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**PRODUCTION FRAGMENTATION IN ELECTRICAL
COMPONENTS**

Is Morocco competitive enough?

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Abstract

This paper analyses production fragmentation in the Moroccan electrical components industry. The different driving forces behind product fragmentation are studied. Balassa's index of revealed comparative advantage is used to measure possible specialisation. The empirical data shows a comparative advantage within certain product groups which implies that Morocco is participating in international production sharing. It also shows that Morocco's degree of integration combined with measures taken to facilitate trade has led to lower transaction costs. The paper concludes that Morocco seems to meet the conditions needed for fragmentation to arise and that it has a comparative advantage within certain product groups in the industry of electrical components. To achieve further competitiveness within the industry, human capital must be targeted.

Key words: Production fragmentation, Morocco, North-South integration, Comparative advantage, Electrical components

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List of Abbreviations

EPZ	Export Processing Zone
EU	European Union
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
MENA	Middle East-North African Region
MNC	Multi Lateral Corporation
NTB	Non Tariff Barrier
RCA	Revealed Comparative Advantage
SITC	Standard International Trade Classification
TFZ	Tangier Free Zone
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organisation

1. Introduction

During the last 30 years Morocco has embarked on a mission to accelerate economic development. In an attempt to encourage sound investments as well as to boost economic growth, the country has liberalized its economy. Today Morocco is considered to have a fairly diversified economy. The export is, however, still dominated by agricultural products, phosphate and textile. Being dependent on primary products is an uncertain path to follow. The abolishment of the Multi Fibre Agreement made the future of the textile production uncertain. The challenge is therefore to find alternatives to these sectors.

One feature of today's world trade is the disintegration of the production process. This disintegration is often referred to as production fragmentation or vertical specialisation and means that the production process is split into separate parts that can be produced in different locations. Production fragmentation can be an opportunity for developing countries to commence production of non traditional products.

Morocco has increased its export of electrical components over the last years and there are signs of an emerging specialisation within this industry. Electrical components are suitable for production fragmentation. I will therefore focus my work on the following questions. Has Morocco specialized in trade with electrical components and if that is the case, is it then a question of international production fragmentation? What does the fragmentation consist of at more disaggregated levels? Does Morocco have the possibility to compete in this type of industry?

The main approach of this paper is to try to assess the specialisation of electrical components in the Moroccan industry. Since Morocco is a developing country the theoretical framework will focus on the effects and benefits for a developing country that is taking part in a production network through production fragmentation.

Over the last forty years, Morocco and the European Union, have initiated and deepened their trade relations in several association agreements. The Moroccan government has realised the importance of developing its trade relations with the rest of the world and has over the last decade signed trade agreements with many countries. One of the most significant being the free trade agreement signed between Morocco and the United States in 2004.

This paper is limited in time and deals mainly with the period of 1995 – 2007. It is also limited in scope and concentrates primarily on electrical components.

The paper is organized as follows: Chapter two presents the theoretical framework of product fragmentation with special focus on the developing world. Chapter three reviews the characteristics of the electrical components industry and illustrates its development in Morocco. In chapter four, Balassa's index of revealed comparative advantage is used to measure product fragmentation in the Moroccan electrical component industry. The role of trade liberalisation, foreign direct investments and trade facilitation for Morocco's competitiveness in trade with parts is reviewed in chapter five. Chapter six summarizes and concludes.

2. Fragmentation of production – theoretical framework

Production fragmentation is hardly a new concept, but the increased liberalisation of world trade has transformed it from being mainly a domestic phenomenon to becoming increasingly international. This chapter presents theories of production fragmentation and explains some of the driving forces necessary for it to arise. It also aims to pinpoint determinants for firms' decision on where to locate production.

2.1 Definition

Fragmentation is defined as “a splitting up of a previously integrated production process into two or more components” (Jones & Kierzkowski 2001, p. 18). This process enables further specialization in each production segment and the possibility of higher cost efficiency.

There are two forms of fragmentation which are necessary to distinguish between; intra-firm and inter-firm fragmentation. The former refers to when a firm separates its production process into different plants each specialising in producing a certain component before the final assembly. The sub-plants belong to the same company but with different locations. Multinational corporations (MNCs) are typical examples of firms that engage in intra-firm fragmentation on an international level. The advantage of this form of fragmentation is, besides keeping control over the entire line of production that firm specific knowledge and advantages can be protected. Choosing to produce all components within the

same firm can however entail higher costs i.e. intra-firm fragmentation implies a risk of diseconomies of scope. Inter-firm fragmentation, or outsourcing, enables firms to better exploit economies of scale and hence lower production costs. A potentially negative side-effect is the risk of losing firm specific know-how as well as increased transaction and communication costs.

If the production of a certain good takes place in at least two countries, fragmentation is considered international.

2.2 Driving Forces

There are certain conditions needed for fragmentation to arise and they are related to the production technology, factor costs, the use of factor intensities and transaction costs.

2.2.1 Factor Costs

Differences in factor costs are fundamental for fragmentation. In order to exploit these differences it must be possible to break down the production process into separate stages where each stage uses production technologies with different factor intensities. For international fragmentation, it must be possible and cost efficient to site the production of components at different locations. An internationalisation of the production process is therefore most suitable between countries with different factor costs and for parts with different factor intensities (Ruane & Görg 2001, p. 147).

2.2.2 Transaction Costs

Fragmentation implies that firms can benefit from lower factor costs in their production. Profitable fragmentation requires that additional costs such as transportation and coordination between plants are low. Developments in these areas are considered to be significant driving forces for fragmentation (Harris

2001, p.53). Products most suitable for outsourcing are products where the transportation costs make up for a very small proportion of the value of the final product (Yeats 2001, p. 125). Besides the direct costs of transportation and coordination there are also the costs of legal trade documents, necessary insurances, tariff barriers and non tariff barriers (NTBs).

Product fragmentation increases the role of services compared to traditional production in one place (Deardorff 2000, p. 26). Evidently it is important for a country to improve its level of service if it wishes to attract MNCs or simply participate in an international production network. If these costs are too high, they can constitute an obstacle even for fragmentation with very low factor costs. Improved services reduce transaction costs and facilitate fragmentation. In recent years technology advances and convergence of legal and regulatory system as well as an opening up of the market have created an environment more suitable for fragmentation (Arndt & Kierzkowski 2001, p. 4).

The above mentioned driving forces do not singlehandedly lead to successful international production sharing but together constitute the necessary conditions needed for cost efficient fragmentation.

2.3 Localisation Advantage

For international fragmentation geographic proximity between plants is becoming less important due to technological advances. Instead, besides differences in factor costs, macroeconomic and political stability is of greater relevance. Firms do not wish to face sudden nationalisation, frequent strikes or political instability. A disturbance in one part of the production could halt the entire production network resulting in great costs. Government policies in the host country can foster or discourage fragmentation to take place. It has the possibility to increase the country's competitiveness through direct measures such as tax relief, improved infrastructure, harmonization of trade procedures and establishing export processing zones (EPZs) as well as through indirect policies such as education.

2.4 Regional Integration

Regional integration and trade liberalisation has significantly reduced trade costs and made fragmentation more advantageous. As mentioned, trade barriers increase the costs for fragmentation and the reductions of these barriers play an important role for international fragmentation. Besides reducing the tariffs, regional integration often leads to a harmonization of rules and regulations for trade within the region's borders. This has a large impact on fragmentation where border delays or other disturbances in the line of production aggregate to a costly effect. This is especially true regarding manufactures, where the different rounds of multilateral negotiations under the auspices of the GATT and later the World Trade Organisation (WTO) has been successful in lowering tariffs. Active trade facilitation by governments, through harmonization of rules and improvement in administration and logistics, simplifies trade and reduces transaction costs. This is vital in order to improve trade and attract investments.

2.5 Foreign Direct Investment and International Fragmentation

An additional explanation for the upsurge in international fragmentation is the growing role of foreign direct investment (FDI). FDI is often a vital part in a MNCs activity and can be defined as “*an investment in which the investor acquires a substantial controlling interest in a foreign firm or sets up a subsidiary in a foreign country*” (Markusen et.al 1995, p. 394).

While FDI used to be considered mainly a tariff jumping alternative, it is now, with reduced trade barriers and ever increasing FDI considered a way for MNCs to successfully compete on the international market. The reduction in trade barriers reduces the costs of division of labour and the MNC can better take advantage of location advantages in different host countries. Reductions in trade barriers are expected to benefit the vertical FDI especially (Blomström & Kokko 1997, p 3).

There are four main motives for FDI: 1) To seek natural resources 2) to seek new markets 3) to restructure existing foreign production through rationalization and 4) to seek strategically related created assets (Narula & Dunning 2000, p. 150). The first three factors can be considered asset-exploiting while the last one is asset-augmenting. Investments (FDI) in a developing country are likely to be of the former kind. Asset-exploiting investments, that target the comparative advantages in unskilled labour, are a footloose kind of FDI. This means that the host economy risk losing its investment if a more profitable alternative is available. A positive side effect of this is however that the host economy is forced to constantly improve in the factor in which it was once deemed to be the most efficient.

As we can see, the conditions for FDI are similar to the conditions needed for fragmentation to arise, so it is not hard to understand that the two are intertwined.

2.6 North – South –Specialisation and Trade

It is worth pointing out the possible effects that fragmentation could have for a developing country. Not only has trade between the developed and the developing world increased but the production networks that arise create interdependence between the developed and developing¹ world where industries rely on supplies from other countries (Yeats 2001, p. 114). It also opens doors for economic development for the south – at least in theory.

2.6.1 Specialisation in the South

While the traditional export in many developing countries still mainly consists of primary goods, there has been a shift during the last decades, towards simple manufacturing products. Developing countries have comparatively low labour

¹ Throughout the paper the term north-south will be used interchangeably with the developed- developing world.

costs and since fragmentation follows the traditional theories of specialisation according to comparative advantage, it is the labour intensive production segments that are typical for outsourcing.

This is the traditional starting point for countries that participate in north-south production networks. Over time however, outsourced production is expected to shift from labour intensive products to more capital and human capital intensive activities, very much due to the know-how that is transferred from the developed countries in this process. The presence of MNCs can function as “incubators” for the indigenous firms in starting similar businesses (Ruane & Görg 2001, p. 149). They improve their industrial skills due to the existence of new technologies brought in by the foreign firms.

Firms participating in this type of production only need to produce a certain segment effectively to enter and compete on the world market instead of mastering an entire production process. Fragmentation therefore creates an opportunity for a faster entry onto the world market and can lead to rapid economic development and a clear improvement for the industrial development in the south.

The increase in trade liberalisation has caused a shift in the labour intensive industries in the developing world. Instead of producing for the domestic market they are now, to a large extent, doing assembly work for foreign firms from the developed world. While the developing countries provide cheap labour for the assembly work, the foreign firms provide high-skill services such as marketing, product design and relevant technologies.

2.6.2 South and Foreign Direct Investment

The effects of FDI on the host country are of interest to this paper. MNCs are considered to have a potential benefit on host countries, through for example various spillovers (Markusen & Venables 1999, p. 336). Attracting FDI has also

come to be a common development strategy for less developed countries (Narula & Dunning 2000, p. 142). For a developing country FDI constitutes a route to economic development, this due to the country's own inability to accumulate sufficient capital to acquire the technology needed to start its own production.

Developing countries use their locational advantages in their bargaining with MNCs. This has led to increased competition between governments that have similar advantages. In order to attract FDI they offer financial incentives and subsidies. This bargaining can lead to the previously mentioned asset exploitation and be detrimental to the host country. Taking this into account it is vital for developing countries to attract the *right* sort of FDI which means the kind of FDI that has beneficial externalities for the host country in form of for example technological spillovers (Ibid, p. 150). For the spillovers to occur the domestic firms must be capable of absorbing them. The host country's level of success is dependant upon its human capital as well as its ability to institutionalize and transfer the available knowledge.

2.6.3 Some Caution is Advised

Production fragmentation can offer great possibilities for the south but there are dangers as well. One is the risk of limiting the production of the developing countries to certain branches. Without the ability to absorb the positive externalities they run the risk of becoming tied to their current comparative advantage and are unable to develop and become competitive within the latter, more advanced stages of production. Furthermore, there is the risk of a negative dependence upon the partner country and a vulnerability to changes in its economy. The footloose characteristics of this type of production sharing imply that the partner may relocate if there is a more cost efficient alternative to be found (Graziani 2001, p. 223).

2.7 Summary

The international fragmentation that we see today is a result of the changing world trade system with deregulation of trade barriers and reduction of transaction costs. These give new opportunities for firms to locate some of or their entire production outside their borders and exploit the benefits of differences in factor costs. With increasing fragmentation on the international level it follows intuitively that trade must increase as well, since components will be both imported and exported while still in the production process. This type of international trade also creates an increasing interdependence between the developed and the developing world.

Figure 2.1 shows the suitability for fragmentation of an industry at a certain location. “Fragmentation advantages” are related to the characteristics of the industry; that it can be split into different segments with different factor intensities and hence gain from different locations comparative advantages. If this is the case, the advantages of fragmentation are strong. “Regional integration” contains the change of transaction costs. A deepened regional integration reduces the transaction costs through a removal (complete or partial) of trade barriers and a harmonization of rules.

Figure 2.1: Industries’ fragmentation potential

	Fragmentation advantages Weak → Strong	
Regional integration		
Simple	4	3
↓		
Deepened	2	1

In area 1 we find industries that have high fragmentation advantages and enjoy a deepened integration that entails low or very low transaction costs. The gains

from fragmentation are high. If the production instead does not have the production technology needed, where the split is difficult or with less difference in factor intensities but with the possible positive effects of regional integration there may still be fragmentation and hence the industry is placed in area 2 with smaller gains from fragmentation.

Industries in area 3 would gain from fragmentation, but the costs would be high due to the lack of integration. Trade barriers, transportation costs and a lack of harmonization in regulations would most likely discourage firms to locate part of their production abroad.

Finally, in area 4 industries with weak or no fragmentation advantages and low regional integration are placed. They are not suitable for fragmentation.

If the production technology of electrical components has strong fragmentation advantages, the determinant on where in the model to position Moroccan industries that produce these products is dependent upon the degree of integration. Trade liberalisation through bilateral agreements with several countries and most importantly the European Union means that production could be moving towards area one.

3. The Electrical Component Industry

This chapter explains the production characteristics of electronics and electrical components.² More over it reviews the situation of the electrical component industry in Morocco.

3.1 Characteristics of production in electrical components

Electronics and electrical components are product categories that often have a production technology where it is easy to differentiate between capital and labour as well as between skilled and unskilled labour. This implies that it has the most fundamental precondition for an industry suitable for fragmentation. Parts and products are often light weighted which makes transport costs relatively low, another important prerequisite for international production sharing, whether it be intra-firm or inter-firm fragmentation. When transaction costs are less of an obstacle, firms are prone to locate the assembly work in peripheral regions and one of the determining factors for where to locate is the cost of labour.

The above mentioned characteristics make the production of electronics and electrical components ideal for a north–south type of fragmentation. For countries in the developing world the electronics industry has proven to be an important sector when trying to diversify their export and to improve their trade performances. This is an industry that is classified as a dynamic sector due to it

² While the aim is to focus on electrical components they are often placed in the same category as electronics and therefore the term electrical components is sometimes replaced by the term electronics and electrical products.

showing high annual growth in export value and significant increase in its share of world trade (UNCTAD 2005) which makes it a lucrative industry to be part of.

The opportunities offered by this industry are several but it is an industry which is sensitive to factor cost differences. Countries and firms need constantly to improve their productivity and competitiveness in order to survive. Besides facilitating trade by creating an environment attractive for the initial foreign investments, one of the most important roles for governments to play is in improving and developing human capital within the country so as to fully take advantage of the expected spillover effects. If the government is successful in these endeavours the country is more likely to be able to upgrade from basic labour intensive manufacture and assembly work to more value added production (high skilled labour).

3.2 Morocco and Electrical Components

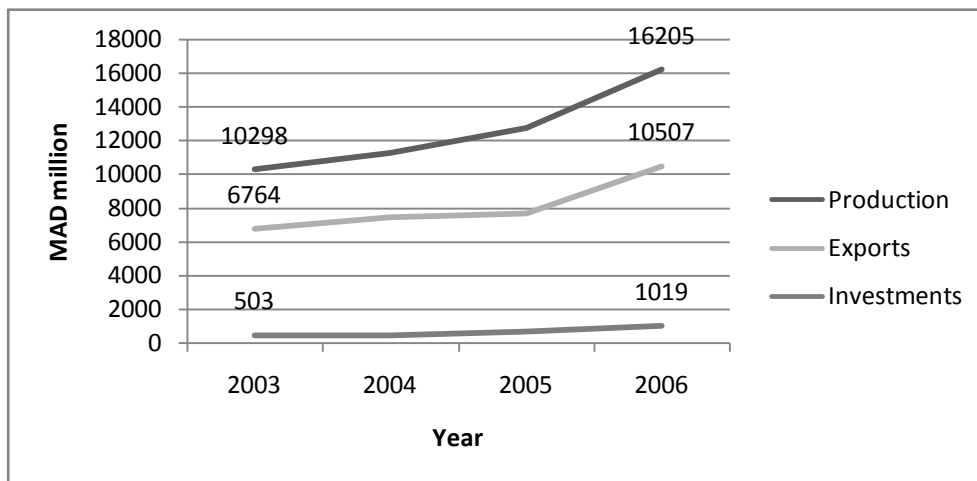
The Moroccan industry is currently dominated by textile and agro-business. The government's industrial strategies are formulated in the *Emergence plan* which aims to develop and modernize sectors that are considered to be potential engines for growth. Automotive equipment; aviation equipment and speciality electronics are pinpointed and all deal with electrical components.

The Moroccan production of electronics and electrical products is insignificant compared to international levels. The developing world's trade in these products is dominated by East and Southeast Asia but Morocco and a few other countries in the Middle East and North African (MENA) region have recently embarked on the same route. Studies show that there are a few product groups where the MENA region has a small but increasing share of world's exports. In 2003 the region had a 2,72% share of world exports in electrical distribution equipments (see appendix A.1). This is of interest since Morocco has recently emerged as a regional leader within production of electrical components (UNCTAD 2005). This would imply that a large part of the MENA share stems from Morocco.

The electrical and electronics industry in Morocco is mainly concentrated to the following six sub-sectors: *wiring and cables, electronic components, electrical distribution equipment, electrical batteries and storage devices, electric devices and lamps and electric transformers and generators.*³ While the production is small compared to Morocco's traditional products, it is increasing.

Figure 3.1 shows the development in the electrical and electronics industry. It shows that export counts for a large part of the production and that investment doubled from 2003 to 2006 from around 500 million MAD to 1 billion MAD in 2006⁴. It is an industry that employs over 35 000 workers which correspond to approximately 7 % of the workforce active in the industrial sector.

Figure 3.1: The development of the electrical and electronics industry, 2003-2006.



Source: Morocco Business News

3.2.1 The Example of the Automotive Industry

The automotive industry has grown in importance for the Moroccan economy and is worth mentioning when discussing electrical components. In 2007 it constituted 5 % of industrial GDP and 15 % of industrial export (WTO 2009). The sector can

³ Information and statistics on Moroccan electrical and electronics industry in this chapter is taken from Morocco Business News if not stated otherwise.

⁴ €1 ≈ 10 MAD (Moroccan dirham).

be divided into two different sub-sectors. The first consisting of assembly work of private vehicles and light and heavy goods vehicles for companies such as Mercedes, Volvo, Renault⁵ and Mitsubishi and the other being subcontracting of manufacture of parts.

While assembly work offers important employment opportunities it is the other sub-sector that is of greater interest since it could offer possibility of a more value added production. This type of production is growing, and Morocco is increasingly becoming a global hub for electrical components that are sub contracted (Morocco Business News).

Firms engaging in subcontracting that specialize in the production of parts for the automotive industry are mainly located in the Tangiers Free Zone (TFZ) where they enjoy a liberal trade environment and proximity to the European market, which is still by far Morocco's largest trading partner. The production is destined for export and produced in association with foreign firms.

The government strategy is to attract foreign investments to this sector by offering a liberal trade environment and plans of developing integrated industrial hubs dedicated especially to the manufacture of automotive parts for export.

3.3 Summary

So far we have seen that electrical components have the necessary production technology for fragmentation to arise. It is also suitable for north-south fragmentation. Even if Asia is by far the greatest player of this industry there are signs that Morocco has a share of the global market. The next chapter will measure if Morocco has a comparative advantage and hence specialisation in these products.

⁵ The assembly work for Renault-Nissan is planned to amount to a capacity of 400 000. vehicles a year by 2013 of which 90 % are destined for export (WTO 2009).

4. Production Fragmentation of the Moroccan Electronic and Electric industry

The previous chapter showed that the production of electrical components is a growing sector in the Moroccan manufacturing industry. It is also one of the sectors which the government pinpoints as an engine for economic growth. This chapter will examine the specialisation in the production of electrical components with the help of Balassa's index of revealed comparative advantage, calculated on different disaggregated levels.

4.1 Measuring Product Fragmentation

There is no direct way of measuring product fragmentation in trade. Instead there are several different options; examining a country's level of outward or inward processing trade is one alternative (Ruane & Görg 2001) This measure covers the goods that are temporarily exported for processing and then re-imported for sale (Ibid p.153). Unfortunately, data availability is limited and difficult to access. This measure will therefore not be applied here.

Increased fragmentation has led to deeper specialisation and specialisation is considered to occur on goods where the country has a comparative advantage. Comparative advantage means that countries will export commodities with the lowest relative costs, and hence price, under autarky. While the theory is easy to follow it is harder to quantify and test the concept of comparative advantage since it is not possible to access autarky prices for countries that have engaged in world trade for some time (Greenaway & Milner 1993, p. 181). Nevertheless the concept of comparative advantage is widely accepted and economists try to get around the

measurement problem by using indirect methods of calculating comparative advantage in order to apply it to real-world conditions. One alternative is Balassa's index of revealed comparative advantage (Balassa 1989).

4.1.1 Balassa's Index of Revealed Comparative Advantage

This paper will use Balassa's index of revealed comparative advantage (RCA) in order to see if there are signs of comparative advantage in Morocco's trade with electrical components at different levels of aggregation. There are two different versions, RCA_1 and RCA_2 :

$$RCA_1 = (X_{ij}/X_{wj})/(\sum X_{ij}/\sum X_{wj})$$

$$RCA_2 = (X_{ij}-M_{ij})/(X_{ij}+M_{ij})$$

Where i = country, j = commodity and w = world

The RCA_1 measures country i 's share of export of good j (X_{ij}/X_{wj}) compared to country i 's share of total exports ($\sum X_{ij}/\sum X_{wj}$), i.e. it measures the country's relative share of export of good j . If the index is larger than 1 there is a comparative advantage which means that country i exports relatively more of this good. An index below 1 implies a comparative disadvantage. The second measure RCA_2 , includes imports and measures only the countries trade performance. It includes the possibility of both exporting and importing within a particular product category. The ratio ranges from -1 (revealed comparative disadvantage) to +1 (revealed comparative advantage). Values around zero come with ambiguity (Greenaway & Milner p.186).

When measuring the revealed comparative advantage it should be noted that it can be distorted through policy effects like tariffs, non-tariff barriers etc (Ibid, pp.184). The RCA_1 attempts to solve this problem by excluding imports since they are often subject to restrictions that are more pervasive. But, omitting imports

means that intra-industry specialisation is not taken into account which can be partially solved through RCA_2 .

Another potentially misleading factor is the country size effect. Small countries, with a small share in total world export and where export is concentrated to a few goods, risk showing greater comparative advantage through this measurement than is factual. This can be avoided through RCA_2 which measures the country's own trade performance.

When analysing the results these weaknesses should be taken into account.

4.2 Measuring Morocco's RCA in Electrical Components

The trade data used in this paper is collected and compiled from the United Nations Commodity Trade Statistics Database (COMTRADE). The United Nations Standard International Trade Classification (SITC) 3rd revision includes trade statistics on product groups that are disaggregated into sub groups down to a five digit-level. This makes it possible to see a country's trade in parts and components which is needed when trying to find and analyse comparative advantage in electrical components.

Electronics and electrical components are reported in SITC group 7, *Machinery and transport equipment*, which is divided into sub groups 75 *office machines and automatic data-processing machines*, 76, *telecommunications and sound-recording equipment* and 77, *electrical machinery*. This paper will only deal with the possible specialisation within electrical machinery, hence group 77 since this is the sub group where many of the products mentioned in chapter three can be found.

The period of interest is 1995 -2007 and the results will be shown in averages of

three years, 1995-1997, 2000-2002 and 2005-2007. The period coincides well with the emergence of the products studied and Morocco's deepening integration with world trade.

The Balassa measures were applied according to the following:

X_{ij} = Morocco's exports of the goods in the relevant SITC group

M_{ij} = Morocco's imports of the goods in the relevant SITC group

X_{wj} = World exports of goods in the relevant SITC group

4.2.1 RCA on a Three-digit Level

The subgroups of SITC 77 are 771 *Electric power machinery and parts thereof*, 772 *Electrical apparatus for switching or protecting electrical circuits etc*, 773, *Equipment for distributing electricity*, 774 *Electrodiagnostic apparatus*, 775, *Household type electrical and non electrical equipment*, 776, *Thermionic valves and tubes, semiconductors and circuits* and 778, *Electrical machinery and apparatus*.⁶ The factor intensities within the group of electrical machinery are, according to the UN classification, defined as medium skilled except for 776, *transistor and valves*, which has a high skill factor intensity.

Table 4.1: Factor intensities

SITC	Product group	Factor intensity
771	Electric power machinery, and parts thereof	Medium-skill
772	Electrical apparatus such as switches, relays, fuses and plugs	Medium-skill
773	Equipment for distributing electricity	Medium-skill
774	Electric and radiological apparatus, for medical purposes	Medium-skill
775	Household type, electrical and non-electrical equipment	Medium-skill
776	Thermionic, cold and photo-cathode valves, tubes, and parts	High-skill
778	Electrical machinery and apparatus	Medium-skill

Source: UNCTAD 2002

On a three digit level sub group 773, *equipment for distributing electricity* is the only group that shows a comparative advantage which is growing over the entire

⁶ For a more detailed description see appendix A.2

period studied. In the first period, it only reveals a small comparative advantage in the RCA_1 and with ambiguity for the RCA_2 . While this result is not strong it is reconfirmed by the results in the later periods. This is also the group where we could expect to find some signs of comparative advantage due to the relatively large share (2,72 %) of world export that the MENA region has. Since Morocco is the leading countries within these products it is reasonable to expect that a larger than proportional share of the production is Moroccan. It is reasonable to expect signs of specialisation within this group of products. In the last period some signs of possible comparative advantage are seen in the groups 772, *electrical apparatus for switching* and 776, *semiconductors, valves and circuits*. These results are not surprising since these components are used within the growing automotive sector.

Table 4.2: RCA on a three-digit level

1995-1997			2000-2002			2005-2007		
SITC	RCA_1	RCA_2	SITC	RCA_1	RCA_2	SITC	RCA_1	RCA_2
771	0,03	-0,94	771	0,10	-0,64	771	0,20	-0,64
772	0,10	-0,78	772	0,44	-0,43	772	1,42	-0,08
773	2,56	-0,03	773	4,93	0,31	773	10,15	0,27
774	0,01	-0,97	774	0,01	-0,98	774	0,01	-0,98
775	0,06	-0,85	775	0,04	-0,91	775	0,01	-0,99
776	0,00	-0,95	776	1,48	0,32	776	1,69	0,23
778	0,03	-0,93	778	0,03	-0,99	778	0,07	-0,86

Source: Author's calculations based on trade statistics from COMTRADE

4.2.2 RCA on a Four-digit Level

A three digit level is rather aggregated and since the SITC offers statistics down to a five-digit level these subgroups will be analysed further. However, not all results can be shown here since the material is extensive, all levels for relevant groups can be studied in appendix A.4.

Morocco's specialisation in this industry seems to be very specific and limited to just a few groups. On the four digit level it is only subgroups 7731, *insulated*

wires, cables and conductors and 7763, diodes, transistors and semiconductors that reveal a comparative advantage except for in the last period were 7724, electrical apparatus for switching or protecting circuits also shows an advantage.

Table 4.3: RCA on a four digit level

1995-1997			2000-2002			2005-2007		
SITC	RCA ₁	RCA ₂	SITC	RCA ₁	RCA ₂	SITC	RCA ₁	RCA ₂
772.2	0	-0,98	772.2	0,01	-0,83	772.2	0,03	-0,84
772.3	⁷	-	772.3	0	-0,98	772.3	0,08	-0,76
772.4	0,4	-0,7	772.4	0,17	-0,75	772.4	11,63	0,24
772.5	0,16	-0,75	772.5	0,68	-0,33	772.5	0,74	-0,17
772.6	0,04	-0,89	772.6	0,04	-0,92	772.6	0,2	-0,78
772.8	0,01	-0,97	772.8	0,99	-0,39	772.8	3,88	-0,02
773.1	2,81	0,06	773.1	5,35	0,43	773.1	10,92	0,28
773.2	0,05	-0,98	773.2	0,22	-0,95	773.2	0,28	-0,83
776.3	0,01	-0,94	776.3	14,08	0,37	776.3	11,64	0,29
776.4	0	-0,97	776.4	0,05	-0,31	776.4	0,05	-0,48
776.8	0	-0,63	776.8	0,09	-0,69	776.8	0,25	-0,47

Source: Author's calculations based on trade statistics from COMTRADE

4.2.3 RCA on a Five-digit Level

The results shown are limited to the two sub groups 773 and 776 – since they have shown signs of comparative advantage on more aggregated levels. Results for sub groups to 7724 can be found in appendix A.4. Some of the sub groups seem to reveal a strong comparative advantage which is increasing over time. Especially two groups 77314, *other electric conductors* and 77633, *transistors* have a high index.

Table 4.4: RCA on a five-digit level

1995-1997			2000-2002			2005-2007		
SITC	RCA ₁	RCA ₂	SITC	RCA ₁	RCA ₂	SITC	RCA ₁	RCA ₂
773.13	0,17	0,06	773.13	0,02	-0,27	773.13	2,34	-0,11
773.14	11,68	0,29	773.14	17,82	0,43	773.14	63,01	0,39
773.15	0,45	-0,11	773.15	6,07	0,67	773.15	9,75	0,2

⁷ - indicates missing value

773.17	0,18	-0,97		773.17	1,34	-0,51		773.17	3,13	-0,2
776.31	0,04	-0,21		776.31	1,48	0,01		776.31	0,11	-0,17
776.33	0,01	-0,75		776.33	55,76	0,39		776.33	43,83	0,3
776.35	-	-		776.35	5,66	0,34		776.35	-	-
776.43	-	-		776.43	0,2	0,08		776.43	0	-0,94
776.49	0	-1		776.49	0,06	-0,27		776.49	0,9	0,31
776.81	-	-		776.81	-	-		776.81	1,27	0,71

Source: Author's calculations based on trade statistics from COMTRADE

4.3 Summary

In chapter three we learned that production of electrical components is a small but growing industry in Morocco. This was further confirmed by the results in this chapter.

The empirical findings show a comparative advantage in products such as circuits, conductors and transistors, and hence it is reasonable to assume that Morocco has an emerging specialisation in these products. These products can be used as components which could indicate that Morocco is taking part in production sharing networks. These products belong to product groups classified as having medium and high skill factor intensities. This is a positive finding since production with more value added contribution is profitable.

The index is increasing, with some exceptions, over time which could imply that deeper integration into world trade through trade liberalisation has had an impact and contributed to further specialisation. The findings show specialisation but it is weak and limited to very few products. There could be a distortion due to county size effect which makes the data difficult to analyse correctly and could show for an advantage where there is not. These findings alone are not evidence enough to show for a competitive position in production of electrical components. This leads us to study the production environment in Morocco.

5. Driving factors of product fragmentation

Previous chapters have reviewed the characteristics of production fragmentation and its driving forces. It has concluded that electrical components have a production technology suitable for production fragmentation. Empirical findings show tendencies for specialisation. This chapter will review Morocco's position in relation to the additional conditions needed for fragmentation to arise.

5.1 Factor Costs and Productivity

Moroccan labour costs are low compared to the industrialized North. However, when compared with countries in Asia and South East Asia that compete in similar production, such as Thailand and India, Morocco is less competitive. Cost of labour is higher in Morocco which would not be disadvantageous if counteracted by higher productivity but this is unfortunately not the case. The level of education in the labour force is lower compared to Asian competitors (World Bank 2000). This is a substantial obstacle if Morocco is to participate in production of high skilled products (Ibid)⁸. Morocco has declared 2000-2010 a national decade of education and training (OECD 2008), and a recent report shows an improvement in Morocco's firm-level labour productivity, especially within machinery products (Kinda et al, 2009). This should imply an increased competitiveness for Moroccan firms within these industries. This in turn leads to greater possibilities for Morocco to participate in production fragmentation.

⁸ The high unemployment rates among graduates indicate that the education system do not meet industry needs.

5.2 Euro-Moroccan Trade Integration

Trade liberalisation is a strong driving force for international product fragmentation. Parts cross borders during different stages of production and a dismantling of tariffs reduces the costs of the final product. The European Union is by far Morocco's most important trading partner. Moroccan exports and imports to the EU accounts for 72% and 51% respectively (WTO 2009). In 1996 Morocco signed a bilateral agreement, EU-Morocco Association Agreement, which entered into force in 2000.⁹ It is part of a broader regional integration plan known as the Barcelona process which works for the deepening of integration between the European Union and its southern Mediterranean partners.¹⁰ The EU – Morocco Association Agreement is an extensive agreement which covers economic, political and social topics.

Within the economic framework the overall impact for Morocco is low due to the limitations of the agreement. Restrictive rules of origin for textile products and an almost exclusion of agricultural goods means that the agreement has restrictions on two of Morocco's most important sectors.¹¹ The agreement mainly covers industrial goods and has a twelve year schedule for the dismantling of tariffs depending on the type of good. Tariffs on intermediate goods were eliminated when the agreement came into force. This should have a positive effect on production sharing between Morocco and the European Union.

In 2004 Morocco signed a free trade agreement with the United States. Besides market diversification and new export opportunities Morocco hope that its preferential access to these two large markets will make it an attractive location.

⁹ It replaced the 1976 co-operation agreement.

¹⁰ The Euro-Med partnership or Barcelona Process was re-launched in 2008 under the new name: Union for the Mediterranean.

¹¹ Agriculture is part of the agreement but to be negotiated in the future (World Bank 2003).

5.3 Trade Facilitation

A small economy like Morocco with a relatively small domestic market is most likely to attract investments intended for production of export products. This makes reductions in transaction costs even more important. Trade facilitation is defined by the WTO (cited in Engman 2005) as “*the simplification and harmonization of international trade procedures*”. Complicated and time consuming bureaucratic procedures (red tape) such as time spent in customs, paper work needed for declaration of goods and other formalities and practices related to the movement of goods in international trade can be serious obstacles to a cost efficient production and trade. Efficient border procedures reduce trade transaction costs (TTC) which have a real affect on firms’ decisions on where to locate. This makes trade facilitation a vital topic for Morocco.

The decision on where to locate a product suitable for fragmentation is directly linked to the transaction costs involved. Developing countries not only compete in factor costs but also in their ability to create an attractive business environment of which transaction costs play an important part. Fragmentation will not be profitable if these costs are not competitive. Among the actions taken by the Moroccan government to improve and facilitate the country’s integration in the world economy are; streamlining the customs procedures, computerization and transparent administration making all information available for the public and adopting electronic declaration which reduces the costly time spent in customs. Corruption has also been stemmed through performance based bonuses for customs officers (World Bank 2003).

5.3.1 Measuring Trade Facilitation

Measuring trade facilitation is not a simple task, the ranking provided by the World Bank Doing Business index will be used to illustrate how Morocco performs in comparison with other countries and regions.

The Doing Business index ranks 181 countries according to their ease of doing business divided into different topics. In *Trading Across Borders*, the procedures and requirements for import and exports are reviewed and in 2009 Morocco was ranked in 64th place. Table 5.1 shows Morocco's performance compared to the rest of the MENA-region, the OECD countries and East Asia and Pacific. As the table shows, Morocco performs well in comparison.

Table 5.1: Trade across borders

Region or Economy	Documents for export (number)	Time for export (days)	Cost to export (US\$/container)	Documents for import (number)	Time for import (days)	Cost to import (US\$/container)
Morocco	7	14	700	10	18	1000
Middle East & North Africa	6,5	23,3	1024,4	7,6	26,7	1204,4
OECD	4,5	10,7	1069,1	5,1	11,4	1132,7
East Asia & Pacific	6,7	23,3	902,3	7,1	24,5	948,5

Source: World Bank Doing Business Index

5.4 Export Processing Zones

Chapter three noted that the majority of firms in the automotive industries are located in Morocco's export processing zone the Tangier Free Zone (TFZ). Export processing zones (EPZ) or free trade zones have become a popular strategy for developing countries to attract investments since they offer advantageous conditions for foreign and domestic firms. These conditions often differ immensely from the rest of the country. Products imported to the zone are exempt from import taxes under the condition that the goods after being assembled or processed are re-exported again.¹² Additional incentives given to attract firms are a reduction of bureaucracy, flexible labour laws and improved infrastructure. Through EPZ the country hopes to attract FDI and accomplish a transfer of technology and knowledge. These zones are often a means to promote non-traditional exports. The EPZ combines the developing country's advantage in low

¹² Some EPZ allow for domestic sales.

labour costs with low transaction costs and effective infrastructure; this makes the EPZ a suitable location for production fragmentation.

There are different opinions on the long term positive effects of EPZs. Madani (1999) argues that though export processing zones can be efficient for a developing country during a limited period of time these zones should be seen as a transition phase before liberalising the entire country's economy. There is a risk that the benefits and spillover effects enjoyed by the firms within the zone are not transferred and therefore lost to the rest of the country.

5.4.1 The Tangier Free Zone

In 2001 Morocco's first export processing zone, the Tangier Free Zone (TFZ) started operating. With its strategic location on the Mediterranean coast, only a few kilometres away from Gibraltar, Spain and the European Union, it has been a success in terms of attracting investments and creating jobs.¹³

The TFZ has attracted a diversified production of goods and services. Compared to the rest of the country production is dominated by non-traditional manufacturing, of which automotive manufacturing and electrical components are the main industries. The whole TFZ is estimated to attract 1900 companies. Firms from France, Germany Italy, Japan, Portugal, Spain and the United States as well as local firms have opened production in the Tangier Free Zone.

The attractiveness of the TFZ is further enhanced by the establishment of the *Tangier – Med* port which is predicted to become the largest container port on the Mediterranean. The success of the TFZ has been followed by Casashore outside Casablanca¹⁴ and several new free trade zones are planned for the coming years.

¹³ Between 2001 and 2005 employment rose from 6000 to 18000 positions and exports went from US\$ 90 million to US\$ 200 million (World Bank 2006).

¹⁴ Morocco has become the number one destination for francophone call centres and a hub for call centres in Africa – the majority located in Casashore .

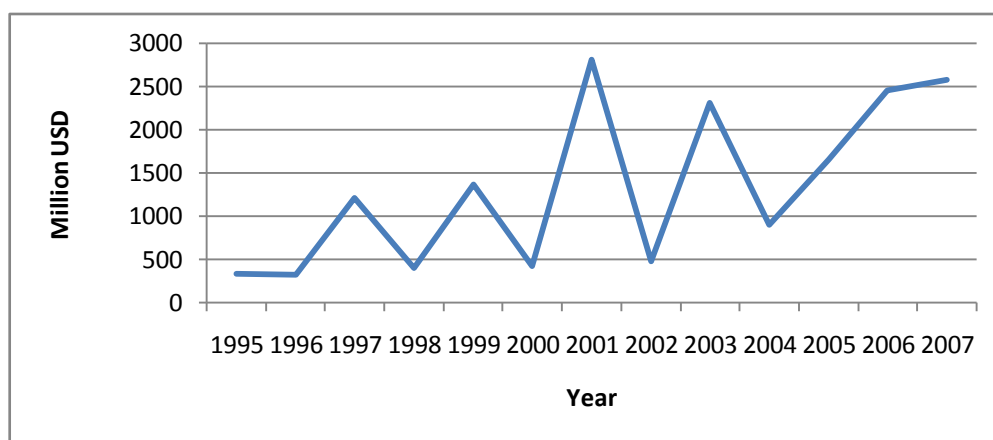
5.5 Foreign Direct Investments

An export processing zone is an instrument to attract FDI. As mentioned in chapter 2 foreign direct investments and product fragmentation have similar driving forces and are intertwined. An increase in FDI can therefore be an indication of production fragmentation. Foreign direct investments are important tools for developing countries' economic growth; they often bring job opportunities, new technology and a possibility for countries to enter into new types of production. Without investments from abroad many developing countries would not be able to participate in production of more sophisticated products.

The Moroccan government works to attract investments and has undertaken related measures like the implementation of an investment charter, protection measures and bilateral investment treaties, to improve and secure FDI (UNCTAD 2007). The active role taken to facilitate trade, greater integration into the world economy and a sound macroeconomic situation have most likely contributed to the increase of investments to the country over the last decade

Between 1995 and 2000 FDI averaged 675 million USD annually which increased to 1728 million USD annually between 2002 and 2007. The yearly investments have been volatile but with an upward trend in recent years (see figure 5.1).

Figure 5.1: Inflows of FDI to Morocco 2000 – 2007



Source: UNCTAD FDI Database

The absolute bulk of investments come from France and Spain where over 60 % of the FDI originates. The majority of the FDI to Morocco has been driven by privatization. Telecommunications and services are large recipients. The FDI to the industrial sector counted for 24 % of the total FDI during the period 2000-2007.¹⁵ It has not been possible to find accurate information on the distribution within the industrial sector but since FDI is often linked to MNCs we could get some indications on the relevance of the FDI on the electrical sector by looking at the largest MNCs in Morocco. In 2007, 2 of the 5 largest MNCs were within the electrical and electronics industry (see appendix A.2). In general foreign ownership is not strong in Morocco but the firms that do have foreign capital export a majority of their production (75%). The electronics and electrical component sector had one of the largest shares, within the manufacturing sector, of foreign ownership, 29%, in 1999 (World Bank 1999). A conclusion from this is that, one of the industries that foreign firms are most likely to be part of is electronics and electrical equipment. This strengthens the assumption that Morocco is taking part in production fragmentation within this industry.

¹⁵ Author's calculations based on data from Office de Changes

6. Summary and Conclusion

The purpose of this paper was to study Morocco's trade with electrical components and to see if it showed signs of specialisation and production fragmentation.

Production fragmentation can be a way for developing countries to promote economic development. It offers a relatively easy entry to the world market since firms only need to produce a certain component effectively instead of an entire product. Domestic firms can learn from MNCs through a transfer of know-how and move from basic labour intensive production towards more human capital intensive production. If the production technology allows for fragmentation it is driven by among other, differences in factor costs and trade liberalisation. Transaction costs are of special importance since they have great impact on the cost of production.

The paper concludes that electrical components is an industry suitable for production fragmentation and specifically north - south since it has a production technology where it is easy to differentiate between capital and labour as well as between skilled and unskilled labour. For a developing country it is an opportunity to diversify the country's export to products of higher value added.

My empirical findings show that production of electrical components occurs in Morocco. It also shows that Morocco has a comparative advantage in a few of these product groups. Under the assumption that production occurs where there is a comparative advantage and that comparative advantage leads to specialisation and fragmentation then Morocco is part of international production sharing networks.

These findings are however ambiguous. The comparative advantage can only be

found in a small portion of the product groups studied. There are nevertheless large MNCs operating in Morocco in this industry which would indicate, under the assumption that MNCs are profit seeking, that there are comparative advantages to be found.

Driving forces behind fragmentation are factor costs and transaction costs. Within this industry the most important factor cost for Morocco is the cost of labour and the level of productivity. Though this cost is lower than in the north it is higher than its Asian competitors. This is an obvious disadvantage for Morocco.

The transaction costs of production and trade in Morocco seem to, in some cases, counteract the disadvantages in factor costs. The deepened integration with the EU in combination with measures taken by the Moroccan government to facilitate trade have lowered transaction costs.

The establishment of an export processing zone has most likely been an important incentive for MNCs to invest in Morocco. FDI is disproportionately large in production of products destined for export. This together with the fact that two of the largest MNCs operating in Morocco are within the electrical component industry indicates that specialisation and fragmentation of electrical components is taking place and that it is intra-firm. There is an upward trend in FDI to Morocco which also indicates an improved trade climate.

Taking this into account it is clear that the Moroccan government has enhanced the country's comparative advantages through lowering transaction costs and creating a beneficial environment for the electrical component industry. If these measures outweigh the disadvantages in factor costs then it is reasonable to assume that product fragmentation will prosper in Morocco.

These conditions indicate that the electrical component industry is moving towards area 1 in figure 2.1 which would make production advantageous and imply participation in production sharing networks.

So far Morocco has been successful in lowering transaction costs, it remains to be seen if it can be as successful in the development of its human capital. This is crucial since it will improve its productivity, ensure the transfer of available knowledge into the country and enable the country to climb the value added ladder in production. Improving human capital is a gradual process but a necessary one to accomplish sustainable economic development.

If Morocco is successful in doing this it will be competitive not only within certain product groups in the electrical component industry but also improve its competitiveness in general.

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Appendix

A.1. Trends in regional trade in electronics, selected years

Product	Exports to world (\$ millions)			Share of Asia Pacific in world exports (%)			Share of North Africa - Middle East in world exports (%)		
	1995	2000	2003	1995	2000	2003	1995	2000	2003
SITC									
771 Elect power transm equip	23 409	41 034	39 964	36,26	35,25	35,85	0,61	0,50	0,75
772 Electric circuit equipmt	66 030	108 206	118 385	18,41	22,92	23,71	0,26	0,36	0,61
773 Electrical distrib equip	29 502	46 823	48 342	16,22	16,31	17,14	2,36	2,29	2,72
774 Medical etc el diag equip	12 389	18 483	26 429	2,65	3,80	4,14	0,02	0,05	0,03
775 Domestic equipment	31 462	40 821	55 138	23,54	26,51	29,22	0,90	1,10	2,12
776 Valves/transistors/etc	188 763	333 326	314 009	39,04	42,74	49,02	0,00	0,15	0,20
778 Electrical equipment nes	79 827	113 990	120 186	22,21	19,56	25,51	0,17	0,18	0,29

Source: UNCTAD 2005

A.2 Largest affiliates of MNC in Morocco, 2007 (based on sales)

Company	Industry	Home Country
Air Liquide Maroc SA	Chemicals and chemical products	France
Nexans Maroc Sa	Electrical and electronic equipments	France
Unilvever Bestfoods Maghreb Sa	Chemicals and chemical products	United Kingdom
St Microelectroncs Maroc Sa	Electrical and electronic equipments	Netherlands
Nestle Maroc SA	Food products, beverages and tobacco	Switzerland

Source UNCTAD World Investment Directory

A.3 Division 77 of the SITC 3rd rev.¹⁶

77	Electrical machinery, apparatus and appliances,
771	Electric power machinery
771.1	Transformers, electrical
771.2	Other electric power machinery
772	Electrical apparatus for switching or protecting electrical circuits
772.2	Printed circuits
772.3	Electrical resistors
772.4	Electrical apparatus for switching or protecting electrical circuits
772.41	Fuses
772.42	Automatic circuit-breakers
772.43	Other automatic circuit-breakers
772.44	Isolating switches
772.45	Lightning arresters,
772.49	Other electrical apparatus for switching or protecting electrical circuits...
772.5	Electrical apparatus for switching or protecting electrical circuits
772.6	Boards, panels
772.8	Parts...
773	Equipment for distributing electricity,
773.1	Insulated wire, cable...
773.11	Winding wire
773.12	Co-axial cable...
773.13	Ignition wiring sets...
773.14	Other electric conductors
773.15	Other electric conductors
773.17	Other electric conductors
773.18	Optical fibre cables
773.2	Electrical insulating equipment
773.22	Electrical insulators of glass
773.23	Electrical insulators of ceramics
773.24	Electrical insulators of materials other than glass or ceramics
773.26	Insulating fittings for electrical machines
773.28	Insulating fittings for electrical machines, appliances or equipment, solely for purposes of assembly
773.29	Insulating fittings for electrical machines, solely for purposes of assembly
774	Electrodiagnostic apparatus
774.1	Electrodiagnostic apparatus
774.2	Apparatus based on the use of X-rays
775	Household-type electrical and non-electrical equipment, n.e.s.
775.1	Household-type laundry equipment
775.2	Household-type refrigerators and food freezers
775.3	Dishwashing machines of the household type
775.4	Shavers and hair clippers
775.7	Electromechanical domestic appliances

¹⁶ COMTRADE, shortened version

775.8	Electrothermic appliances, n.e.s.
776	Thermionic, cold...;
776.1	Television picture tubes, cathode-ray
776.11	...colour
776.12black and white or other monochrome
776.2	Other electronic valves and tubes
776.21	Television camera tubes;
776.23	Other cathode-ray tubes
776.25	Microwave tubes
776.27	Other valves and tubes
776.29	Parts of the tubes and valves
776.3	Diodes, transistors and similar semiconductor devices
776.31	Diodes
776.32	Transistors
776.33	Transistors
776.35	Thyristors, diacs and triacs
776.37	Photosensitive semiconductor devices
776.39	Other semiconductor devices
776.4	Electronic integrated circuits and microassemblies
776.41	Digital monolithic integrated units
776.43	Non-digital monolithic integrated units
776.45	Hybrid integrated circuits
776.49	Other electronic integrated circuits and microassemblies
776.8	Piezoelectric crystals, mounted
776.81	Piezoelectric crystals, mounted
776.88	Parts of the devices
776.89	Parts of the articles of subgroup 776.4
778	Electrical machinery and apparatus, n.e.s.
778.1	Batteries and electric accumulators, and parts thereof
778.2	Electric filament or discharge lamps
778.3	Electrical equipment,
778.4	Electromechanical tools for working in the hand
778.6	Electrical capacitors, fixed, variable or adjustable
778.7	Electrical machines and apparatus,
778.8	Electrical machinery and equipment, n.e.s.

A.4. RCA on Different Levels of Aggregation¹⁷

SITC	1995-1997		2000-2002		2005-2007	
	RCA ₁	RCA ₂	RCA ₁	RCA ₂	RCA ₁	RCA ₂
771	0,03	-0,94	0,10	-0,64	0,20	-0,64
771.1	0,08	-0,93	0,17	-0,56	0,46	-0,54
771.2	0,01	-0,95	0,08	-0,68	0,12	-0,70
772	0,10	-0,78	0,44	-0,43	1,42	-0,08
772.2	0,00	-0,98	0,01	-0,83	0,03	-0,84
772.3	⁻¹⁸	-	0,00	-0,98	0,08	-0,76
772.4	0,40	-0,70	0,17	-0,75	11,63	0,24
772.41	0,88	-0,52	-	-	0,01	-1,00
772.42	-	-	-	-	0,07	-0,97
772.43	1,93	-0,23	0,06	-0,83	-	-
772.44	-	-	0,05	-0,96	0,24	-0,92
772.45	-	-	0,22	-0,74	0,03	-0,98
772.49	0,05	-0,91	0,30	-0,01	26,06	0,47
772.5	0,16	-0,75	0,68	-0,33	0,74	-1,00
772.6	0,04	-0,89	0,04	-0,92	0,20	-0,78
772.8	0,01	-0,97	0,99	-0,39	3,88	-0,02
773	2,56	-0,03	4,93	0,31	10,15	0,27
773.1	2,81	0,06	5,35	0,43	10,92	0,28
773.11	-	-	0,02	-0,87	0,01	-0,95
773.12	0,20	-0,76	0,16	-0,73	0,80	-0,11
773.13	0,17	0,06	0,02	-0,27	2,34	-0,11
773.14	11,68	0,29	17,81	0,43	63,01	0,39
773.15	0,45	-0,11	6,07	0,67	9,75	0,20
773.17	0,18	-0,97	1,34	-0,51	3,13	-0,20
773.18	-	-	0,32	-0,50	0,40	-0,77
773.2	0,05	-0,98	0,22	-0,95	0,28	-0,83
773.22	-	-	-	-	0,04	-0,99
773.23	-	-	-	-	0,02	-0,99
773.24	-	-	0,02	-0,99	0,51	-0,88
773.26	0,14	-0,75	0,10	-0,47	0,06	-0,55
773.28	0,08	-0,97	0,51	-0,94	-	-
773.29	-	-	-	-	0,31	-0,86
774	0,01	-0,97	0,01	-0,98	0,01	-0,98
774.1	0,00	-0,99	0,00	-0,98	0,01	-0,99
774.2	0,02	-0,96	0,01	-0,98	0,02	-0,97
775	0,06	-0,85	0,04	-0,91	0,01	-0,99
775.1	0,00	-1,00	0,03	-0,93	0,00	-1,00

¹⁷ Authors' calculations based on trade statistics from COMTRADE (appendix A.4)

¹⁸ Indicates missing value

775.2	0,31	-0,68		0,16	-0,84		0,00	-1,00
775.3	-	-		0,00	-1,00	-	-	
775.4	0,03	-0,73	-	-			0,29	-0,36
775.7	0,00	-0,99		0,01	-0,98		0,03	-0,94
775.8	0,01	-0,97		0,00	-0,98		0,00	-0,99
776	0,00	-0,95		1,48	0,32		1,69	0,23
776.1	-	-	-	-		-	-	
776.11	-	-	-	-		-	-	
776.12	-	-	-	-			0,15	-
776.2	-	-	-	-			0,00	-0,93
776.21	-	-1,00	-	-		-	-	
776.23	-	-	-	-		-	-	
776.25	-	-	-	-		-	-	
776.27	-	-	-	-		-	-	
776.29	-	-	-	-		-	-	
776.3	0,01	-0,94		14,08	0,37		11,64	0,29
776.31	0,04	-0,21		1,48	0,01		0,11	-0,17
776.32	-	-	-	-		-	-	
776.33	0,01	-0,75		55,74	0,39		43,82	0,30
776.35	-	-		5,66	0,34	-	-	
776.37	-	-		0,03	-0,86		0,02	-0,89
776.39	-	-	-	-		-	-	
776.4	0,00	-0,97		0,05	-0,31		0,05	-0,48
776.41	-	-		0,00	-0,97		0,08	-0,56
776.43	-	-		0,20	0,08		0,00	-0,94
776.45	0,00	-0,90		0,07	-0,04		0,01	-0,83
776.49	0,00	-1,00		0,06	-0,27		0,90	0,31
776.8	0,00	-0,63		0,09	-0,69		0,25	-0,47
776.81	-	-	-	-			1,27	0,71
776.88	0,01	-0,63		0,49	-0,69		0,01	-0,97
776.89	-	-		0,00	-0,92		0,00	-0,99
778	0,03	-0,93		0,03	-0,99		0,07	-0,86
778.1	0,02	-0,95		0,03	-0,90		0,04	-0,87
778.2	0,01	-0,99		0,01	-0,99		0,01	-0,99
778.3	0,08	-0,86		0,03	-0,91		0,03	-0,92
778.4	0,00	-0,99		0,00	-0,98		0,01	-0,98
778.6	0,03	-0,67		0,01	-0,76		0,11	-0,41
778.7	0,00	-1,00		0,02	-0,98		0,19	-0,80
778.8	0,02	-0,92		0,03	-0,92		0,04	-0,91

A.5 Export statistics¹⁹

Export of goods, Morocco to the World (1000 USD)

SITC	1995	1996	1997	Average	2000	2001	2002	Average	2005	2006	2007	Average
771	361	789	958	703	4248	3814	3780	3947	6913	10180	18932	12008
771.1	185	475	889	516	1576	1301	1762	1546	2875	3287	11769	5977
771.2	176	315	69	186	2672	2513	2018	2401	4038	6892	7163	6031
772	8765	6050	4082	6299	44377	35463	61369	47070	194190	267025	275507	245574
772.2	1	10	45	19	263	337	137	246	479	498	1565	847
772.3	-	-	1	-	0	6	12	6	24	25	1668	572
772.4	3494	754	4	1417	552	612	1055	740	51648	114340	100294	88760
772.41	-	322	0	107	0	-	-	-	3	0	2	2
772.42	-	-	-	-	0	-	2	-	3	8	134	48
772.43	3187	126	1	1105	-	-	111	37	-	-	39	-
772.44	96	-	-	-	44	10	91	48	199	308	609	372
772.45	-	-	-	-	250	-	2	84	4	26	16	15
772.49	211	-	3	71	259	602	848	570	51438	113998	99494	88310
772.5	4948	4790	3810	4516	38945	25492	29437	31292	46949	51042	65332	54441
772.6	305	357	167	276	118	447	1101	556	3871	7093	5611	5525
772.8	16	139	55	70	4497	8569	29628	14231	91218	94027	101038	95428
773	72517	71707	86447	76890	197884	231569	313743	247732	719261	843389	993301	851983
773.1	72472	71549	86267	76763	196787	230716	312899	246801	718532	841147	991098	850259
773.11	18	10	-	-	15	73	92	60	31	187	61	93
773.12	366	332	432	377	600	367	423	464	3016	3835	5327	4059

¹⁹ Source: COMTRADE

773.13	3880	34	4	1306	699	5	114	272	67230	86573	61	51288
773.14	63640	67166	84964	71923	182050	152489	195760	176766	524865	618261	782144	641757
773.15	4566	3517	601	2895	12680	74585	110199	65821	109419	116705	186476	137533
773.17	3	489	266	253	641	2047	4057	2248	11999	15104	16282	14462
773.18	-	-	-	-	102	1151	2254	1169	1971	483	747	1067
773.2	44	158	180	127	1097	852	844	931	729	2241	2202	1724
773.22	-	-	-	-	-	-	-	-	26	0	1	9
773.23	-	1	1	-	-	-	1	-	24	7	7	13
773.24	-	-	-	-	0	1	45	15	359	758	447	521
773.26	22	60	45	42	50	38	41	43	30	26	28	28
773.28	21	98	134	84	1047	806	707	853	-	1147	1581	-
773.29	1	-	-	-	-	8	50	-	290	303	138	244
774	301	95	60	152	26	138	139	101	489	254	416	386
774.1	-	-	57	19	0	52	86	46	133	93	69	99
774.2	301	95	2	133	25	86	53	55	356	161	347	288
775	5207	193	234	1878	4741	175	283	1733	964	1357	1372	950
775.1	3	1	10	5	592	5	45	214	120	0	17	46
775.2	4971	9	192	1724	4125	9	14	1383	3	20	50	25
775.3	-	-	-	-	0	2	0	1	0	1	-	-
775.4	2	108	0	37	-	12	-	-	592	872	775	746
775.7	53	4	21	26	4	105	27	45	195	417	409	340
775.8	178	71	11	87	20	42	197	86	55	47	121	75
776	597	95	79	257	480202	386174	502194	456190	626264	732310	726322	694965
776.1	-	-	-	-	-	-	-	-	-	1	-	-
776.11	-	-	-	-	-	-	-	-	-	1	-	-

776.12	-	-	-	-	-	-	-	-	-	-	46	-	15
776.2	-	5	3	-	-	1	18	-	-	0	46	1	16
776.21													-
776.23	-	-	-	-	-	-	0	-	-	0	-	-	-
776.25	-	-	-	-	-	-	-	-	-	-	-	-	-
776.27	-	5	3	-	-	1	18	-	-	-	46	-	-
776.29	-	-	-	-	-	1	-	-	-	-	-	-	-
776.3	575	70	66	194	445107	381251	498806	441721	619461	705977	688504	671314	
776.31	535	1	0	179	28966	6	1	9658	431	583	1725	913	
776.32	-	-	-	-	-	-	-	-	-	-	-	-	-
776.33	39	59	42	46	400969	381023	498581	426858	618826	704911	686295	670011	
776.35	-	-	1	-	15006	-	-	5002	-	-	-	-	-
776.37	-	10	23	-	165	222	224	204	204	484	484	391	
776.39	-	-	-	-	0	-	0	-	-	-	-	-	-
776.4	0	21	10	45	32618	3548	2409	12858	5326	16185	29808	17106	
776.41	-	-	-	-	52	277	330	220	4126	10360	19855	11447	
776.43	-	-	-	-	30941	679	6	10542	16	24	302	114	
776.45	-	13	10	8	1577	1403	616	1199	67	221	238	175	
776.49	0	8	0	3	48	1190	1457	899	1116	5580	9414	5370	
776.8	22	-	-	18	2477	1374	961	1604	1478	10102	8009	6529	
776.81	-	-	-	-	-	-	-	-	1301	9989	7960	6417	
776.88	22	-	-	7	2467	1371	952	1597	136	19	41	65	
776.89	-	-	-	-	9	3	9	7	40	93	8	47	
778	2429	1714	1391	1845	3570	1870	1342	2261	7367	5668	22471	11835	
778.1	787	37	17	280	1617	85	90	597	1926	685	1506	1372	

778.2	74	70	62	69	16	82	90	63	183	138	104	142
778.3	926	955	790	890	501	450	518	490	1031	837	778	882
778.4	4	15	7	9	34	38	14	29	59	66	119	81
778.6	276	359	301	312	183	138	240	187	1801	1876	2800	2159
778.7	34	5	6	15	177	816	78	357	915	992	15596	5834
778.8	328	273	208	270	1041	261	312	538	1451	1074	1569	1365
TOTAL	4718877	4742000	4674170	4711682	7431841	7144079	7850326	7475415	11184847	12530624	14607346	12774272

Import of goods, Morocco to world (Million USD)

SITC	1995	1996	1997	Average	2000	2001	2002	Average	2005	2006	2007	Average
771	32815	22269	10532	21872	15660	21412	16803	17958	40156	45725	77117	54332
771.1	22754	15828	3493	14025	3535	8000	4713	5416	12360	15622	31955	19979
771.2	10061	6441	7039	7847	12125	13412	12090	12542	27796	30103	45162	34354
772	57870	52810	45220	51967	103587	103185	145628	117467	235527	250375	376881	287595
772.2	2787	2318	1386	2164	5101	1509	1583	2731	9412	11019	8013	9481
772.3	676	678	658	670	576	539	682	599	1166	1566	9818	4183
772.4	12999	6130	4872	8000	5116	5063	5076	5085	58892	49401	53910	54068
772.41	372	394	264	343	342	218	197	252	13332	485	596	4804
772.42	1707	2035	704	1482	1174	1115	775	1022	2886	2849	5225	3653
772.43	4311	884	69	1755	180	651	349	393	7292	888	3274	3818
772.44	3824	1548	1819	2397	2039	2052	2741	2277	4505	7841	13492	8613
772.45	557	374	819	583	586	535	544	555	1349	1724	1118	1397
772.49	2228	893	1197	1439	796	492	470	586	29528	35614	30213	31785
772.5	32347	32118	29310	31258	62599	53834	70524	62319	56074	72288	99758	76040

772.6	2513	7351	4885	4916	10213	9312	23228	14251	19659	22779	93382	45273
772.8	6548	4215	4110	4958	19982	32928	44534	32481	90326	93232	112001	98520
773	80814	59292	104609	81572	112348	121243	160582	131391	365088	446555	668049	493231
773.1	65654	48972	91430	68685	83084	91328	118537	97650	344963	428767	651632	475121
773.11	570	991	966	843	910	697	1010	872	2752	3701	3856	3436
773.12	4403	1884	2061	2783	4213	2996	1700	2970	5114	3233	6745	5031
773.13	3141	193	130	1155	241	582	606	476	15340	23471	152437	63749
773.14	43573	35252	39600	39475	59338	65666	84378	69794	224970	281976	339830	282259
773.15	4386	3504	2986	3625	5601	11715	22229	13182	64563	77814	130016	90798
773.17	1946	4233	44531	16904	6870	8358	5339	6856	21669	31089	11878	21545
773.18	7634	2914	1156	3901	5911	1313	3276	3500	10556	7485	6869	8303
773.2	15160	10321	13179	12886	29264	29914	42045	33741	20125	17788	16417	18110
773.22	8775	2944	5172	5630	2048	2025	2108	2060	2508	1575	1068	1717
773.23	759	631	489	626	1219	627	1364	1070	1619	2474	2845	2313
773.24	790	1072	1722	1195	2934	4221	4996	4050	8741	8338	6446	7842
773.26	407	238	253	299	179	126	52	119	48	110	131	96
773.28	4290	5334	5385	5003	22723	22706	33051	26160	2640	2188	3628	2819
773.29	139	102	158	133	160	209	474	281	4571	3104	2299	3325
774	11933	8166	9687	9929	9001	12200	11185	10795	32118	30984	37182	33428
774.1	3973	2851	3285	3370	4450	4264	4702	4472	12299	15044	14263	13869
774.2	7960	5315	6402	6559	4551	7936	6484	6323	19820	15940	22918	19559
775	22805	24328	24264	23799	31248	33569	45745	36854	103527	119423	172678	131876
775.1	2446	3509	3278	3078	3936	5235	9575	6249	26310	31671	49348	35776
775.2	10221	8348	8720	9096	13617	15246	18879	15914	46095	50902	74462	57153
775.3	202	240	304	248	515	681	923	706	2131	3372	4332	3278

775.4	295	202	224	241		269	260	369	299	1215	1561	2010	1595
775.7	3482	5392	4769	4548		5116	4227	5825	5056	8697	10201	12773	10557
775.8	6159	6637	6969	6588		7795	7921	10173	8630	19079	21716	29752	23516
776	9557	10076	10011	9881		290826	229590	190854	237090	391437	376367	550056	439286
776.1	30	60	56	49		37	31	21	30	21	13	16	17
776.11	30	53	49	44		33	31	21	28	21	13	16	17
776.12	-	7	7	-		4	-	0	-	0	-	-	-
776.2	1029	577	773	793		726	660	781	722	275	655	387	439
776.21	13	1	8	7	-		2	45	-	-	3	11	-
776.23	88	26	34	49		10	156	37	68	12	7	150	56
776.25	67	119	265	150		62	57	40	53	77	127	62	89
776.27	855	424	460	580		640	442	654	578	180	515	161	285
776.29	5	8	6	6		15	2	5	7	5	3	3	4
776.3	6180	6217	5120	5839		234795	200412	173458	202888	350623	321556	442781	371653
776.31	324	274	227	275		27904	152	196	9417	677	926	2288	1297
776.32	40	110	30	60		6	14	9	10	31	8	7	15
776.33	251	467	274	330		197000	198178	169724	188301	344012	313336	432358	363235
776.35	182	243	223	216		6928	206	200	2445	349	368	212	310
776.37	5310	5093	4327	4910		2892	1720	3215	2609	5372	6581	7489	6481
776.39	74	3	39	38		64	143	115	107	181	337	428	315
776.4	2243	3103	4019	3122		44988	17988	10789	24588	29898	42977	74865	49247
776.41	752	1012	1169	978		17638	14453	6316	12802	22667	34086	65299	40684
776.43	517	551	267	445		25213	1122	444	8926	2034	4165	5422	3874
776.45	45	176	200	140		1107	884	1869	1287	2569	1255	1801	1875
776.49	930	1364	2383	1559		1031	1529	2160	1573	2628	3471	2342	2814

776.8	75	118	43	79	10280	10499	5806	8862	10620	11165	32006	17930
776.81	23	21	17	20	52	55	43	50	951	1007	1299	1086
776.88	23	63	13	33	10185	10254	5453	8631	7756	3433	274	3821
776.89	29	34	13	26	43	190	310	181	1913	6725	30434	13024
778	48748	59195	55745	54563	69599	97740	96974	88104	135612	139871	193573	156352
778.1	10365	10124	9684	10058	14112	10464	8575	11051	15079	15651	26736	19155
778.2	10402	12896	11712	11670	10301	11779	13306	11795	20673	18100	22085	20286
778.3	12307	12511	10597	11805	9223	9791	10538	9851	16074	18198	26643	20305
778.4	2592	3287	2811	2897	3517	3150	3308	3325	667	8053	10806	6509
778.6	1691	1572	1475	1579	1578	1358	1259	1398	3173	4634	7504	5104
778.7	5718	10969	12293	9660	23304	46109	41561	36991	51823	43684	61405	52304
778.8	5674	7836	7173	6895	7563	15088	18427	13693	22144	31542	38394	30693
TOTAL	854047	825343	787752	822381	1153338	110368	1187815	817174	146551947	169772485	195396884	170573772
L	6	7	9	4	3	5	3	0	1	9	2	4

Exports of goods World (Million USD)

SITC	95	96	97	Average	2000	2001	2002	Average	2005	2006	2007	Average
771	21808360	24406596	28129530	24781495	34806352	32226354	30352392	32461699	44300551	54281817	67242980	55275116
771.1	6174214	6598916	8036235	6936455	8055951	7328875	6947820	7444215	8711300	11049022	15093424	11617915
771.2	15634146	17807680	20075520	17839115	26750400	24897479	23388606	25012162	35589251	43183499	52149556	43640769
772	63509706	66047427	70654873	66737335	90660901	82642801	84792999	86032234	135655342	155695715	177327967	156226341
772.2	10037950	10554648	12292567	10961722	19181882	16093171	15926419	17067157	25498379	29238927	31735370	28824226
772.3	4562009	4230393	4605662	4466021	6100198	4805002	4704186	5203129	6025048	6839660	7626675	6830461
772.4	3520558	3902147	3943904	3788870	3482850	3623614	3744412	3616959	5754664	6886712	7996766	6879381
772.41	106236	153318	130116	129890	184441	172874	142678	166664	286410	306922	368221	320518
772.42	350534	396435	401150	382706	297448	285361	337598	306802	525245	599239	655823	593436

772.43	571762	632601	613233	605865	528215	518670	532731	526538	853988	993833	1160825	1002882
772.44	683033	771092	953055	802393	660409	829991	778591	756330	1224472	1412138	1632715	1423108
772.45	313845	342627	316459	324310	319443	311218	279469	303377	437122	501797	507570	482163
772.49	1494247	1604967	1528695	1542636	1490482	1499103	1667504	1552363	2427410	3067004	3671560	3055325
772.5	28847306	29519656	30921729	29762897	40239477	36237375	36078328	37518394	56594057	66041265	75301169	65978830
772.6	7748739	8436215	8466547	8217167	9879537	10689525	12443130	11004064	22726177	24727478	29144242	25532632
772.8	8791536	9402202	10144566	9446102	11776956	11194113	11896523	11622531	19057017	21961673	25523745	22180812
773	28757119	32464165	34383298	31868194	42253012	40824113	39288447	40788524	60488713	76185848	90349274	75674612
773.1	25913108	29506670	31298151	28905977	38792241	37596633	35820771	37403215	55687169	70818182	84102539	70202630
773.11	2486260	2370175	2556182	2470872	2689473	2467142	2411546	2522720	4135348	5749721	6998333	5627800
773.12	1888149	2062015	2020230	1990131	2589415	2310943	1983114	2294491	3295857	4473089	5874352	4547766
773.13	6833821	8126384	8793378	7917861	10565068	11045542	12495592	11368734	17581809	19712684	21890888	19728460
773.14	5745189	6583681	7234513	6521127	9295701	7645535	7201595	8047610	10867316	13778080	2906246	9183881
773.15	6098731	7035939	7415084	6849918	9079855	8522001	8782202	8794686	15273292	20987862	1911722	12724292
773.17	1297429	1601629	1539332	1479463	1348768	1379152	1351969	1359963	2557792	3702511	6227254	4162519
773.18	1538183	1687295	1711395	1645624	3213032	4211253	1570608	2998298	1975694	2356530	2926329	2419518
773.2	2844011	2957495	3065206	2955571	3460771	3227480	3467676	3385309	4801543	5367666	6246735	5471981
773.22	124211	120875	116274	120453	89022	95678	128292	104331	160885	169478	225843	185402
773.23	522156	501745	555022	526307	483848	481812	488498	484719	587968	702514	800379	696954
773.24	565441	549303	570567	561770	653497	632389	619314	635067	842900	884322	1036354	921192
773.26	281842	317873	329857	309857	384739	339214	312924	345625	389372	442996	462839	431736
773.28	1094686	1139635	1140659	1124994	1379745	1237821	1480612	1366060	2226106	2451926	2869751	2515928
773.29	254221	327779	351955	311319	468822	439195	436047	448021	594313	710510	851568	718797
774	12392069	13126401	13156117	12891529	14792491	15756256	17201608	15916785	25856603	29372491	33112755	29447283
774.1	5587035	6014666	6295850	5965850	7427797	8126531	8992570	8182299	12338980	13788272	15162110	13763121
774.2	6805035	7111735	6860187	6925652	7364694	7629724	8209038	7734486	13517623	15584220	17950645	15684162
775	31135157	33001142	33990856	32709052	36046039	37123906	41397599	38189182	63457612	70660013	80709159	71608928
775.1	4275228	4847060	5086611	4736300	4825400	5125000	5799722	5250040	10143112	10929645	12108266	11060341

775.2	5871058	5888629	5920309	5893332	6515703	7028722	7882394	7142273	12654854	15127690	17614554	15132366
775.3	1266046	1331411	1417944	1338467	1494510	1495850	1649262	1546541	2662972	2980595	3497957	3047175
775.4	1526523	1250360	1268907	1348597	1477566	1246332	1270423	1331440	2177060	2326685	2572310	2358685
775.7	5286443	5677240	6017660	5660448	6139260	6374832	7214883	6576325	10743824	11362241	12070385	11392150
775.8	12909859	14006443	14273679	13729993	15593351	15853146	17468435	16304977	25075783	27715949	31843561	28211764
776	179715704	184777475	198955177	187816119	289309710	224434542	237230138	250324797	335525901	379408562	398845013	371259825
776.1	7693794	8857802	9448904	8666834	9195052	8014372	8900872	8703432	5987729	4713266	2746051	4482349
776.11	7490172	8654589	9208915	8451225	9009342	7841449	8588290	8479694	5840765	4606679	2716555	4388000
776.12	203620	203209	239157	215329	184053	167610	312582	221415	146964	106586	29496	94349
776.2	9283936	9817160	11664636	10255244	10060498	7298582	6363328	7907469	5169347	3713011	2774930	3885763
776.21	312183	264682	494731	357199	401830	267371	271303	313501	375586	406088	476977	419550
776.23	5095584	5452129	6091020	5546245	4863687	3178881	2460032	3500867	1203078	665463	389086	752542
776.25	453688	457757	985239	632228	431446	496273	421058	449593	452241	422790	481957	452330
776.27	531158	520695	1023386	691746	543267	487887	451992	494382	1104671	731475	568455	801534
776.29	2891323	3121897	3070260	3027827	3820267	2868170	2758943	3149127	2033771	1487196	858456	1459807
776.3	17827098	18041526	19537729	18468785	28021935	22726033	25560097	25436022	44286101	53743361	57984728	52004730
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776.32	2826137	2763949	3068811	2886299	4051364	3168937	3395225	3538509	5084193	5550326	4910007	5181508
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776.4	135454994	137952323	147411984	140273101	223605381	173598275	182587390	193263682	261444488	293847517	305518772	286936926
776.41	91073414	96259662	101602540	96311872	148591838	113861000	110669514	124374118	164543765	185405557	15391879	121780400
776.43	27589407	24611383	27012547	26404446	45158643	35761917	46086976	42335845	74999208	83797006	4590024	54462079
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776.49	10586524	11079159	12536041	11400575	15808591	11683380	11986720	13159564	7177212	7041350	1849420	5355994
776.8	9455870	10108618	10821262	10128583	18426844	12797280	13777940	15000688	18638236	23238705	29820530	23899157
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776.88	1509245	1420735	1449338	1459773	3590422	2305676	2017432	2637843	3636587	4896614	5869556	4800919
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778	77465878	76061181	79650927	77725995	9979968	86807773	89629013	62138918	139902949	157058807	166284658	154415471
778.1	11618975	12484117	13689636	12597576	17010255	15296750	15660720	15989242	24014692	26760961	32469339	27748330
778.2	6640516	6733003	7878333	7083951	7942105	7814925	7893088	7883373	13132013	14677587	16879307	14896302
778.3	11513922	12105979	12330266	11983389	13836949	13292645	15007205	14045600	21731824	23540692	27897694	24390070
778.4	5441923	5562357	6034730	5679670	6132531	6323957	6006711	6154400	9534154	10693590	12018289	10748678
778.6	10795565	10045796	11625369	10822243	19947561	13337614	13331832	15539002	15860021	18485376	20427524	18257640
778.7	10422719	11278322	12129853	11276965	17439205	14414511	14960970	15604895	26135260	31943449	25610277	27896329
778.8	21032257	17851607	15937763	18273876	17491072	16327371	16768487	16862310	29494984	30957152	30982228	30478121
TOTAL	4732078773	5030950558	5213597361	4992208897	6111867372	5893594987	6188856881	6064773080	9927320960	11534011416	13096767982	11519366786