



Turkey's Machinery Industry

REPUBLIC OF TURKEY PRIME MINISTRY
INVESTMENT SUPPORT AND
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Executive Summary

- ❖ This report presents statistical analysis and information together with insights about the machinery industry in Turkey
- ❖ Turkey's machinery production value accounts for 2.4% of nominal GDP with a capacity utilization of 73% (2011)
- ❖ In 2012, Turkey exported USD 21b worth of machinery, placing the trade deficit at USD 12b; going forward, the Turkish Government aims at increasing machinery exports to USD 35.1b by 2018 and USD 100b by 2023
- ❖ FDI flow into Turkey contributes to increasing exports; total FDI flow into the country increased from USD 8.5b in 2005 to USD 15.9b in 2011, representing a CAGR of 11%; during the same period, FDI inflow for machinery manufacturing increased from USD 26m to USD 513m with a CAGR of 64%
- ❖ Turkey emphasizes its competitiveness as an industrialized country with favorable input costs and strong enablers
- ❖ The report takes a detailed look at Turkey's presence and potential in the following machinery sub-sectors and components:
 - Telecom equipment
 - HVAC equipment
 - Electro-medical equipment
 - Electricity distribution equipment
 - Construction machinery
 - Turbines
 - Agricultural machinery
 - Food processing machinery
 - Textile Machinery
 - Bearings
 - Compressors
 - Electric motors and internal combustion engines



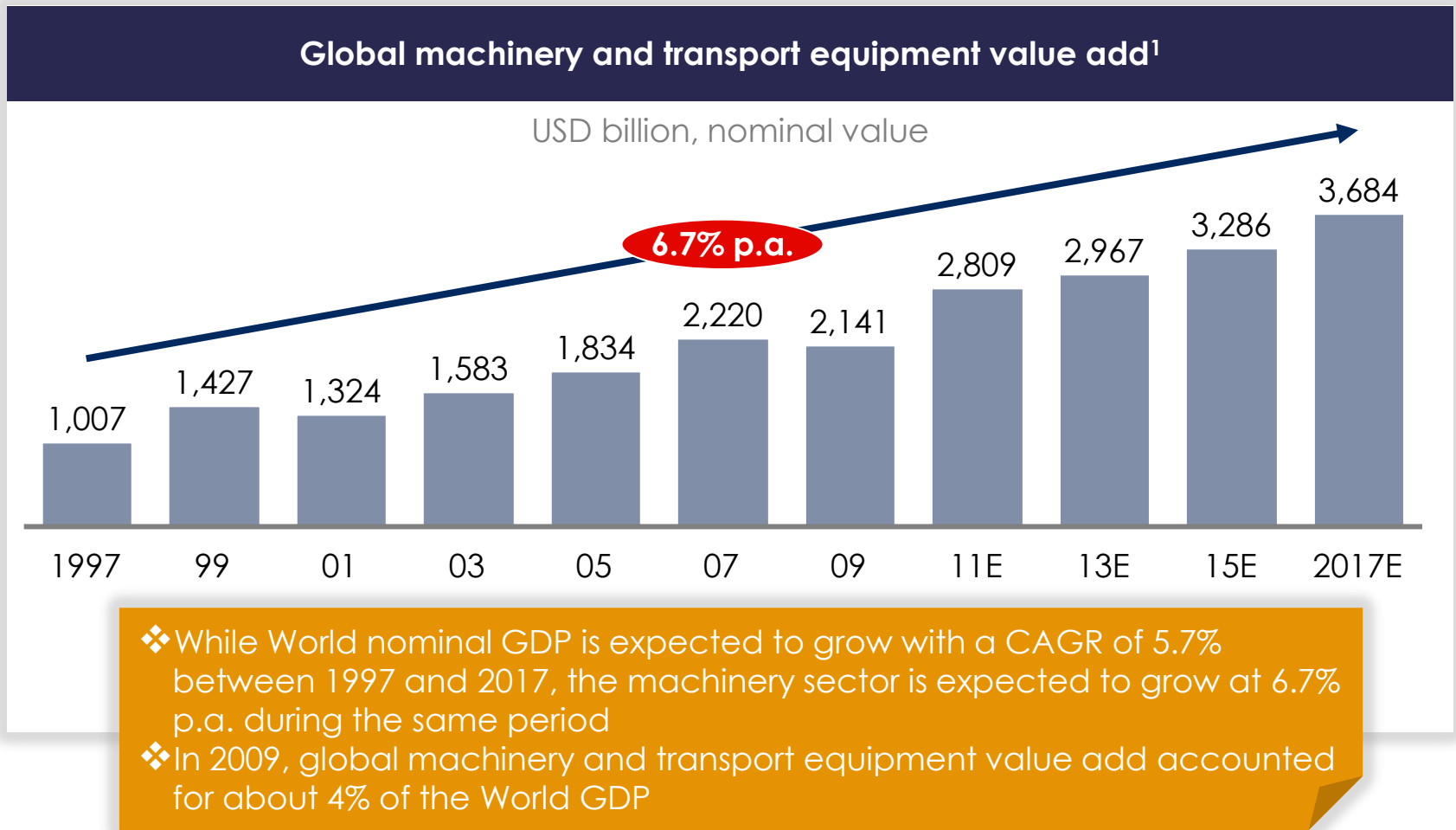
Contents

❖ **Global machinery sector overview**

- ❖ Turkish machinery sector overview
- ❖ Selected machinery sub-sectors
- ❖ Selected machinery components



Global machinery and transport equipment value add is expected to sustain its past growth performance



¹ Based on 99 countries' data

Source: World Bank, IMF World Economic Outlook 2013



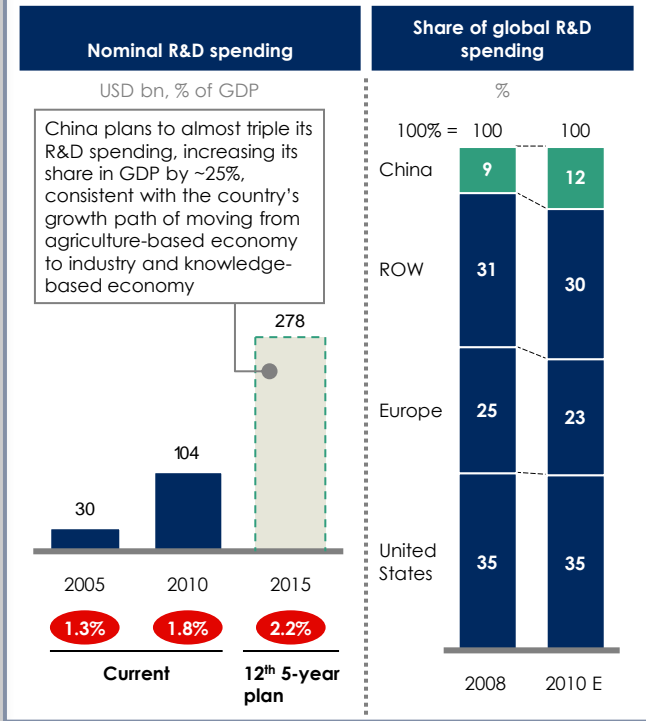
Machinery manufacturing is more R&D and trade intensive, and mostly creates higher value add than other manufacturing areas

● % of USD 10.5 trillion (nom.) global manufacturing value added

■ High ■ Upper-middle ■ Lower-middle ■ Low

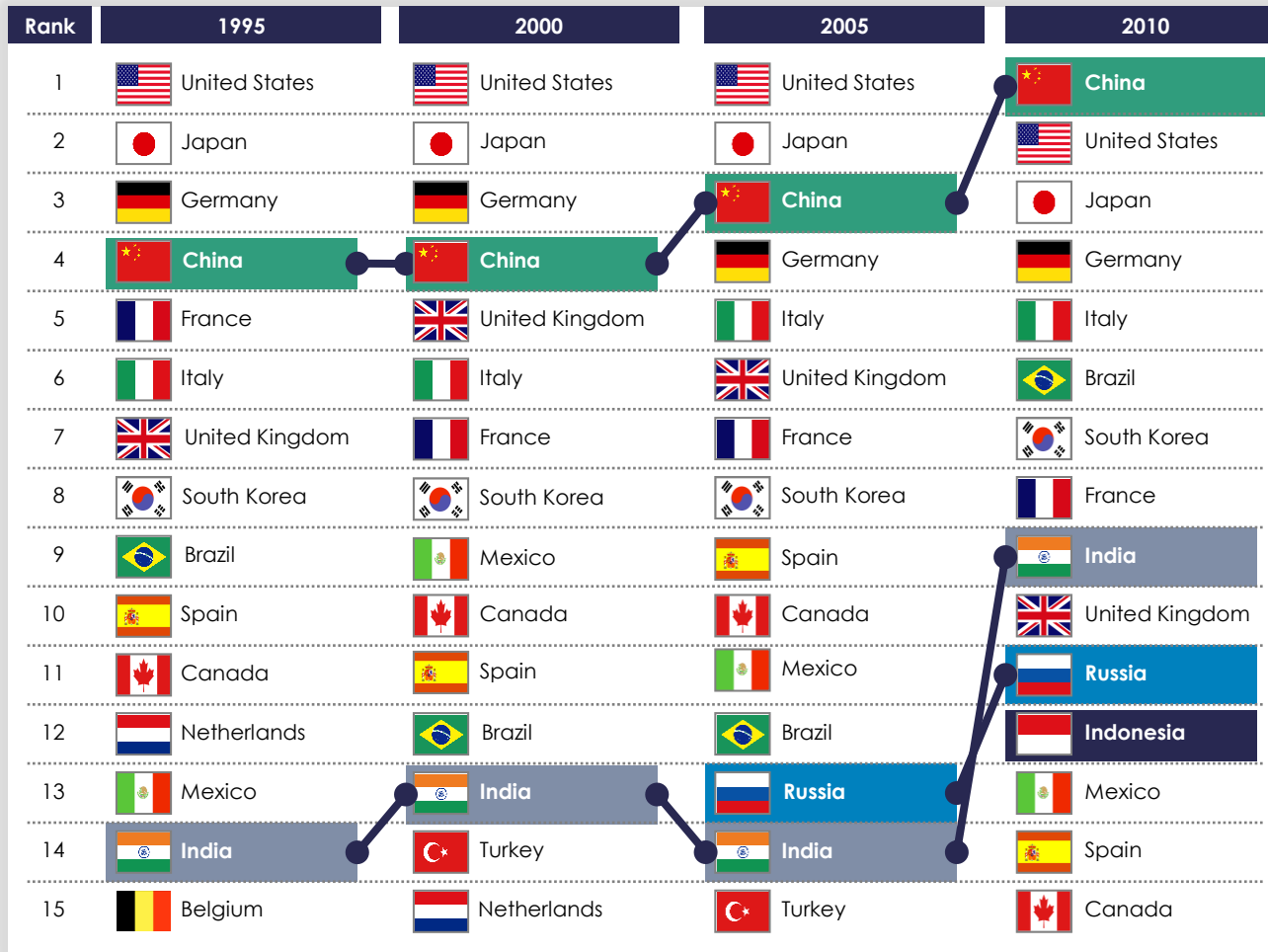
Group	Industry	R&D intensity	Labor intensity	Capital intensity	Energy intensity	Trade intensity	Value density
Global innovation for local markets (34)	Chemicals	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Motor vehicles, trailers, parts	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Other transport equipment	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Electrical machinery	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Machinery, equipment, appliances	High	Low	High	Upper-middle	Upper-middle	Lower-middle
Regional processing (28)	Rubber and plastics products	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Fabricated metal products	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Food, beverage, and tobacco	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Printing and publishing	High	Low	High	Upper-middle	Upper-middle	Lower-middle
Energy-/resource-intensive commodities (22)	Wood products	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Refined petroleum, coke, nuclear	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Paper and pulp	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Mineral-based products	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Basic metals	High	Low	High	Upper-middle	Upper-middle	Lower-middle
Global technologies/innovators (9)	Computers and office machinery	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Semiconductors and electronics	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Medical, precision, and optical	High	Low	High	Upper-middle	Upper-middle	Lower-middle
Labor-intensive tradables (7)	Textiles, apparel, leather	High	Low	High	Upper-middle	Upper-middle	Lower-middle
	Furniture, jewelry, toys, other	High	Low	High	Upper-middle	Upper-middle	Lower-middle

- ❖ Manufacturing is not monolithic and segmenting the overall industry reveals the reasons behind competitive advantage drivers and how different factors of production influence where companies locate their important activities, such as production and R&D
- ❖ Innovation driven manufacturing is the highest value add segment, which includes machinery manufacturing
- ❖ China focuses on innovation by increasing R&D spending in order to create know-how domestically and expand its presence in higher-value add sectors, such as machine manufacturing



Large developing economies are moving up in global manufacturing

Nominal manufacturing value added



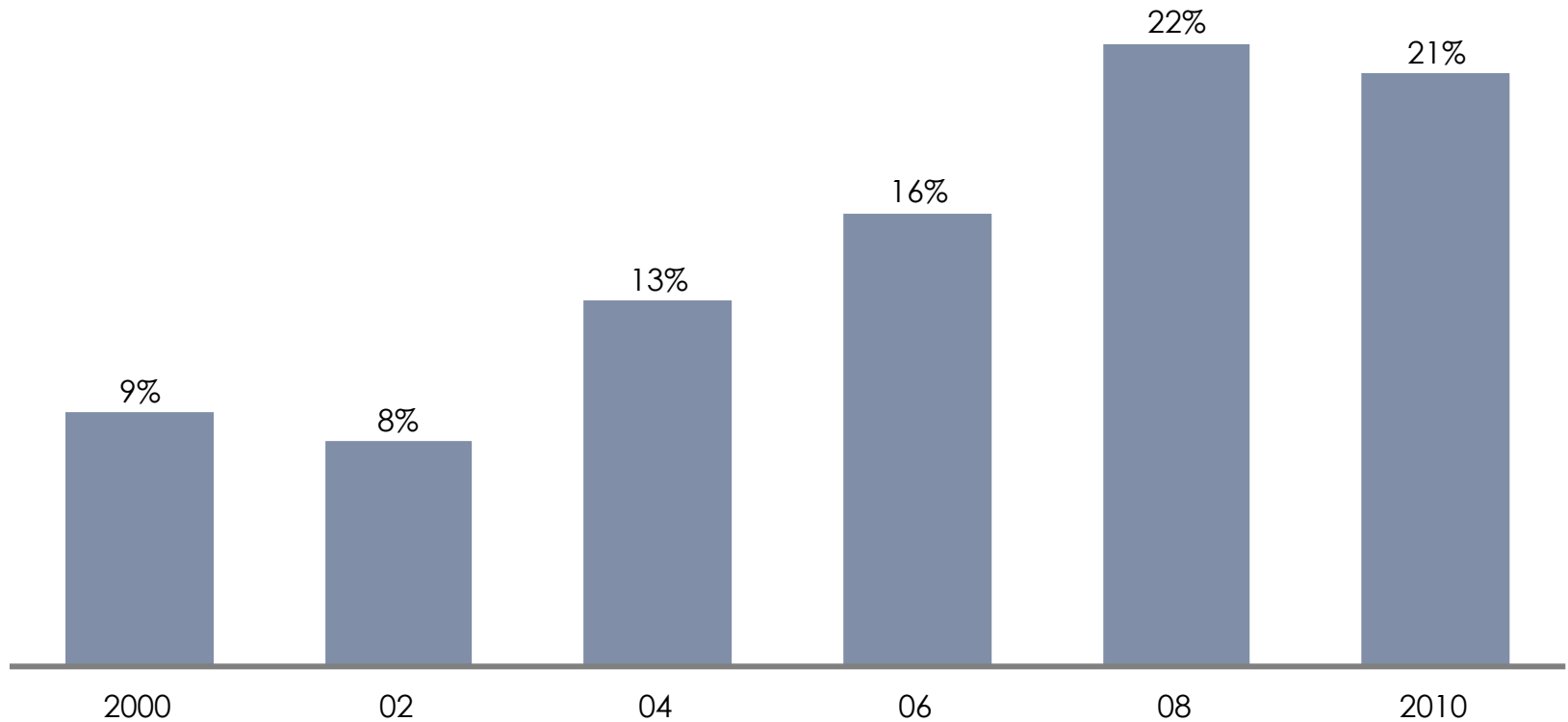
- ❖ Globally, manufacturing outputs grew by about 2.7% annually in advanced economies and 7.4% in large developing economies between 2000 and 2007
- ❖ Economies such as China, India, and Indonesia have risen into top ranks of global manufacturing and in the world's 15 largest manufacturing economies
- ❖ The sector contributes from 10 to 33% of value added
- ❖ Turkey's rank in 1995 and 2010 are 23rd and 16th, respectively



Source: World Bank

China's manufacturing value add is slowing down, giving other developing economies the opportunity to gain share in labor-intensive manufacturing

5-year rolling growth rate of China nominal manufacturing value add



Source: World Bank, press search

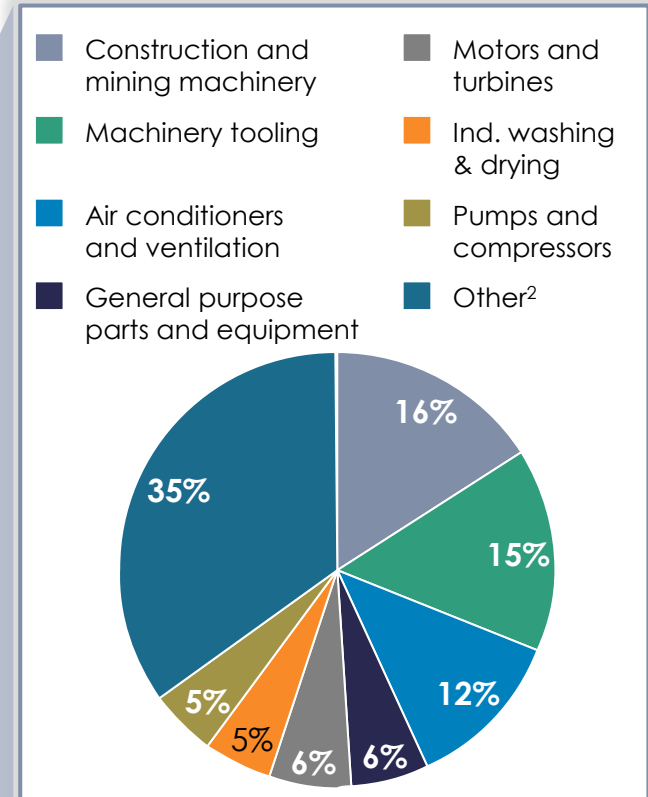
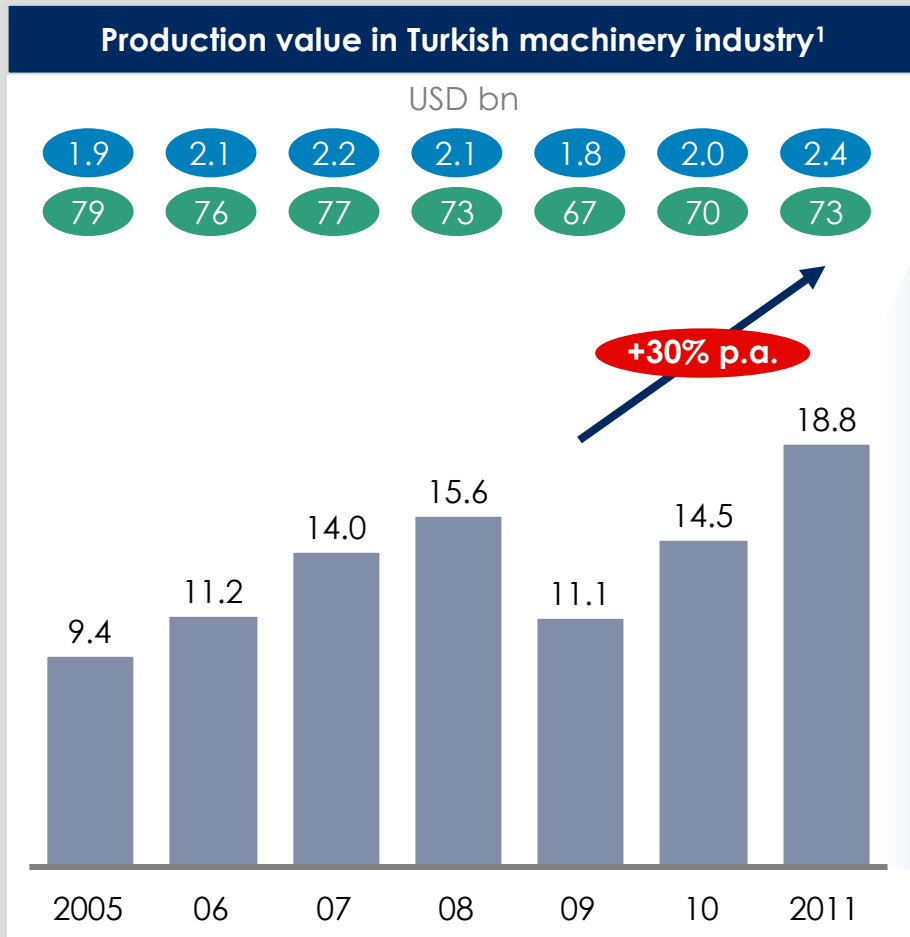
Contents

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- ❖ **Turkish machinery sector overview**
- ❖ Selected machinery sub-sectors
- ❖ Selected machinery components



Turkish machinery production value and capacity utilization

XX Ratio to nom GDP, Percent
 XX Capacity utilization, Percent

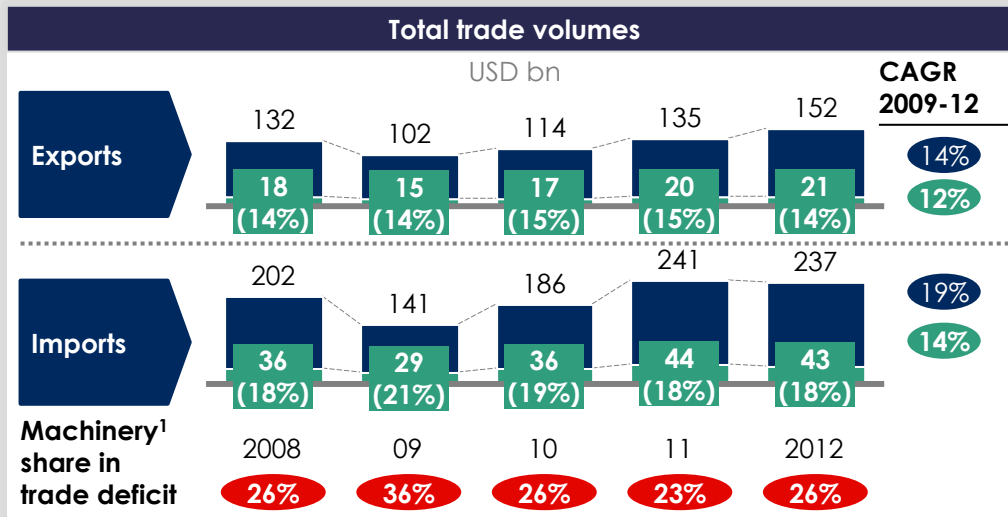


¹ TURKSTAT production database has missing data; actual numbers are expected to be higher; excludes automotive
² Fragmented segments, incl. faucet & valve equipment, food & beverage machinery, lifting & transport equipment, etc.
 Source: TURKSTAT, TMMOB Machinery Manufacturing Industry Report 2012, IMF World Economic Outlook 2013

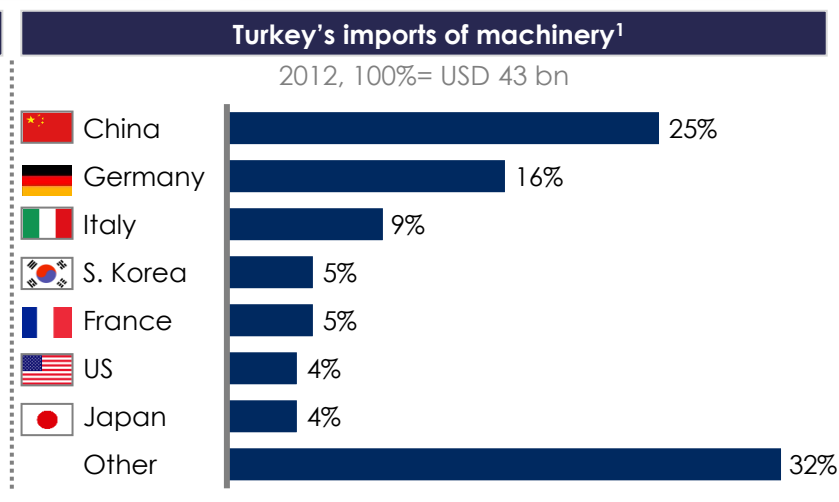
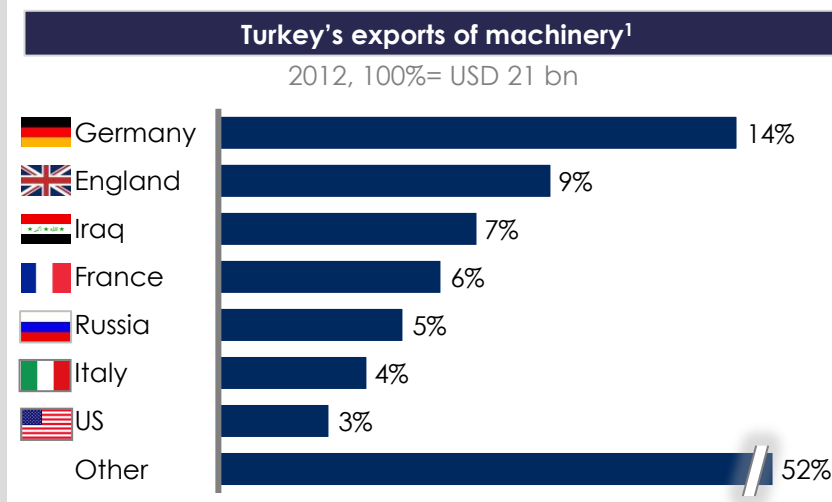


Turkey's trade deficit share of machinery was around 25% over the last 5 years and peaked in 2009

■ Non-machinery
■ Machinery¹



- ❖ Import of machinery has increased at a slower pace than overall national import
- ❖ While Turkey exports machinery to a fragmented set of countries, the country imports mostly from China, Germany, and Italy constituting 50% of import volume in 2012
- ❖ Germany, England and France had the top 3 cumulative export amount during the past 5 years; export to Iraq increased significantly since 2008
- ❖ Turkey targets to increase export volume of machinery to USD 35.1 billion by 2018 and 100 billion by 2023



¹ SITC Rev.3 codes 71-77 (78 and 79 are automotive related and excluded)
Source: TURKSTAT, TİM (Turkish Exporters Assembly)

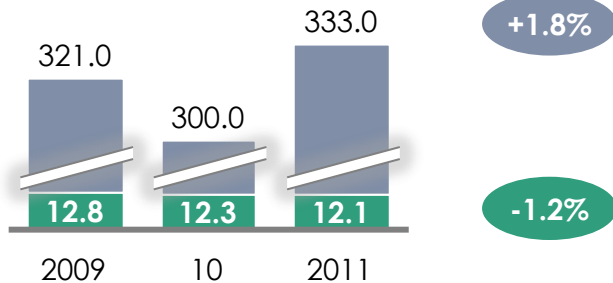
While the number of enterprises in machinery manufacturing has not changed much from 2009 to 2011, the number of employees increased 14% p.a. outpacing the overall manufacturing sector

■ General manufacturing¹ ■ Machinery and equipment manufacturing²

Number of enterprises in manufacturing

Thousand

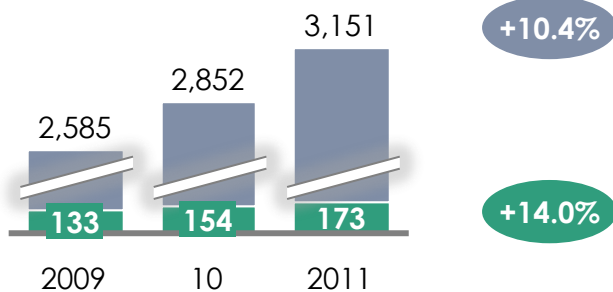
**CAGR
2009-2011**



Employment number in manufacturing

Thousand

**CAGR
2009-2011**



- ❖ Regional distribution of machinery production sites in Turkey show preferences for areas with strong support structures including access to raw materials, skilled workforce, transportation, and end markets
- ❖ Marmara and Aegean region hosts 61%, Western Black Sea and Central Anatolia 23%, Mediterranean and Southwest Anatolia 11%, and Eastern Black Sea and Eastern Anatolia 5% of machinery production sites in Turkey
- ❖ Production is concentrated in organized industrial zones and smaller scale industrial zones
- ❖ While Marmara and Aegean regions are dominating in machinery production, the recent growth rates in other regions have surpassed that of these two regions
- ❖ SMEs constitute the backbone of Turkish machinery production industry; however, there are companies with high enough scale for international presence
- ❖ Companies with revenues up to USD 0.66 million are considered SME and accounts for 50% of the industry
- ❖ 40% of companies have revenues between USD 0.66 million and 30 million and 10% of companies have more than USD 30 million revenues
- ❖ R&D spending on machinery manufacturing has increased 33% p.a. between 2010-2012 outpacing the R&D spending on manufacturing in general (24%) and on overall activities (19%) in Turkey

¹ NACE codes: 10-33

² NACE code: 28

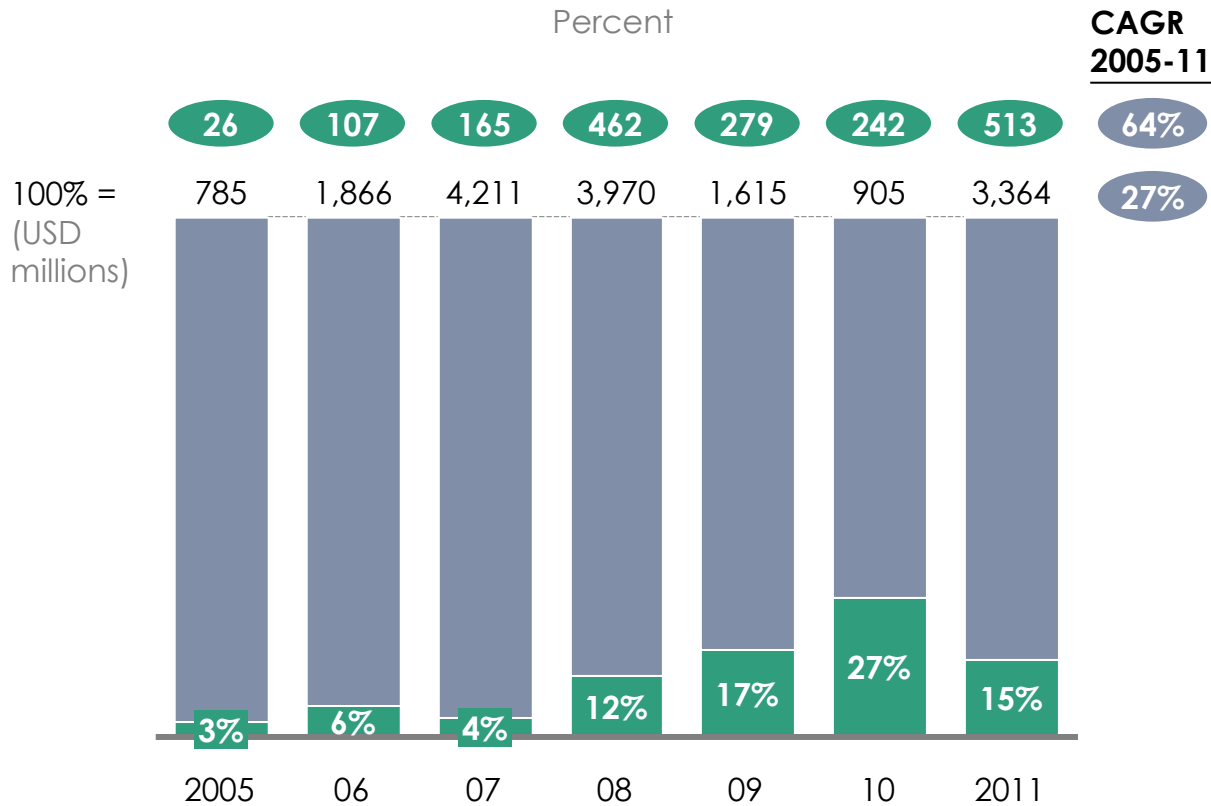
Source: TURKSTAT, TMMOB Machinery Manufacturing Industry Report 2012



FDI flow into Turkey

... FDI inflow amount in machinery
USD millions

Machinery manufacturing¹ FDI inflow compared to overall manufacturing FDI inflow in Turkey

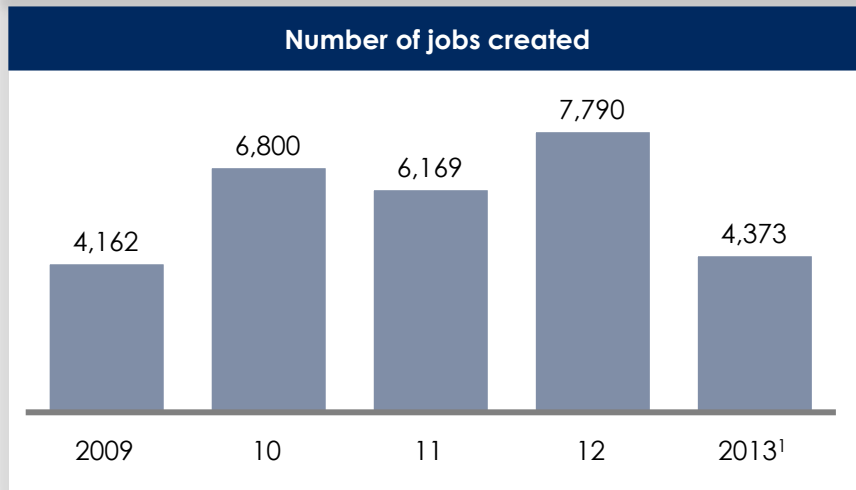
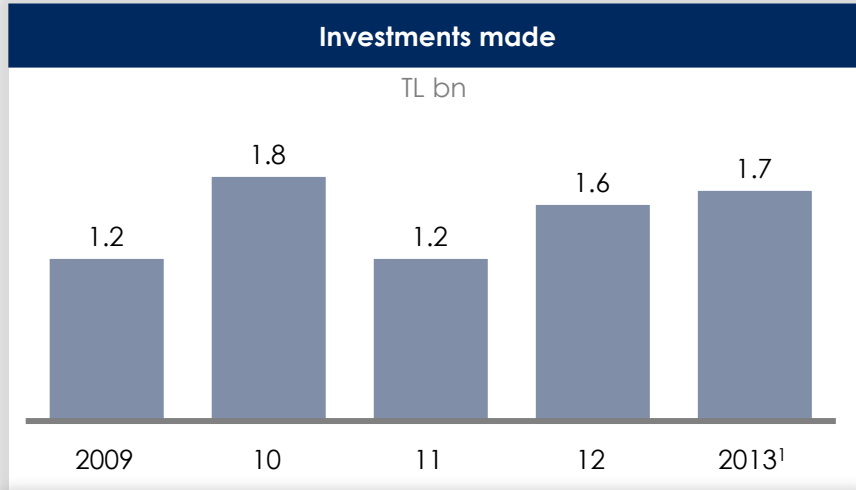


- ❖ Total FDI flow into Turkey increased from USD 8.5 billion in 2005 to USD 15.9 billion in 2011 representing a 11% CAGR
- ❖ In 2011, overall manufacturing accounted for 21% of total FDI inflows, representing an important source of FDI attraction
- ❖ With a 64% p.a. growth in machinery manufacturing FDI inflow since 2005, the sector has been a growth driver for overall manufacturing FDI; the drive is expected to continue because machinery FDI is still a small percentage of the total

¹ Includes manufacture of machinery and equipment and of electrical and optical equipment
Source: Investment Support and Promotion Agency of Turkey



Turkish machinery sector attracted both domestic and foreign investments² with the latter contributing to ~33% of investments and ~21% of job creation in 2012-13



- ❖ In 2013¹, 22 out of 239 investments were made with foreign capital contributing to 35% of investments made and 17% of jobs created that year
- ❖ Top 2 investments in 2013¹ were made with foreign capital
 - Solarvan Güneş Enerjisi ve Ekipmanları Üretimi ve Sanayi Ticaret LTD ŞTİ. from Van received TL 214 million as a new investment to manufacture solar cells and panels; the investment created 150 jobs
 - BSH Ev Aletleri Sanayi ve Ticaret A.Ş., from Tekirdağ received TL 38 million as a modernization investment for home appliance manufacturing;
- ❖ In 2012, 20 out of 308 investment were made with foreign capital contributing to 31% of investments made and 25% of jobs created that year
- ❖ Top 3 investments in 2012 were made with foreign capital
 - Vestel Elektronik San. ve Tic. A.Ş. from Manisa received TL 195 million as a modernization investment to manufacture electronic devices for home use; the investment created 150 jobs
 - Bosch Rexroth Otomasyon San ve Tic. A.Ş. from Bursa received TL 118 million as an investment for modernization and product portfolio expansion to manufacturer hydraulic pumps; the investment created 400 jobs
 - Türk Traktör ve Ziraat Makineleri A.Ş. received TL 90 million as a new investment to manufacture agriculture tractors, the investment created 875 jobs

¹ Includes investments up to August 2013

² Investments that received investment incentive certificates from Turkish government

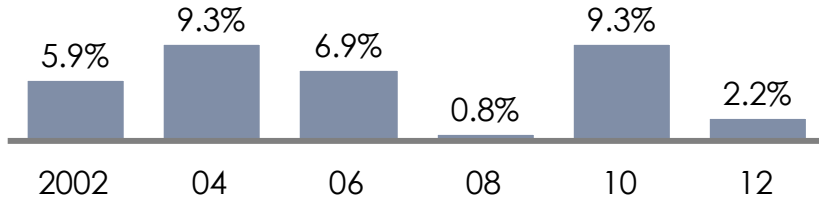
Source: Turkish Ministry of Economy



Turkey has experienced economic growth

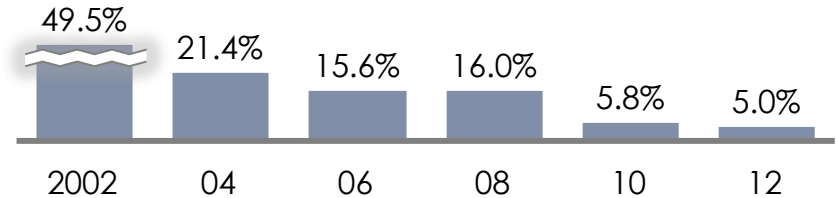
Real GDP growth

Continuous growth



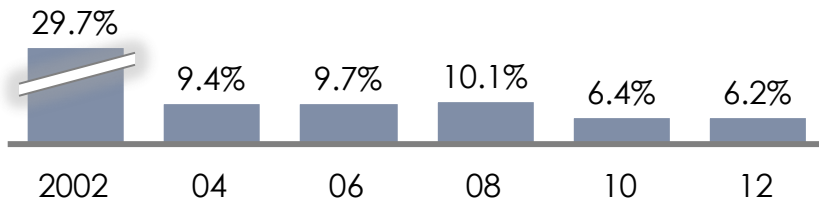
Interest rates

Decreasing cost of capital



Annual Inflation (CPI)

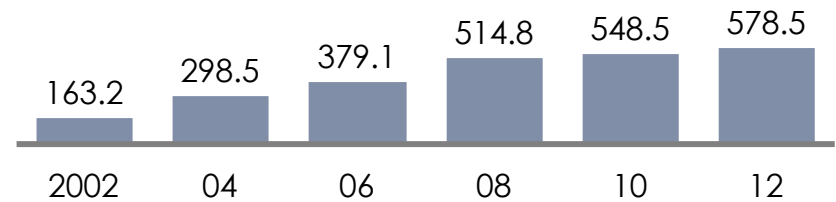
Single-digit inflation



Personal disposable income

USD bn

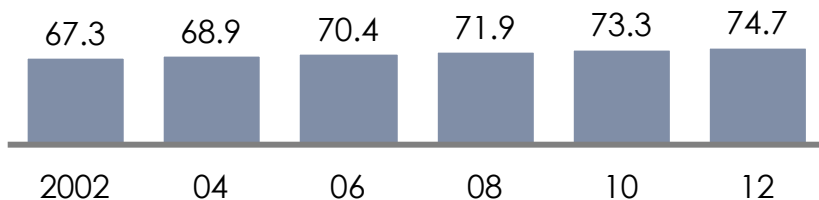
Increasing income



Population

Million

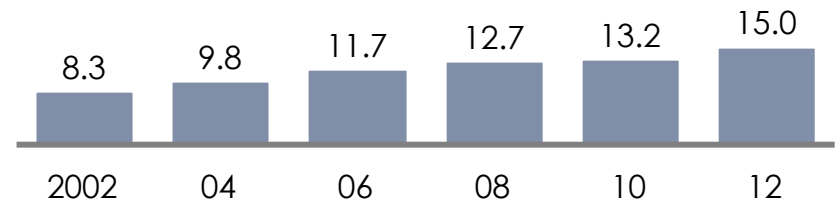
Growing population



GDP per capita (with PPP adjustment)

USD thousand

Increasing wealth

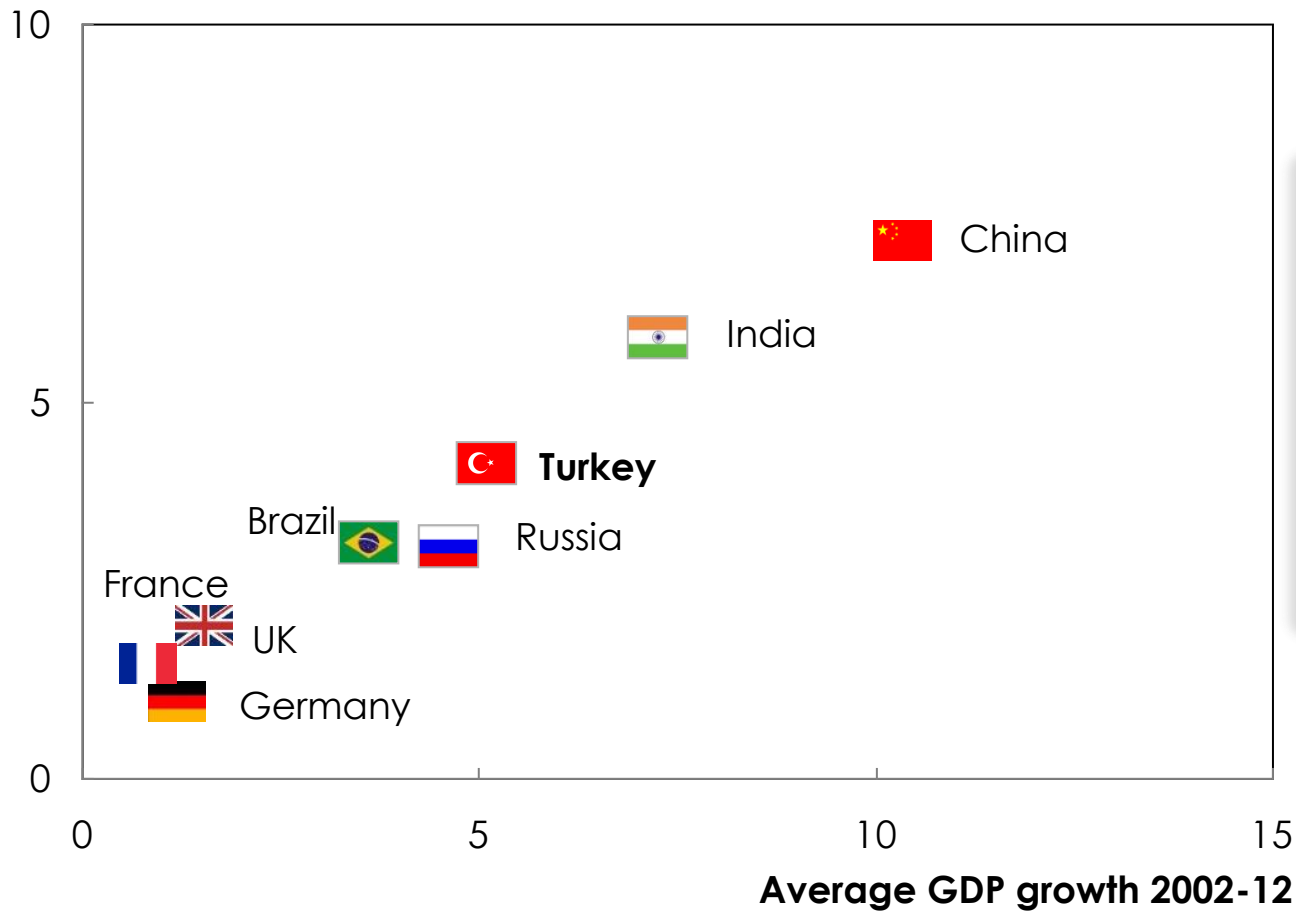


Source: Central Bank, State Institute of Statistics

Turkey is one of the rising economies in the world

CAGR, Percent

Expected average GDP growth, 2013-18



- ❖ Turkey was the **17th largest economy** in the world in 2012
- ❖ Turkish Government set a target to become among **top 10 economies by 2023**

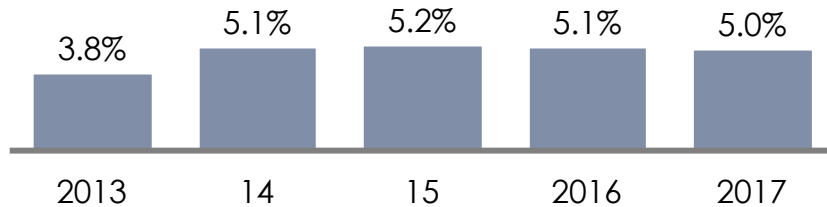


Source: IMF World Economic Outlook 2013

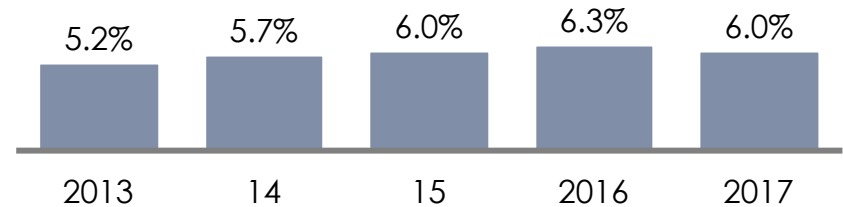
Investment Support and Promotion Agency of Turkey

Growth in Turkey is expected to continue

Real GDP growth



Interest rates

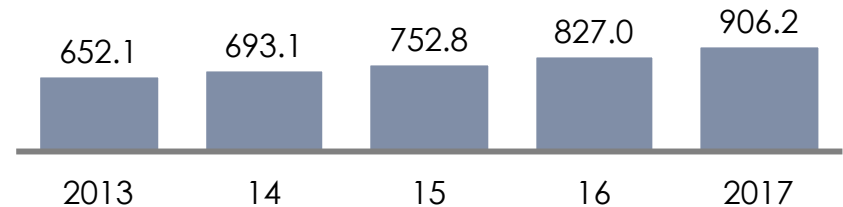


Annual Inflation (CPI)



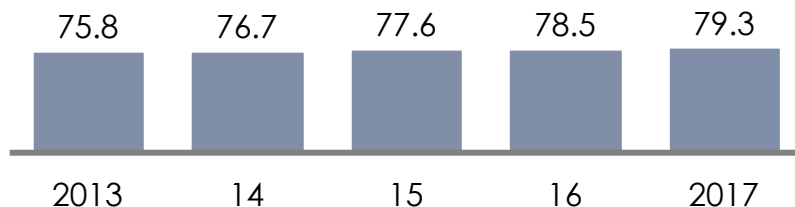
Personal disposable income

USD bn



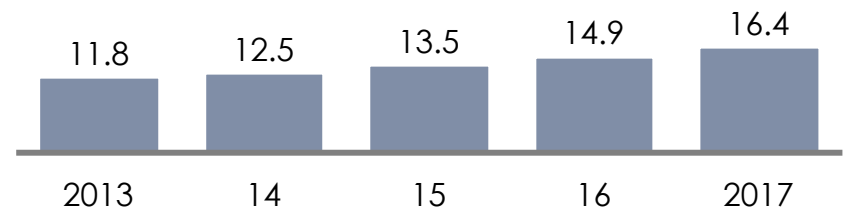
Population

Million



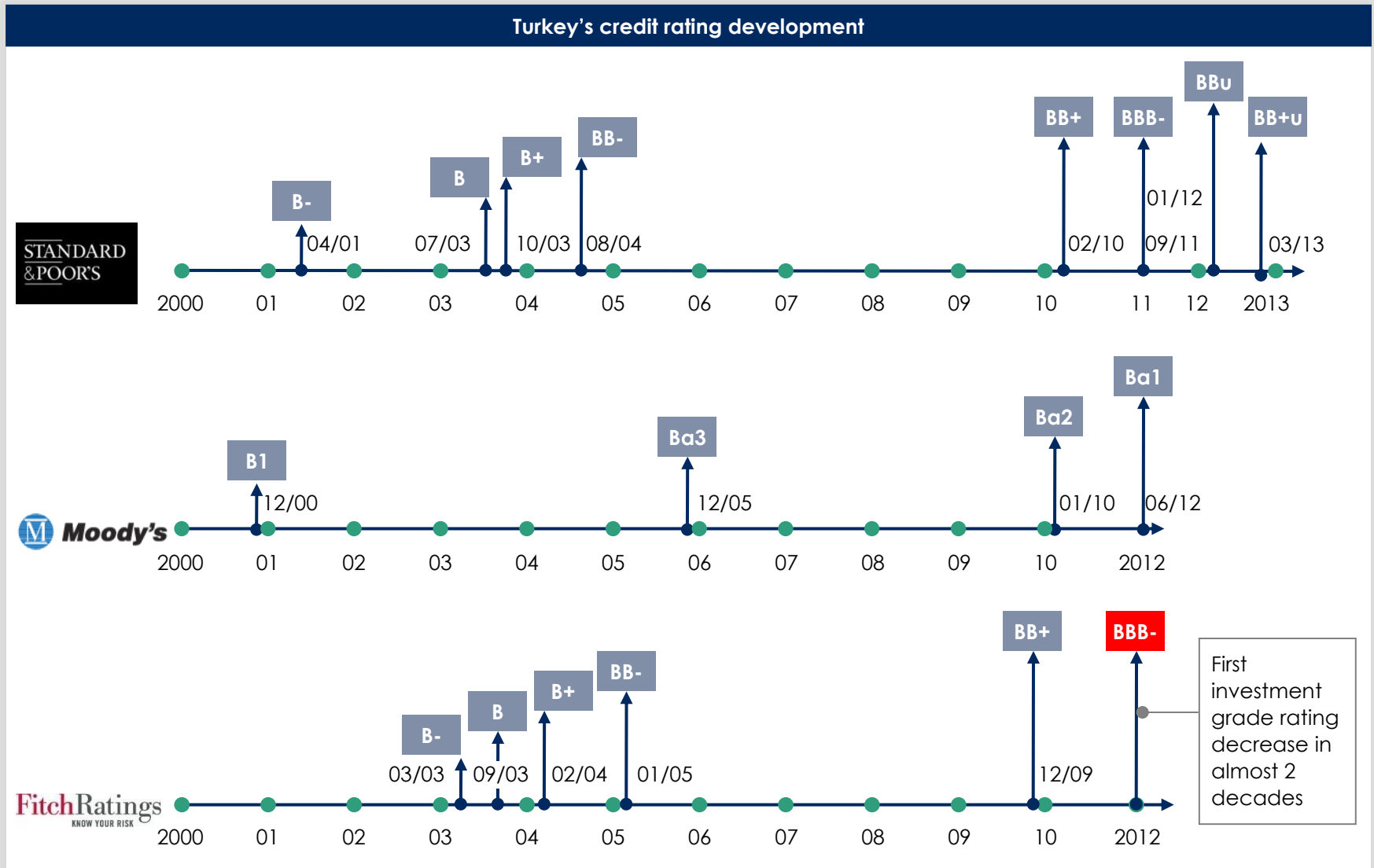
GDP per capita (with PPP adjustment)

USD thousand



Source: Central Bank, State Institute of Statistics, IMF World Economic Outlook 2013

Leading rating agencies awarded Turkey with investment grade rating



Source: Press search

Turkey emphasizes its competitiveness in machinery with favorable input costs and strong enablers

A

Input cost



Labor:

- ❖ Labor market practice flexibilities



Energy:

- ❖ Electricity supply and cost



Logistics:

- ❖ Geostrategic location



B

Enablers



Innovation and technological readiness:

- ❖ Fundamentals & infrastructure supporting innovation



Skilled labor:

- ❖ Workforce profile



IP protection:

- ❖ Institutional IP protection



Incentives:

- ❖ Support programs



Supply basis and domestic cluster:

- ❖ Raw materials and ecosystem



A1 Turkey offers a flexible labor market



❖ Among the metrics of market efficiency, Turkey scores the highest in 2 items

- Flexibility of wage determination
- Hiring & firing practices

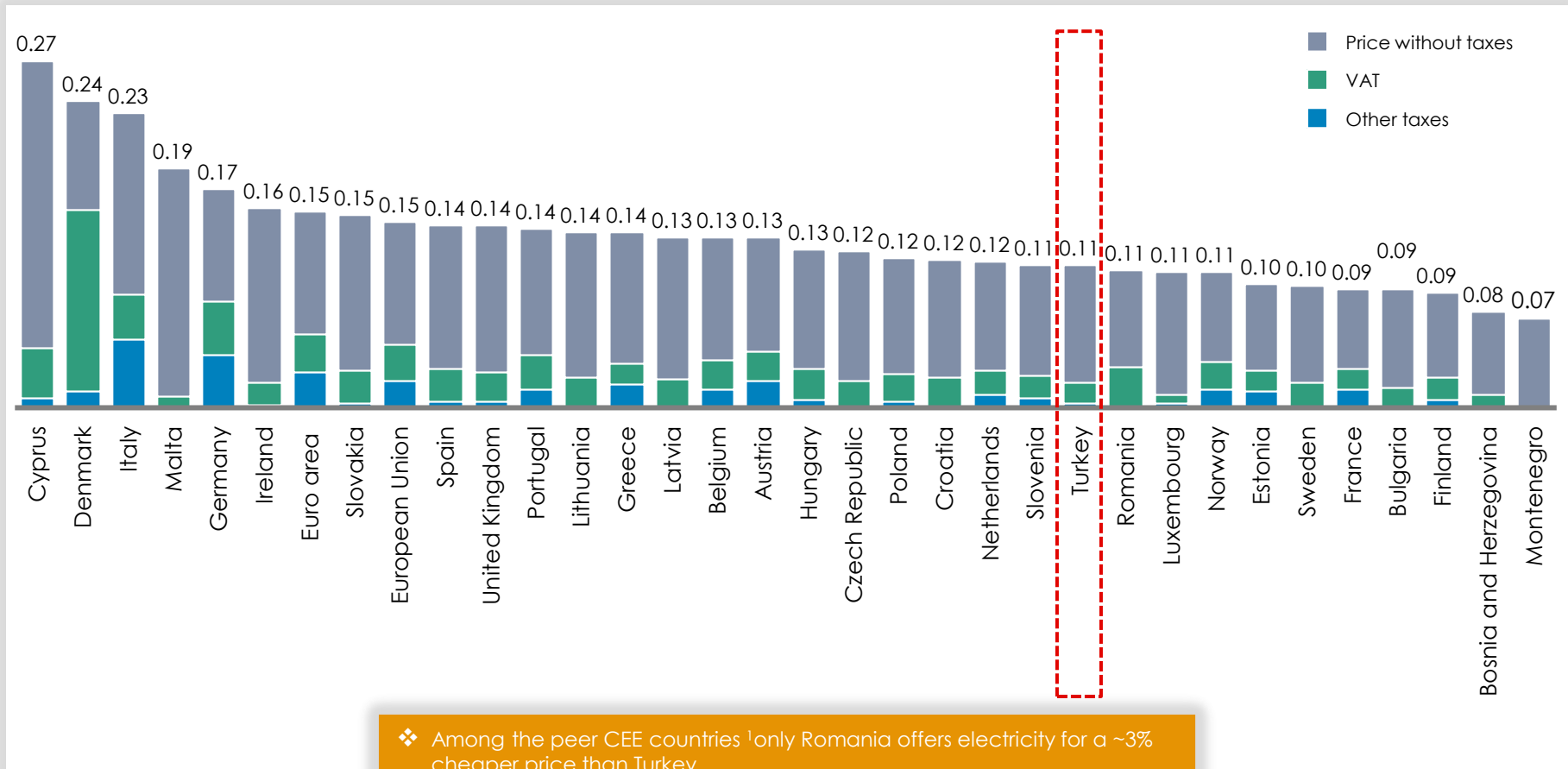
❖ Turkey sustained an above average rating in all 5 metrics



Source: World Economic Forum – Global Competitiveness Report 2012

A2 Turkey offers electricity for 11.3 US¢/kWh for industrial use

US¢/kWh



❖ Among the peer CEE countries ¹only Romania offers electricity for a ~3% cheaper price than Turkey

❖ Industry electricity price in Turkey is ~10% below the peer country average

¹ Peer Central and Eastern Europe countries include Romania, Slovenia, Hungary, Czech Republic, and Poland

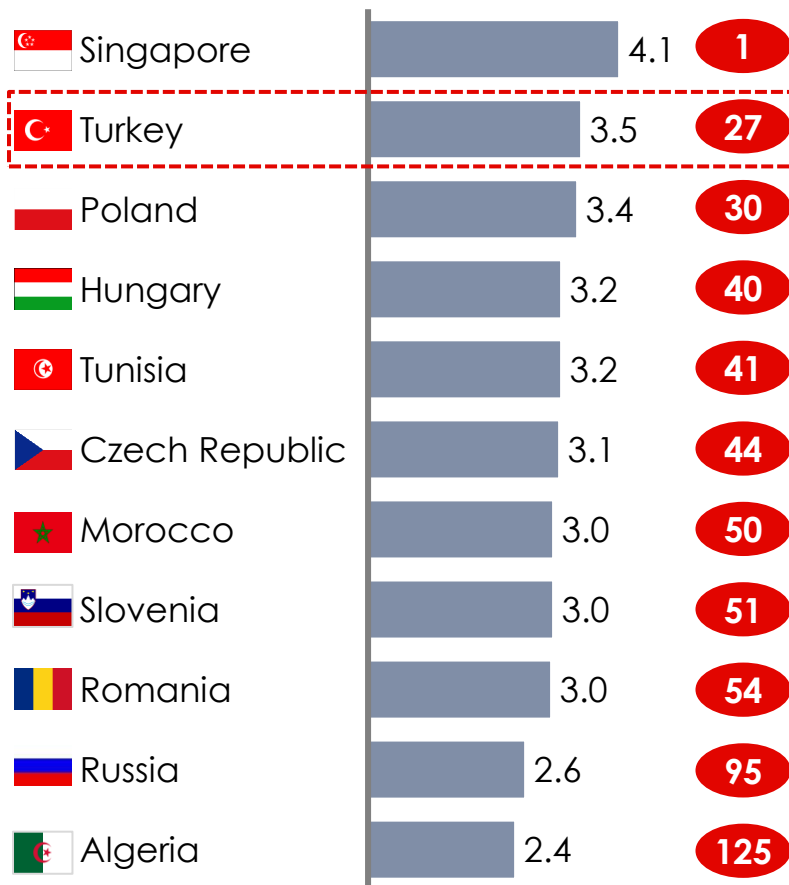
Source: Eurostat



A3 Turkey's trade logistics performance

X Rank

Logistics performance index (LPI) (2012)

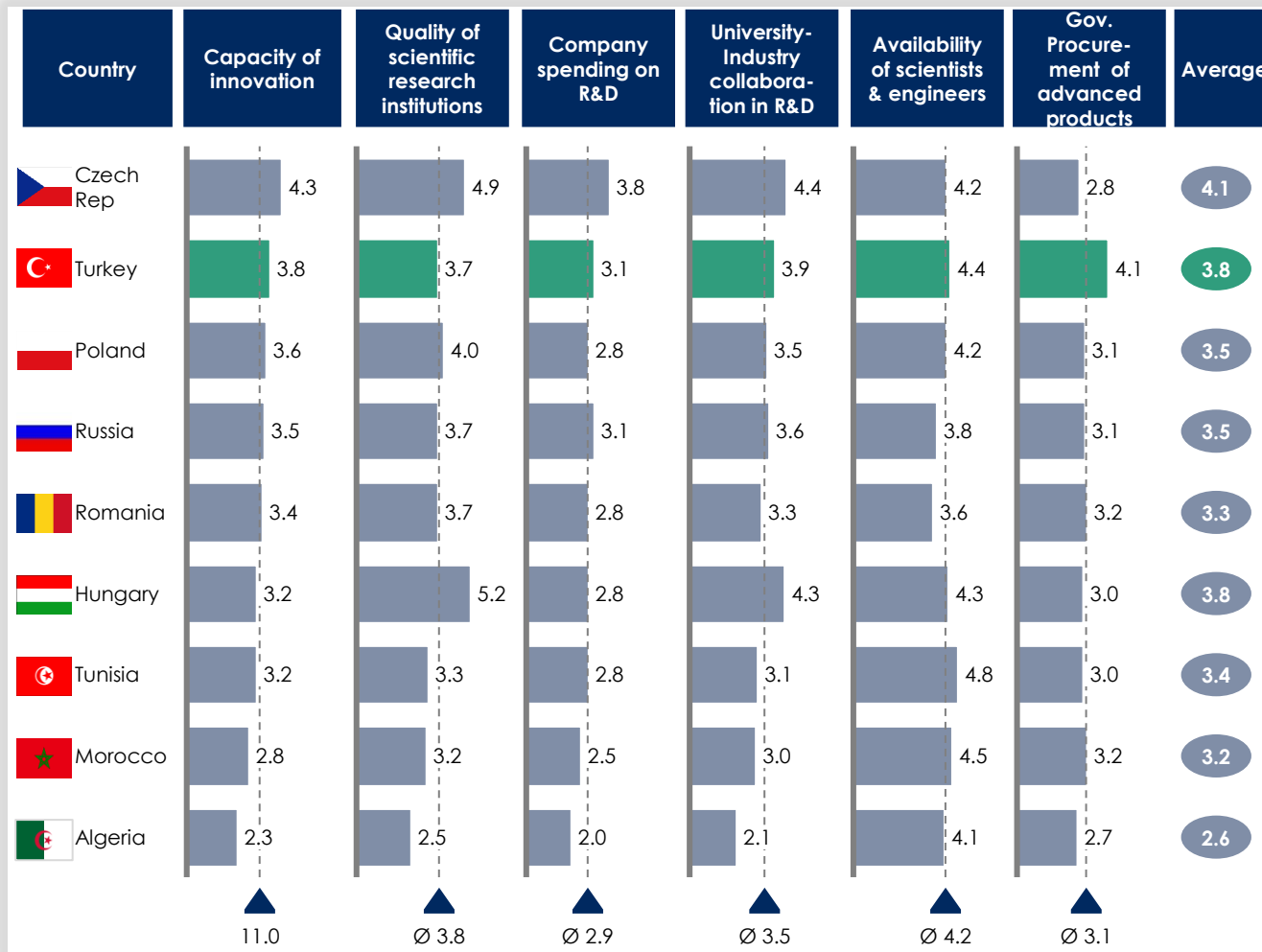


- ❖ A subset of countries including Turkey, Poland, Hungary, Czech Republic, Morocco, Slovenia, Romania, Russia, and Algeria are considered peer in this analysis
- ❖ LPI index scores each country on 6 dimensions from 1 to 5 and aggregates them in a single ranking
- ❖ In 3 of the 6 LPI dimensions, Turkey scores the best among peers with
 - 3.62 in infrastructure
 - 3.52 in logistics quality and competence
 - 3.54 in tracking and tracing
- ❖ In the remaining 3 LPI dimensions, Turkey ranks in top 3 among peers with
 - 3.16 in customs
 - 3.38 in international shipments
 - 3.87 in timeliness
- ❖ Turkey offers cost advantage for exporters by ranking 4th in cost per container at USD 990 in 2012. The only peers with lower cost are Hungary, Tunisia, and Morocco with USD 885, 773 and 577, respectively



Source: The World Bank – LPI report

B1 Turkey's performance in indices related to innovation



- ❖ In 3 additional innovation related indices, Turkey scores the highest average among peer countries with
 - 5.4 in availability of latest technologies; peer average 4.6
 - 5.3 in firm level technology absorption; peer average 4.4
 - 4.9 in FDI technology transfer; peer average 4.5
- ❖ Moreover
 - International Internet bandwidth in Turkey is 40 kb/s per user
 - DSL coverage¹ is 98%, placing the country at the top in peer group
 - 3G coverage¹ is 90%, placing Turkey on par with developed countries
- ❖ Number of full-time equivalent R&D personnel and researches in Turkey increased 14% p.a. since 2002, reaching 146 thousand in 2010
- ❖ Turkey's world ranking for number of scientific publications improved from 22nd in 2002 to 18th in 2010

¹ As percent of population, 2011

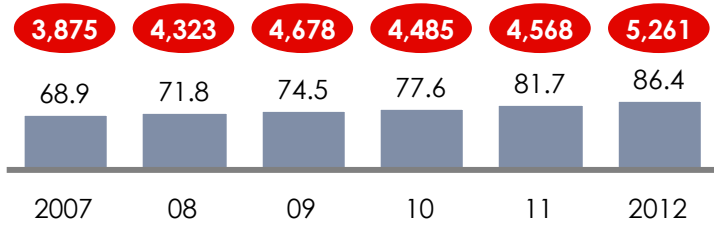
Source: World Economic Forum – Global Competitiveness Report 2012, TC Kalkınma Bakanlığı Bilgi Toplumu Stratejisinin Yenilenmesi Projesi, BTK, TURKSTAT

B2 Turkey's machinery industry workforce

X Number of graduates

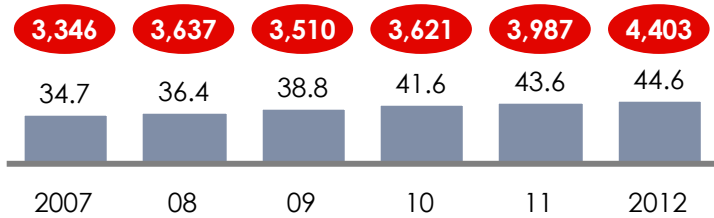
Number of mechanical engineers

Thousand



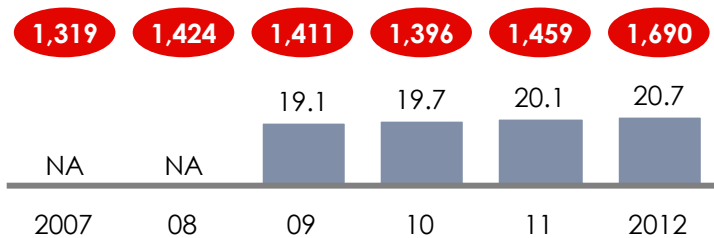
Number of electrical and electronics engineers

Thousand



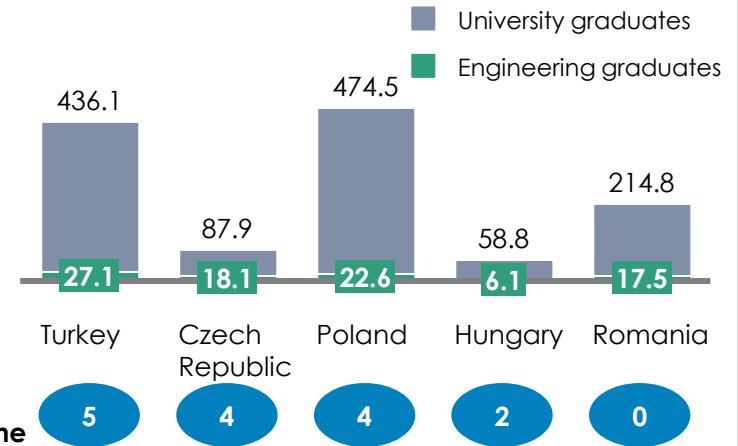
Number of chemical engineers

Thousand



Number of graduates per year

Thousand



The number of universities within the top 500 world-wide ranking¹ 2008



- ❖ Bilkent University (332th)
- ❖ Koç University (401-450th)
- ❖ Sabancı University (401-450th)
- ❖ İstanbul University (401-450th)
- ❖ İstanbul Technical University (451-500th)

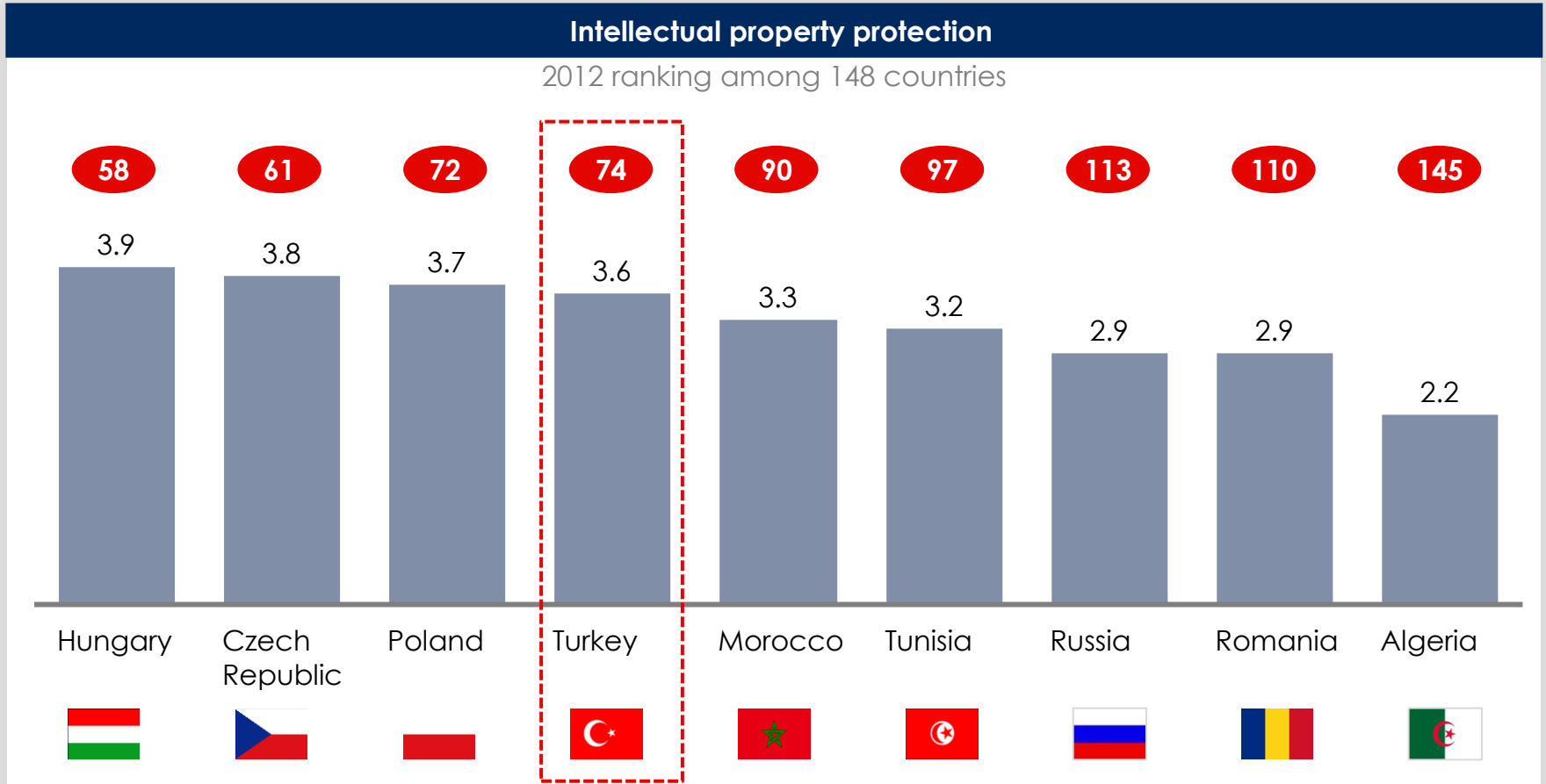
- ❖ There are ~160 universities in Turkey with ~30k engineering graduates a year
- ❖ Besides university graduates, every year ~400-450k students graduate from technical and vocational high schools
- ❖ In 2012, ~4k science, math & computing and ~ 4k engineering, manufacturing & construction MS and Ph.D. students graduated from Turkish universities

¹ THE-QS world university ranking

Source: Eurostat, National Statistical Offices, Higher Education Board, QS Quacquarelli Symonds – www.TopUniversities.com , ÖYSM

B3 Intellectual property protection index of Turkey

xx Rank



Turkey's international property protection systems ranked 117th in 2009, advancing to 74th in 2012



Source: World Economic Forum, Global Competitiveness Report

Investment Support and Promotion Agency of Turkey

Turkey's incentive and support systems target at R&D and general industrial activities, including machinery manufacturing

R&D and innovation incentives

- 1 Government support for industry R&D centers since 2008**
 - ❖ # 5746 law – provides support to R&D organizations having at least 50 employees
- 2 San-Tez program to promote collaboration between academia and industry**
 - ❖ # 5593 law – 75% of cost of selected R&D projects are paid by Ministry of Science
- 3 Technoparks to foster innovation ecosystem generation on a large scale**
 - ❖ Since 2001, 46 technoparks established in Turkey, hosting industry players, entrepreneurs, and academics
- 4 114 thematic research centers in 39 universities to work on new projects**
 - ❖ In 2011, the centers conducted research in life sciences, engineering and material science, agriculture and food, information and communication technologies, nano-technology, energy, etc.
- 5 Incentive programs administered by KOSGEB, Ministry of Science, Industry, and Technology, and TTGV**
 - ❖ KOSGEB support system for SME; others have general systems targeting technology development projects
- 6 Grant programs managed by TÜBİTAK to support innovation ecosystem of Turkey**
 - ❖ 9 grant programs to incentivize R&D for wide range of innovation ecosystem players, including startups, universities, industry enterprises, and venture capitalists

Other incentives for industrial activity in general, including machinery manufacturing

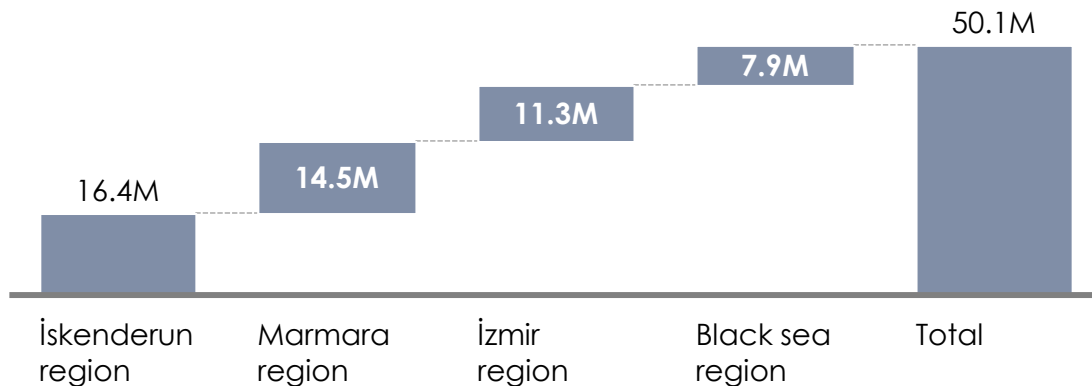
- 1 Regional incentive system**
 - ❖ Depending on minimum investment amount ranging from TL 500k to TL 4 million in machinery, the system offers varying degree of support for VAT exemption, custom tax exemption, tax discount, insurance premium, place allocation, income tax withdrawal
- 2 Large-scale incentive system**
 - ❖ For a minimum investment of TL 50 million, the system offers support for VAT exemption, custom tax exemption, tax discount, insurance premium, place allocation, income tax withdrawal
- 3 Strategic incentive system**
 - ❖ For a minimum fixed investment of TL 50 million; a minimum investment value add of 40%; in a sector where domestic production is less than imports and imports are at least USD 50 million per year, the system offers support for VAT exemption, custom tax exemption, tax discount, insurance premium, place allocation, investment support, income tax withdrawal, VAT return
- 4 Reduced VAT for machinery leasing**
 - ❖ In December 2013, the VAT for leasing machinery reduced from 18% to 1%, benefiting especially SME that prefer to incur OPEX rather than CAPEX for high cost machinery; this move is expected to trigger further growth in the machinery industry



Steel and metal forging and casting industries in Turkey support machinery production

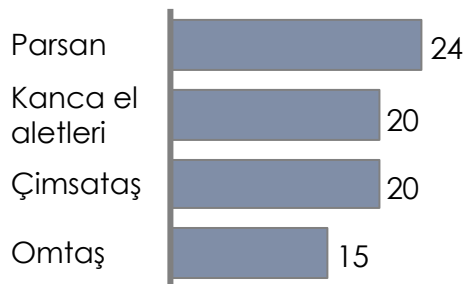
Steel production capacity

Tones per year, 2012



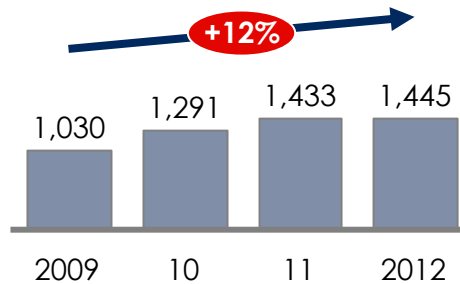
Capacity of top players in Turkish forging industry

Thousand tons per year, 2010



Metal casting production in Turkey

Thousand tons



- ❖ Turkey is a major steel producer in the region with a capacity of ~50 million tons per year, providing raw material to machinery industry
- ❖ Top 4 metal forging companies have a total capacity of ~80k tons per year as of 2010
- ❖ Metal casting production in Turkey increased 36% p.a. since 2009 and reached ~1.4 M tons in 2012 when the industry was composed of 962 casting facilities employing 33 thousand people



Free Zones in Turkey

Overview

- ❖ In operation: 19
- ❖ Under construction: 1
- ❖ Total: 20
- ❖ # of companies: 3,620¹
- ❖ # of employment: 50,000¹
- ❖ %85 of volume is industrial products

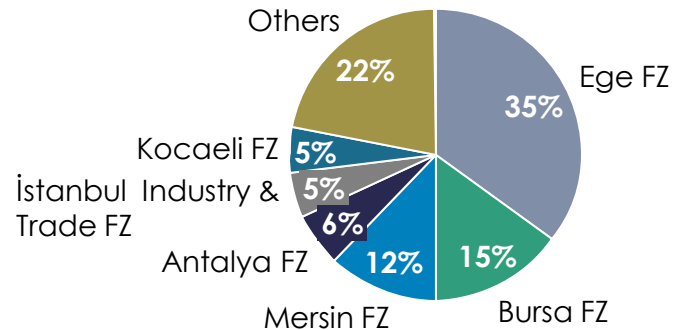
Incentives

- ❖ 100% exemption from customs duties and other assorted duties
- ❖ 100% exemption from corporate income tax for manufacturing companies
- ❖ 100% exemption from VAT and special consumption tax
- ❖ 100% exemption from income tax on employees' salaries
- ❖ Goods can remain in free zones for an unlimited period
- ❖ Companies are free to transfer profits from free zones to abroad as well as Turkey without restriction

Geographical distribution of free zones (2009)



Employment distribution in free zones (2009)



¹ 2009 Data

Source: Investment Support and Promotion Agency of Turkey, Tepav, Republic of Turkey Ministry of Economy

B5 Organized Industrial Zones in Turkey

of OIZ

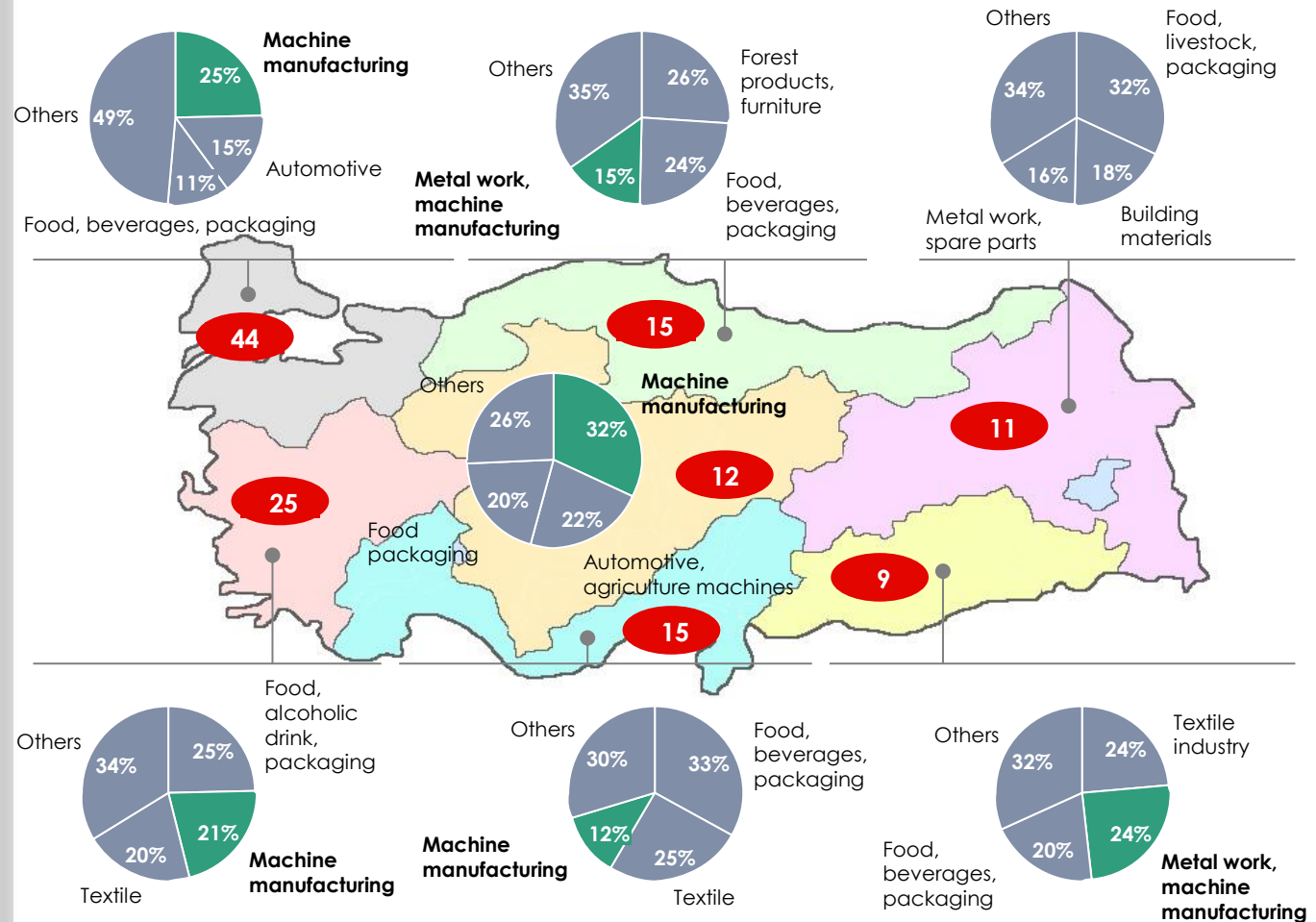
Overview

- ❖ In operation: 181
- ❖ Under construction: 95
- ❖ Total: 276
- ❖ # of companies: 37,000¹
- ❖ # of employment: 820,000¹

Incentives

- ❖ No VAT for land acquisitions
- ❖ Exemption from real estate duty for five years starting after construction of the plant
- ❖ Low water, natural gas and telecommunication costs
- ❖ Exemption from municipality tax for construction and usage of the plant
- ❖ Exemption from the municipality tax on solid waste if the OIZ does not benefit from the municipality service

Geographical and sectorial distribution



¹ 2009 Data

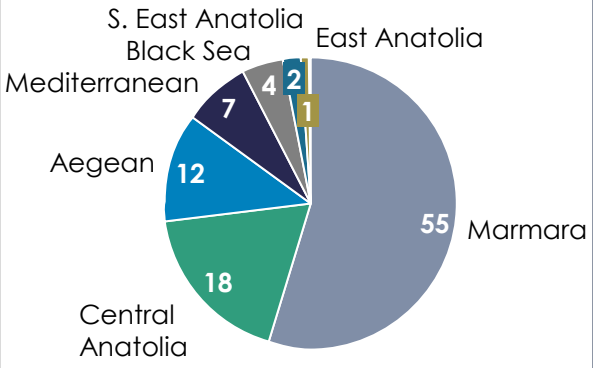
Source: Investment Support and Promotion Agency of Turkey, Chamber of Mechanical Engineering, Tepav, Republic of Turkey Ministry of Economy

B5 Machinery manufacturing industry is concentrated in Marmara region with 320,000 active employee base

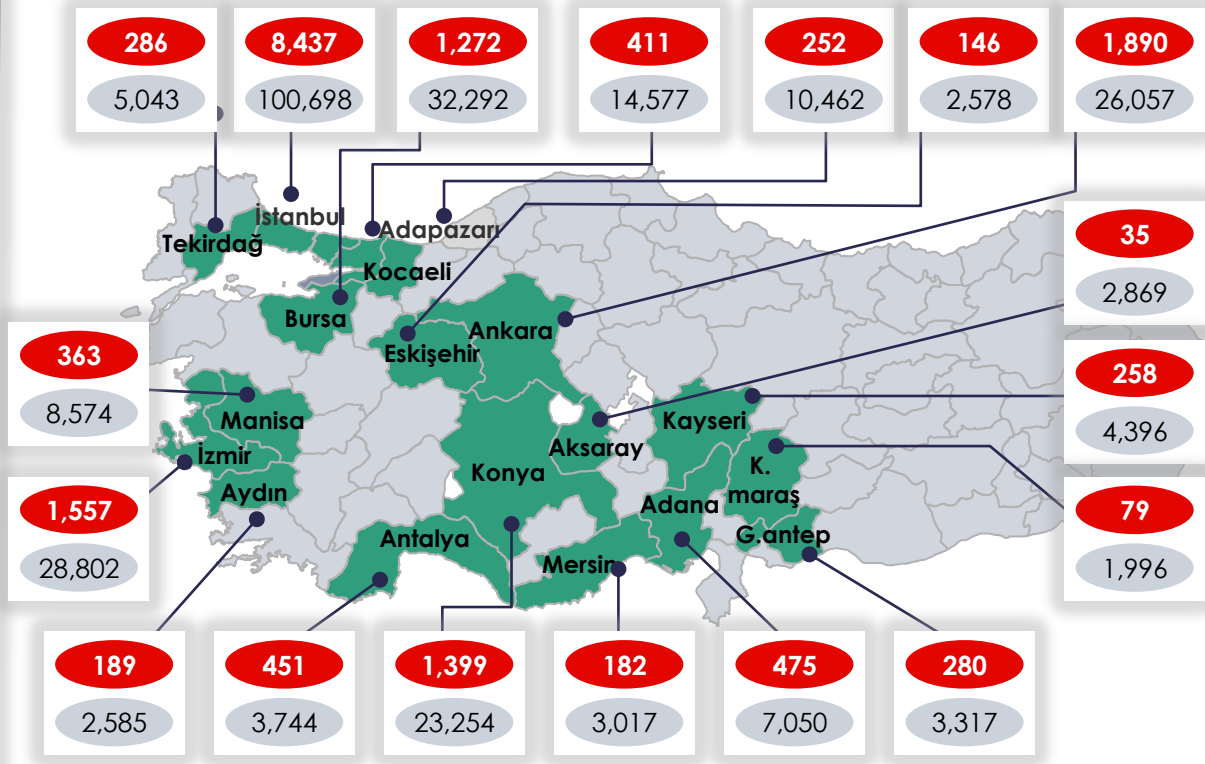
● Number of enterprises ● Number of employees

Companies manufacturing machinery and related equipment¹

Percent by region
100% = 20,881²



Top 20 cities by employment in machinery and related equipment



- ❖ There is a total of 320,293 employees in machinery manufacturing industry
- ❖ Largest clusters are around Istanbul, Bursa, Izmir, Ankara, Konya and Kocaeli
- ❖ On average, a company in Aksaray has 82 employees while industry average is 15 employees

¹ Based on NACE Rev. 2 code 28
² Based on number of registered companies at SGK (Social Security Institution)
 Source: SGK (Social Security Institution)



Sample stories – FDI inflow to Turkish machinery sector



- ❖ Leading Chinese global information and communication technology solutions provider
- ❖ Works with Turkey's leading fixed line and mobile operators to establish telecommunication infrastructure
- ❖ Commenced operations in Turkey in 2002 and currently has offices in Ankara, Izmir, Diyarbakir, Trabzon, and Istanbul, serving as a management hub for 9 countries in Central Asia and Caucasus
- ❖ Huawei employs 750 people, 85% of whom are Turkish, as of 2012
- ❖ Istanbul houses the 2nd largest R&D center the company operates outside China, established with an investment of USD 50 million

"This new cooperation will be the new Silk Road for us. It will connect East Asia to the West. I think both sides will have great opportunities"

-Gong Xiaosheng, Chinese Ambassador to Turkey



- ❖ Japanese HVAC company
- ❖ Pursuing strategies to accelerate entries into new emerging markets and expansion of business areas
- ❖ Acquired Turkey's Airfel in 2011 for USD 260 million to manufacture residential and commercial heating, air conditioning and ventilation products
- ❖ Both locally produced and imported products are serving the Turkish and regional markets

"Through this acquisition we plan to strengthen our services in Turkish markets, by combining performances of the heating, air conditioning and airing sectors..."

-Masatsugu Minaka, Daikin Europe head



- ❖ Alstom Grid -operating in Turkey since 1966- is a global expert in electrical grid performance
- ❖ The French company invested 10 million euros in 2012 to establish a power transformer repair facility in Gebze, Turkey employing about 100 staff members

"The inauguration of this new facility is the latest example of Alstom's long term commitment to the Turkish energy industry and to the country's export efforts..."

-Patrick Kron, Alstom Chairman and CEO



- ❖ Taiwanese global electronics manufacturing services provider invested USD 60 million in 2011 to establish a production facility in Europe Free Trade Zone in Çorlu
- ❖ The company started operations by producing HP desktop PCs with an annual capacity of 1.5 million units, employing up to 3,000 staff members

"Ninety-five percent of the production will be exported to North Africa, the Middle East and Europe"

-Tuna Kardeş, General Manager, Foxconn Turkey

Contents

- ❖ Global machinery sector overview
- ❖ Turkish machinery sector overview
- ❖ **Selected machinery sub-sectors**
- ❖ Selected machinery components



Turkey offers opportunities in telecom equipment

1

Strong demand and potential for telecom equipment

- ❖ The telecom equipment market is approximately **USD 1.2 bn** (2012) with **growing demand for equipment used for transceiving and processing information, including switches and routers**
- ❖ Turkey is a **net importer of telecom equipment** with imports **constituting ~90% of the total market**
- ❖ The immediate region of Turkey¹ shows **demand (USD 7.5 bn in imports (2012))** for telecom equipment, led by **Eastern Europe**
- ❖ Increasing usage of fixed and mobile **Internet services** are the key drivers for **demand in Turkey**
- ❖ There are three **investment drivers** for mobile carriers: **modernization, 3G to 4G mitigation, next generation solutions**

2

Quality, convenience, and flexibility for electronics manufacturing services (EMS) players

- ❖ Turkey's geographic location could create opportunities for **EMSs** to establish a **regional hub**
- ❖ Turkey has **strong blue and white collar workforce** trained in manufacturing of electronics, making them **valuable resources for EMS** players

3

Potential for expansion of telecom equipment R&D activities

- ❖ Turkey has semiconductor and electronics system development activity with **presence of major OEMs**, such as Huawei and Ericsson
- ❖ Turkey has improving **R&D landscape supported by government**
- ❖ Turkey has a **workforce** with education in core fields that are relevant for telecom equipment technologies in **circuits, systems, and software**

¹ Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

SOURCE: United Nations COMTRADE database, DESA/UNSD, TURKSTAT, press search, Ministry of Science, Industry, and Technology, Association of Turkish technology parks, Ministry of Development (DPT), TÜBİTAK Ministry of Economy, ÖYSM, TC Kalkınma Bakanlığı Bilgi Toplumu Stratejisinin Yenilenmesi Projesi, expert interviews



Turkey offers opportunities in HVAC equipment

1

Strong demand and potential for HVAC equipment

- ❖ The AC equipment market was around **USD 1.5 bn in 2012** and is expected to **grow 4% YoY** in the near future
- ❖ **Mono & multi-split** and **VRF/V based AC systems** constitute the largest market in Turkey with **2012 volumes** of **2.3 million** and **168 thousand** (indoor + outdoor), respectively
- ❖ Turkey is a **net exporter of split-systems** (until 2012) and **net importer of VRF/V systems**
- ❖ The immediate region of Turkey¹ shows **demand (USD 4.4 bn in imports (2012))** for HVAC equipment, led by **Eastern Europe**
- ❖ **Eco design and new energy label regulations** create shift from **on/off split systems** to **inverter-based** ones as well as shift towards next generation **VRF/V systems**; EU started the mandate in 2013 while Turkey starts in 2014

2

A location as a high-tech HVAC equipment development and manufacturing hub serving the growing local and regional markets

- ❖ Global **Japanese, Korean, European, and US** players have business models favoring **non-commoditized production of high-tech products**, making them suitable partners for countries aiming at **increasing know-how** and **sustainable global presence** in the industry
- ❖ A number of Turkish players **already have manufacturing and distribution relationships with global players**, providing a base to extend the partnerships to higher-value add product technology development and manufacturing
- ❖ The highest **value-add** in the HVAC value chain are the development of **technologies**, defining the **specifications of individual components** that go into products, and the ability to **integrated the whole system**
- ❖ Know-how development for **critical components** as well as **system-level integration** would constitute competitive advantage for Turkey who is on the path to become a regional hub for the design, production, and export of HVAC equipment

¹ Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

Source: TURKSTAT, United Nations COMTRADE database, DESA/UNSD İSKİD, company websites, expert interviews



Turkey offers opportunities in electro-medical equipment

1

Strong demand and potential for electro-medical equipment

- ❖ The medical products market is **USD 2 bn** (2011) with **growing demand for high-value add products**
- ❖ Increased **income**, longer **life expectancy**, and desire to improve **quality of life** drives the **demand in Turkey and overall region**
- ❖ Turkey is a **net importer of medical products** with imports **constituting ~80% of the total market**
- ❖ There is potential in contributing to **key success of factors** of the industry: **innovation, manufacturing, sales/marketing**
- ❖ Few **Turkish players produce medical supplies**, such as hospital furniture, tools, and gas units; some players are Bıçakçılar (Istanbul), Çağdaş Elektronik Medikal (Istanbul), Detaysan (Izmir)

2

Innovation and manufacturing of high-tech, high-quality equipment with flexible operations

- ❖ Turkish government has taken steps to **foster innovation and R&D** by incentivizing the electro-medical industry and supporting **collaboration with academia**
- ❖ Government and non-government support programs in form of **grants, tax incentives, and operational help** – such as business model generation help incumbent and new entrants to gain traction in **innovation** and **manufacturing process improvements**
- ❖ Turkey has a **workforce** with **education** in core fields that are relevant for electro-medical devices; e.g. electronics and biomedical engineering, biotechnology and biochemistry
- ❖ Besides **white collar** workforce, Turkey has well educated **blue collar** workforce, mostly comprised of ~750 vocational student graduates a year

3

Personalized and customer-centric sales and marketing services to the region

- ❖ Proximity to large markets nearby (developed as well as emerging) gives Turkey the advantage of becoming a **hub for sales and marketing**
- ❖ **Turkey's immediate region¹**, Eastern Europe, Middle East, North Africa, and Central Asia together import **~USD 6 billion** worth of electro-medical devices

¹ Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

Source: TURKSTAT, United Nations COMTRADE database, DESA/JUNSD, expert interviews, Ministry of Science, Industry, and Technology, Association of Turkish technology parks, Ministry of Development (DPT), TÜBİTAK Ministry of Economy, ÖYSM



Turkey offers opportunities in electricity distribution equipment

1

Strong demand and potential for electricity distribution equipment

- ❖ **Turkish electricity consumption** has **risen** in the last 3 decades with **large growth potential still remaining**
- ❖ In order to meet the expected rapid growth in electricity demand both **TEİAŞ¹ and distribution companies** plan to **invest ~ 2.6 bn TL annually** until 2015
- ❖ **Transformer shortages** and the goal of replacing 35 million electricity meters with **smart meters** are expected to drive **major investments** in the country
- ❖ There is a **local and regional demand² for transformers** with imports exceeding USD 1.8 billion
- ❖ Turkey is a **net importer for switchgear** with an import amount of ~USD 290 million
- ❖ All major **global T&D equipment players** – Schneider, ABB, Alstom, Siemens- are present in Turkey

2

Strong manufacturing and export capabilities for transformers and switchgear

- ❖ The need for **additional power generation plants** (e.g. new hydro and wind plants) benefits from strong **local sourcing of transformers**
- ❖ Given weight of transformers, manufacturing **proximity to market is important**
- ❖ High-voltage nature of transformer often necessitates **specialized local manufacturing** due to specification differences
- ❖ Foreign **high-voltage switchgear** manufactures with strong brand perception **dominate the Turkish market** – presenting a significant advantage
- ❖ **Low-voltage switchgear** equipment manufacturing facilities present in **peer countries**, some with cost structure higher than that of Turkey

¹ Turkish Electricity Transmission Company

² Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

Source: TEDAŞ, TEİAŞ, EPDK, TURKSTAT, United Nations COMTRADE database, DESA/UNSD, company websites, expert interviews



Turkey offers opportunities in construction machinery

1

Strong demand and potential for construction machinery

- ❖ In recent years, **growth in local demand** surpassed the in-house sales growth (locally produced and sold volume), which **resulted in an increase in imports**
- ❖ Turkey's construction machinery demand is estimated to be **~USD 2bn in 2012** with a **37%** p.a. increase since 2009; **~50%** of this demand is met via **imports**
- ❖ Local demand for construction and hence for the equipment is driven by **demographic changes, public sector plans** (e.g. urban transformation, infrastructure investments), and a **regionally active contractor base**
- ❖ **Established manufacturing facilities** of automotive OEMs and **presence of local construction machinery manufacturers** provide suitable ground for construction machinery industry

2

Investment opportunities in manufacturing and R&D

- ❖ The **lack of local sourcing of mini equipment** and the expected **30% growth** rate with a **2012 size of 1,400** in this product segment could create important investment opportunities in Turkey
- ❖ **Small-sized construction equipment** investments have **lower capital needs** and presents **growth opportunities** for global players who are recovering from the 2008 recession
- ❖ **Local companies** have developed **know-how for small-sized construction equipment manufacturing** and could supply the market demand in Turkey, and **region¹** where construction projects in dense cities increase in number
- ❖ **Capabilities in assembly** (developed in the automotive industry) and **incentives for R&D** activities in the country could make Turkey an **attractive hub for post-recession growth** by offering **assembly** and **technology development** services to meet the increasing regional demand and competitiveness in the sector

¹ Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

Source: United Nations COMTRADE database, DESA/UNSD, TURKSTAT, CECE, Turkish Contractor Association, IGEME, OICA, OSD, expert interviews, Ministry of Science, Industry and Technology



Turkey offers opportunities in turbines

1

Strong demand and potential for turbines

- ❖ **Power consumption** in Turkey is estimated to **increase 6.4%pa until 2020**, which is currently **240TWh**
- ❖ **72GW installed capacity** is forecasted until 2016 which is 56GW as of October 2013, 16GW of licenses are granted and 35GW of licenses are pending
- ❖ Hydro, gas and coal have the highest installed capacity with 33%, 31% and 22% shares, respectively
- ❖ **USD1.3 Billion of Turkey's trade deficit** is sourced from **boiler, turbine and generator industry**
- ❖ **2.4GW gas turbine** installation is made in 2012, **GE and Siemens captured 80% of the market** in recent years
- ❖ **Steam turbine** installations **peaked in 2011 with 2.8GW** installation, Chinese players captured 50% of the market
- ❖ **2.6GW Hydro turbine** installation is scheduled for 2014, **Andritz, Alstom and Voith** captured **80% of the market**
- ❖ Since 2006, nearly **1.8GW wind turbine** installation was made, of which **Vestas, Nordex, Enercon and GE constitute 95%**

2

A strategically located hub that sources critical parts for wind, gas, and steam turbines as well as for boilers and generators

- ❖ **Nacelle** is the most value added part of **wind turbines** and are easy to transport; producers of this part are essential players of the **OEM ecosystem**
- ❖ TEI-like local players have the **know-how** of manufacturing **gas turbines parts**, making Turkey a potential choice of OEMs that assemble their products in developed countries with higher cost structures
- ❖ Turkey presents a **low-cost alternative** to **steam turbine part** suppliers that are located in high-cost countries, giving OEMs the chance to **improve profits** by reducing cost
- ❖ **Chinese boiler OEMs**, with 77% market share in Turkey, could benefit from the **local supply of boiler parts** due to cost, flexibility, and quality
- ❖ Turkey's **vast copper reserve** and **proximity to large markets** could support **generator part manufacturing**



Turkey offers opportunities in agriculture machinery

1
Strong demand and potential for agriculture machinery

- ❖ **Turkish market** for agriculture machinery amounted to ~**USD 1.3 bn** in 2011 and was dominated by tractors over the years
- ❖ **Turkish exports** are USD 521 million in 2012 and **growing by 15% p.a. since 2007**, with **tractors dominating** and accounting for **63% of exports**
- ❖ Despite strong tractor exports, Turkey has a **trade deficit mostly due to large imports of harvesting machinery and planting & fertilizing machinery**
- ❖ Turkey's region¹ has a strong import demand for tractors
- ❖ **Government grants** for agriculture machinery aim to **replenish the inventory of machinery** in the country in order **increase agricultural GVA**

2
Capacity increase in machinery that have gained momentum and regional hub presence for small equipment

- ❖ Local production of **silage machines** and **straw or fodder balers** have gained momentum; strong **bovine animal, sheep, and goat stocks** together with **new players** entering the market has increased local production of these machinery
- ❖ New players entering the market for **straw or fodder balers** have started tapping into the **potential of Turkey**
- ❖ **Local players** already strong in **agricultural spray and powder dispersers** offer increased capacity to meet the **sizable regional demand**
- ❖ The increasing demand for **small agricultural machinery** (e.g. tractors) locally and in the region due to small farm sizes, especially North Africa, and Middle East, gives Turkey an opportunity to use its **unused capacity** and become a **regional hub** for these machinery

¹ Eastern Europe, Caucasus, Central Asia, Middle East, North Africa

Source: : McKinsey Global Institute, Eurostat, FAOSTAT, GAP BKI TURKSTAT, United Nations COMTRADE database , DESA/UNSD, Tamakbir report, Food, Agriculture and Livestock Ministry, expert interviews

Turkey offers opportunities in food processing machinery

1

Strong demand and potential for food processing machinery

- ❖ Turkish market is driven by **high consumption of packaged food and beverage, amounting to ~75 TL billion**
- ❖ **Large multinational food companies** (Unilever, Kraft, Nestle) have strong presence in Turkey and use the country as an export base and are planning further investments
- ❖ **Turkish market size is ~USD 900 million with exports and production amounting to ~USD 381 and 376 million, respectively**, including packaging machinery (35%), machinery for grains (18%), bakery for biscuits (16%) and filtration and purification (8%) as leading categories
- ❖ Turkey has high **trade deficit** in all categories of packaging machinery as well as food processing machinery driven by bakery and confectionary machinery segments

2

Opportunity for global players in confectionary and heat exchange equipment to expand their production network and for local production of key parts

- ❖ There are about **110 local producers** operating in a **fragmented market**; **~TL 209 million local investments** were realized in last five years, mostly concentrated in Marmara and Central Anatolia regions
- ❖ Turkey offers **logistics** and **market proximity advantages** for global **confectionary and biscuit, cake and bread bakery** players as well as players offering food processing equipment with **heat exchange** technology; all of these machinery is mostly imported from developed countries, such as Germany and Italy, and from China
- ❖ **Leading equipment players** implementing a **global production footprint strategy** could find Turkey especially attractive; **Chinese companies** for example can use **Turkey** as a **hub** to reach **regional markets** in Europe, Africa, and Middle East
- ❖ Specific equipment **parts** that are **not locally sourced** but are in **high demand** present opportunities for **profitable parts supply investments**; examples of such parts are heat exchangers, ball-bearing, electrical automation and control systems, pneumatics, filtering and compressors

Source: United Nations COMTRADE database, DESA/UNSD, TURKSTAT, Food Association, SUDER, Investment Support and Promotion Agency of Turkey, company websites, Ministry of Economics, expert interviews



Turkey offers opportunities in textile machinery

1

Strong demand and potential for textile machinery

- ❖ Turkey is one of the **leading textile & apparel manufacturers** with **~50 USD billion gross exports**; further development is supported by growing investments, governmental support and strong export markets
- ❖ **Turkey has low share of technical textile** output (5% of total textile production compared to 22% in EU) and exports are concentrated on a few products like bulk containers for packaging, nonwoven hosiery and rubber, showing growth potential for machinery using this technology
- ❖ **Turkey textile machinery market size amounts to USD ~2 billion** with **production amounting only to USD 450 million**, internal **machinery park amounts to USD 14-25 billions**
- ❖ Turkey has **trade deficit in all categories of machinery** but there are some **local manufacturers especially in finishing and knitting machinery** where market is very fragmented

2

Opportunity for global players active in yarn/fiber and weaving machinery as well as technical textile (non-woven) machinery to tap into Turkey's production capacity and market proximity

- ❖ Low share of technical textile output compared to European countries drives development of **technical textile (non-woven) machinery** park and creates opportunity for selected **European players** to **shift production from higher-cost countries to lower-cost Turkey**
- ❖ **Forming partnerships** with leading global **players** to obtain the know-how and supply the local and regional demand for **yarn/fiber and weaving machinery, as well as technical textile** could result in **mutual benefits** for both the **player** (access to market) and **Turkey** (gaining sustainable competitive advantage)



Contents

- ❖ Global machinery sector overview
- ❖ Turkish machinery sector overview
- ❖ Selected machinery sub-sectors
- ❖ **Selected machinery components**



Turkey offers opportunities in bearings industry

1 Strong demand and limited local supply for bearings in various sectors

- ❖ **Turkish market** size is ~**USD 950 million** with a local **production** of **USD 250 million** ; two **local manufacturers** (ART and ORS¹) have a **market share** of **20-25%** while **global players** (SKF, Schaeffler, Timken, NSK) have the **remaining market share**
- ❖ **Local manufacturers** took recent **initiatives for growth**: **ART** has invested in producing **low volume** products for **special applications** in automotive, railroad, wind energy, and steel industry under **Das Lager brand**; **ORS** has put goals to **increase its exports**
- ❖ **Turkey** has **trade deficit** in **ball bearings, tapered roller bearings, spherical roller bearings** and **cylindrical roller bearings** which are mostly supplied from developed countries like France, Germany, Sweden; peer countries like Romania, Slovakia and Poland; and from China

2 Good investment opportunities due to growth in demand driving sectors

- ❖ Turkish **bearings demand** is **driven** by local **automotive** and **machinery production** as well as by **speed railway construction**; likewise, Turkey's **surrounding region** shows **demand** especially due to **automotive production** and **increase in railway construction**
- ❖ **Global investments** were mostly driven by **automotive development**; thus, **high automotive production activity in Turkey** and surrounding region leads to **potential for investments**
- ❖ Turkey has **potential** for both **greenfield investments** due to lack of capacity and developed automotive production and **JVs** with global players, enabling local companies to engage in R&D intensive bearings development

¹ Anadolu Rulman and Ortadoğu Rulman Sanayi

Source: United Nations COMTRADE database, DESA/UNSD, TURKSTAT, TCDD, press search, expert interviews, company interviews



Turkey offers opportunities in compressor industry

1 Strong demand in gas compressors due to high AC production and limited local production


- ❖ Turkey has production of two types of compressors, **industrial gas/air compressors and gas compressors for refrigeration** equipment such as AC, refrigerators
- ❖ Industrial **air/gas compressor** demand is driven by high **construction development** and **automotive, chemicals, oil & gas production** in the country. **Gas compressors** for refrigeration equipment demand is driven by production of **refrigerators and HVAC**
- ❖ Market size for compressors has increased since 2009 and reached **USD 764 million in 2011** when **production was USD 111 million**, dominated by screw and piston compressor
- ❖ Turkey has **trade deficit of ~USD 615 million** of which **~USD 485 million** are from **refrigeration equipment compressors** and **~USD 130 million** from **industrial air/gas compressors**
- ❖ **Turkey's region** has sizable demand (**~USD 1.4 billion**), mostly for compressors for refrigeration equipment

2 Potential for air conditioner compressor manufacturers due to regional demand

- ❖ Turkey has **screw and piston compressor production**, but **lacks screw block** production. Many **global players** have **sales presence**; Atlas Copco, Kaesar, Ingersoll Rand constitute 41% of the market
- ❖ **Refrigeration equipment compressors** are demanded in 4 sub-categories that are mostly not produced in Turkey, **only one player (Arçelik) has production** in refrigeration compressors while **others are imported from China, Brazil** from leading players such as **Danfoss, Copeland** and **Toshiba**
- ❖ Turkey has **potential for capacity expansion** especially in **commercial air conditioner compressors** and **vehicle air condition compressors** via **greenfield investments**



Refrigeration equipment compressors can be examined in four categories, among which only refrigeration compressors are produced in Turkey

Compressor type	Players present	Raw material	Potential markets
Refrigerator compressors	 arçelik	❖ Imported from China, Toshiba	<ul style="list-style-type: none"> ❖ There is no installed production of refrigeration in surrounding region ❖ Turkey market has potential of <ul style="list-style-type: none"> • 500 thousand - 1 million units due to production of refrigeration • 300 – 500 thousand units due to maintenance service of refrigeration ❖ Volume is main concern for compressor production in Turkey
Commercial air conditioner compressors	No production	<ul style="list-style-type: none"> ❖ Imported from <ul style="list-style-type: none"> • Brazil • China 	<ul style="list-style-type: none"> ❖ Turkey air conditioner compressor market has potential of <ul style="list-style-type: none"> • 300-500 thousand units due to production • 50 thousand units due to maintenance
Car air condition compressors	No production	❖ Imported from world's leading brands	❖ Turkey has significant vehicle production and is surrounded with other vehicle producing countries
Cooling systems (scroll compressors)	No production	❖ Imported from China, Danfoss and Copeland	<ul style="list-style-type: none"> ❖ Niche market with less demand, but higher performance and more expensive equipment, 10 thousand demand per year ❖ Potential due to development of construction sector and need for cooling applications



Source: Expert interviews

Turkey offers opportunities in electric motor and internal combustion engine industries

1
Strong demand and growth trend for motors and engines

- ❖ Turkey's forecasted **population** of 81 million and an expected **per capita GDP** of USD15,300 in 2018 offers **sustainable growth base**
- ❖ Main **driver of internal combustion engines** is **motor vehicle production**
- ❖ Main **drivers for electric motors** are **vehicle production, machinery production, heating and cooling equipment and household appliances production**
- ❖ Turkey is the **16th largest motor vehicle manufacturer in the world** in 2012 with 1.1 million unit production volume
- ❖ **Machinery production** in Turkey has increased **33%p.a. between 2009 and 2011** to **USD18.8 Billion**
- ❖ **4 Million units of air conditioner** are manufactured in Turkey in 2011 and **growing with 20%p.a.**
- ❖ **25.3 million units of household appliances** are manufactured in Turkey in 2011 which is **increasing with 8%p.a.**
- ❖ Both electric motors and internal combustion engines have **significant imports in Turkey's close region**; USD 2.2 billion and USD 19 billion, respectively
- ❖ **Electric motors trade deficit is USD 448 million** and is mainly due to electric motors of output less than 37.5 W and AC motors single phase of output bigger than 750W
- ❖ **Internal combustion engine trade deficit amounts to USD 4.4 billion** and dominated by diesel engines for motor vehicles, spark-ignition reciprocating engines over 1000 cc and engines other than motor vehicles/marines

2
A strategically located hub with production ecosystem

- ❖ Turkey is seen as a **manufacturing base with 6 automobile OEMs** producing over 1 million motor vehicles annually together with part suppliers
- ❖ **TL 26 million investment in engine related industries** is made in last 3 years in Turkey; currently industry employs 21,000 people
- ❖ Internal combustion engine manufacturers include **BMC, Anadolu Motor** and part manufacturers include **Bosch**
- ❖ **TL 113million investment in electric motor related industries** is made in last 5 years in Turkey; currently industry employs 13,000 people
- ❖ **Electric motor** types manufactured in Turkey includes **air conditioning motors, elevator motors and appliance motors**

SOURCE: TURKSTAT, United Nations COMTRADE database, DESA/UNSD, OSD, Ministry of Economy, press search, company websites

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