and Some Comparators

Turkish manufacturing sector growth rates have improved rapidly since 2001, but a stagnation has set in more recently. Overall, the average growth rate of Turkey's manufacturing value added is among the highest in the world (Table 4). This was reflected in the rapid expansion of exports between 2001 and 2012 despite a significant contraction in 2009 following the global financial crisis.

However, although Turkish manufacturing value added per annum is among the top 20 in the world, it is still small compared to that of the large industrial economies. Turkey's manufacturing sector generated a total value added of USD 126 billion in 2014. That makes the country the 16th largest manufacturer in the world.

The manufactured goods market is in fact quite concentrated; the world's four largest manufacturers generate a total of USD 7.35 trillion in manufacturing value added per annum. The information in Table 5 shows that there is a gap in the size of manufacturing value added after Germany, the fourth largest manufacturer in the world. An indicative classification is also presented in Table 5 defining USD 200 billion to USD 399 billion in manufacturing value added as the upper-medium group and USD 100 billion to USD 199 billion as medium-low group. On that basis, Turkey can be considered a lower-medium-sized manufacturer.

Table 4 Average growth of manufacturing value added per annum: selected countries (billion USD unless otherwise indicated)

Country name	2000	2014	Average nominal growth rate (%)
China	482	3,713	14.6
India	67	322	11.0
Indonesia	46	187	9.8
Switzerland	48	129	6.8
Malaysia	29	77	6.7
Egypt	18	45	6.3
Turkey	53	126	5.9
Germany	404	788	4.6
Italy	200	297	2.7
France	193	284	2.6
USA	1,509	1,944	1.7
Korea	146	390	6.8
United Kingdom	217	283	1.8

Source: Çukurova Genç İşadamları Derneği (2016), IMF, and World Bank

However, in terms of per-capita manufacturing value added, perhaps a better indicator of the level of industrialization, Turkey ranks poorly (Table 6). It is the 56th country in the world with USD 1,632 as compared to USD 7,720 for Korea and USD 15,793 for Switzerland.

3.2 Exports and Export Sophistication

Exports reveal a country's competitiveness. Turkey's exports are constituted predominantly by manufactured products (Table 7). Thus the industrial sector plays an important role in foreign currency earnings. Turkey has diversified its export markets significantly in the 2000s relative to BRICS or eastern European peers. While Turkey had the second highest level of market concentration of exports in 1999, within the next decade it was one of the most diversified (World Bank 2014a, b, 8–11). During the same period, export product diversification also proceeded rapidly and surpassed that of BRICS and eastern European countries (World Bank 2014a, b, 8–11).

However, Turkey's export sophistication is still limited; its exports comprise mostly low- and middle-technology products. Compared to high-income countries (Table 7), the composition of Turkey's exports

Table 5 Total manufacturing value added (2014)

	Country name	Billion USD
Large manufacturers		
1	China	3,713
2	USA	1,944
3	Japan	905
4	Germany	788
Upper-medium manufacturers		
5	Korea	390
6	India	322
7	Italy	297
8	France	284
9	United Kingdom	283
10	Russia	249
11	Brazil	219
12	Mexico	217
13	Indonesia	187
Lower-medium manufacturers		
14	Spain	167
15	Switzerland	129
16	Turkey	126
17	Thailand	112
18	Holland	96
19	Australia	94
20	Sweden	93

Source: Çukurova Genç İşadamları Derneği (2016), IMF, and World Bank

reveals some key disadvantages. For high-income countries and S. Korea, the majority of exports are composed of chemical products (HS 1988/2 product groups 28–38), electrical and non-electrical machinery (HS 1988/2 product groups 84–85) and transportation equipment (86–89), and miscellaneous manufactured goods, including high-value items such as optical and music equipment, arms, and toys (HS 1988/2 product groups 90–99). The share of Turkey's exports in these categories is significantly smaller than those of high-income countries and shares common features with medium- and lower-income countries such as Mexico, Brazil, China, and India. Export sophistication studies show that although the share of medium-technology exports in total increased during the last decade, their level is still around one-third of the total. More importantly, the share of high-technology exports remained at lower than 5 per cent of the total (World Bank 2014a, b, 14).

Table 6 Manufacturing value added per capita by selected countries (2014, USD)

Rank	Country name	Manufacturing value added per capita	Rank	Country name	Manufacturing value added per capita
1	Switzerland	15,793	23	Italy	4,962
2	Ireland	11,062	25	United Kingdom	4,476
3	Singapore	10,022	28	France	4,209
4	Germany	9,546	30	Slovakia	3,627
5	Monaco	9,049	31	Spain	3,537
6	Austria	8,484	34	Hungary	2,896
7	Sweden	8,238	36	Malaysia	2,713
8	Korea	7,720	37	Portugal	2,589
9	Luxemburg	7,624	38	Saudi Arabia	2,578
10	Finland	7,173	39	Poland	2,411
12	Denmark	7,043	42	China	2,161
15	Japan	6,443	43	Romania	1,939
16	America	6,392	44	Russia	1,796
18	Belgium	5,745	45	Mexico	1,789
19	Holland	5,602	46	Greece	1,771
20	Israel	5,361	47	Thailand	1,754
21	Canada	5,094	48	Turkey	1,632
22	Czech Republic	5,027			

Source: Çukurova Genç İşadamları Derneği (2016), IMF, and World Bank
Note: Smaller economier such Lichtenstein, Puerto Rico, San Marino, Qatar, New Caledonia and Trinidad Tobago which appeared among the top manufacturers have been excluded from table

3.3 Positioning Turkey in a Streamlined Industrialization Process Map

As discussed earlier, Turkey has pursued various industrial policies over the decades. Where have these policies taken Turkey in terms of industrialization? And where does Turkey stand in the industrialization process compared to other countries? These questions are important for discussions about Turkey's path forward. Furthermore, it would be useful to compare Turkey's position in the industrialization process with that of other countries.

Table 7 Composition of exports: selected countries

HS 1988/92		France	Germany	USA	S. Korea	Turkey	Mexico	Brazil	China	Indonesia
Product Group	01–05_Animal	3.02	1.74	1.92	0.34	1.35	0.88	7.79	0.8	3.48
	28–38_ Chemicals	15.13	12.15	10.11	6.86	3.32	2.82	5.08	4.67	10.51
	16–24_ FoodProd	6.59	2.95	2.84	0.74	4.76	2.67	11.56	1.24	2.06
	64–67_ Footwear	0.63	0.42	0.12	0.13	0.48	0.19	0.55	3.01	1.04
	27–27_Fuels	3.88	2.68	9.61	9.67	3.74	10.61	9.17	1.47	19.63
	41–43_ HidesSkin	1.41	0.26	0.37	0.3	0.57	0.2	1.35	1.5	1.23
	84–85_ MachElec	19.33	26.35	23.72	34.56	14.77	35.29	7.53	41.44	7.12
	72–83_Metals	6.87	7.5	4.87	8.23	13.21	4.39	7.17	7.87	8.06
	25–26_Minerals	0.24	0.19	0.69	0.12	2.51	1.3	12.97	0.18	1.05
	90–99_ Miscellan	7.83	11.76	17.65	7.43	4.38	7.69	3.2	9.8	1.8
	39–40_ PlastiRub	5.05	5.25	4.84	7.06	5.52	2.83	2.46	3.87	2.6
	68–71_ StoneGlas	2.3	1.95	4.67	1.08	7.12	2.88	2.11	4.79	13.72
	50–63_ TextCloth	2.91	2.33	1.62	2.81	18.42	1.76	1.13	12.28	12.15
	86–89_ Transport	18.99	20.61	9.6	19.81	12.58	22.9	7.17	4.47	8.16
	06–15_ Vegetable	3.52	1.24	4.83	0.17	5.33	2.87	16.52	0.93	6.81
	44–49_Wood	2.3	2.61	2.54	0.7	1.95	0.73	4.25	1.68	0.57
	01_99_All Products	100	100	100	100	100	100	100	100	100
	Top 5 export products	84, 88, 87, 85, 30	87, 84, 85, 30, 99	84, 85, 99, 27, 87	85, 87, 84, 27, 89	87, 84, 61, 85, 72	87, 85, 84, 27, 90	26, 12, 27, 2, 84	85, 84, 94, 61, 62	27, 71, 87, 84, 29

Source: Çukurova Genç İşadamları Derneği (2016), World Integrated Trade Solutions database (World Bank)

We will locate Turkey on a simple four-stage streamlined process map developed by Yülek (2016a). In the first stage, capital deepening occurs in the form of production by imported machinery replacing manual production (Fig. 5). This leads to a jump in labour productivity. However, technical skill accumulation remains quite limited. Over time, firms and the labour force start to develop skills that help them run machinery better and more efficiently. This is the 'adoption' stage, Stage II, where new technology is not developed but the technology embedded in the imported machinery is appropriated by the local manpower. In the next stage, Stage III, the importing country furthers technology adoption by gaining skills to service and repair imported machinery. This leads to further productivity gains by a smaller amount of downtime or lower maintenance/repair costs.

Most countries remain somewhere between Stages II and III. Few countries achieve the imitation stage (Stage III) and new products stage (Stage IV). Yülek (2016a) describes these stages as follows:

> If Stage III is reached, a country's firms (through its firms and human resources) reverse-engineer some of the imported machinery and build similar or slightly different ones. This is a new sector for the country. For example, starting with firms that produce textiles, now the country has firms that manufacture textile machinery. The next and ultimate step in the industrialization process is developing new products (Stage IV in Fig. 4). This can be either through formal or informal R&D or through incremental innovation. Both unleash TFP-based GDP growth. They might also lead to new capital deepening and productivity-enhancing avenues owing to the machinery developed. This stage requires properly skilled human resources, such as research and development engineers in the firms and/or in the universities. Countries that have reached this stage have firms at the boundaries of commercialized products. In order to compete, they need to develop new products that are costly but at the same time that provide them with a certain period of pricing power.

Locating countries on the process map is rather subjective. Perhaps a scoring tool could be developed for this purpose, but even that might yield controversial results. Thus a country may be in Stage IV, whereas Fig. 5 identifies it as a Stage III country. Nevertheless, such an exercise could help

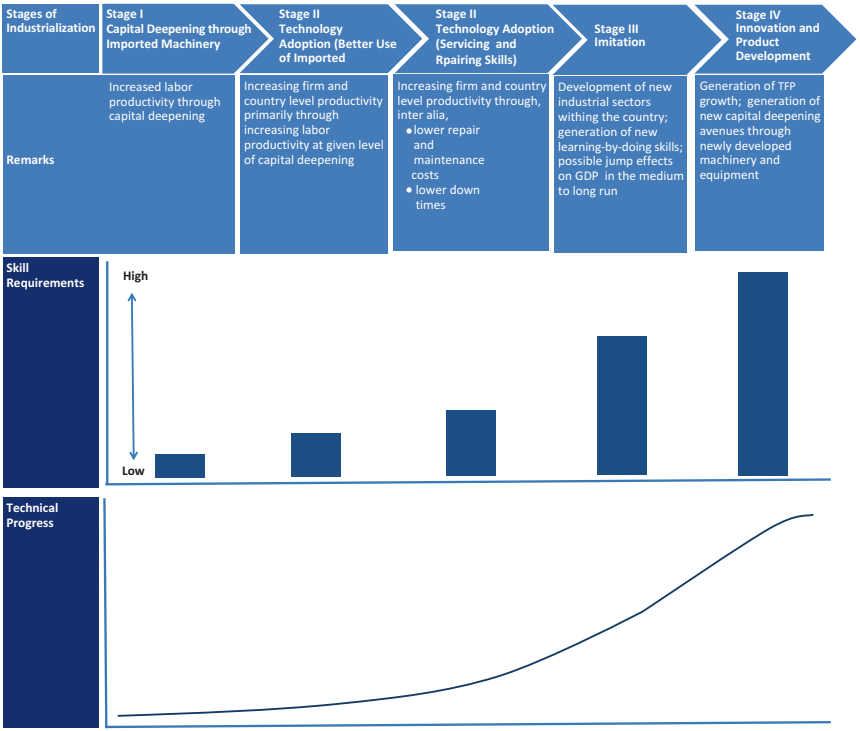

Fig. 5 Industrialization, technical progress, and skills (Source: Yülek 2016a)

fine-tune needed policies to take the country to more advanced stages. In such an analysis, some countries can be identified as being in more than one stage. There are two reasons for this. Firstly, if the assignment of a country to a certain stage is not done on the basis of the 'centre of gravity' of its manufacturing industries, its industrial standing can be different for different manufacturing sectors. For example, Korea can be considered a Stage II country in aviation equipment, a Stage III country in synthetic textiles, and a Stage IV country in electronics. Secondly, it may simply not be possible to assign a specific stage to a country's 'centre of gravity' in the manufacturing sector before a detailed sectoral analysis is completed.

Table 8 presents some tentative placements of selected countries on the industrialization process map. Turkey is listed as a Stage II country.

Table 8 Classification of countries in terms of industrialization

Stage of industrialization	Stage I	Stage II	Stage III	Stage IV
Features	Using imported machinery (capital deepening); this leads to an initial jump in the (per hour) productivity of domestic labour	Adoption of technology; the importing country, through its firms and labour force, develops skills to run the machinery more efficiently. Labour productivity continues to rise	Imitation of sophisticated industrial products of other countries; locally branded industrial goods	Development of new and sophisticated industrial products
Product examples	Textiles and garments, plastics	Textiles and garments, plastics, automobiles, or aircraft under licence, assembly of electrical and non-electrical equipment, assembly of electronic equipment	Technical textiles, locally branded automobiles or aircraft; flat screen for TVs, GSM* equipment, electronic equipment	Branded textile and garments, technical textiles, locally branded automobiles, new medical equipment, branded GSM equipment
Selected countries	Bangladesh	Turkey, Pakistan, Brazil, India, China, Malaysia, Iran	Korea, China	Switzerland, USA, Germany, Japan, S. Korea

Note: Some countries are purposely classified in two different stages
*GSM: Global System for Mobile Communications

Looking at a major comparator, South Korea is identified as an either Stage III or Stage IV country. The reason for this selection for Turkey is that Turkey has so far industrialized primarily on the back of imported equipment. At the moment it is a country that manufactures goods by using this equipment. Its products are mostly standard, undifferentiated ones with medium-technology content. The country's exports mainly consist of industrial goods. The country has not ventured adequately into imitating higher-technology products or developing relatively more sophisticated products such as flat screens, smartphones, tomography equipment, or computer numerical control machines. Moreover, it has not been able to develop locally developed or branded automobiles or aircraft.

4 Thinking About a New Industrial Policy for Turkey

This section starts with a brief summary of the current state of industrialization and the main deficiencies to be addressed. It then discusses the features of an appropriate industrial policy for Turkey with a view to accelerating the industrialization process from where it is now, as reviewed in the previous section. This section considers the administrative structure under which policies will be both designed and implemented.

The foregoing discussion in Sects. 2 and 3 indicated that while Turkey has recorded relatively high growth rates in the manufacturing sector, the level of industrialization is still behind that of the top manufacturers of the world and it is experiencing a middle-income trap. Moreover, as illustrated by its export performance, the country suffers from low sophistication and, thus, low value of exports. The design and implementation of an appropriate industrial policy should be based on these initial conditions.

Thus, one can infer that Turkish industrial policy should address the existing key deficiencies. The key pillars of such an industrial policy are taken up in the rest of this section. This can help the country escape the middle-income trap, as suggested by the positive relationship between

the growth of manufacturing output and per-capita income, as well as per-capita manufacturing output and per-capita GDP (Yülek 2016a).

4.1 Concentration on Technical Capabilities of Industrial Layer

Industrialization is a process of building on technical capabilities (Yülek 2016a). Technical capabilities comprise three components: productive, technological, and R&D capabilities (Fig. 6). Productive capabilities refer to 'producing with a given level of technology at world levels of efficiency or productivity' (Radošević and Yoruk 2015: 5). Technological capabilities, on the other hand, refer to making use of 'technological knowledge in an effort to assimilate, use, adapt and change existing technologies in order to sustain competitiveness' (Yun 2007; Kim 2001). R&D capabilities, on the other hand, refer to making deliberate and effective use of R&D activities in order to develop new products and processes. R&D activities become more significant as a firm approaches the world technology frontier when its own R&D substitutes technology transfer activities.

The industrial policy should concentrate first and foremost on building these capabilities across manufacturing firms, public and private research institutions and universities, and human resources. Together, these form an ecosystem that can be called the 'industrial layer' (Yülek 2016a). In other words, Turkish industrial policy covering the next ten to twenty years should aim at forming a strong industrial layer that can accelerate the industrialization process and make the country among the top manufacturers of the world.

Currently, the country lacks an adequately strong industrial layer in some manufacturing subsectors, especially those subsectors that higher-

Fig. 6 Capabilities necessary for the formation of an industrial layer

income countries currently specialize in, namely electrical and non-electrical machinery, chemicals, transport equipment (other than automobiles), certain other machinery such as optical and precision equipment, pharmaceuticals, and health and personal care goods. Hausman et al. (2007) suggest that increasing export sophistication, which can be achieved by extending a product range towards that of the higher-income countries, would lead to higher growth rates in developing economies.

With the objective of forming a strong industrial layer, the prospective industrial policy can concentrate on the number of pillars to build or strengthen technical capabilities. Firstly, enhancing the productive capabilities of firms should be an important objective of the policy. Learning by doing leads to diminishing unit costs, informal training of the workforce, formation of an ecosystem of suppliers, and small-scale innovations.

A diminished manufacturing base due to 'premature deindustrialization' (Dasgupta and Singh 2007) in developing countries may thus lead to a loss of valuable time. Some manufacturing is better than no manufacturing, whatever the level of sophistication of the products is, because forces such as learning-by-doing-induced unit cost reductions are at play. Furthermore, manufacturing highly sophisticated and priced products starts with manufacturing products of low- or medium-level sophistication.

A drive to increase the sophistication of a product pattern will obviously benefit from the build-up of productive capabilities. In any case, competition in low-sophistication products are fiercer, and it is not sustainable for countries like Turkey with relatively high wages compared to low-cost producers to compete in such products in the global market.

4.2 Sector Targeting

Shifting towards more sophisticated products necessitates a well-focused sector based on industrial policy for a mid-level industrialized country such as Turkey. The answer to the question of whether a sector-targeting industrial policy is necessary for Turkey is yes, in order to overcome mar-

ket failures leading to artificially high barriers of entry to more sophisticated industrial products.

4.3 Branding for Product Differentiation

Turkey has experimented with branding programmes such as Turquality. In some subsectors where Turkey has a relatively stronger industrial layer (such as textiles and apparel), the country needs to improve its national- and firm-level branding. This will, again, help raise export prices in global and local markets and support economic growth. Branding is important not only for consumer goods but also for capital goods industries; thus, machinery and intermediate goods industries should also benefit from branding efforts.

4.4 Science, Technology, and Innovation Policies and Innovation in Product Differentiation

Science, technology, and innovation (STI) policies, as a category distinct from industrial policies, would also play a role for a mid-level industrial country, if not for a low-level one. Even if the overall industrial layer needs to be strengthened in Turkey, there are industrial sectors such as automotive spare parts, defence, software, or medical equipment, where certain firms have built up competitive advantages. These sectors would appropriately need support that would fall into the realm of STI policies, which would bolster the technological and R&D capabilities of firms.

One of the key difficulties of such firms is commercialization. They develop prototypes of products but may have difficulty in launching production for domestic and international markets, which would require industrial-scale production facilities as well as successful branding, marketing, and distributing of commercial products. This should be an important component of STI policies. TUBITAK rightly considers commercialization a key activity to be supported. But the success of its support initiatives in this field has not yet been monitored and assessed.

In subsectors in which Turkey has a relatively strong industrial layer, firms' technological and R&D capabilities need to be developed to facilitate innovation. That, in turn, will help raise export prices in global and local markets and, thus, the manufacturing value added. Cooperation between industry and universities, which is manifestly weak, needs to be strengthened so that firms can benefit from the university resources to upgrade their technological and R&D capabilities.

4.5 Development-Based Public Procurement Policy

Public procurement policy should be used actively to foster productive and technological capabilities (Yülek and Taylor 2011). Industrialization efforts in developing countries face considerable barriers from manufacturers in both low-cost countries (in less sophisticated industrial products) and developed countries (in sophisticated industrial products). Obstacles impeding the access of local companies to public and private markets (such as low or negative recognition, inadequate scale effects, or technological barriers) act as typical market failures necessitating government action.

Development-based public procurement provides market and commercialization opportunities to local firms in developing countries, including Turkey, that can be more effective than financial support in developing productive and technological capabilities for firms, especially small and medium-sized enterprises (SMEs). Development-based public procurement policies may assist those efforts by enhancing market opportunities for firms of less industrialized countries (Yülek and Tiryakioğlu 2014; Tiryakioğlu and Yülek 2015).

In Turkey there is a growing awareness about the need for development-based public procurement. However, it is still the case that international firms are favoured in the public procurement of civilian manufactured goods such as elevators, health equipment, and transportation equipment despite growing local manufacturing.

4.6 Reorganization of Industrial Policy Related to Public Entities

Public-sector organization is critical in the development of technical capabilities and industrialization in Turkey. In the current, de facto, situation, the public administration that handles industrial-policy-related matters is quite fragmented, which leads to inefficiencies in the design and implementation of policy. The Ministry of Economy (MoE) handles international trade policy, in particular international commercial agreements and anti-dumping taxes. As the majority of Turkey's international trade is made up of industrial products, the ministry is in fact highly involved in the industrial sector.

MoE also regulates and implements industrial incentives through the General Directorate of Incentives. In Turkey, industrial incentives are considered mostly as a tool of regional development. The incentives decree encourages industrial investments in backward regions by providing tax and social security advantages to firms investing in those regions.

The Ministry of Development (MoD) in its current form draws up multiyear development plans, develops strategies for regional development, and makes approval decisions on line ministries' physical capital investments. The General Directorate of Incentives was first established as a department in the Ministry of Development, formerly called the State Planning Organization in the 1960s.

The Ministry of Science, Industry and Technology (MSIT) has a number of responsibilities. Firstly, it regulates and supervises the safety of industrial products. Secondly, it is responsible for approving the establishment of industrial zones and technoparks, which are mostly undertaken by private-sector agents. Thirdly, it develops industrial strategy documents; however, it does not have direct authority over most strategic measures. Fourthly, it develops science and technology policies and runs certain financial support programmes. Fifthly, it oversees the establishment of R&D centres by firms. R&D centres are encouraged by the ministry by certain tax and social security incentives. The MSIT has recently developed regulations for an industrial participation programme, which establishes the rules for industrial participation in publicly procured

industrial products. However, the programme is optional for procuring public entities. Thus, the ministry does not have a tool to enforce the selection of this mode by any public entity.

MSIT has three major related entities. The Scientific and Technological Research Council of Turkey (TUBITAK), SME Promotion and Support Institution (KOSGEB), and the Turkish Patent Institution. Through these institutions the ministry supports R&D efforts and smaller businesses in the country and regulates patenting services.

The Defence Industry Undersecretariat is the procuring body for defence products. It is linked to the Ministry of Defence. It makes decisions on how procurement will be made and establishes offset rules. The defence industry purchases sophisticated industrial products. Thus, the undersecretariat's responsibility extends to industrial policy.

In its current form, industrial policy is thus developed and implemented by a host of different bodies, which leads to inefficiencies, as well as effectiveness problems. The reorganization of these entities could enhance the effectiveness of industrial policy and its outcomes and impacts.

Manpower is critical to the competitiveness of industrial firms. Currently, tertiary educational institutions are regulated and supervised by the Higher Education Council, which is an independent body. Vocational high schools, which provide mid-level technical manpower to industry, on the other hand, are under the jurisdiction of the Ministry of Education. MSIT has no influence over universities and vocational high schools.

A blueprint for reorganization can consist of the following:

- Merging MoE and MIST along the lines of MITI in Japan following the Second World War: Because the country's international trade consists mostly of industrial products, and because trade issues mostly involve the same products, such a merger would increase coordination in the industrial sector. In non-industrial fields such as agriculture, the relevant ministry would coordinate policies with MIST.
- Merging the regional development functions of MoD with MIST: Industrial incentives (currently under MoE) under the new MIST

could be designed both from the perspective of both regional development and industrial development.
- Putting the Undersecretariat of Defence under MSIT: This would also bring about efficiency and coordination gains in the industrial sector.
- Heavy representation of MIST in the Higher Education Council, which regulates and supervises tertiary education in Turkey: This would be necessary to encourage academia–industry relations, including on university curricula.
- Encouraging MIST representation in Ministry of Education's vocational high school policy and implementation.

5 Conclusions

Turkey has utilized different industrial policy sets with varying success. One outcome was that it has fallen into three middle-income traps since 1980 and has been in the third one since 2008. Currently, the country can be considered a medium-level industrialized economy. Under mounting pressure from other competing nations in both its domestic and international markets, the country faces difficulties in progressing from Stage II to Stage III in the industrialization process.

Industrialization is a complex capability-building process requiring appropriate responses to challenges faced and the stage of industrialization. Furthering the level of industrialization in Turkey is likely to help boost overall economic growth rates, increase export earnings, and get the country out of the current middle-income trap.

We conclude that, to continue its rise in the industrialization process, Turkey's industrial policy framework and its administrative structure should be reviewed. The key policy suggestions developed in this chapter are as follows:

- Concentrate on technical capabilities to strengthen the industrial layer;
- Introduce focused sector-targeting industrial policies with a view to developing productive capabilities in the relatively less-developed

industrial firms in addition to implementing STI policies that target technological and R&D capabilities for more developed firms;
- Strengthen cooperation between academia and industry;
- Undertake focused public procurement policies enhancing market potential for local industrial firms and SMEs that are negatively discriminated against;
- Perform an overhaul of institutional structures by reorganizing ministerial organizations.

Appendix 1: Industrial Facilities Included in First Five-Year Industrial Plan (1934–1938) and Their Year of Establishment

Textiles

a) Taşköprü Cannabis Factory (1946)
b) Bursa Merinos Woolen Woven Fabric Factory (1938)
c) Bodrum Sponge Factory (1934)
d) Bakırköy Cotton Weaving Factory (1934)
e) Kayseri Weaving Factory (1935)
f) Ereğli Cloth Weaving Factory (1937)
g) Nazilli Cloth Factory (1937)
h) Malatya Cotton Weaving Factory (1940)
i) Gemlik Silk Fabric Factory (1938)

Mining and Metallurgy

a) Karabük Iron and Steel Factory (1938)
b) Keçiborlu Sulphur Factory (1935)
c) Zonguldak Semicoke Factory (1935)
d) Izmit Paper and Cellulose Factory (1941)

Ceramics

a) Kütahya Ceramic Factory (1940)
b) Beykoz Glass and Bottle Factory (1935)
c) Sivas Cement Factory (1943)

Chemicals

a) İzmit Chlorine and Sodium Hydroxide Factory (1945)
b) Karabük Superphosphate Factory (1944)
c) Isparta Rose Oil Factory (1935)
d) Izmit Hamza Match Factory (1940)

Notes

1. Among many examples in a range of countries are the discussions of encouraging advanced manufacturing methods in the USA, the new industrial policy in the European Union, and the new industrial policy in South Africa.

References

Aydoğuş, Osman, Çağaçan Değer, Elif Tunalı Çalışkan, and Gülçin Gürel Günal. 2015. Import Dependency in Turkey: An Input-Output Analysis. *Ege University Working Papers* 2015/5: 1–9.

Çukurova Genç İşadamları Derneği. 2016. *İmalat Sanayinde Küresel Eğilimler ve Adana: Analiz ve Öneriler*, Report Prepared by PGlobal Global Advisory and Training Services Inc.

Dasgupta, Sukti, and Ajit Singh. 2007. Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis. In *Advancing Development*, ed. George Mavrotas and Anthony Shorrocks, 435–454. London: Palgrave.

Eşiyok, B. Ali. 2004. *Türkiye ekonomisinde kalkinma stratejileri ve sanayileşme (Dün-Bugün-Yarın)*. Ankara: Türkiye Kalkınma Bankası Araştırma Müdürlüğü Yayını.

Hausmann, Ricardo, Jason Hwang, and Dani Rodrik. 2007. What You Export Matters. *Journal of Economic Growth* 12 (1): 1–25.

Kaldor, Nicholas. 1967. *Strategic Factors in Economic Development*. New York: Cornell University Press.

Kim, L. 2001. The Dynamics of Technological Learning in Industrialisation. *International Social Science Journal 53* (168): 297–308.

Radošević, Slavo, and Esin Yoruk. 2015. *A New Metrics of Technology Upgrading: The Central and East European Countries in a Comparative Perspective*, GRINCOH Working Paper Series 3.04.

Sanayi ve Teknoloji Bakanlığı. 1973. 50. Yılda Türk Sanayii. Ankara.

———. 1977. *Ağır Sanayi*. Ankara.

Sanır, Arslan Bekir. 2011. *Türk Otomotiv Sanayii Kuruluş ve Gelişim Sürecinde Yazılanlar, Belgeler ve Yorumlar*. Ankara.

Senesen, Ümit, and Gülay Günlük-Senesen. 2003. Import Dependency of Production in Turkey: Structural Change from 1970s to 1990s. In *10th Annual Conference of the Economic Research Forum*, Cairo.

Tiryakioğlu, Murat, and Murat Ali Yülek. 2015. Development-Based Public Procurement Policies: A Selective Survey of Literature, Cross-Country Policy Experience and the Turkish Experience. *Innovation: The European Journal of Social Science Research* 28 (3): 344–359.

World Bank. 2014a. *Trading Up to High Income: Turkey Country Economic Memorandum*. Washington, DC: World Bank Report 82307-TR.

———. 2014b. *Trading Up to High Income*. Washington, DC: World Bank Country Economic Memorandum.

Yücel, Fikret. 2014. *Cumhuriyet Türkiye'sinin sanayileşmede ilk önemli adımı: birinci beş yıllık sanayi planı* 1934–1938.

Yülek, Murat Ali. 1998. *Financial Liberalization and the Real Economy: The Turkish Case*, PhD Dissertation. Ankara: Capital Market Board of Turkey.

———. 2016a. On the Middle Income Trap, the Industrialization Process and Appropriate Industrial Policy. *Journal of Industry, Competition and Trade* 17 (3): 325–348.

———. 2016b. Industrial Policies and Outcomes: A Comparison of Pre-liberalized Korean and Turkish Economies. *Journal of Comparative Asian Development* 15 (1): 179–200.

Yülek, Murat Ali, and Travis K. Taylor, eds. 2011. *Designing Public Procurement Policy in Developing Countries: How to Foster Technology Transfer and Industrialization in the Global Economy*. New York: Springer.

Yülek, Murat Ali, and Murat Tiryakioğlu. 2014. Development-Based Public Procurement Policies: A Selective Survey of Policy Experience. In *Supplement to the 2013 Annual Statistical Report on United Nations Procurement: Procurement for Innovation.* Copenhagen: UNOPS.

Yun, J.J. 2007. The Development of Technological Capability and the Transformation of Inward FDI in Korea from 1962 to 2000. In *Innovation and Technology in Korea: Challenges of a Newly Advanced Economy*, ed. J. Machlich and W. Pascha. Heidelberg: Physika Verlag.