





© 2022 Yépez and Mora. This article follows the  Open Access policy of CC BY NC under Creative Commons attribution license v 4.0.  Revistia

## International Insertion Quality: The European Union (EU-27) Case

**Eduardo Terán-Yépez<sup>1\*</sup>**

**Andrea Guerrero-Mora<sup>1</sup>**

<sup>1</sup>Department of Economy and Business, University of Almería, Spain

\*Email: [ety879@inlumine.ual.es](mailto:ety879@inlumine.ual.es)

*DOI: 10.26417/ejes.v5i1.p141-152*

### Abstract.

This research has a double aim. On the one hand, to introduce the International Insertion Quality (IIQ) construct. On the other hand, to present a classification of the European Union (EU-27) countries to establish which of them have a better IIQ. For this purpose, first, the IIQ construct is presented. Second, the evolution of the export's technological intensity degree of the EU-27 countries between the periods 2001-2003 and 2015-2017 is analyzed. Then, the evolution of the exports' diversification degree, both, by products and by destination markets in the same periods, is studied. This allows to observe in perspective the qualitative changes that have taken place between the two reference periods. In addition, a classification matrix of countries according to their quality of insertion in international trade is presented. The results allow arguing that Germany and France are the countries that have a higher IIQ. Also, there are nations that have a high technological content, but moderate markets diversification and/or products concentration; and other countries that have geographical and/or goods diversification, despite the fact that their exports contain a medium-low-level of technological intensity. This research allows concluding which EU-27 countries should work on their commercial policies to encourage the diversification of their exports and/or the development of products with greater technological content.

**Keywords:** International Insertion Quality (IIQ), export diversification, technological intensity, European Union.

## Introduction

Literature (Samen, 2010; ECLAC, 2001; Kaitila, 2017; Misztal, 2011; Martínez-Piva and Pérez, 2003) has shown that for a positive link to be established between trade and economic growth, it is not enough “simply” for national economies to broaden their integration into the international arena, but it is necessary to improve the quality of that integration. In this sense, a country that depends on income generated by exports to few markets or by a limited export basket is more vulnerable than another whose exports are more diversified (ECLAC, 2002; Bengi, 2016), which causes that its integration quality is not stable (Kuwayama and Durán-Lima, 2003).

Likewise, the literature (Martínez-Piva and Pérez, 2003; Ietto-Gillies, 2010) establishes that another criterion normally used to measure the quality of international insertion of a nation, is the technological content of exports. It can be argued that products with little dynamic consumption are not capable of generating sustainable economic growth (Kuwayama and Durán-Lima, 2003), that helps governments to achieve several of their macroeconomic objectives, such as for example: income redistribution, the satisfactory balance of payments situation and employment (Samen, 2000; Misztal, 2011).

Export diversification and export technological intensity has become a central issue inside the trade policies of several developed countries and especially most developing countries (Benti, 2016; Gokturk et al., 2013). This emergence has caused that the study of this topic has recently attracted the attention of different researchers (Xuefeng and Yasar, 2016; Benti, 2016; Can and Gozgor, 2018). Also, these studies have been carried out on the European Union countries (Misztal, 2011; Vahalík, 2015; Kaitila, 2017). However, the study of this subject must be deepened in order to understand the reality of each of the EU-27 countries and not only study them as a whole. Likewise, although the literature has established some variables that could help to understand the International Insertion Quality of a country, there is no construct that measures it (Terán-Yépez and Guerrero-Mora, 2018).

It is for this reason that this work has a double objective. On the one hand, to present a first approximation to the International Insertion Quality theoretical construct. On the other hand, classify each of the European Union countries according to their IIQ. These will allow arguing which are the countries of the EU-27 that present a better quality of insertion in the international trade. But also which of them should work in their commercial policies, to stimulate the exporting diversification and/or the sophistication of their products. For this research and based on previous works presented by Kuwayama and Durán-Lima (2003) and Terán-Yépez and Guerrero-Mora, (2018) the IIQ construct is a mixture between: (1) the degree of diversification of export products, (2) the degree of diversification of exports by destination markets and (3) the degree of technological intensity of exports.

From now on, this paper is structured as follows. First, through a literature review it was analyzed the importance, the types and the measure of the export diversification by products and by destinations, as well as the degree of technological intensity of exports. Secondly, and after presenting the methodology, the IIQ construct is described. Third, the evolution of the degree of technological intensity of exports of the EU-27 countries is analyzed, as well as a study of the evolution of the degree of exports diversification. Fourth, as result a classification matrix of countries according to their international insertion quality is presented. Finally, this research presents certain conclusions and implications.

## **Literature Review: Export Diversification and Degree of Technological Intensity of Exports**

### **Background**

Export diversification has become one of the main trade objectives of both several developed countries and most developing nations (Benti, 2016; Gokturk et al., 2013). This is because a group of countries, especially the least developed, depend on the export of a relatively small range of products, usually agricultural, or their exports are concentrated on a few markets (Kuwayama and Durán-Lima, 2003; Gokturk et al., 2013). Prebisch (1950) also suggested that there is a long-term tendency for prices of primary commodities to decline in relation to those of manufactured products, which have greater technological intensity or sophistication. This causes that countries that depend on commodities or have a limited export basket face a constant instability of their exports (Rodrik, 2005), which arises from inelastic and unstable world demand (Gobbée, 2008).

### **Types of Diversification: Vertical vs. Horizontal**

Over time, different researchers (Ali et al., 1991; Barthelemy and Chauvin, 2000; Herzer and Nowak-Lehmann, 2006; Matthee and Naude, 2007) have defined export diversification in different ways, but the main idea is the same. In general, literature stipulates two dimensions of export diversification: (1) horizontal diversification, which means increasing the number of export products and/or the number of export destination markets (Prada-Villamizar and García-Cediel, 2016). And (2) vertical diversification, which implies a change in the composition of exports from primary products to manufactured products or the country's initiation to process and export value-added products from commodities that would previously have been exported as raw materials, i.e. it implies the degree of technological intensity of goods (Samen, 2010; Can and Gozgor, 2018).

### **How to measure the Degree of Diversification/Concentration of Exports and the Degree of Technological Intensity?**

According to the literature (Samen, 2010), the most commonly used measure of concentration/diversification ratio by product and/or geographic is the Herfindhal-

Hirschman Index (HHI). The HH Index is formally expressed with the following mathematical formula:

$$HH = \frac{\left( \sum_{j=1}^n p_j^2 - \frac{1}{n} \right)}{1 - \frac{1}{n}}$$

where  $p_j = \frac{x_j}{XT_i}$ , indicates the market share of country  $j$  is the exports of country  $i$  is the total of its exports to the world ( $XT_i$ ). As far as the analysis is concerned, an HH Index above 18% (0.18) shows a concentrated market. Between 11% and 18%, moderately concentrated. While one that is between 0% and 10% reflects a diversified market (Durán-Lima and Álvarez, 2008).

On the other hand, in order to divide exports into different degrees of technological intensity, the most commonly used methodological classification is that offered by the Economic Commission for Latin America and the Caribbean (ECLAC) (2011). A summary of the above classification can be seen in Table 1.

**Table 1: Technological classification of exports**

CLASSIFICATION	
PRIMARY PRODUCTS (PP)	
NATURAL RESOURCE-BASED MANUFACTURES (RB)	RB 1: AGRICULTURAL AND FORESTRY
	RB 2: OTHER PRODUCTS BASED ON NATURAL RESOURCES
LOW-TECHNOLOGY MANUFACTURES (LT)	LT1: TEXTILE AND FASHION PRODUCTS
	LT2: OTHER LOW-TECH PRODUCTS
MEDIUM-TECHNOLOGY MANUFACTURES (MT)	MT 1: AUTOMOTIVE PRODUCTS
	MT 2: MEDIUM TECHNOLOGY PROCESS INDUSTRIES
	MT 3: MEDIUM TECHNOLOGY ENGINEERING INDUSTRIES
HIGH-TECHNOLOGY MANUFACTURING (HT)	HT 1: ELECTRICAL AND ELECTRONIC PRODUCTS
	HT 2: OTHER HIGH-TECH PRODUCTS
OTHER PRODUCTS (UNCLASSIFIED PRODUCTS)	

**Source:** Own elaboration based on Lall (2000) and ECLAC (2011).

Subsequently, in order to facilitate the comparability of the degree of technological intensity, which will be a measure that summarizes the six categories of technological intensity, the Coefficient of Technological Content of Exports (CCTX) proposed by Schteingart (2015: 198) is calculated. This coefficient will range between 0 and 100 percent; where 0% represents that the exports of a given country would be entirely PP, while 100% would represent that all exports are HT. The intermediate categories shall be weighted in percentages as follows: RB, 25%; LT, 25%; MT, 75%. The category “Other products” is excluded from the weighting. In this way, the CCTX is mathematically expressed in the following way:

$$CCTX = (\text{share } PP * 0 + \text{share } RB * 0.25 + \text{share } LT * 0.25 + \text{share } MT * 0.75 + \text{share } HT * 1) / (1 - \text{share other products})$$

### **Diversification of Exports and Degree of Technological Content in the EU**

According to Misztal (2011), based on an analysis of the relationship between the degree of diversification of exports and GDP per capita in the EU Member States during the years 1995-2009, he postulates that diversification/concentration of exports is one of the most important factors determining GDP per capita in the EU. In this sense, although between 1995 and 2012, the EU (as a bloc) increased its geographical diversification. There was also a slight increase in the concentration of certain types of raw materials exported by the EU. It should also be noted that the intensive margin for geographical diversification shows that the share of EU exports declined over the period 1995-2012, i.e. EU exports have been slowly replaced in some destinations by exports from other countries (Vahalík, 2015). This decrease in the EU's intensive margin is mainly due to China's rapidly growing expansion.

Kaitila (2017) argues that EU countries have typically witnessed a slow increase in their coverage of the total possible quantity of export products. It also states that in general, EU countries have become more similar over time in terms of export product coverage, which means that the value of total exports and the number of products exported are positively related. On the other hand, according to Vahalík (2015), by 2012 the EU had a very high technological intensity compared to other economies, such as the BRICS. However, unlike several emerging countries, the values of the European Union in terms of technological intensity did decrease during that period. Also, according to Aiginger and Davies (2004), the EU shows a constant reduction in exports of natural resource-based manufactures; this is due to the constant growth of products with a higher technological content, especially manufactures of low technological sophistication.

From this section, it can be concluded that by carrying out a brief search and to the best of our knowledge, it cannot be able to find articles that compare the degree of diversification/concentration of EU countries' exports and/or the degree of technological intensity of their exports. Nor has there been any evidence of research calculating the International Insertion Quality of the member states of this bloc. This article is Therefore, intended to contribute to this understudied area.

### **Methodology**

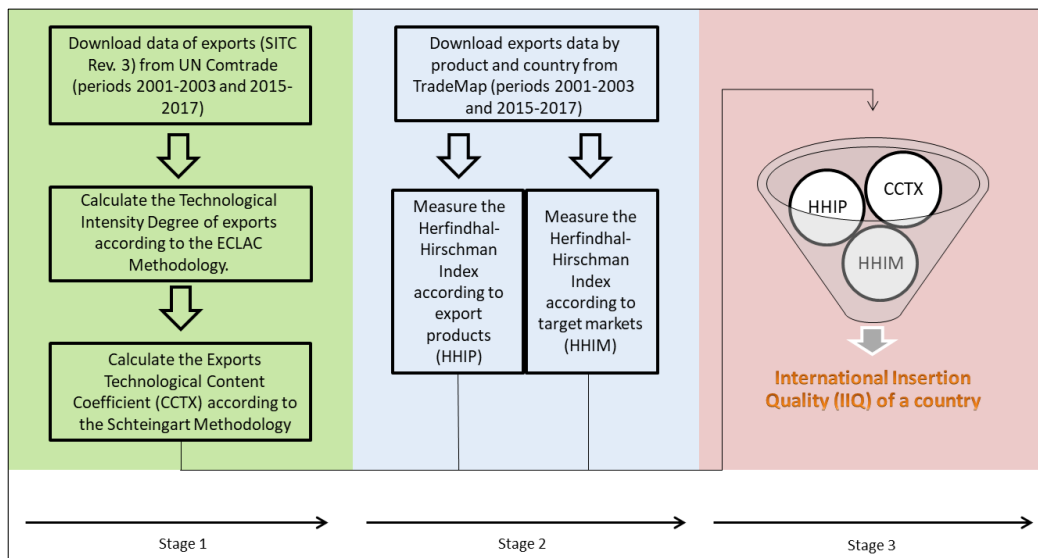
First, the degree of technological intensity of exports is calculated following the ECLAC methodology, which was presented previously in this article. In order to observe its evolution within the EU, it is calculated in two different time periods, 2001-2003 and 2015-2017. Likewise, the Coefficient of Technological Content of Exports (CCTX) is calculated using Schteingart's proposal (2015), with which it can be summarize in a single indicator the six categories of technological intensity proposed by Lall (2000), using the formula presented beforehand. In this case, this

classification takes as its base the breakdown by products of the system of Uniform Classification for International Trade (SITC), specifically, the SITC Rev.3. - 3 digits (in Annex 1, you can see the categories of exports according to technological intensity established by SITC Rev.3). For data collection the source used in this work was the UN Comtrade Statistical Database.

Secondly, using the Herfindhal-Hirschman Index, the diversification/concentration of EU countries' exports by both products and markets in the same periods of the previous point is calculated, which also presents a scatter plot that allows the qualitative changes between the two reference periods to be seen in perspective. The TradeMap statistical database was used for data collection.

Finally, bearing in mind that the main objective of this work is to classify the European Union countries according to their International Insertion Quality, a first IIQ measure approximation is presented (see Figure 1). That allows classifying through a 16 quadrants matrix each one of the EU -27 economies. Taking into consideration that this construct requires static data, in this case only the data obtained for the period 2015-2017 is used.

**Figure 1: Methodology flowchart and IIQ construct**



Source Own elaboration

## Results

### Evolution of the Degree of Technological Intensity of Exports of EU-27 Countries

Table 2 shows the variation in the Coefficient of Technological Content of Exports (CCTX) between the period 2001-2003 (P1) and the period 2015-2017 (P2). In addition, the average exports of these periods are represented according to the

different degrees of technological intensity. Thus, a greater positive variation of the CCTX is observed in countries such as Romania, Latvia and Slovakia which have increased the technological content of their exports over 10%. For example, Romania, which in the P1 study concentrated 49.66% of its exports in low-technology products in the P2 concentrates 43.70% in medium-technology products and decreased the production of low technology products to 20.41%; this country also increased the export of high technology products by 3% with respect to the P1. Being the most exported products in the P1 clothes and accessories, while in the P2 machines, devices and electrical equipment, and their parts, recording or reproduction devices were their largest export products.

On the other hand, it can be seen that some countries such as Sweden, Ireland, Finland and Malta have decreased the technological content of their exports by more than 4%. Malta is the most striking case, since the variation in the technological content of their exports in the study periods is -17.82%, this is due to the considerable increase (29.19%) of exports based on natural resources in P2 with respect to P1 and the decrease in high-tech products by -22.47% in these 2 periods. Malta's most exported products in the period 2001-2003 were machinery apparatus and electrical equipment, while in P2 Malta's exports are based on mineral fuels, mineral oils and products of their distillation.

Table 2 also shows that the European Union, as a whole, increased the sophistication of its exports, registering a positive variation of 0.95% in the technological intensity of its exports during the study periods, which is in accordance with what is established in the literature (Aiginger and Davies, 2004; Vahalík, 2015). In this sense, in P2 there is an increase of 2.11% in the export of medium-technology products with respect to P1. In the same way, it can observe a decrease of -6% in the export of low technology products between both periods. In general, of the 27 economies examined, 17 of them show a positive change in their CCTX, while the other 10 economies show a negative change in this coefficient.

### ***Evolution of the Exports Diversification of EU-27 by Products and Markets Destination***

In this section, the diversification/concentration of EU countries' exports by both products and destination markets will be calculated through the HH Index, as presented previously.

Graph 1 shows the evolution of the export diversification of EU countries by product. The results obtained show that several economies have made significant progress in terms of export diversification in relation to the number of products, as argued by Kaitila (2017), although other countries also show setbacks in this area. The comparison made between P1 and P2 shows that 14 of the 27 economies have managed to diversify their basket of exports to the world. The most notable cases are Finland, Latvia and Malta, whose index went from “moderately concentrated” to

“diversified” for the first two, while Malta went from “concentrated” (0.33) to “moderately concentrated” (0.14).

On the other hand, 7 countries show a decline in terms of product diversification; the most notable cases being Cyprus, Slovakia, Greece and the Czech Republic. In the case of Greece, although in both periods it remains in the “diversified” category, in P1 its index was 0.03 while in P2 its index was 0.10, just at the limit of becoming a “moderately concentrated” category. In the cases of Cyprus, Slovakia and the Czech Republic, the three economies have gone from “diversified” to “moderately concentrated”, the most worrying case being that of Cyprus, since its index in P2 is 0.16, very close to becoming a “concentrated” economy.

There are three details that need to be clarified. Firstly, 6 economies show neither improvement nor deterioration in terms of export diversification by products. Secondly, on average for all EU countries the index shows an improvement, going from 0.08 in the period 2001-2003 to 0.07 in the period 2015-2017. And thirdly, for the period 2015-2017 it can be identified 21 “diversified” countries, 6 “moderately concentrated” and none “concentrated”.

In regard to the results obtained for the diversification according to destination markets, as can be seen in Graph 2, it can be argued that by comparing periods P1 and P2, 24 of the 27 economies examined (the exceptions are Denmark, Finland and Ireland, which in the 3 cases show neither improvement nor deterioration), have managed to improve their geographical diversification, as postulated by Vahalík (2015). The most notable cases are: Cyprus, Slovakia and Hungary. In the case of Cyprus, although in P1 it was already a “diversified” economy, it has improved its geographical diversification from 0.09 to 0.05. Slovakia and Hungary went from being “moderately concentrated” to “diversified”.

On this point, it is necessary to specify two aspects. The first of them, that on average, the EU countries present an improvement in geographical diversification by going from 0.09 to 0.07. The second is that of the 27 economies, only 3 (Ireland, Luxembourg and Czech Republic) present a category of “moderately concentrated” countries, while the remaining 24 economies are “diversified”, although it is evident that 4 are close to being “moderately concentrated” economies, Austria and Portugal with 0.10 and Hungary and Poland with 0.09.

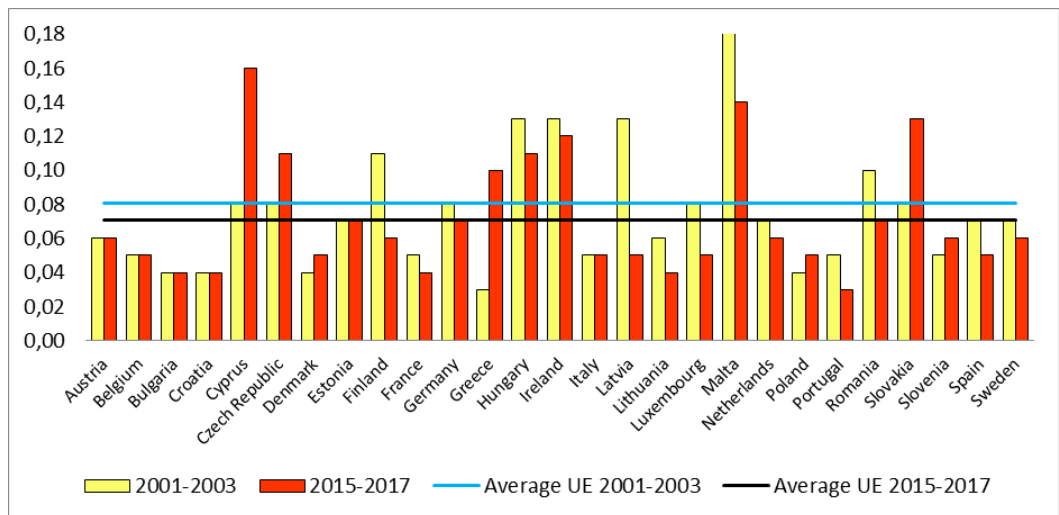


**Table 2: Export Structure by Technological Intensity Categories and Coefficient of Technological Content of Exports (CCTX)**

Countries	Primary products		Resource based manufactures		Low technology manufactures		Medium technology manufactures		High technology manufactures		Other transactions		CCTX		Variation
	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P2-P1
European Union	6,85%	8,50%	20,15%	22,96%	22,23%	16,07%	29,77%	32,97%	17,42%	16,09%	3,59%	3,42%	52,21%	52,36%	↑
Austria	4,32%	5,79%	13,80%	13,88%	21,44%	19,86%	36,51%	38,58%	14,27%	17,28%	9,66%	4,61%	55,86%	57,29%	↑
Belgium	7,34%	8,40%	23,73%	25,91%	14,61%	13,82%	35,05%	32,68%	15,01%	15,81%	4,26%	3,38%	53,15%	52,01%	↓
Bulgaria	15,23%	22,14%	19,34%	21,21%	36,12%	19,04%	16,90%	22,00%	5,30%	8,69%	7,10%	6,91%	34,27%	37,88%	↑
Croatia	7,57%	9,47%	26,27%	24,64%	25,23%	21,78%	28,44%	25,86%	11,51%	13,75%	0,98%	4,49%	46,17%	46,86%	↑
Cyprus	11,92%	8,51%	35,42%	39,97%	11,38%	4,71%	28,86%	11,78%	10,91%	28,05%	1,51%	6,98%	44,93%	51,66%	↑
Czech Republic	3,84%	4,07%	14,05%	10,03%	22,61%	18,86%	41,78%	46,50%	15,74%	18,92%	1,99%	1,63%	57,38%	62,03%	↑
Denmark	17,67%	14,30%	16,56%	16,09%	18,22%	17,24%	22,04%	21,75%	19,87%	19,28%	5,63%	11,34%	47,79%	49,54%	↑
Estonia	8,63%	7,66%	25,96%	24,90%	25,96%	15,34%	19,07%	25,77%	19,39%	17,57%	0,98%	8,76%	47,14%	51,47%	↑
Finland	3,75%	5,99%	32,71%	33,15%	9,57%	9,72%	26,29%	29,64%	26,03%	12,27%	1,65%	9,24%	57,26%	49,82%	↓
France	6,95%	7,41%	15,23%	15,44%	13,89%	14,30%	38,01%	34,32%	22,07%	24,70%	3,85%	3,83%	60,17%	60,18%	↑
Germany	3,89%	4,81%	11,61%	10,96%	12,76%	12,09%	47,45%	46,08%	18,47%	19,94%	5,81%	6,12%	63,86%	64,19%	↑
Greece	22,02%	18,89%	26,13%	45,27%	25,56%	11,36%	15,84%	13,10%	8,00%	8,52%	2,45%	2,85%	33,63%	33,46%	↓
Hungary	6,77%	6,24%	9,55%	11,40%	14,83%	10,05%	39,93%	49,07%	26,62%	20,47%	2,30%	2,77%	64,14%	64,42%	↑
Ireland	3,29%	4,80%	28,38%	33,02%	7,31%	7,00%	11,28%	13,43%	45,23%	40,62%	4,50%	1,14%	65,56%	61,39%	↓
Italy	3,63%	4,62%	13,46%	15,44%	30,01%	25,59%	39,16%	40,43%	11,03%	11,09%	2,70%	2,83%	52,69%	53,17%	↑
Latvia	8,98%	14,06%	43,86%	31,70%	29,83%	14,83%	9,55%	20,74%	6,12%	13,41%	1,66%	5,26%	32,24%	42,85%	↑
Lithuania	8,57%	11,29%	32,01%	31,07%	23,51%	19,24%	27,11%	27,54%	6,88%	8,61%	1,92%	2,24%	41,90%	42,81%	↑
Luxembourg	6,25%	8,08%	15,97%	19,52%	35,24%	28,08%	25,83%	33,13%	11,90%	6,61%	4,81%	4,58%	46,30%	45,44%	↓
Malta	1,62%	4,32%	10,38%	39,19%	16,92%	7,04%	12,34%	12,29%	55,67%	33,20%	3,07%	3,96%	74,02%	56,20%	↓
Netherlands	10,72%	14,21%	19,10%	24,57%	9,61%	12,60%	20,37%	27,39%	21,52%	19,84%	18,69%	1,39%	54,08%	50,37%	↓
Poland	10,17%	9,59%	16,25%	17,58%	27,91%	22,10%	38,66%	39,04%	5,88%	10,43%	1,12%	1,26%	46,44%	50,26%	↑
Portugal	4,04%	6,54%	20,66%	27,71%	32,90%	27,23%	33,03%	29,53%	8,83%	7,86%	0,54%	1,13%	47,25%	44,25%	↓
Romania	5,33%	8,87%	17,52%	14,39%	49,66%	20,41%	20,64%	43,71%	5,67%	8,72%	1,18%	3,90%	38,40%	52,24%	↑
Slovakia	4,36%	4,62%	17,96%	11,07%	26,45%	16,25%	43,11%	55,01%	6,54%	12,47%	1,58%	0,60%	50,78%	60,91%	↑
Slovenia	4,80%	6,62%	14,57%	15,25%	26,40%	18,13%	38,39%	37,90%	14,01%	19,53%	1,84%	2,57%	54,03%	57,78%	↑
Spain	11,63%	13,15%	17,28%	18,76%	16,00%	16,37%	43,00%	37,49%	9,41%	10,55%	2,67%	3,68%	51,36%	49,26%	↓
Sweden	3,30%	7,30%	20,16%	20,77%	14,02%	12,98%	35,63%	36,61%	21,02%	16,80%	5,86%	5,55%	59,80%	55,78%	↓

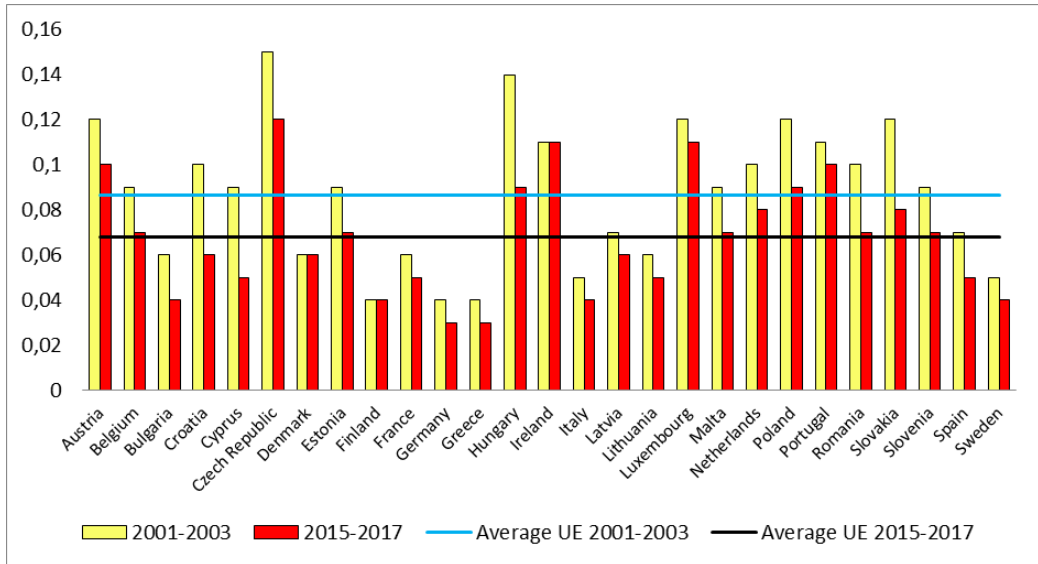
Source: Own elaboration based on UNComtrade data (2018).

**Graph 1: Diversification of EU countries' exports by product**



Source: Own elaboration based on TradeMap data (2018).

**Graph 2: Diversification of EU countries' exports by market**

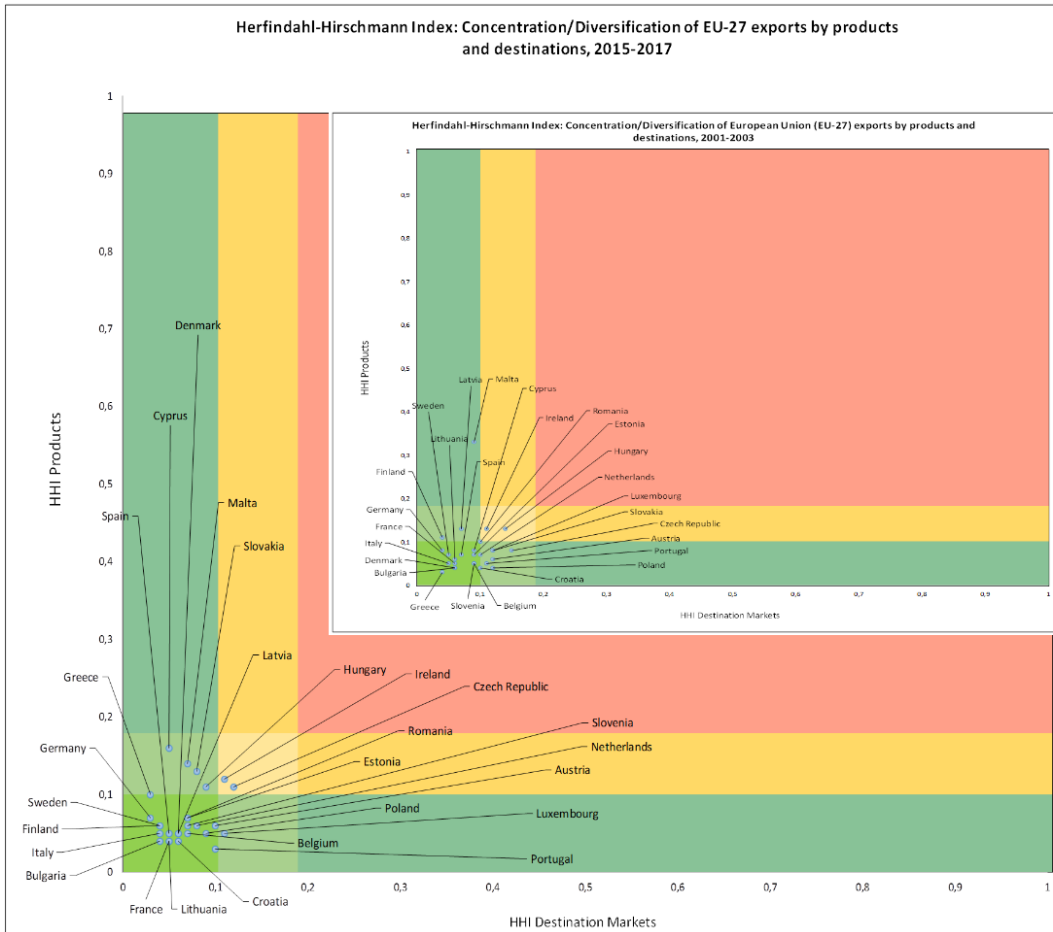


**Source:** Own elaboration based on TradeMap data (2018).

Graph 3 shows the qualitative changes that have taken place between the two reference periods, time-lapse in which 12 of the 27 economies studied have achieved greater degrees of diversification, both in terms of products and geographical destinations. Those are: Germany, Spain, France, Hungary, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal and Sweden. 14 other countries show improvements in one of the two types of diversification (12 in geographical destinations, Austria, Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Estonia, Greece, Italy, Poland, Slovakia, Slovenia and 2 in products, Finland and Ireland), while the remaining country, Denmark, shows no improvement in either category, in fact shows a reduction in product diversification.

The most relevant cases are those of Latvia and Malta, as the former shows an improvement of 0.01 in its geographical diversification but an improvement of 0.08 in terms of product diversification, while Malta shows an improvement of 0.02 in its diversification by target markets and a substantial improvement of 0.19 in terms of product diversification. On the other hand, the most atypical cases are those of: Cyprus, Greece, Slovakia and the Czech Republic, whose have all improved in terms of geographical diversification, but it can also be seen that they have increased their concentration in terms of exported products.

### Graph 3: Diversification of EU countries' exports by products and markets



**Source** Own elaboration based on TradeMap data (2018).

In summary, it can be argued that in the P2, there are 20 EU-27 countries that have the category of “diversified”, both by destination markets and by products. On the other hand, it can be postulated that there are 4 economies (Cyprus, Slovakia, Hungary and Malta) that have a “diversified” category index in terms of geographical diversification, but have a “moderately concentrated” index in product diversification. And that Luxembourg is the only country among those studied which has “diversification” by product and “moderate geographical concentration”. Finally, it is worth mentioning that there are 2 countries (Ireland and the Czech Republic), which present “moderate concentration” both in their diversification by products and by destination markets.

## International Insertion Quality (IIQ)

At this point it should be noted that the last two sections were used to reflect the evolution of the CCTX and export diversification of the European Union countries, in order to observe if they have shown improvements between P1 and P2. However, and as is logical the greatest positive variations are presented in countries that in P1 had scarce technological sophistication or concentrated export diversification. Since for a country the higher the technological content or lower the concentration, it is more difficult to improve its indicators. Therefore, the IIQ construct "calculated" in this section, being static, does not take into consideration if there has been an improvement between the study periods. Rather classifies the EU-27 countries according to the indicators presented only in the P2, thereby establishing their "current" international trade insertion quality.

Table 3 shows the classification of the IIQ of the European Union countries, using both the HH Index by destination markets and by products calculated before, and the Coefficient of Technological Content of Exports (CCTX) presented previously.

**Table 3: Classification of the international insertion quality of EU countries**

		CCTX			
		Low (<40%)	Medium-low (40%-50%)	Medium-high (50%-60%)	High (>60%)
Concentration / Diversification	HHIM1P1	Greece Bulgaria	Lithuania, Latvia, Portugal, Croatia, Spain, Finland, Denmark	Poland, Estonia, Netherlands Romania, Belgium Italy, Sweden Slovenia, Austria	France, Germany
	HHIM1P2			Cyprus, Malta	Slovakia Hungary
	HHIM2P1		Luxembourg		
	HHIM2P2				Ireland Czech Republic

**Source:** Own elaboration.

The rows will represent the levels of diversification/concentration (HHI) of markets (M) and products (P) of which those numbered 1 will correspond to "diversified" markets or products (IHH 0.00-0.10) and those numbered 2 will be those with a "moderately concentrated" market or product (IHH 0.11-0.18). In the absence of results corresponding to markets or "concentrated" products (HHI 0.19-1.00), a third numbering was omitted.

On the other hand, the columns correspond to the Coefficient of Technological Content of Exports (CCTX), where to facilitate the analysis although with an inevitable quota of arbitrariness, the following classification is carried out: low if it scores < 40%,

medium-low if it scores between 40% - 50%, medium-high if it scores between 50% - 60%, and high export technological content if it is above 60%.

Thus, Table 3 shows that most EU-27 countries have diversified export markets and products (HHIM1P1) with medium-low and medium-high technological content. However, countries such as Greece and Bulgaria stand out for being in this quadrant and having products with a low-technological content. In addition, this section highlights France and Germany, which not only have diversified export markets and products, but also have a high technological intensity.

Slovakia and Hungary, however, are countries with a high technological content in their exports and with a diversified export market, but their export products are moderately concentrated. Other cases that call the attention are those of Ireland and the Czech Republic that although their exports have a high technological content, their markets and products are moderately concentrated.

### **Conclusions and Implications**

The double aim of this research consisted, on the one hand, to present a first approximation to the International Insertion Quality (IIQ) construct. And, on the other hand, to classify the EU-27 countries, through a 16 quadrants matrix, which allows evidencing the countries that have a better quality of insertion in international trade. But also which of them should optimize their trade policies in terms of the technological sophistication of their exports and/or their diversification.

Through this research it can be conclude that at a macro level the EU-27 exports of are mostly diversified both in products and in destination markets, which shows a stability of the European Union bloc, making it attractive for investment. Likewise, in general it can be postulated that most of the countries of this bloc have improved their export basket, their geographical diversification and the sophistication of their exports from the period 2001-2003 to the period 2015-2017.

At a micro level, this paper concludes that just as there are countries that have improved the sophistication of their exports, such as Romania, Latvia and Slovakia, there are also economies that are showing a decline in this area, as their exports of primary products and manufactures based on the increase of natural resources, as is the case of Malta, Sweden, Ireland and Finland. This would have serious implications at the level of the productive development of these countries, since their goods, losing their technological content, become more vulnerable to economic shocks in the international market. Therefore, these countries have the task of making decisions within their trade policy to raise their levels of value-added generation. To this end, they must not only properly take advantage of the exploitation of the goods in their current export basket, endow their labor force with knowledge and skills, but must also develop or acquire new technologies.

It can also be concluded that 12 of the 27 economies show a qualitative improvement in the degree of diversification of their exports both by markets and products, however there are also cases of countries that show a high decline in this area, such as Cyprus, Slovakia and the Czech Republic. This could cause serious drawbacks, because they are dependent on income generated by the export of few products or to concentrated geographical destinations, making them more vulnerable than other economies with more diversified export baskets. In this case, countries should encourage, through their trade policies, the diversification of their export basket and/or the geographical diversification of their export goods. In the first case, it should encourage the export of “non-traditional” products, through incursion or deepening in different industries. In the second case, they should take advantage of their status as member states of the European Union, as well as establish long-term trade links with non-EU states and thus expand the destination markets for their exports.

In summary, although there are countries such as Germany and France that have a wide diversification of exports by products and markets and a high technological content, cases have also been found of countries such as Ireland and the Czech Republic, which have a high technological content but a “moderate concentration of markets and products”, or cases such as Greece and Bulgaria, which have a wide geographical and goods diversification, despite the fact that their exports contain a low level of technological intensity.

In general, the results obtained make it possible to argue that economies that have a lower technological content or a “moderate concentration” geographically or by products, should establish trade policies that encourage export diversification and/or the sophistication of their exports, which could help them overcome the instability of exports, which could intensify and accelerate their economic growth. If these countries do not take these measures, they could see instability in their exports that could discourage the necessary investments in the economy by risk-averse firms, increase macroeconomic uncertainty and be detrimental to longer-term economic growth. In other words, the diversification of exports and/or the sophistication of these would stabilize export earnings in the long term, thereby also improving the quality of insertion and integration in the international trade of these nations.

This study is not exempt from some limitations, which nevertheless open gaps for future research lines. Maybe, the major limitation of this work is that in proposing a first approximation to a new construct (that allows measuring the quality of insertion in the international trade of a nation), presents certain limitations in itself. It just takes into consideration three static indicators. In that sense, the IIQ construct can and should be improved with additional indicators which could help to measure the IIQ as accurately as possible. It would be very interesting if this study were extended to all regions of the world (non EU countries) in order to analyze the IIQ of all the countries of the world.

## References

- [1] Aiginger, K., & S. Davies, W. (2004). Industrial Specialisation and Geographic Concentration: Two Sides of the Same Coin? Not for the European Union. *Journal of Applied Economics*, 7(2), 231-48.
- [2] Ali, R., Alwang, J., & Siegel, P.B. (1991). Is export diversification the best way to achieve export growth and stability? A look at three African countries, Policy Research Working Paper Series 729, The World Bank.
- [3] Berthelemy, J.C. & Chauvin, S., (2000). Structural Changes in Asia and Growth Prospects after the Crisis, Working Paper No.00-09, CEPIL.
- [4] Benti, G.T. (2016). The patterns of export product diversification and its determinants in four East African countries. Particularity in case of Ethiopia. Master Thesis. Ryukoku University.
- [5] Can, M., & Gozgor, G. (2018). Effects of export product diversification on quality upgrading: an empirical study. *The Journal of International Trade & Economic Development*, 27(3), 293-313.
- [6] Durán-Lima, J.E., & Alvarez, M. (2008). Foreign trade and trade policy indicators: measurements of trade position and dynamism. Santiago de Chile: United Nations.
- [7] Economic Commission for Latin America and the Caribbean [ECLAC] (2001). The manufacturing sector in the Central American isthmus: Vision of the decade of the nineties and conjuncture 2000. ECLAC, Mexico Office, Mexico City, December, 501.
- [8] Economic Commission for Latin America and the Caribbean [ECLAC] (2002). Globalization and development. Twenty-ninth Session, Brasilia, Brazil, 29(3), 6-10 May 2002.
- [9] Economic Commission for Latin America and the Caribbean [ECLAC] (2011). Foreign trade and trade policy manual. Basic notions, classifications. Project document.
- [10] Gobbée, J. (2008). The Industry Speaks. Reflections on Irrationality. *International Food and Agribusiness Management Review*, 11(4), 179-182.
- [11] Gokturk, M., Bostan, T., & Akin, C.S. (2013). The Importance of Export Market Diversification Strategy on the Overcoming Economic Crises: The Case of Turkey. In: *International Conference on Economic and Social Studies (ICESoS'13)*, 10-11 May, 2013, Sarajevo, Bosnia y Herzegovina.
- [12] Herzer, D., & Nowak-Lehmann D.F. (2006). Export Diversification, Externalities and Growth: Evidence for Chile. *Proceedings of the German Development Economics Conference*, Berlin.
- [13] Ietto-Gillies, G. (2010). Research notes special: Measures and indicators of internationalization: Conceptual issues behind the assessment of the degree of internationalization. *Transnational Corporations*, 18(3), 59-83.
- [14] Kaitila, V. (2017). Export Product Range and Economic Performance – An Emphasis on Small Advanced EU Countries. *ETLA Working Papers*, 50.

- [15] Kuwayama, M., & Durán-Lima, J.E. (2003). The quality of the international insertion of Latin America and the Caribbean in world trade. *International Trade* 26, United Nations - Economic Commission for Latin America and the Caribbean (ECLAC), 1-72.
- [16] Lall, S. (2000). The Technological structure and performance of developing country manufactured exports, 1985-98. *Oxford Development Studies*, 28(3), 337-369.
- [17] Martínez-Piva, J.M., & Pérez, E. (2003). The Quality of International Insertion and Competitiveness in the Greater Caribbean: Applying ECLAC Instruments in Assessing Competitiveness, economic commission for Latin America and the Caribbean, 11, 1-47.
- [18] Matthee, M., & Naude, W. (2007). Export diversity and regional growth empirical evidence from South Africa. [Online] Available: <https://www.wider.unu.edu/publication/export-diversity-and-regional-growth>
- [19] Misztal, P. (2011). Export diversification and economic growth in European Union member states. *Oeconomia*, 10(2), 55–64.
- [20] Prada-Villamizar, E., & García-Cediel, G. (2016). Export concentration or diversification by destination: an analysis through the Herfindahl Hirschmann index in Santander, Colombia. *Saber, Ciencia y Libertad*, 11(2), 119-128.
- [21] Prebisch, R. (1950). The Economic Development of Latin America and its Principal Problems. Reimpreso en *Economic Bulletin for Latin America*, 7(1), 1962.
- [22] Rodrik, D. (2005). Economic diversification policies. *CEPAL Review*, 87, 7-23.
- [23] Samen, S. (2010). A primer on export diversification: key concepts, theoretical underpinning's and empirical evidence. Working Paper of the Growth and Crisis Unit. World Bank, Washington, D.C.
- [24] Schteingart, D. (2015) How decisive is the technological content of a country's exports at its level of economic development? *H-industri@*, 9(16), 195-224.
- [25] Terán-Yépez, E., & Guerrero-Mora, A. (2018). Calidad de la inserción internacional de los países de la Unión Europea (UE-27). In *Proceeding of the IV Workshop Extenda en Internacionalización de Empresas*. 25-26 October, Cádiz, Spain.
- [26] Vahalik, B. (2015). Analysis of export diversification development of the European Union and BRICS countries. *Central European Review of Economic Issues*, 18, 59-70.
- [27] Xuefeng, Q., & Yasar, M. (2016). Export Market Diversification and Firm Productivity: Evidence from a Large Developing Country. *World Development*, 82, 28–47.



## ANNEXES

### ANNEX 1

#### EXPORT CATEGORIES ACCORDING TO TECHNOLOGICAL INTENSITY

Classification	Subsectors	SITC codes, Rev.3
Primary Products (PP)	Primary Products (PP)	1, 11, 12, 22, 25, 34, 36, 41, 42, 43, 44, 45, 54, 57, 71, 72, 74, 75, 81, 121, 211, 212, 222, 223, 231, 244, 245, 246, 261, 263, 268, 269, 272, 273, 274, 277, 278, 281, 286, 287, 289, 291, 292, 321, 325, 333, 343, 682, 683, 684, 685, 686
Natural resource-based manufactures (RB)	RB 1: Agricultural and Forestry	16, 17, 23, 24, 35, 37, 46, 47, 48, 56, 58, 59, 61, 62, 73, 91, 98, 111, 112, 122, 232, 247, 248, 251, 264, 265, 322, 421, 422, 431, 621, 625, 633, 634, 635, 641
	RB 2: Other Products based on Natural Resources	282, 283, 284, 285, 288, 334, 335, 342, 344, 345, 411, 511, 514, 515, 516, 522, 523, 524, 531, 532, 551, 592, 629, 661, 662, 663, 664, 667, 681, 687, 689
Low-Technology Manufactures (LT)	LT1: Textile and Fashion Products	611, 612, 613, 651, 652, 654, 655, 656, 657, 658, 659, 831, 841, 842, 843, 844, 845, 846, 848, 851
	LT2: Other Low-Tech Products	642, 665, 666, 673, 674, 675, 676, 677, 679, 691, 692, 693, 694, 695, 696, 697, 699, 821, 893, 894, 895, 897, 898, 899
Medium-Technology Manufactures (MT)	MT 1: Automotive Products	781, 782, 783, 784, 785
	MT 2: Medium-tech Process Industries	266, 267, 512, 513, 533, 553, 554, 562, 571, 572, 573, 574, 575, 579, 581, 582, 583, 591, 593, 597, 598, 653, 671, 672, 678, 786, 791, 882
	MT 3: Medium-tech Engineering Industries	711, 712, 713, 714, 721, 722, 723, 724, 725, 726, 727, 728, 731, 733, 735, 737, 741, 742, 743, 744, 745, 746, 747, 748, 749, 761, 762, 763, 772, 773, 775, 793, 811, 812, 813, 872, 873, 884, 885
High-Technology Manufacturing (HT)	HT 1: Electrical and Electronic Products	716, 718, 751, 752, 759, 764, 771, 774, 776, 778
	HT 2: Other High-Tech Products	525, 541, 542, 792, 871, 874, 881, 891
Other Products	Other Products	351, 883, 892, 896, 911, 931, 961, 971