# Scientific International Collaboration of Turkey, Greece, Poland, and Portugal: A Bibliometric Analysis

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## ABSTRACT

**In this work, a bibliometric research method was used where co-authorships are regarded as an indicator of international research collaboration of Turkish, Greek, Polish, and Portuguese scientists; for comparison purposes scientists from the mainstream countries such as Belgium, Denmark, Switzerland, Norway, Sweden, and the Netherlands. The seventeen years (1990-2006) of scientific research collaboration of the aforementioned countries with the G7 nations (France, Germany, Italy, Japan, UK, USA, and Canada) was examined by using ISI Web of Science Database. Findings reveal that, Turkey clearly is experiencing a remarkable proportional co-authorship growth rate with the G7 countries in comparison to Greece, Poland, Portugal, Denmark, Norway, Netherlands, Belgium, Switzerland, and Sweden, for the period of 1990-2006.**

**Keywords**
Bibliometric, scientific international collaboration, Turkey, Greece, Poland, Portuguese.

## INTRODUCTION

In recent decades the boundaries of scholarly communication have been progressively expanded as scholars have experienced the proliferation of scientific collaboration. The purpose of this study is to compare the degree of international scientific co-authorship of Turkey, Greece, Poland, and Portuguese with that of other selected countries such as Belgium, Denmark, Switzerland, Norway, Sweden, and the Netherlands with G7 countries.

## LITERATURE REVIEW

Using bibliometric analysis to study scientific productivity and collaboration of nations has received considerable attention in the research literature. In the same vein, Glanzel (2001) stated that, "Bibliometric methods, however, afford a deep insight into national characteristics in international co-authorship relations." Admittedly, bibliometrics is an excellent conduit phenomenon to study quantitative patterns in scientific communication (De Bellis, 2009). Glanzel (2001) studied the international scientific co-authorship patterns of the 50 most scientifically active countries for the years 1995-96 by using the SCI database. Glanzel concluded that international scientific collaboration is significantly growing among those 50 nations. In one of the most recent works to date, Glanzel and Schlemmer (2007) studied the scientific research productivity of eight East European countries and particularly the visible effect of the recent European Union integration on these countries' scientific research productivity. Chen and Liu (2006) studied the international collaboration networks of thirty countries, in the fields of mechanics. As in other studies, Chen and Liu chose the Science Citation Index Expanded database of ISI to collect data. According to one result, not surprisingly, USA is the most collaborative country in terms of international mechanics collaboration within these thirty countries. It is followed by the UK, France, Germany, China, and Japan. In another study, Braun and Glanzel (1996) also identified the US as the main research collaboration partner of most of the world's nations.

## METHODOLOGY

Bibliometrics is one of the most frequently used quantitative data collection methods in order to investigate patterns of publications within a given field. In this study a bibliometric research method was used in which co-authorships of at least one researcher from a Turkish, Greek, Polish, Portuguese, and other selected second tier institutions who collaborate with another G7 nation affiliation holder is regarded as an indicator of international research collaboration.

The use of Thomson's ISI databases as a bibliometric research tool is well documented in the literature. It provides access to a huge data pool which was systematically collected from selected publications. Seventeen years of co-authorship data per collaborative case (Turkey, Greece, Poland, Portugal, Denmark, Norway, Netherlands, Belgium, Switzerland, and Sweden versus G7) was collected from the database.

## FINDINGS AND DISCUSSIONS

The findings from the co-authorship analysis organized by the each collaborator G7 country in the following sub-sections namely; Canada, France, Japan, Germany, Italy,



*ASIST 2010,* October 22–27, 2010, Pittsburgh, PA, USA.

UK, and USA. Citations from all document types (journal articles, conference papers, book chapters, letters to editors, etc.) were included for this count. The following graphs show proportional change from 1990 to 2006.

### Scientific Collaboration with Canada

There is a significant proportional increase in Turkish-Canadian co-authorships as it is seen from the figure 1 for the years 1995 and on. Particularly, in 2005 this co-authorship increased rapidly to 2133%. Similarly Portugal-Canada co-authorship increased to 1488% in 2006, while there is a steady proportional growth rate for the other countries.

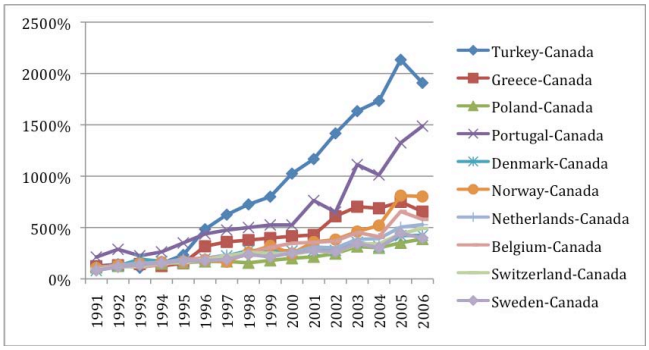


Figure 1. Scientific Co-authorship with Canada of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

### Scientific Collaboration with France

Turkey-France co-authorship increased significantly by a proportion of 2371%, Portugal-France co-authorship increased by 940%, and Norway-France co-authorship by 830%in 2006, as it seen in the figure 2.

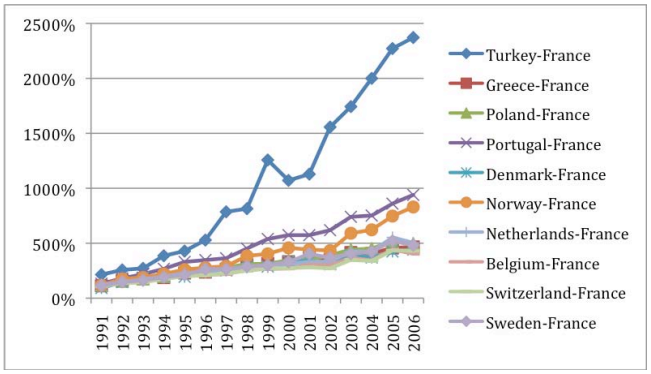


Figure 2. Scientific Co-authorship with France of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

### Scientific Collaboration with Germany

Among the other countries, Turkey-Germany co-authorship is the leader by significant proportional increase for the year 2006 to compare previous years (1003%) while Portugal-German comes as the second high proportional increase as 955%. There is a steady co-authorship trend observed for the rest of the participating countries in the data.

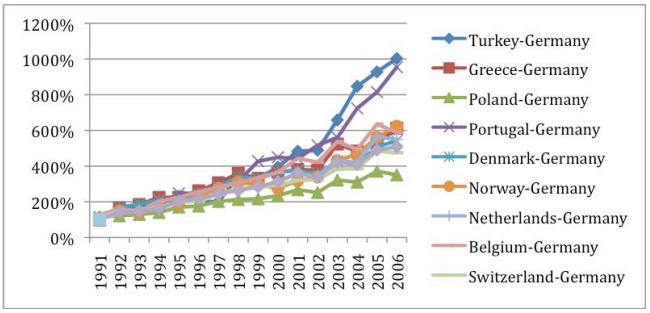


Figure 3. Scientific Co-authorship with Germany of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

### Scientific Collaboration with Italy

As it seen from the figure 4, a strong collaboration was found between Italy and Switzerland. The second main collaborator of Italy is Netherlands from the selected countries. However, when we look at the co-authorship growth rate per year, figure 4, despite the fact that only 8 co-authorships tracked from the indexes for the year 1990, Turkey has the rapid acceleration to 210 co-authorships (2625%) followed by Portugal 1179% for the year 2006.

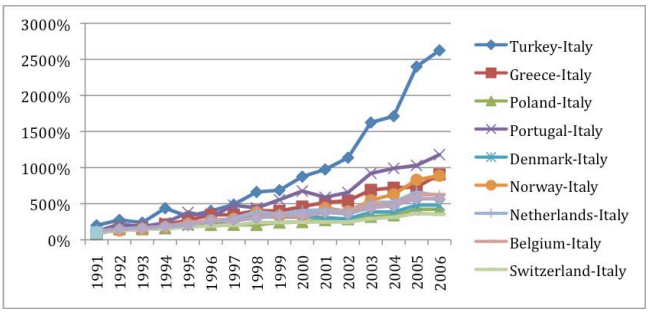


Figure 4. Scientific Co-authorship with Italy of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

### Scientific Collaboration with Japan

Turkey and Greece have a rapid increase with the rate of 3563% and 2800% for the year 2005. While Turkey 8, Portugal 9, and Greece had only 7 scientific co-authorships with Japanese scientists in 1990, this numbers went up to (Turkey-Japan) 203, (Portugal-Japan) 93, (Greece-Japan) 171 in the year 2006.

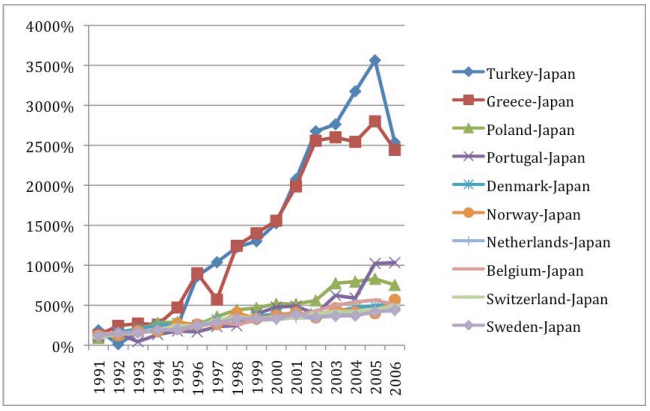

Figure 5. Scientific Co-authorship with Japan of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

**Scientific Collaboration with United Kingdom**

There is no doubt that main collaborators to the UK are the Netherlands, Switzerland, and Sweden followed by Belgium, Denmark, and Norway, as showed by the figure 6 co-authorship data for the period of 1990-2006. Portugal, Poland, Greece, and Turkey have a smaller co-authorship rate with UK compared to the other mainstream countries. However, Turkey's speedy acceleration among other 10 countries also worthwhile to mention while it has the lowest co-authorship rate with the United Kingdom with 357 collaboration for the year 2006.

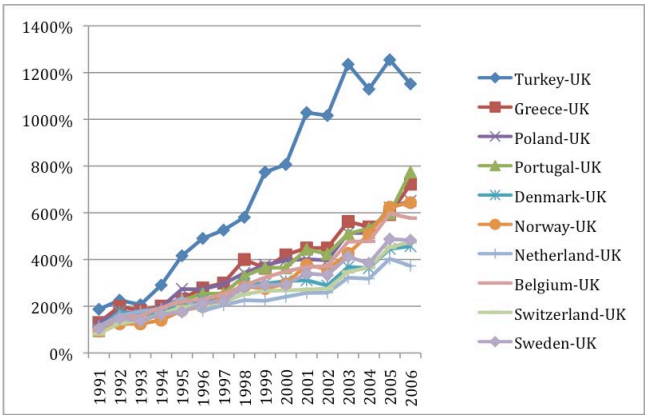


Figure 6. Scientific Co-authorship with UK of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

**Scientific Collaboration with United States**

There is no doubt that US is the main collaboration partner in science and technology for the most of the countries in the world. Netherlands holds the leadership in terms of US collaboration partnership, with the 4,542 co-authorship for the year 2005. Moreover, Switzerland shares the second place with the 3,895 co-authorship followed by Sweden (3,047), Turkey (2,642), and Greece (2,250) for the year 2005. However, in terms of proportional increase, a remarkable co-authorship growth rate belongs to Turkey, (3061% for the year 2005) followed by Greece (996%) and Portugal (759%) as it seen in the figure 7.

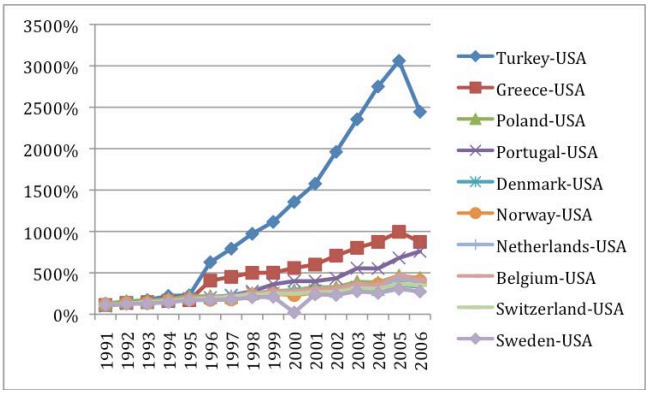


Figure 7. Scientific Co-authorship with US of Tier 2 and Tier 1 countries Graph (% change since 1990-2006)

## CONCLUSION

According to findings, Turkey clearly is experiencing a remarkable co-authorship growth rate with the G7 countries in comparison to that of those 2nd and 1st tier countries, for the period 1990-2006. There was a steady increase in Greek, Polish, and Portuguese trends while the Turkish trend increased by almost four times. Bibliometric data harvesting was a beginning of a full-scale analysis on patterns and trends of international scientific collaboration of Turkish, Greek, Polish, and Portuguese scientist. However, the results showed that there is a significant need for a further study.

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