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EXPORT EFFICIENCY AND COMPETITIVENESS IN HIGH TECH PRODUCTS: AN EXAMINATION ON DEVELOPED MARKETS

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Abstract

High-tech products, which have a dominant share in global markets, have significant value both for the countries that sell them and for the countries that buy them. The competitive advantage of the exporter countries in these products arouses a research curiosity. Moreover, since these countries are mostly in the developed markets group, the extent to which high-tech exports are realized efficiently draws attention as a second research question. In addition to all these, the relationship between export efficiency and global competitiveness in related products constitutes the third and final research question. In this study, the aforementioned three research questions are answered using three different methods and answers are presented for countries that want to export high-tech products. It has been observed that exporting effectively makes a significant difference on the global competitiveness of high-tech products. Countries should channel their economic power to high-tech export, and that the country's wealth should be used efficiently in the financing of foreign trade.

Keywords: *Export efficiency, Export management, Competitiveness, International trade.*

İLERİ TEKNOLOJİ ÜRÜNLERDE İHRACAT ETKİNLİĞİ VE REKABET GÜCÜ: GELİŞMİŞ PİYASALAR ÜZERİNE BİR İNCELEME

Öz

Küresel pazarlarda baskın bir paya sahip olan yüksek teknoloji ürünleri hem bunları satan ülkeler hem de satın alan ülkeler için önemli bir değere sahiptir. İhracatçı ülkelerin bu ürünlerdeki rekabet üstünlüğü araştırma merakı uyandırmaktadır. Ayrıca bu ülkelerin çoğunlukla gelişmiş pazarlar grubunda yer alması nedeniyle yüksek teknoloji ihracatının ne ölçüde verimli gerçekleştirildiği de ikinci bir araştırma sorusu olarak dikkat çekmektedir. Tüm bunlara ek olarak, ilgili ürünlerde ihracat verimliliği ve küresel rekabet gücü arasındaki ilişki üçüncü ve son araştırma sorusunu oluşturmaktadır. Bu çalışmada yukarıda bahsedilen üç araştırma sorusu üç farklı yöntem kullanılarak cevaplandırılmış ve yüksek teknolojili ürün ihraç etmek isteyen ülkeler için cevaplar sunulmuştur. Etkin ihracat yapmanın ileri teknoloji ürünlerin küresel rekabetçiliğinde anlamlı bir farklılık yarattığı gözlemlenmiştir. Ülkelerin ekonomik güçlerini ileri teknoloji ürünlerin ihracatına yöneltmeleri ve böylece ülke zenginliklerinin uluslararası ticaretin finansmanında da etkin olarak kullanılması önerilmektedir.

Anahtar kelimeler: *İhracat etkinliği, İhracat yönetimi, Rekabetçilik, Uluslararası ticaret.*

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INTRODUCTION

Technology is one of the issues that have significant impacts on the developing world economy. Especially in the context of globalization, the contributions of technological advances are nowadays well understood by everyone. As a result of these technological advances, some countries provide various advantages, while some countries buy the technological progress they need from other countries. As a result of this flow of international trade, it is possible to say that technological progress has a significant impact on the direction of global trade. In fact, it is worth mentioning that there are some theories and hypotheses put forward in this regard. Although the relevant theoretical approaches will be discussed in the theoretical framework section of the study, it would be useful to elaborate a little more on the reflection of technology on products and trade.

High-tech products have a significant share in global trade. With their level of technological advancement, these products can often be described as light in weight but heavy in cost. Of course, this is not always a valid interpretation, as some products can also be heavy in weight. Regardless of their weight, the production of high-tech products has the potential to provide a great advantage to producing countries. Especially considering that 29.44% of the world's total exports are made up of a significant share of high-tech products (ITC, 2023), the production and sale of these products becomes more valuable. As mentioned above, it is not economically feasible for every country to produce and sell these products. Therefore, it would be right to focus on countries that can sell these products. For this purpose, it is possible to say that developed countries can be the leaders in the sale of these products by taking into account the concept of economic growth, which is accepted as a return of technology with an economic perspective. Again, looking at ITC (2023) data, it is seen that more than 50% of the total exports of these products are made by these countries. These countries are included in the MSCI Developed Market Index (MSCI, 2023).

But what do the high-tech products exported by these so-called developed markets mean for them? In other words, what is their global competitiveness in the exports of these products against other developed market economies? Or at what level of efficiency is the export of these products realized? In other words, when compared to competitors, are the resources actually used efficiently in the exportation of those products? And finally, is there an interaction between the efficiency of exports and the global competitiveness of those products? All these questions concern not only countries that produce and sell high-tech products but also emerging market economies, i.e. countries that plan to export these products in the future. This study aims to answer these questions and provide an enlightening guidance to both developed and emerging market economies on the export of high-tech products. In this context, firstly, the theoretical foundations of the subject are discussed.

1. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Considering the contexts of developed market economies, which are the sample of the research, and high-tech product exports, which are the subject of the research, it is possible to state that more than one theory can form the basis of the research. First of all, to talk about developed economies, it is known that these economies need to have a certain level of GDP. Having this level of economic growth is theoretically handled with certain approaches. In this part of the study, the theories explaining development based on economic growth will be discussed first. Then, international trade theories explaining the trade of high technology products are explained.

Following the path of some researchers such as Schumpeter (1934) and Arrow (1962), Romer (1986) proposed an economic growth theory called endogenous growth model. This theory was supported by Lucas (1988). The basis of the theory is that the sale of values created by technological progress will increase economic integration and the country's economy will grow. Of course, although economic growth is not shown as a variable in this study, since the sample of the research is countries that have reached a certain level economically, this theory actually shows an explanatory feature. In addition, as mentioned above, it is the countries in the research sample that sell these products to the world at a rate exceeding 50% of high-tech product exports. Therefore, it would not be wrong to state that there may be a causality between them and trade in high-tech products. As a matter of fact, some studies also confirm the relationship between high-tech exports and economic growth (Şeker and Özcan, 2019).

After mentioning the theoretical approach to the research sample, it is useful to raise the first research question and explain the theory underlying this question. In fact, according to the theory of comparative advantage put forward by Ricardo (1817), countries should specialize in the products that they produce with the lowest cost compared to other countries and export those products. Balassa (1965) proposed the Revealed Comparative Advantage Index (RCAI) as a form of measurement of the comparative advantage, which was further developed later. Detailed information on the index is provided in the methodology section of this study. Considering the theory of comparative advantage and advanced market economies, the following research question is the first to be addressed:

Research Question 1: Which advanced market economies have a global competitive advantage in trade in high-tech products?

On the other hand, since it is not easy to produce and export high-tech products, it is believed that only some countries can be strong in this respect. Empirical studies have examined the factors that affect the exports of high-tech products. Some studies have considered the number of patents as innovation and examined its effect on high-tech exports (Akyol and Demez, 2020), while some studies have examined the effect of R&D expenditures on high-tech exports (Kılıç et al., 2014; Çetin, 2016; Göçer, 2013). These studies in the literature shed light for different approaches. So much so that in this study, the efficiency of high-tech product exports is brought to the agenda and R&D expenditures are considered as an input variable in efficiency measurement. Of course, different inputs are also included in this efficiency calculation. One of these inputs is labor force and the other is GDP. While GDP is chosen for the reasons mentioned in the previous research question, labor force is chosen due to the skilled labor theory proposed by Keesing (1965) and Kenen (1965). The relevant theory argues that the qualified workforce of the countries also shapes international trade. Considering the past studies and skilled labor theory, the following research question is the first to be addressed:

Research Question 2: Which advanced market economies have a better high-tech export efficiency?

The answers to the two identified research questions will raise two new variables for research. One of these variables is export efficiency in high-tech products and the other is global competitiveness in high-tech products. A theoretical basis is also needed to examine the relationship between the related variables. There are two theories that are of great value in understanding the relationship between these variables. The first is the technological deficit hypothesis (Posner, 1961) and the second is the product cycle theory (Vernon, 1966). According to the technological deficit hypothesis, since not every country will have the same technology, the countries producing the technology will sell these products first and the others will demand these products. On the other hand, in the theory of product cycle, it is argued that a lifetime is set for new products, and when other countries produce new products, the products reach the maturation point in this lifetime, and then the period of products ends with standardization. These two theories show that the sale of high-tech products will bring a global competitiveness when they are produced and sold. Afterwards, it is possible to say that other countries will imitate these products and realize their product cycle, and that the competitiveness of the countries will vary. Considering the variables provided by research questions and theories of Posner (1961) and Vernon (1966), the following hypothesis comes to the fore:

H_1: According to the export efficiency level of high-tech products, there is a significant difference in the global competitiveness of high-tech products.

2. LITERATURE REVIEW

When looking at the research conducted with RCAI for competition measurement, it is possible to come across studies focusing on Türkiye quite frequently. Çakmak (2005) examined the textile and ready-to-wear sector, Serin and Civan (2008) studied some agricultural products, Şahinli (2011) analyzed the cotton sector, Yalçınkaya and others (2014) compared Türkiye and China, Erkan and others (2015) measured the competitiveness of vegetable products, Kösekahyaoglu and Ozdemir (2018) investigated the most sold agricultural products from Türkiye, Bakan and others (2019) explored the transportation sector, Akyüz (2019) assessed the competitiveness of paper products, and Aktop (2021) measured the competitiveness of the electrical machinery and equipment

sector using RCAI. In addition to these, it is, of course, possible to come across research conducted on different countries as well. Fertö and Hubbard (2003) measured the competitiveness of agricultural products in Hungary, Shohibul (2013) studied the competitiveness of Asian countries, Ishchukova and Smutka (2013) assessed Russia's competitiveness, Startiene and Remeikiene (2014) analyzed Lithuania's competitiveness, and Abbas and Waheed (2017) measured Pakistan's competitiveness using RCAI and conducted their studies accordingly. In addition to all of these, it is also possible to mention studies that evaluate multiple countries in the context of competitiveness using the RCAI index. Bahar et al. (2014) included different countries in the same study, Freund and Pierola (2015) examined 32 countries in a single study, Kuşat (2016) assessed the EU candidate countries in a single study, Kalaycı (2017) studied countries with free trade agreements together in a single study, Kuşat and Denli (2021) analyzed BRICS countries and one other country in a single study, and Kılıçarslan and Dumrul (2022) investigated BRICS countries in a single study using RCAI to measure competitiveness.

It is possible to come across numerous studies in the literature that relate export to economic issues. In this context, the crucial subject of the research is to understand the factors affecting exports or to identify the determinants of high-tech exports. This is essential because certain variables have been used as inputs for export efficiency in the applied DEA model. In this regard, continuing the literature review by discussing the variables associated with exports would be beneficial. Saputra (2014) examined the determinants of export performance for some sectors using the DEA method. In the relevant study, it was found that variables such as the number of employees, capital, and firm size had an impact on export performance. Although this study was conducted at a micro level, it can shed light on macro results. Sandu and Ciocanel (2014) investigated the impact of innovation and R&D expenses on high-tech product exports. Similarly, Seyoum (2005) and Tebaldi (2011) have also conducted studies on the relationship between R&D expenditures and high-tech product exports. Oura and others (2016) discussed the role of innovation in export performance, while Nam and An (2017) examined the influence of patents and R&D expenditures on internationalization. Ortega and others (2014) explored the relationship between exports and innovation, and Meo and Usmani (2014) analyzed the effects of R&D expenses, patent numbers, and academic publications on high-tech product exports. All these studies present scientific evidence suggesting that R&D and innovation concepts have an impact on exports. However, it is important to note that explaining exports and high-tech product exports solely based on these factors is not sufficient.

In many studies conducted to explain exports, the relationship between the level of economic development and exports is frequently addressed (Shakeel et al., 2014; Dedeoğlu and Kaya, 2013; Shakeel, 2021). As the subject of this study does not directly focus on the relationship between these two variables, there was no need for further exemplification in the literature. However, the existence of these studies can be considered as scientific evidence explaining the interaction between these two variables. In this context, investigating countries with developed markets and, as a result, studying high-tech exports presents a natural research opportunity, and the utilization of economic conditions in export efficiency is also justified. Finally, it would be appropriate to evaluate the researches on country exports using the DEA method. It is possible to come across studies that evaluate the economic efficiency of countries with the DEA method (Iqbal et al., 2019; Fathi et al., 2021). On the other hand, studies measuring the export efficiency of a country or a sector of a country with the DEA method can be seen in the literature (Kahveci and Taliyev, 2013; Putri et al., 2020). Literature review reveals that there are studies that measure a country's or a sector's global competitiveness using RCAI and studies that measure a country's or a sector's efficiency using DEA. However, it is evident that there are no researches combining these measurements together. Moreover, it is also correct to say that the direct examination of the relationship between export competitiveness and export efficiency has not been carried out. In this context, considering the theoretical framework and the literature, the applied methodologies in the research are deemed appropriate.

3. METHODOLOGY AND FINDINGS

Three different methods were utilized in the research process. In order to measure the global competitiveness of developed market economies in high technology products, which is the first question of the research, the Revealed Comparative Advantage Index (RCAI) was used. Data Envelopment Analysis (DEA) was used to measure the efficiency of high-tech exports of developed market economies, which is the second question of the research. The last question and hypothesis of the study, which is whether the global competitiveness of countries with high

efficiency in exporting high-tech products differs significantly from countries with low efficiency in exporting high-tech products, is analyzed using statistical analyses. Each of these methods has been applied under the sections opened for them. Before the methods, information about the data set was provided under the data section.

3.1. Data

First of all, it would be useful to provide information about the sample countries considered in the study. The countries whose relevant data are used in RCAI and DEA analyses are selected from the MSCI developed markets index (MSCI, 2023). The reason for this is that more than 50% of the world's exports of high-tech products are realized by these countries (ITC, 2023). The countries involved can be seen in the tables showing the results of each application. Table 1 below presents information such as the data used in the research process, the source of the data, and for which variable the data was used.

Table 1. Information About the Dataset

No	Data	Utilized Analysis	Source
1	High-Tech Product Codes	RCAI (Separate and Total) – DEA (Total)	oecd.org
2	Developed Markets List	Research Sample	msci.com
3	World Export Statistics	RCAI – DEA (Output)*	trademep.org
4	Gross Domestic Product Statistics	DEA (Input)*	worldbank.org
5	Labor Force Statistics	DEA (Input)*	worldbank.org
6	Research and Development (R&D) Expenditure Statistics	DEA (Input)*	oecd.org -

**Inputs and Outputs are selected based on literature review.*

All of the data detailed in Table 1 above were taken for the year 2022 and calculations were made over one year. Thus, the exports of countries selling high-tech products in a recent period are investigated in the light of the latest data.

3.2. Application of RCA Index

Due to the difficulty of determining the comparative advantage of a country over other countries or groups of countries, or more precisely, the difficulty of measuring the price and non-price variables that determine comparative advantages in terms of a large number of countries and a large number of products, it is necessary to calculate comparative advantages based on post-trade data rather than pre-trade data. The most frequently used method at this point is Balassa's RCA index. Balassa's (1965) RCA approach assumes that the true form of comparative advantage can be observed from post-trade data. To measure a country's comparative advantage in trade in a particular good or industry, Balassa constructed an index that measures the ratio of the share of that good or industry in total world exports to the country's share in total exports. The aim here is to determine whether a country has a comparative advantage rather than to identify the underlying sources of comparative advantage. This index is formulated as follows:

$$RCAij = (\frac{xij}{Xj})/(\frac{xiw}{Xw}) \quad (1)$$

Here, the abbreviations refer to the following terms;

RCA: Revealed comparative advantage index,

i: product or product group,

j: country,

w: the world,

x: country's exports of the relevant product,

X: country's total exports,

xij: country j's exports of product i,

Xj: total exports of country j,

xiw: total world exports of product i,

Xw: total world exports,

As a result of the index calculations made during the research process, the RCA indices of the countries were calculated as in the table below.

Table 2. RCAI Results

Country	88**	30**	37**	84**	85**	Total*	Average*
Canada	2,79	0,53	0,06	0,59	0,17	0,42	0,83
USA	0,72	1,22	1,69	1,05	0,66	0,87	1,07
Austria	0,97	1,75	0,17	1,44	0,73	1,12	1,01
Italy	0,15	2,00	0,21	1,51	0,43	1,01	0,86
Australia	0,43	0,19	0,04	0,12	0,06	0,10	0,17
Belgium	0,20	4,51	2,33	0,51	0,20	0,85	1,55
Netherlands	0,40	1,04	1,70	1,08	0,57	0,81	0,96
Hong Kong	0,30	0,08	0,49	1,36	**4,04**	**2,50**	1,25
Denmark	0,46	4,24	0,11	1,19	0,46	1,19	1,29
Norway	0,19	0,09	0,00	0,15	0,07	0,10	0,10
Japan	0,37	0,30	**10,82**	**1,80**	1,02	1,22	**2,86**
Finland	0,24	0,40	0,06	1,09	0,57	0,73	0,47
Portugal	0,74	0,63	0,11	0,55	0,56	0,57	0,52
New Zealand	0,12	0,21	0,10	0,24	0,11	0,17	0,16
France	8,91	1,76	0,45	1,00	0,53	1,02	2,53
Spain	2,10	1,83	0,31	0,58	0,33	0,64	1,03
Singapore	1,62	0,56	0,60	1,38	2,42	1,79	1,31
Germany	**2,89**	2,14	1,10	1,42	0,72	1,19	1,65
Sweden	0,32	1,85	0,11	1,23	0,58	0,97	0,82
Ireland	1,66	**9,48**	0,60	0,42	0,52	1,61	2,53
Switzerland	0,77	6,73	0,03	0,57	0,24	1,17	1,67
Israel	5,14	1,38	0,01	0,69	1,12	1,08	1,67
UK	4,10	1,51	0,49	1,33	0,36	0,93	1,56

***** *The total term in the table refers to the RCAI value calculated for total exports of high-tech products. The average term refers to the arithmetic average of the RCAI values calculated separately for each product group. ** These numbers represent the HS code, which is the international classification of goods for some product groups. In other words, 5 different product groups were selected as high-tech products.*

The index value greater than 1 indicates that the country has a comparative advantage in the relevant product group. In other words, the share of that product in the country's total exports is larger than its share in world trade. An index value less than one indicates that there is a comparative disadvantage in that product or product group. In the light of the index findings, countries such as Hong Kong, Singapore, Ireland and Japan draw attention with their high competitiveness.

3.3. Data Envel opment Analysis

Data envelopment analysis, which measures the relative efficiency of decision-making units (DMU) by producing multiple similar inputs and outputs, is a linear programming-based method (Sarraf & Nejad, 2020: 3;

Tütek et al., 2012: 223). Data envelopment analysis was developed by Charnes, Cooper and Rhodes in 1978 and is based on Farrell's (1957) work (Aldamak and Zolfaghari, 2017: 162). Although there are many data envelopment models in the literature, Ozdemir (2022) says the most widely used models are CCR (Charness, Cooper and Rhodes, 1978) and BCC (Banker, Charnes and Cooper, 1984).

After selecting the appropriate sample size for DEA, i.e. decision-making units (DMUs) (Ramanathan, 2003), it remains to apply the appropriate input-oriented DEA model. As it is known, 23 countries covering developed market economies were selected as DMUs in this study. The DEA model applied in the study is the CCR-I model. The function of the model is given below.

$$Max\ n_k = \sum_{r=1}^{s} \mu_r \gamma_{rk} \tag{2}$$

$$\sum_{i=1}^{m} w_i x_{ik} = 1 \tag{3}$$

$$\sum_{r=1}^{s} \mu_r \gamma_{rj} - \sum_{i=1}^{m} w_i x_{ij} \leq 0 \qquad (j = 1 \ldots . n) \tag{4}$$

$$\mu_r, w_i \geq \varepsilon > 0 \qquad (r = 1 \ldots . . s) \quad ve\ (i = 1 \ldots . . m) \tag{5}$$

Explanations of the abbreviations in equations (2), (3), (4) and (5) are given below:

μr: the weight value of the rth output

yrk: kth output value of the rth decision-making unit

wi: weight value of i. input

xik: kth input value of the i. decision-making unit

In this direction, GDP, labor force and R&D expenditures are determined as input variables while total exports of the related products are selected as output variables to measure the efficiency of high-tech product exports of countries classified as developed market economies and the model is run. DEA results are presented in the table below.

Table 3. DEA Results

No	DMU	Score	Rank
1	Canada	0,0294	19
2	USA	0,0265	20
3	Austria	0,1236	7
4	Italy	0,0829	11
5	Australia	0,0075	22
6	Belgium	0,2527	4
7	Netherlands	0,1556	6
8	**Hong Kong**	**1**	**1**
9	Denmark	0,1224	8
10	Norway	0,0238	21
11	Japan	0,0511	14
12	Finland	0,0554	12
13	Portugal	0,0436	17

14	New Zealand	0,0071	23
15	France	0,0526	13
16	Spain	0,0457	15
17	Singapore	0,6597	2
18	Germany	0,1142	9
19	Sweden	0,0851	10
20	Ireland	0,3295	3
21	Switzerland	0,234	5
22	Israel	0,0453	16
23	UK	0,0378	18

According to DEA findings, Hong-Kong is the only country that effectively exports high-tech products among developed market economies in 2022. On the other hand, the efficiency scores of other countries other than Singapore are observed to be very low. However, 7 countries have efficiency scores above 0.10. This indicates that developed market economies do not export high-tech products efficiently in 2022, given the relevant input variables.

3.4. Testing of Hypothesis

According to the findings from previous methods, Hong-Kong stands out in both competitiveness and efficiency of high-tech products. But is there really a relationship between these two variables? In order to answer this question, the hypothesis of the research will be tested by utilizing statistical methods. As a result of the normality tests performed on the RCAI and DEA results used in the research, it was determined that the data were not normally distributed. For this reason, nonparametric tests were utilized. First of all, it was examined whether there is a significant relationship between the export efficiency of countries exporting high-tech products and their global competitiveness. First, of course, export efficiencies are divided into two groups. Those with an export efficiency of 0.10 and above were placed in group 2 and those with an export efficiency of <0.10 were placed in group 1. Grouping was also done for RCAI values. Here, those with RCAI values of 1 and above were classified in group 2 and those with RCAI values <1 were classified in group 1. After classification phase, Chi-square test was used to understand the relationship. The table below shows the results of the chi-square test.

Table 4. Chi-Square Test Results

		1. Group (<1 RCAI)	**2. Group (>=1 RCAI)**	X^2	**df.**	**p**
Export Efficiency	**1. Group (<0,10 Export Efficiency)**	10	4	5,316	1	0,036
	2. Group (>= 0,10 Export Efficiency)	2	7			

The values in the table above present the findings of the Fisher's exact chi-squared test, which was applied because the sample (n=23) was between 20 and 30, a four-well design was applied, and each of the cells had a value <5. The application of this method was proposed by Güngör and Bulut (2008). According to the test result, there is a significant relationship between the export efficiency level of high-tech products and the level of global competitiveness ($X^2(1) = 5.316$, $p<0.05$). Of course, in addition to the existence of a significant relationship, it is also useful to look at whether there is a difference in the global competitiveness of export activity groups. In order to test the hypothesis of the study, Mann Whitney U test was utilized.

Table 5. Mann Whitney U Test Results

Groups	N	Mean Rank	Sum of Ranks	U	Z	p
1. Group (<0,10 Export Efficiency)	14	8,79	123,00	18,000	-2,836	0,005
2. Group (>= 0,10 Export Efficiency)	9	17,00	153,00			

According to the table 5 above, there is a significant difference between the global competitiveness of countries with low export efficiency level and countries with high export efficiency level in high-tech products (U=18.00, p<0.01) and the second group, i.e. those with high export efficiency level, are more competitive (z= -2.836). In addition to the research questions answered as a result of the research findings, the H_1 hypothesis of the research was supported.

RESULTS AND DISCUSSION

It is an observable fact that life becomes easier as the role of technology in human life increases. It is also possible to say that technological advances have an important role in making the world a more sustainable place. In this context, it would be correct to assume that technological progress will occur as long as humanity exists, and based on this assumption, it would be correct to suggest that only countries with sufficient resources can make these advances. As a matter of fact, the high-tech products that will result from this technological progress will become products demanded by everyone. Therefore, the export of high-tech products is likely to occupy the international trade literature even more in the coming years. In particular, the entry of the so-called emerging markets into the trade scene of these products as new actors points to important trade wars in the future. In this context, the findings of this original research are of significant value.

The findings of the research show that some countries have a relatively high competitive advantage in the export of high-tech products. Countries such as Hong-Kong, Singapore, Japan and Ireland have a higher share in total exports of high-tech products than other countries. On the other hand, when it comes to efficiency scores, Hong-Kong and Singapore stand out in terms of effectiveness. The scores of other countries in terms of the efficiency of exports have been determined to be quite low. As the last but most important finding of the research, it has been determined that exporting effectively makes a significant difference on the global competitiveness of those related products. In other words, the more efficient the export of a country in the product in question is, considering the R&D expenditures, labor force and use of GDP resources, that country also increases its global competitiveness in that product. This means a very important result, especially for emerging market economies. The result of the study shows that even if they are developed market economies, some countries can be in a very low position compared to others in terms of efficiency in high-tech product exports. This low level of efficiency may also result in the global competitiveness of those countries being lower compared to countries with high efficiency levels. It is seen that exporting alone will not be sufficient for countries that will perhaps become a developed market economy in the future or perhaps will increase their exports of high technology products while still remaining an emerging market economy.

The economic development, labor force and R&D expenditures to be made will provide an important input for exports. These inputs will also pave the way for the country's high-tech product exports. However, it is also possible to say that the effective use of these inputs can be directly associated with global competitiveness. In this context, these findings obtained from developed markets contain important clues for emerging market economies. It is one of the important suggestions of the research that the countries should use the right processes to channel their economic power to export, and that the country's wealth should be used efficiently in the financing of foreign trade. However, it is noteworthy that the workforce should be used efficiently in production. It is believed that sensible remuneration policies should be adopted, especially in order to encourage qualified workforce at the point of high-tech product production and to stay in the country. Finally, it is useful to mention the R&D expenditures, which can be considered as one of the most important indicators at the point of producing high technology. The fact that these expenditures are made only in large amounts does not mean that they are done correctly. In order to shift the R&D expenditures to the most accurate projects, the necessary inspections and guidance should also be organized by the relevant government institutions.

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