*Gazi University Journal of Science*
*GU J Sci*
*29(4): 751-767 (2016)*

# Using Cluster Analysis to Define the Position of a Developing Country in Global Transportation Services Trade Environment

Ebru V. ÖCALIR-AKÜNAL[1,♠], Serpil EROL[2]

[1]*Gazi University Faculty of Architecture Department of City and Regional Planning, Ankara 06570,Turkey*
[2] *Gazi University Faculty of Engineering Department of Industrial Engineering, Ankara 06570,Turkey*

*Received: 09/05/2016 Revised:31/08/2016 Accepted: 11/10/2016*

**ABSTRACT**

Liberalization of services brought a competitive environment where governments on the one hand try to get access to the markets of the most competitive sectors for them, and on the other hand they try to protect their local suppliers against sector's global giants. Although several developing countries have participated in the globalization of services, still some developing countries show resistance to process of liberalization in services, as they do not see themselves as possessing much of comparative advantage in the production and exchange of services. In recent years, publication of statistical data on services trade, has allowed researchers make international comparisons in macro level. In this study, Turkey's position in global services trade environment is explored in the case of transport sector. The place of Turkey among 148 member countries of World Trade Organization is evaluated by cluster analysis with respect to transportation services trade indicators.
The results show that current position of Turkey in global services trade market is far from being competitive. The recruitments necessary for Turkey to gain its competitiveness are proved by a scenario analysis.

***Keywords:*** *Liberalization of services; GATS; transport sector; cluster analysis; Turkey*

## 1. INTRODUCTION

The services sector has now gained a global character as conservative policies have left their places to liberal policies and trade agreements in recent decades. The first attempts of developed economies to present services as tradable objects have now returned to a global competition among many countries from all over the World to increase the share of benefits from services sector. Although many variables such as differential productivity growth, outsourcing of service tasks from manufacturing industries, shifts in the composition of

♠Corresponding author, e-mail: ebruocalir@gazi.edu.tr

final demand etc., influence service sector, it is observed that employment in the advanced economies shifts with a remarkable regularity towards services as income per capita rises (Schettkat and Yocarini, 2006). In this competitive environment, governments on the one hand try to get access to the markets of the most competitive sectors for them, and on the other hand they try to protect their local suppliers against sector's global giants.

Several developing countries have participated in the globalization of services. Developing countries (and also some developed countries) have shown resistance to process of liberalization in services. These countries did not see themselves as possessing much of comparative advantage in the production and exchange of services (Sauvé, 2002). One of the main reasons is the domestic characteristic of the services which could possibly not completely fit to the global trading system. Another problem is the feeling that the establishment of multilateral rules and disciplines for services would hurt their pursuit of development goals and public policy objectives by forcing them to open up and deregulate their service sectors. There is also concern that the inclusion of services would enable developed countries to leverage across sectors, by making their concessions in traditional areas like textiles and agriculture, where developing countries had a comparative advantage, conditional upon concessions by developing countries in the service sector. The commitments allow governments to preserve the degree of market access provided by current regulations. The negotiations provide some flexibility to countries in choosing the service sectors they wished to liberalize and the limitations they wanted to maintain on specific subsectors, activities, and modes of supply (Chanda, 2002).

Services are seen as a key determinant of the competitiveness of all firms in open economies. Different sectors in services have different roles in the economy with distinct market structures (Francois and Hoekman, 2010). Transportation, as one of the sectors covered by GATS, has been researched with its subsectors. Francois and Wooton (2001) examine the importance of market structure in the transport sector for the distribution of gains from trade and the benefits of trade liberalization. The paper is concerned with trade in maritime transport services (international shipping, transport, and related logistical services) and the importance of competition and market structure in the sector. Oum et al. (2001) research role of alliances in expanding and strengthening airline global service networks in the air transport industry which is considered as one of the most regulated and restrictive industries in international trade. In the study, some issues about asymmetries in domestic regulatory policy which make direct application of GATS concepts to air services problematic are discussed. Zhang and Zhang (2002) provide a general discussion of various issues related to the liberalization of air cargo services in international aviation. Customs and inter-modal transportation are also discussed in the context of cargo liberalization in the study. Kimura et al. (2004) present the results of their analysis on the maritime and air transportation sectors in Russia, which did not have a membership of the World Trade Organization (WTO) on that date (The Russian Federation has been a member of WTO since 22 August 2012). The study depends on questionnaire surveys. Restrictiveness index tables for two transportation sectors with scoring weights from literature are listed and restrictiveness indexes of barriers to trade are estimated, which reflect the collected information on the regulatory environment in Russia.

The statistical issues entailing trade in services have become important during the last decades, which helped rise of international comparisons. A matrix summarizing the status of the trade in services data publication by international organizations is available at the UNSD website (http://unstats.un.org/unsd/tradeserv/TFSITS/matrix.htm ). A manual is first published by the UN (2002) followed by a review in 2010 (UN, 2012) to set out an internationally agreed framework for the compilation and reporting of statistics of international trade in services in a broad sense. WTO (World Trade Organization) publishes exports and imports of total commercial services, transport, travel and other commercial services, by region and selected economy for the years 1980-2013. Data for the breakdown of other commercial services is also available as from 2000 (http://stat.wto.org). The services delivered through enterprises that are locally established but foreign-controlled are covered by FATS, which is the term "foreign affiliates trade in services statistics" that has been superseded by the more general term "foreign affiliates statistics", with 2007 as the first reference year (http://ec.europa.eu/).

Clusters define the extent to which results should be generalized to other countries (Ronen and Shenkar, 1985). In scientific literature there are studies on some macro level interrelationships, in which cluster analysis is used to group countries in a systematic manner, in terms of their selected characteristics and the focused research criteria. Fritz and Koch (2014) attempt to empirical identify structural potentials and policy challenges for prosperity at scales, where economic development remains within ecological carrying capacities. The results of cluster and correspondence analyses for 38 countries indicate the existence of five 'prosperity regimes' and demonstrate that all aspects of prosperity - including (unsatisfactory) ecological performance - are linked to economic development. Montalbano and Nenci (2014) investigate the trade competitiveness of the new emerging Southern economies – China, India, Brazil and South Africa (CIBS) – with respect to their main global partners, with a sample of 46 countries. Das and DiRienzo (2014) perform a cluster analysis to group the countries into three distinct clusters based on their similarities in the three diversity measures. Given these country clusters, this study examines how these different clusters perform, on average, in regard to thirteen different economic and political indicators. Dunning (1981) explores the preposition of a country's international direct investment position, and changes in that position, with a data set of 67 countries. Leuz et al. (2003) use cluster analysis to define systematic differences in earnings management across 31 countries. They perform a descriptive cluster analysis to identify groupings of

countries with similar institutional characteristics and then show that earnings management varies systematically across these institutional clusters. Saint-Arnaud and Bernard (2003) perform cluster analysis to identify the regimes, which display specific arrangements between markets, the state and families in the production and distribution of the resources required for the well-being of people. The authors' comparative analysis allows them to identify Canada's place in the worlds of welfare capitalism. Hirschberg et al. (1991) propose statistical cluster analysis methods to explore different ways and levels for clustering of 23 diverse attributes such as political rights, civil liberties, life expectancy, literacy, real domestic product, etc. for measuring quality of life attributes across countries. In the study, aggregate measures of welfare are computed for many countries, and the sensitivity of several key inequality measures with respect to clustering and degrees of aggregation is studied. Boreiko (2003) researches the Central and Eastern Europe Countries' (CEEC) readiness to join the Economic and Monetary Union (EMU) using a fuzzy clustering algorithm to identify the groups of countries that are closer to being ready. Artis and Zhang (2001) look for inhomogeneity in the actual and prospective membership of the EMU by applying techniques of cluster analysis to a set of variables suggested by the theory of Optimal Currency Areas. The analysis reveals that the member countries may be divided into a core and two periphery clusters.

The literature survey shows that there are some doubts among developing countries about liberalization in services. National studies give clues of the possible problems which would new partners of the market face, but international comparisons should give a better description of the situation. The statistical data which have been collected by some related organizations in recent decades would give rise to studies in macro level.

The literature survey also shows that earlier studies have used cluster analysis in macro level to define the clusters which have similar characteristics. Therefore, in this study a cluster analysis is performed.

Another result derived from literature survey is, sector specific studies help better understand the dynamics of the very comprehensive services. Transport specific studies in this context are needed to be developed.

In Section 2, brief information on legal basis of liberalization in trade of services is given. In Section 3, the research related to the case study Turkey is given in detail. In Section 4, a scenario to increase the chance of competitiveness of Turkey in transportation services trade sector is presented. Finally in Section 5, we provide our conclusions and suggestions for future studies.

## 2. LEGAL BASIS OF LIBERALISATION IN TRADE OF SERVICES

Services make up over 70% of world production and employment in advanced industrial societies although they account only 20% of world trade (Sauvé and Stern, 2010; Freund and Weinhold, 2002). The GATS brought a new ground by broadening the scope of world trade rules to cover trade areas never before subject to multilateral disciplines.

Once a service is bound after negotiations in a country, it is nearly impossible to unbound it again. For this reason, in countries where liberalization would destroy internal structures of the economy, the negotiations should be followed carefully.

The most well-known and wide-reaching agreement involving services is the General Agreement on Trade in Services (GATS), which became effective in 1995. The GATS is the first and only set of multilateral rules governing international trade in services. Negotiated in the Uruguay Round, it was developed in response to the huge growth of the services economy over the past 30 years and the greater potential for trading services brought about by the communications revolution (www. wto.org).

Services represent the fastest growing sector of the global economy and account for two thirds of global output, one third of global employment and nearly 20% of global trade. When the idea of bringing rules on services into the multilateral trading system was floated in the early to mid-1980s, a number of countries were not sure and even opposed. They believed such an agreement could undermine governments' ability to pursue national policy objectives and constrain their regulatory powers. The agreement that was developed, however, allows a high degree of flexibility, both within the framework of rules and also in terms of the market access commitments (www. wto.org).

The General Agreement on Trade in Services has three elements: the main text containing general obligations and disciplines; annexes dealing with rules for specific sectors; and individual countries' specific commitments to provide access to their markets, including indications of where countries are temporarily not applying the "most-favoured-nation" principle of non-discrimination (www. wto.org).

The agreement covers all internationally-traded services-business, communication, construction and engineering, distribution, education, environment, financial, health, tourism and travel, recreational, cultural and sporting, transport and others.

Individual countries' commitments to open markets in specific sectors-and how open those markets will be - are the outcome of negotiations. The commitments appear in "schedules" that list the sectors being opened, the extent of market access being given in those sectors (e.g. whether there are any restrictions on foreign ownership), and any limitations on national treatment (whether some rights granted to local companies will not be granted to foreign companies). So, for example, if a government commits itself to allow foreign banks to operate in its domestic market, that is a market-access commitment. And if the government limits the number of licenses it will issue, then that is a market-access limitation. If it also says foreign banks are only allowed one branch while domestic banks are allowed numerous branches, which is an exception to the national treatment principle (www. wto.org).

These clearly defined commitments are "bound": like bound tariffs for trade in goods, they can only be modified after negotiations with affected countries. Because "unbinding" is difficult, the commitments are

virtually guaranteed conditions for foreign exporters and importers of services and investors in the sector to do business (www. wto.org).

The study is performed only for "transportation" services in the WTO database. Transportation covers all transportation services that are performed by residents of one economy for those of another and that involve the carriage of passengers, the movement of goods (freight), rentals (charters) of carriers with crew, and related supporting and auxiliary services. Some related items that are excluded from transportation services are freight insurance (included in insurance services); goods procured in ports by non-resident carriers and repairs of transportation equipment (both are treated as goods, not services); repairs of railway facilities, harbors and airfield facilities (included in construction services); and rentals or charters of carriers without crew (included in operational leasing services) (UN, 2002).

There are also some concerns about the GATS (Sinclair, 2000):

- The GATS exposes virtually any government action affecting services to WTO oversight and potential challenge.
- Any government action, whatever its policy objective, that arguably alters the conditions of competition in favour of either domestic service providers or in favour of some foreign service providers over others, is exposed to challenge under a very tough test of de facto discrimination.
- The GATS prohibits certain types of public policies, absolutely diminishing democratic governmental authority.
- The GATS is designed to enable transnational corporations, in collaboration with foreign governments, to attack general, non-discriminatory public interest regulations as unnecessary or burdensome.
- The GATS is hostile to public services, treating them as, at best, missed commercial opportunities and, at worst, unfair competition or barriers to entry for foreign services and suppliers.
- The GATS investment restrictions demolish industrial policy whether primarily aimed at goods or services, closing off the path to development.

## 3. A CASE STUDY: TURKEY

### *3.1. Methodology and analysis*

This study is concerned with the international (macro) and national levels (micro). In international (macro) level cluster analysis is performed to group linkages in the transportation services trade indicators as a whole. The analysis is focused on definition of clusters thus the linkages among countries. A meso level of analysis for regional blocks is not in the scope of this study. In national (micro) level, and the competitiveness of a single country (Turkey) in the global transportation services trade environment is evaluated by country specific services trade indicators of the WTO (Table 1).

**Table 1.** Methodology and focus of analysis

| Level of Analysis | Methodology | Focus of Analysis |
|---|---|---|
| National level (micro) | Literature survey (country specific services trade indicators) | Competitiveness of Turkey's economy |
| | | Need for innovation and structural reforms |
| International level (macro) | Cluster analysis(Group linkages in the transportation services trade indicators as a whole) | Definition of (leading) clusters |

In order to define the Turkey's position in world's services trade environment, cluster analysis has been performed to group countries with similar transportation services indicators characteristics. The aim is first to identify country clusters with similar features such as the market indicators of transportation sector, investment in economy (mill.US$) in the sector, production and employment, number of passengers, amount of freight, freight, investment in transportation services imports, investment in transportation services exports, and investment abroad, and then to examine whether a shift to a more competitive cluster is possible.

The database is derived from WTO (World Trade Organization) for 148 member countries. The cluster analyses are performed for valid cases that have relevant data for the last possible year. The criteria for cluster analysis for transportation services sector are given in Table 2.

The $n<300$, so a hierarchical cluster analysis with an agglomerative model is performed. For distances between clusters, Ward's method, that for each cluster, the means for all variables are calculated, has been selected. In this method, for each case, the squared Euclidean distance to the cluster means is calculated. These distances are summed for all of the cases. At each step, the two clusters that merge are those that result in the smallest increase in the overall sum of the squared within-cluster distances. The coefficient in the agglomeration schedule is the within-cluster sum of squares at that step, not the distance at which clusters are joined. Values are standardized by Z scores because the measurement scales are different from each other.

**Table 2.** The criteria for cluster analysis for transportation services sector

| Variable | Items |
|---|---|
| market indicators of transportation sector | number of international airports, airplanes fleet (no), maritime merchant fleet (‘000 DWT) rail lines (km), road lines (km) |
| investment in economy (mill.US$) | inward FDI stocks, inward FDI flows |
| production and employment | value added (mill. US$), % of total value added, employment (% of tot. employment, container port traffic ('000 TEUs) |
| passengers | by air, by rail, by road |
| freight | by air, by rail, by road |
| transportation services imports (mill.US$) | by sea, by air, by other transport |
| transportation services exports (mill.US$) | by sea, by air, by other transport |
| investment abroad (mill.US$) | stocks, flows |

Some detailed information regarding country specific services trade indicators of Turkey is also gathered from WTO and some indicators are presented in graphics.

3.1.1. Micro Level Analysis: A General Overview of Turkey’s Transportation Services Trade

Turkey’s commitment list covers business, communication, construction & engineering, education, environment, financial, health, tourism & travel and transport services. As a developing country Turkey needs to define its role and position in global services trade environment before completing negotiations and making structural reforms in its legal procedures. In this study, Turkey’s position in global services trade environment is explored in the case of transport sector. In transportation sector, Turkey’s GATS commitments cover maritime transport, airway transport, railway transport and road transport.

The share of employment in services is commonly given as a good proxy for an economy’s level of development as it tends to rise with per capita incomes (OECD, 2002). According to WTO data for the year 2011, Turkey’s share of employment in services is 43.8% and GNP per capita in thousands of USD has raised to 18,800 from 8,190 in 1999 (Worldbank data, http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD).

In Figure 1, GNI per capita, PPP (current international $) of Turkey between 1998 and 2010 is given. PPP GNI is the gross national income (GNI) converted to international dollars using purchasing power parity rates.

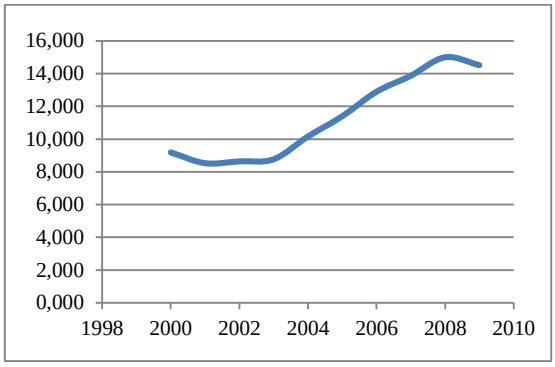


**Figure 1.** GNI per capita, PPP (current international $) of Turkey
Worldbank data, http://data.worldbank.org/

In Figure 2, services value added (% of GDP) in Turkey between 1998 and 2010 is given. Services include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services. Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.

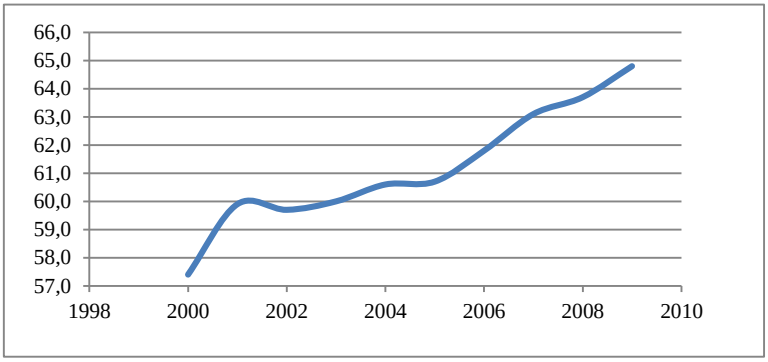


**Figure 2.** Services value added (% of GDP) in Turkey
Worldbank Data, http://data.worldbank.org

In Figure 3, trade in services (% of GDP) in Turkey between 2005 and 2013 is given. Trade in services is the sum of service exports and imports divided by the value of GDP, all in current U.S. dollars.

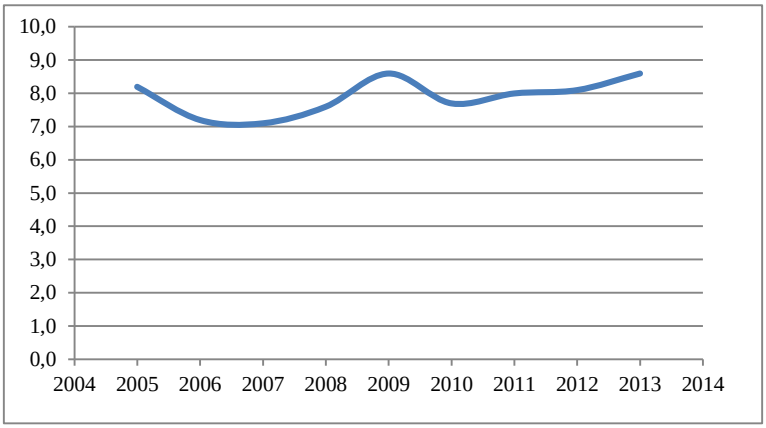


**Figure 3**. Trade in services (% of GDP) in Turkey
Worldbank Data, http://data.worldbank.org/indicator/BG.GSR.NFSV.GD.ZS/countries

In Figure 4, investment in transport with private participation is given. Investment in transport projects with private participation covers infrastructure projects in transport that have reached financial closure and directly or indirectly serve the public. Movable assets and small projects are excluded. The types of projects included are operations and management contracts, operations and management contracts with major capital expenditure, greenfield projects (in which a private entity or a public-private joint venture builds and operates a new facility), and divestitures. Investment commitments are the sum of investments in facilities and investments in government assets. Investments in facilities are the resources the project company commits to invest during the contract period either in new facilities or in expansion and modernization of existing facilities. Investments in government assets are the resources the project company spends on acquiring government assets such as state-owned enterprises, rights to provide services in a specific area, or the use of specific radio spectrums. Data are in current U.S. dollars.

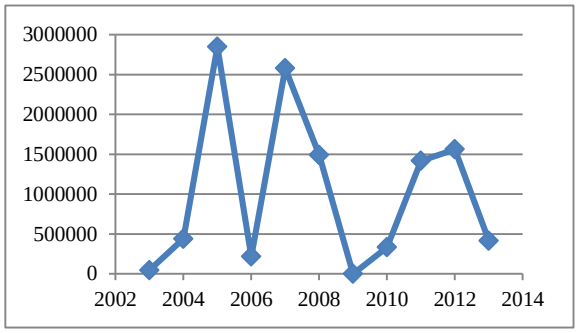


**Figure 4.** Investment in transport with private participation (current 1.000 US$)

Figure 5 shows that, exports in transportation services sector in Turkey have a tendency to increase in a linear trend. The figure also shows that a gap between imports and exports are growing. The increase in imports follows a polinomial trend.

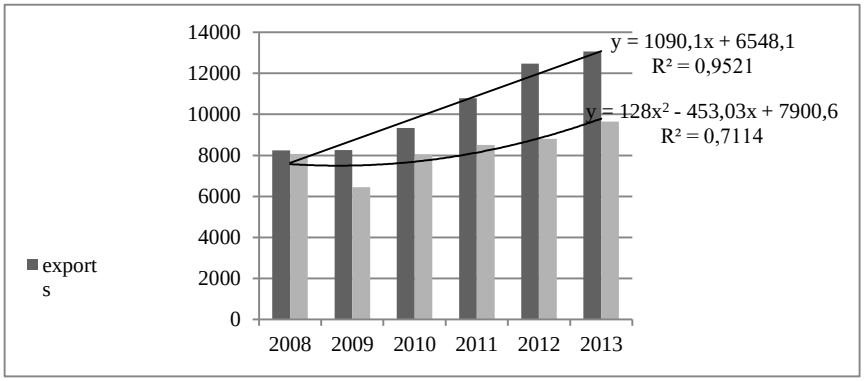


**Figure 5.** Exports and imports (in Mill.US$) in transportation services sector in Turkey

According to the World Trade Organization's data, import and export in transportation services in Turkey are given as a time series between 2006 and 2011 in Figure 5. The subsectors are given in Figure 6. Figure shows that airway is the leading subsector in exports in transportation services. Maritime subsector is the leader in imports in transportation services.

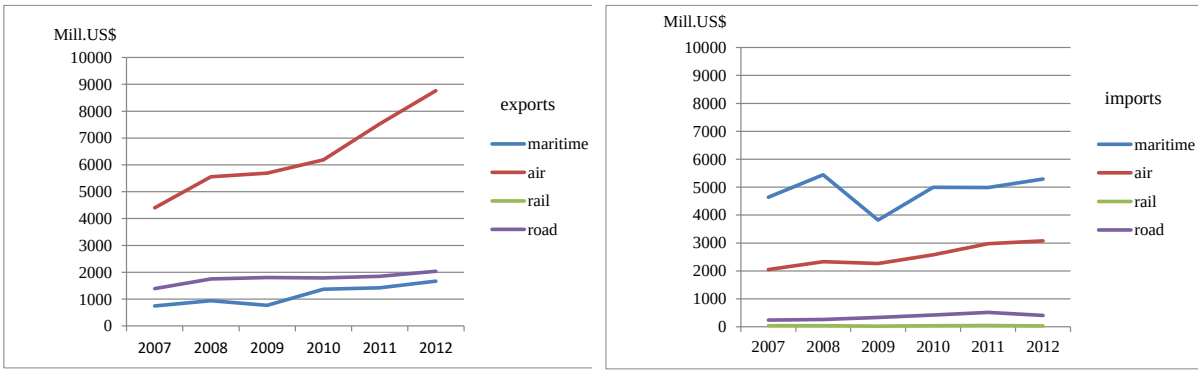


**Figure 6.** Exports and imports (in Mill.US$) in transportation services by sub-sectors in Turkey

The results of the micro level analysis show that, Turkey has a potential to increase the income from services activities. The tendencies in recent years show that investment in private sector does not follow a regular development, which can be an obstacle against expected growth.

A list of general indicators of Turkey's transportation services trade is given in Appendix 1.

*3.1.2. Macro level analysis: Results of cluster analysis*

A cluster analysis was run on 65 valid cases (countries) each responding to items on market indicators of transportation sector (number of international airports, airplanes fleet (no), maritime merchant fleet ('000 DWT) rail lines (km), road lines (km)). A hierarchical cluster analysis using Ward's method produced four clusters, between which the variables were significantly different in the main. USA is alone in the cluster with highest comparative advantage. Turkey is in the most populated cluster.

A cluster analysis was run on 93 valid cases (countries) each responding to items on investment in economy (mill.US$) in transportation sector (inward FDI stocks, inward FDI flows. The analysis produced two clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

A cluster analysis was run on 84 valid cases (countries) each responding to items on investment in transportation production and employment (value added (mill. US$), % of total value added, employment (% of tot. employment, container port traffic ('000 TEUs)). The analysis produced three clusters, between which the variables were significantly different in the main. Turkey is in the second cluster.

A cluster analysis was run on 44 valid cases (countries) each responding to items on passengers (by air, by rail, by road). The analysis produced three clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

A cluster analysis was run on 36 valid cases (countries) each responding to items on freight (by air, by rail, by road). The analysis produced three clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

A cluster analysis was run on 86 valid cases (countries) each responding to items on investment in transportation services imports (mill.US$) (by sea, by air, by other transport). The analysis produced five clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

A cluster analysis was run on 81 valid cases (countries) each responding to items on investment in transportation services exports (mill.US$) (by sea, by air, by other transport). The analysis produced five clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

A cluster analysis was run on 43 valid cases (countries) each responding to items on investment abroad (mill.US$) (flows, stocks). The analysis produced three clusters, between which the variables were significantly different in the main. Turkey is in the most populated cluster.

The results of the macro analysis show for each of the given criteria Turkey takes place on crowded clusters with many other countries. Some countries on the other hand take place in more competitive clusters.

**Table 3.** A comparison of clusters according to all criteria

| | market indicators | investment in economy | production and employment | passengers | freight | transportation services import | transportation services export | investment abroad | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Australia | | + | | | | | | | 1 |
| Austria | | | | | | + | + | | 2 |
| Belgium | | | | | | + | + | | 2 |
| Canada | + | | | | | + | | | 2 |
| China | + | + | + | + | + | + | + | + | 8 |
| Colombia | | + | | | | | | | 1 |
| Denmark | | | | | | + | + | + | 3 |
| France | + | | | | | + | + | + | 4 |
| Germany | + | | | | | + | + | + | 4 |
| Greece | + | | | | | | + | | 2 |
| India | + | | | | | + | + | | 3 |
| Italy | + | | | | | + | | | 2 |
| Japan | + | | + | | | + | + | + | 5 |
| Malaysia | | | | | | | | + | 1 |
| Mexico | + | | | | | | | | 1 |
| Netherlands | | + | | | | + | + | + | 4 |
| Norway | | | | | | | + | + | 2 |
| Poland | | | | | | | + | | 1 |
| Russian Federation | + | | | | | + | + | | 3 |
| Singapore | | + | | | | | | | 1 |
| Spain | + | | | | | + | + | | 3 |
| Switzerland | | + | | | | | | + | 2 |
| United Kingdom | + | + | | | | + | + | + | 5 |
| USA | + | + | + | + | + | + | + | + | 8 |
| TOTAL | 13 | 7 | 3 | 2 | 2 | 15 | 16 | 11 | 66 |

In Table 3, 25 countries which do not belong to the crowded clusters of each criterion take place. In the right column, the sum of the criteria that a country meets as a competitive advantage is given. We see that, only two countries, China and the USA, are far from all other countries for all of the given criteria. The nearest countries are Japan and United Kingdom, showing uniqueness in only 5 criteria. Australia, Colombia, Malaysia, Mexico, Poland and Singapore, as potential competitors, show their competitiveness in just one criterion at the moment.

### 3.2. Scenarios to increase Turkey's chance in services trade in transportation sector

The results of the macro analysis show that for the given criteria, most countries tend to take place in large clusters. According to the cluster analyses, Turkey takes place in crowded clusters with many other countries

(Appendix B). For none of the given criteria a relative competitiveness is observed. For a competition, Turkey needs to make a jump to the league of these 25 countries.

Among the 8 criteria, 3 of them are mostly observed in most of the countries. Transportation services imports (15 countries), transportation services exports (16 countries), and market indicators (13 countries) are three of the criteria which can be used to change a country's position in clusters for future scenarios.

**3.2.1.Scenario 1. increase transportation services imports (mill.US$)**

A scenario study with transportation services imports (mill.US$) is examined to change a Turkey's position in clusters for future scenarios.

**Table 4**. A scenario study with transportation services imports (mill.US$)

| Transportation services imports | Current situation (mil.ABD$) | Hypothetical (1000 increase ) (mil.ABD$) | Hypothetical (2000 increase ) (mil.ABD$) | Hypothetical (3000 increase ) (mil.ABD$) |
|---|---|---|---|---|
| Maritime | 5293 | 6293 | 7793 | 8293 |
| Air | 3078 | 4078 | 5078 | 6078 |
| Other | 442 | 1442 | 2442 | 3442 |
| CLUSTER | 5 | (no change) | (no change) | **4** (shift from 5) |

Step 1: The transportation services imports of Turkey are hypothetically increased by 1000 (mill.US$) for each iteration and a possible breakdown is searched to shift Turkey to a better (more competitive) cluster.

Step 2: The transportation services imports of Turkey are hypothetically increased by 2000 (mill.US$) for each iteration and a possible breakdown is searched to shift Turkey to a better (more competitive) cluster.

Step 3: It is found that if transportation services imports (mill.US$) can be increased by 3000 (mill.US$) in each sub-sector (sea, air, other), then Turkey moves to the Cluster 2 with Austria, Belgium, Canada, Italy, Netherlands, Russian Fed, Spain and United Kingdom, which is a more competitive place (Appendix C).

**3.2.2. Scenario 2. increase transportation services exports (mill.US$)**

A scenario study with transportation services exports (mill.US$) is examined to change a Turkey's position in clusters for future scenarios

.

**Table 4.** A scenario study with transportation services exports (mill.US$)

| Transportation services exports | Current situation (mil.ABD$) | Hypothetical (1000 increase ) (mil.ABD$) | Hypothetical (2000 increase ) (mil.ABD$) |
|---|---|---|---|
| Maritime | 1666 | 2666 | 3666 |
| Air | 8763 | 9763 | 10763 |
| Other | 2038 | 3038 | 4038 |
| CLUSTER | 5 | (no change) | **4** (shift from 5) |

Step1: The transportation services exports of Turkey are hypothetically increased by 1000 (mill.US$) for each iteration and a possible breakdown is searched to shift Turkey to a better (more competitive) cluster.

Step 2: In the second step it is found that If transportation services exports (mill.US$) can be increased by 2000 (mill.US$) in each sub-sector (sea, air, other), then Turkey moves to the Cluster 2 with Austria, Belgium, France, Netherlands, Poland, Russian Fed and Spain (Appendix C).

**3.2.3. Scenario 3. Increase market indicators of transportation sector**

A scenario study with market indicators of transportation sector is examined to change a Turkey's position in clusters for future scenarios.

Step 1: Market indicators of transportation sector (International airports (nr), airplanes (nr), maritime fleet (DWT), rail lines (km), road lines (km)) are hypothetically increased by 10%. Unfortunately these changes are not enough to change the related cluster.

Step 2: Market indicators of transportation sector (International airports (nr), airplanes (nr), maritime fleet

(DWT), rail lines (km), road lines (km)) are hypothetically increased by 20%. If these numbers increase, then Turkey moves to the Cluster 2 with Canada, France, Germany, Italy, Japan, Mexico, Russian Fed, Spain and Indonesia (Appendix C).

**Table 5**. A scenario study with market indicators of transportation sector

| Market indicators of transportation sector | Current situation | Hypothetical (10% increase in each item) | Hypothetical (20% increase in each item) |
|---|---|---|---|
| Int_airports (nr) | 13 | 14 | 16 |
| Airplanes (nr) | 526 | 579 | 631 |
| Maritime_fleet (DWT) | 10123 | 11135 | 12148 |
| Rail_lines (km) | 9718 | 10690 | 11662 |
| Road_lines (km) | 37027 | 40729 | 444331 |
| CLUSTER | 4 | 4 (no change) | **3** (shift from 4) |

## 4. RESULTS AND DISCUSSION

This study intends to show the position of a country among other World Trade Organization members in the GATS negotiations process in the transport sector. The results show that the current position of Turkey in global services trade market is ordinary and far from being competitive, despite its growth in the transport services trade. Turkey, as a case study, needs to make some improvements in selected criteria to get a better position, thus cluster, in the giants' world. The scenario studies show that it is possible to shift to better clusters if some structural changes are to be made.

Transportation services include aviation, ocean shipping, inland waterways, railroads, trucking, pipelines, and intermodal services as well as ancillary and support services in ports, airports, railyards, and truck terminals. High transport costs, together with shipping costs are a barrier to international trade. GATS regulations can help reduce barriers to trade if managed well. Countries can define their level of liberalization and protect their local market conditions accordingly. On the other hand, an increase in export and import of transportation services, in addition to increasing capacity of transport infrastructure, would provide an attractive environment also for merchandise trade. Transportation is the indispensable service for international trade in goods moving all manufactured, mining, and agriculture products to market as well as transporting business and leisure travelers around the World and level of transport costs determine the potential access to foreign markets. In Turkey there are some restrictions for a more liberalised supply of transport services. Cabotage restrictions in maritime transport and more strict regulations in railway transport aim to protect local conditions. These restrictions are at the same time barriers to international trade of transport services. So, in order to increase Turkey's position in World's transportation services trade, regulations to allow foreign investors should be prepared. Competition with foreign firms in market should be allowed. Some targeted infrastructure investments should be realized. Regional cooperation on transportation and trade facilitation initiatives together with some neighbouring countries should be supplied.

Further studies could focus on developing new scenarios to change the cluster profiles. Each of the criteria can be examined to see the possibility to change the position of Turkey in global competitive market.

This study has been performed for transport specific services. The study can be extended to each of the service sectors.

The study can also be performed for any other country which has part in the database.

**Appendix A. General indicators of Turkey's transportation services trade**

| | Value 2013 | % Change 2005-13 | 2013 | Share in world |
|---|---|---|---|---|
| **Investment in economy (mill. US$)** | | | | |
| Gross fixed capital formation | ... | ... | ... | |
| Inward FDI | | | | |
| Stocks (2011) | 1253 | ... | 1 | |
| Flows (2011) | 214 | - | - | |
| | | | | |
| **Market indicators** | | | | |
| International airports (no., 2005) | 13 | ... | ... | 1.1% |
| Airplanes fleet (no., 2005) | 526 | ... | ... | 1.9% |
| Maritime merchant fleet ('000 DWT) | 10123 | 5 | 5 | 0.6% |
| Rail lines, tot. network (km) | 9718 | 1 | 1 | 0.9% |
| Road lines, tot. network (km, 2011) | 370276 | 1 | 1 | |
| | | | | |
| **Production and Employment** | | | | |
| Value added (mill. US$, 2011) a | 105157 | 8 | 9 | |
| % of total value added (2011) a | 15.3 | 0 | 4 | |
| Employment (% of tot. employment, 2011) | 4.7 | ... | -4 | |
| Container port traffic ('000 TEUs, 2012) | 6230 | 10 | 4 | 1.0% |
| Passengers (mill. P-Km) | | | | |
| By air | 116867 | ... | 21 | 2.0% |
| By rail | 3775 | -4 | -18 | 0.1% |
| By road (2011) | 242265 | 5 | 7 | |
| Freight (mill. ton-km) | | | | |
| By air | 2349 | 25 | 21 | 1.3% |
| By rail | 10244 | 2 | -4 | 0.1% |
| By road (2011) | 203072 | 3 | 7 | |
| | | | | |
| **Trade - Balance of Payments (mill. US$)** | | | | |
| Transportation services imports | 9656 | 8 | 10 | 0.8% |
| By sea (2012) | 5293 | 8 | 6 | |
| By air (2012) | 3078 | 8 | 4 | |
| By other transport (rail, road, ...) (2012) | 442 | 6 | -21 | |
| | | | | |
| Transportation services exports | 13066 | 13 | 5 | 1.4% |
| By sea (2012) | 1666 | 8 | 17 | |
| By air (2012) | 8763 | 15 | 16 | |
| By other transport (rail, road, ...) (2012) | 2038 | 12 | 10 | |
| | | | | |
| **Other trade-related indicators** | | | | |
| International freight | | | | |
| By sea (mill. tons) | ... | ... | ... | |
| By air (mill.ton-km) | 2325 | 25 | 22 | 1.5% |
| By road (mill.ton-km) | ... | ... | ... | |
| Intl. passengers - By air (mill. P-Km) | 93450 | ... | 22 | 2.6% |
| | | | | |
| **Investment abroad (mill. US$)** | | | | |
| Outward FDI | | | | |
| Stocks (2011) | 357 | ... | 22 | |
| Flows (2011) | 587 | - | - | |

http://stat.wto.org/ServiceProfile/WSDBServicePFView.aspx?Language=E&Country=TR

**Appendix B. Country clusters**

| Variable | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 |
|---|---|---|---|---|---|
| Countries sorted by market indicators of transportation sector (number of international airports, airplanes fleet (no), maritime merchant fleet (‘000 DWT) rail lines (km), road lines (km)) | USA | China, Greece, India, United Kingdom | Canada, France, Germany, Italy, Japan, Mexico, Russian Fed, Spain | Argentina, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Bolivia, Brazil, Bulgaria, Cambodia, Cameroon, Chile, Colombia, Congo, Croatia, Denmark, Egypt, Estonia, Finland, Georgia, Indonesia, Ireland, Israel, Jordan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Madagascar, Malaysia, Morocco, Mozambique, Netherlands, Norway, Pakistan, Peru, Poland, Portugal, Romania, Saudi Arabia, Slovak Rep, Slovenia, Sri Lanka, Sweden, Switzerland, Thailand, Tunisia, **Turkey**, Ukraine, Viet Nam | |
| Countries sorted by investment in economy (inward FDI stocks, inward FDI flows) | Australia, Belarus, China, Colombia, Netherlands, Singapore, Switzerland, United Kingdom, USA | Argentina, Austria, Bangladesh, Belgium, Bolivia, Bosnia, Botswana, Brazil, Bulgaria, Cabo Verde, Cambodia, Canada, Chile, Congo Dem., Croatia, Cyprus, Denmark, Dominican R, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, FYR Macedon, Georgia, Germany, Greece, Guatemala, Honduras, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Kyrgyz Rep, Latvia, Lithuania, Luxembourg, Macao Chin, Madagascar, Malawi, Malaysia, Malta, Mauritius, Mexico, Morocco, Mozambique, Namibia, New Zealand, Nicaragua, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russian Fed, Saudi Arabia, Slovak Rep, | | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Slovenia, South Africa, Spain, Sweden, Tanzania, Thailand, **Turkey**, Uganda, Ukraine, United Arab, Uruguay, Viet Nam, Zambia | | | |
| Countries sorted by production and employment (value added (mill. US$), % of total value added, employment (% of tot. employment, container port traffic ('000 TEUs)) | China, Japan, USA | Bahamas, Bangladesh, Barbados, Belize, Chile, Colombia, Cuba, Egypt, Estonia, Jamaica, Latvia, Lithuania, Madagascar, Maldives, Mauritius, Norway, Pakistan, Panama, Peru, Philippines, Russian Fed, Singapore, South Africa, Sri Lanka, Tanzania, **Turkey**, Ukraine, United Arab Emirates | Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chinese Taipei, Costa Rica, Croatia, Cyprus, Denmark, Dominican Republic, Ecuador, El Salvador, Finland, France, Georgia, Germany, Greece, Guatemala, Honduras, Iceland, Indonesia, Ireland, Israel, Italy, Korea Rep, Kuwait, Malaysia, Malta, Mexico, Morocco, Netherlands, New Zealand, Nicaragua, Nigeria, Paraguay, Poland, Portugal, Qatar, Romania, Saudi Arabia, Senegal, Slovenia, Spain, Sweden, Switzerland, Thailand, United Kingdom, Uruguay, Venezuela, Yemen | | |
| Countries sorted by passengers (by air, by rail, by road) | USA | China | Argentina, Australia, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Canada, Croatia, Cuba, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Kyrgyz Rep, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, Norway, Pakistan, Poland, Portugal, Romania, Russian Federation, Serbia, Spain, Sweden, Switzerland, **Turkey**, Ukraine, United Kingdom, Viet Nam | | |
| Countries sorted by freight (by air, by rail, by road) | USA | China | Australia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, Colombia, Croatia, Finland, France, Germany, Greece, India, Ireland, Italy, Japan, Kazakhstan, Kyrgyz Rep, Luxembourg, Mexico, Morocco, Norway, Pakistan, Poland, Portugal, Romania, Russian Fed, | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | Serbia, Spain, Switzerland, **Turkey**, Ukraine, United Kingdom, Viet Nam | | |
| Countries sorted by transportation services imports (by sea, by air, by other transport) | France, Germany, USA | Denmark, India, Japan | China | Austria, Belgium, Canada, Italy, Netherlands, Russian Fed, Spain, United Kingdom | Afghanistan, Argentina, Azerbaijan, Bangladesh, Barbados, Belarus, Benin, Bolivia, Bosnia, Brazil, Bulgaria, Burkina Fas, Burundi, Cambodia, Cameroon, Chile, Chinese Tai, Colombia, Costa Rica, Croatia, Cyprus, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, FYR Macedon, Georgia, Greece, Guatemala, Honduras, Hungary, Iceland, Ireland, Israel, Kazakhstan, Kenya, Latvia, Lebanese Re, Libya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Montenegro, Morocco, Mozambique, Namibia, Nicaragua, Niger, Norway, Pakistan, Paraguay, Poland, Portugal, Romania, Rwanda, Senegal, Serbia, Slovak Rep, Slovenia, Swaziland, Sweden, Tanzania, Togo, Tunisia, **Turkey**, Ukraine, Venezuela |
| Countries sorted by transportation services exports (by sea, by air, by other transport) | USA | Greece, India, Norway | China, Denmark, Germany, Japan, United Kingdom | Austria, Belgium, France, Netherlands, Poland, Russian Fed, Spain | Argentina, Azerbaijan, Bangladesh, Barbados, Belarus, Benin, Bermuda, Bosnia, Brazil, Bulgaria, Burkina Fas, Cambodia, Cameroon, Canada, Chile, Chinese Tai, Colombia, Costa Rica, Croatia, Cyprus, Djibouti, Dominican R, Egypt, El Salvador, Estonia, Ethiopia, Finland, FYR Macedon, Georgia, |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Guatemala, Honduras, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kenya, Latvia, Lebanese Re, Libya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Montenegro, Morocco, Mozambique, Nicaragua, Niger, Portugal, Romania, Rwanda, Senegal, Serbia, Slovak Rep, Slovenia, Sudan, Swaziland, Sweden, Togo, Tunisia, **Turkey**, Ukraine |
| Countries sorted by investment abroad (flows, stocks) | Denmark, France, Germany, Japan, Malaysia, Norway, Switzerland, United Kingdom | China, Netherlands, USA | Australia, Austria, Belgium, Brazil, Bulgaria, Chile, Croatia, Cyprus, Estonia, Finland, FYR Macedon, Greece, Hungary, Iceland, Israel, Italy, Kazakhstan, Korea, Latvia, Lithuania, Macao Chin, Malta, Morocco, Poland, Qatar, Romania, Slovak Rep, Slovenia, Spain, Sweden, Thailand, **Turkey** | - | - |

## Appendix C. Cluster after scenario studies

Scenario 1

| Variable | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 |
|---|---|---|---|---|---|
| Countries sorted by transportation services exports (by sea, by air, by other transport) | USA | Greece, India, Norway | China, Denmark, Germany, Japan, United Kingdom | Austria, Belgium, France, Netherlands, Poland, Russian Fed, Spain, **Turkey** | Argentina, Azerbaijan, Bangladesh, Barbados, Belarus, Benin, Bermuda, Bosnia, Brazil, Bulgaria, Burkina Fas, Cambodia, Cameroon, Canada, Chile, Chinese Tai, Colombia, Costa Rica, Croatia, Cyprus, Djibouti, Dominican R, Egypt, El Salvador, Estonia, Ethiopia, Finland, FYR Macedon, Georgia, Guatemala, Honduras, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kenya, Latvia, Lebanese Re, Libya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Montenegro, Morocco, Mozambique, Nicaragua, Niger, Portugal, Romania, Rwanda, Senegal, Serbia, Slovak Rep, Slovenia, Sudan, Swaziland, Sweden, Togo, Tunisia, Ukraine |

Scenario 2

| Variable | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | Cluster 5 |
|---|---|---|---|---|---|
| Countries sorted by transportation services imports (by sea, by air, by other | France, Germany, USA | Denmark, India, Japan | China | Austria, Belgium, Canada, Italy, Netherlands, Russian Fed, | Afghanistan, Argentina, Azerbaijan, Bangladesh, Barbados, Belarus, Benin, Bolivia, Bosnia, Brazil, Bulgaria, Burkina Fas, Burundi, Cambodia, Cameroon, Chile, Chinese Tai, Colombia, Costa Rica, Croatia, Cyprus, |

| | | | | | |
|---|---|---|---|---|---|
| transport) | | | | Spain, United Kingdom**, Turkey** | Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, FYR Macedon, Georgia, Greece, Guatemala, Honduras, Hungary, Iceland, Ireland, Israel, Kazakhstan, Kenya, Latvia, Lebanese Re, Libya, Lithuania, Luxembourg, Malaysia, Mali, Malta, Montenegro, Morocco, Mozambique, Namibia, Nicaragua, Niger, Norway, Pakistan, Paraguay, Poland, Portugal, Romania, Rwanda, Senegal, Serbia, Slovak Rep, Slovenia, Swaziland, Sweden, Tanzania, Togo, Tunisia, Ukraine, Venezuela |

Scenario 3

| Variable | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 |
|---|---|---|---|---|
| Countries sorted by market indicators of transportation sector (number of international airports, airplanes fleet (no), maritime merchant fleet (‘000 DWT) rail lines (km), road lines (km)) | USA | China, Greece, India, United Kingdom | Canada, France, Germany, Italy, Japan, Mexico, Russian Fed, Spain, Indonesia, **Turkey** | Argentina, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Bolivia, Brazil, Bulgaria, Cambodia, Cameroon, Chile, Colombia, Congo, Croatia, Denmark, Egypt, Estonia, Finland, Georgia, Ireland, Israel, Jordan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Madagascar, Malaysia, Morocco, Mozambique, Netherlands, Norway, Pakistan, Peru, Poland, Portugal, Romania, Saudi Arabia, Slovak Rep, Slovenia, Sri Lanka, Sweden, Switzerland, Thailand, Tunisia, Ukraine, Viet Nam |

## CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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