# TRADE TRENDS OF MANUFACTURED GOODS WITHIN AEA ZONE

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## Introduction

No nation is self-sufficient in a global economy. Each is involved at different levels in trade to sell hat it produces, to acquire what it lacks and also to produce more efficiently in some economic sectors than its trade partners. The globalization of production is concomitant to the globalization of trade as one cannot function without the other. Keeping pace with developing human demand, trade has been occurring at an ever increasing scale over the last 600 years to play an even more active part in the economic life of nations and regions. This process has been facilitated by significant technical changes in the transport sector. (Rodrigue, 2013)

The scale, volume and efficiency of international trade have all continued to increase since the 1970s, creating a more extensive market coverage that can be accessed faster & at a lower cost. It has become increasingly possible to trade between parts of the world that previously had limited access to international transportation systems. Further, the division and the fragmentation of production that went along with these processes also expanded trade, all of which are topics addressed in this research. Trade facilitates the distribution of a wide range of manufactured goods, the subject commodity division of the present paper, that are produced in different parts of the world to what can be labeled as the global market. Wealth becomes increasingly derived through the regional specialization of economic activities. This way, production costs are lowered, productivity rises and surpluses are generated, which can be transferred or traded for commodities that would be too expensive to produce domestically or would simply not be available. As a result, international trade decreases the overall costs of production worldwide. (Rodrigue, 2013)

This overall & continuous rise in trade quantity has come despite the fact that scholars still believe that geographic distance is an inherent impediment to trade, or as one might like to put it, "Distance Hasn't Died Yet". (Panahi, 2007., Berthelon and Freund, 2007., Brun and Carrere, 2002). This explains the tight relationship between trade & development, where economic growth may even be sought in interaction with the most distant regions of the globe. (Ghadari Faraz, 2011)

The present research aims to reveal trade trends of Manufactured Goods, Classified Chiefly by Material (registered under Code 6 in the Standard International Trade Classification) throughout Europe, Asia & Africa (abbreviated as AEA) between 1965 & 2005. The category is further subdivided into 9 distinct commodity branches which will be mentioned later on. Trade value and weight trends for all subcategories were obtained, respectively, in terms of US Dollars & kilograms based on data extracted from UN Comtrade online database for the 40 year time span mentioned. Results clearly illustrate prevailing trade value & weight directions within the Europe-Asia- Africa zone for manufactured goods. Moreover, the presence of strategic trade items such as steel, iron, cement, fabricated construction materials, precious stones and metals such as silver and platinum in this category might add to the importance of this appraisal.

## Commodity Classification Details

SITC (Standard International Trade Classification) is a classification of the commodities being subject to international trade. It was designed to help provide a categorization needed for economic analysis and to facilitate the international comparison of trade data. A single numeral represents a major category (e.g. 6 for Manufactured goods classified chiefly by material) and each subsequent numeral represents a sub-classification that can reach up to five numerals. For instance, Articles of natural cork (633.1) is a subcategory of Cork manufactures (633), which in turn, is a subcategory of Cork and wood manufactures (excluding furniture) (63) itself. [II] The hierarchical structure of the classification is as follows:

| | | | |
|---|---|---|---|
| - Sections | - One-digit | codes; | - Divisions |
| | - Two-digit | codes; | - Groups |
| | - Three-digit | codes; | - Subgroups |
| | - Four-digit | codes; | - items |
| | - Five-digit | codes; | - [I] |

The studied 'Section' & its divisions are as follows (first and second digits):
'Manufactured goods classified chiefly by material' (Code 6):

- 61 - Leather, leather manufactures, n.e.s., and dressed furskins
- 62 - Rubber manufactures, n.e.s.
- 63 - Cork and wood manufactures (excluding furniture)
- 64 - Paper, paperboard and articles of paper pulp, of paper or of paperboard
- 65 - Textile yarn, fabrics, made-up articles, n.e.s., and related products
- 66 - Non-metallic mineral manufactures, n.e.s.
- 67 - Iron and steel
- 68 - Non-ferrous metals
- 69 - Manufactures of metals, n.e.s. [II]

**Data Collection**

Data for trade value between 125 countries of Asia-Europe-Africa were extracted from the UN Comtrade online databank [III] in 5 year intervals between 1965 & 2005, i.e. the years 1965, 1970, 1975,1980, 1985, 1990, 1995, 2000 and 2005, resulting in 9 sets of information. This collection was performed by Java programming-based Data Crawling. The output of the procedure was 162 sets of unique 125*125 matrices containing prices of trade in all divisions & years mentioned above, where import and export figures appear in separate matrices. Trade weight statistics on the other hand were gathered from bilateral trade standings between several countries within the AEA region that were thought to be best representative of trade trends & had the least number of missing data. Having acquired both value & representative weight information for trade of manufactured goods, a coefficient indicating commodity unit weight price ($/kg) for every single division & year of trade was established. When applied to value matrices, these coefficients would yield the same number of trade weight matrices for all the 125 countries involved. All in all, considering 18 sets of 125*125 separate import/export matrices for 9 divisions of commodity, a total number of 2531250 trade value data were mined and employed in the analysis.

**Data Analysis and Modeling**

Collected data was sorted, organized & adjusted in desired configuration by means of MATLAB programming. The extracted value matrices contained missing elements which had to be omitted from calculation and analysis. Each of these missing entries reflect missing trade data for a particular commodity division in a particular year & might in turn, implicate either unreported trade data or no existing bilateral trade for that specific code-year. These data were indexed & treated as missing values in MATLAB and thus didn't appear in the final analysis. As mentioned before, all valid data were processed and sorted (by MATLAB programming) such that all import and export trade information for every trade item could be summed up for each year of study. The next step was to form an average for available import and export trade data of all 125 countries. This resulted in a single number representing the overall value of trade in US dollars for each code – at the second digit level also called "commodity division"- in each year. These discrete numbers are plotted against time (Figure 1) and regression models are applied to each individual curve (Table 1). Thus, each individual curve depicts the trade value trend for a specific division of the "Manufactured Goods" section. The same exact procedure was applied to weight data and the results are tabulated in Figure 2.

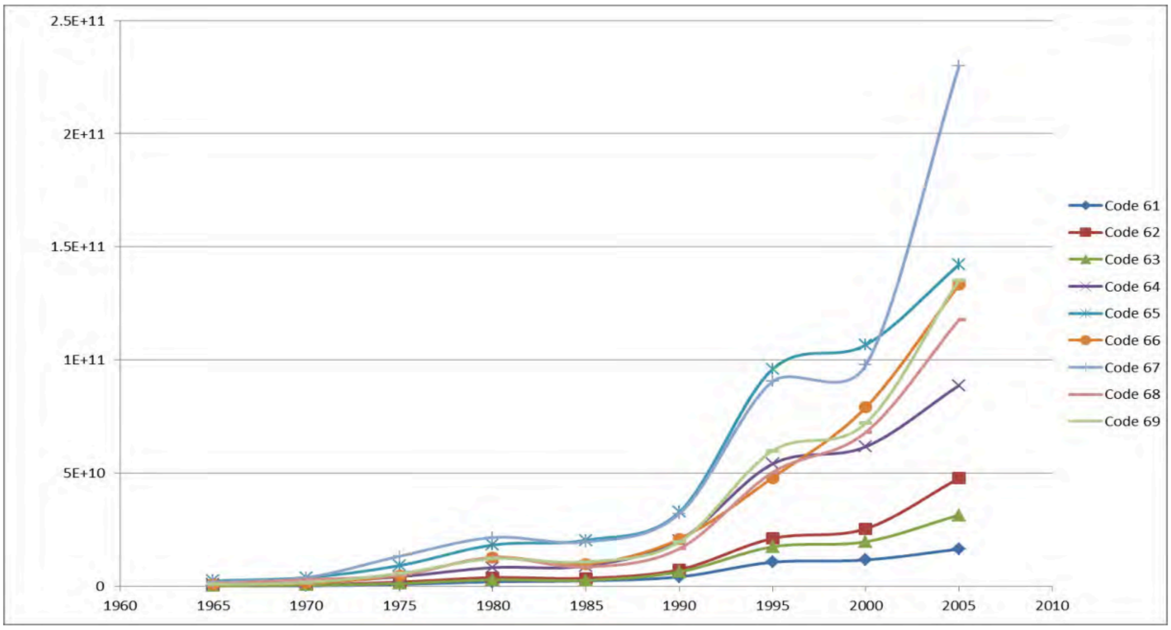


Figure 1: Average Trade *Value* amongst 125 AEA States Against Time (US$) (1965-2005)

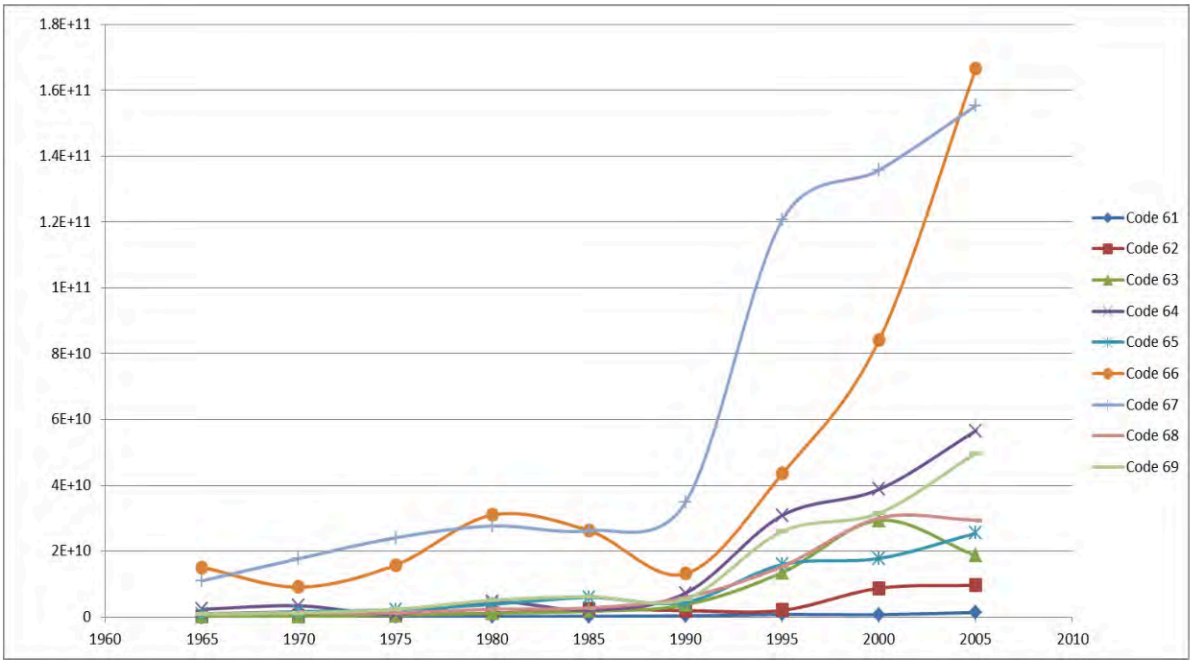


Figure 2: Average Trade *Weight* amongst 125 AEA States Against Time in Kilograms (1965-2005)

Then, to illustrate the general observed trade trend of SITC section 6 as a whole (Code 6) throughout the 40 year period, an aggregate (cumulative) curve of trade value & weight is presented below (Figure 3). Each point represents the sum total of all trade weight and values pertaining to a specific division code, in a specific year of study, i.e. weight and values of divisions 61, 62, 63, …., 69 altogether accumulated to form a single number representing the whole amount of trade weight and value for Code 6 per year (at the "Section" or first digit level).

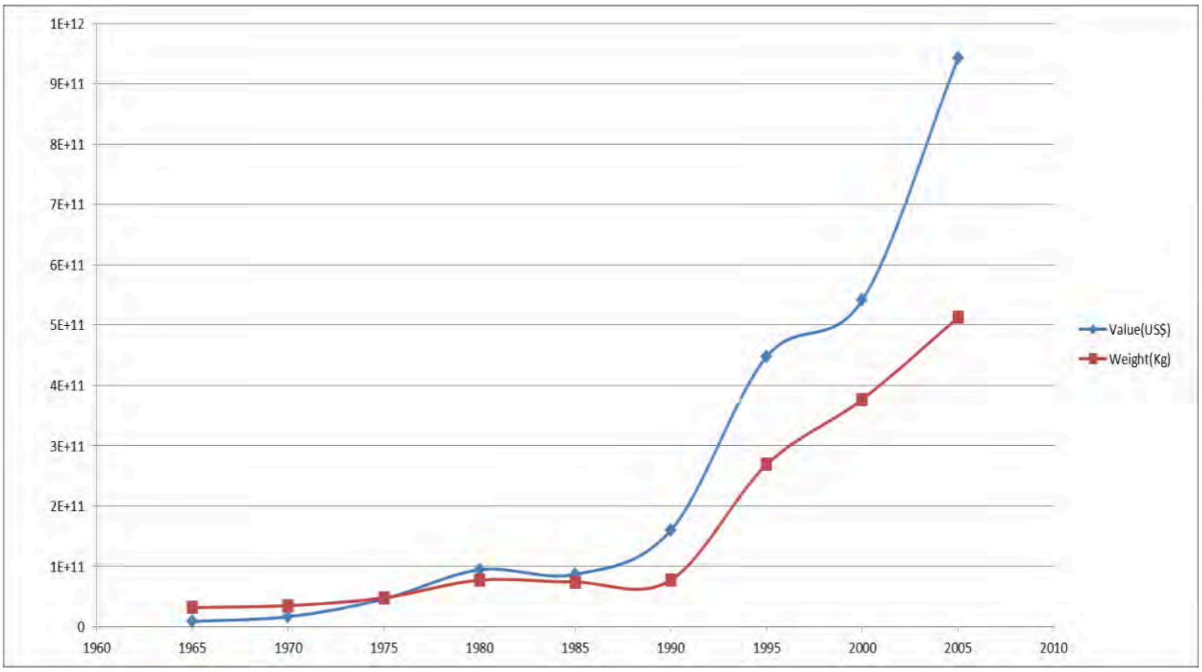


Figure 3: The average weight and price of trade in the time interval 1965-2005 (Manufactured goods classified chiefly by material (Code 6)).

As can be easily implied by Figure 1, In terms of the magnitude of trade value, the 'Iron and Steel' (Code 67) and 'Textile yarn, fabrics, made-up articles, n.e.s., and related products' (Code 65) have mostly been in the lead throughout the study period, swapping first place from time to time, although a dramatic jump in Iron and Steel trade value statistics can be detected between the years 2000 and 2005. Codes 69 and 66, respectively referring to 'Manufactures of metals' and 'Non-metallic mineral manufactures' have been tightly following one another in third place for most of the period. Referring to Table 1, trends for trade value for all nine divisions of Section 6 (Code 6) were found to be ascending, a fact also explicitly pointed out by Figure 1. With reference to Figure 1 and of course more precisely, Table 1, seeing that the linear regression model for Code 67 (Iron and Steel) is the steepest, it can be stated that Iron and steel trade value (US$) has been the fastest growing among all commodity divisions in the course of 1965 to 2005. While textile yarn, fabrics and etc. (Code 65) is seen to have gained the second most extreme trade value growth, Non-metallic mineral manufactures (Code 66) and Manufactures of metals (Code 69) – exhibiting about the same growth rate – lie in third place. Meanwhile, Leather and leather manufactures (Code 61) trade has experienced the mildest increase rate in value among other divisions, closely followed by Codes 63 (Cork and wood manufactures) and 62 (Rubber manufactures). According to Figure 1, the trade value growth momentum has slightly eased between 1995 and 2000. Though still on the rise, this transient halt may be attributed to Asia's 1997-1999 financial crisis.

Likewise, in view of Figure 2 and Table 1, dominant trade weight trends may also be recognized. Again, trends for trade weight for all nine divisions of Section 6 (Code 6) were found to be ascending and once more, the steepest slope belongs to the regression line of 'Iron and steel' (Code 67), reflecting fastest growing trade weight for this division amongst all nine commodity divisions. Behind Iron and Steel, this time comes 'Non-metallic mineral manufactures' (Code 66), followed by ' Paper, paperboard and articles of paper pulp, of paper or of paperboard' (Code 64). Leather, leather manufactures and etc. (Code 61) is observed to have the slowest growth in trade weight, while 'Rubber manufactures' (Code 62) can be placed second. In terms of trade weight magnitude, for the most of the study period, 'Iron and steel' (Code 67) owns first position and is followed by 'Non-metallic mineral manufactures' (Code 66). Plus, codes 61 & 62, respectively, have had the lowest trade by weight in 'Section 6'. Figure 3 signifies an overall upward trend in both trade value and weight for the 'Manufactured goods' section (Code 6) when a cumulative approach is applied (all divisions summed up for a specific year). Low growth rates in the early stages of study have jumped dramatically from the beginning of the 90's. Trade value (US$) has clearly increased more vigorously compared to trade weight (kg), a possible indicative of global inflation in trade of manufactured goods costs.

Obtained regression coefficients of determination are satisfactory and models for both trade value and weight are considered reliable. As the last row of Table 1 highlights, models describing trade value trends are proved to be slightly more reliable than the weight models, which in turn may reflect the superiority of the meticulous and comprehensive data collection method carried out for trade value data extraction versus the selective and representative approach deployed for trade weight information. Nevertheless, both models appear to be efficient in explaining trade trend.

| **Division** | **Detail** | **Value of Trade** | | **Weight of Trade** | |
|---|---|---|---|---|---|
| | | **Linear Regression Models (US$)** | **$R^2$** | **Linear Regression Models (Kilograms)** | **$R^2$** |
| 61 | Leather, leather manufactures | v = 4E+08t - 8E+11 | 0.8572 | w = 3E+07t - 6E+10 | 0.8248 |
| 62 | Rubber manufactures | v = 1E+09 t - 2E+12 | 0.7558 | w = 2E+08 t - 4E+11 | 0.7113 |
| 63 | Cork and wood manufactures | v = 7E+08 t - 1E+12 | 0.8079 | w = 6E+08 t - 1E+12 | 0.6852 |
| 64 | Paper & paper articles | v = 2E+09 t - 4E+12 | 0.8307 | w = 1E+09 t - 3E+12 | 0.7387 |
| 65 | Textile yarn, fabric and etc. | v = 4E+09 t - 7E+12 | 0.8432 | w = 6E+08 t - 1E+12 | 0.8244 |
| 66 | Non-metallic mineral manufactures | v = 3E+09 t - 6E+12 | 0.7509 | w = 3E+09 t - 6E+12 | 0.6017 |
| 67 | Iron and steel | v = 5E+09 t - 9E+12 | 0.7037 | w = 4E+09 t - 7E+12 | 0.7972 |
| 68 | Non-ferrous metals | v = 3E+09 t - 5E+12 | 0.7521 | w = 8E+08 t - 2E+12 | 0.7656 |
| 69 | Manufactures of metals | v = 3E+09 t - 6E+12 | 0.7539 | w = 1E+09 t - 2E+12 | 0.7709 |
| **Code 6** | ***Manufactured goods*** | **v = 2E+10 t - 4E+13** | **0.78** | **w = 1E+10 t - 2E+13** | **0.7713** |

Table 1: Linear Regression Models for 125 countries during 1965-2005 (Code 6: Manufactured Goods)

**Conclusion**

Trade trends of 'Manufactured Goods Classified Chiefly By Material', demonstrated by code No.6 in the Standard International Trade Classification, SITC, throughout Asia, Europe and Africa (AEA region), both in terms of trade value & weight, respectively in US dollar & kilograms were studied. Trade data, including trade price & trade weight were derived from UN Comtrade database for 125 countries in the AEA region spanning a time period of 40 years between 1965 and 2005. Data was extracted in 5 year intervals resulting in 9 sets of information. The SITC classification system subdivides manufactured goods into 9 initial subdivisions. Overall, a total number of 2531250 trade data were collected & used in the analysis. Value & weight figures were then plotted against time & linear regression revealed trade trends of the mentioned tributary commodities. Moreover, the subdivisions with the sharpest & lightest rising trends in value & weight were identified. This study is among the few to address commodity trade weight as a distinguished parameter & its combined study with trade value.

Results are depicted in in Figures No.1, 2 and Table No. 1. Figure 1, pertaining to trade weight, points out an ever-upward trend in trade value since 1965 for all commodity divisions. With the start of the 1990's, trade value (US$) figures for all nine divisions have significantly risen in the AEA region, compared to a fairly steady increase rate during 1965 to 1990. In terms of the magnitude of trade value, the 'Iron and Steel' (Code 67) and 'Textile yarn, fabrics & etc.'(Code 65) have mostly been in the lead throughout the study period, although a dramatic jump in Iron and Steel trade value statistics can be detected between 2000 and 2005. Iron and steel trade value (US$) was found to own the fastest growing among all commodity divisions in the course of 1965 to 2005, followed by 'Textile yarn & fabrics.

Figure 2 reveals prevailing trade trends in terms of weight(Kg). Again, trends for trade weight for all nine divisions of Section 6 (Code 6) were found to be ascending and once more, 'Iron and steel' (Code 67) is shown to be the fastest growing trade item by weight, where 'Non-metallic mineral manufactures' (Code 66), & ' Paper, paperboard & etc.(Code 64) come second and third. In terms of trade weight magnitude, for the most of the study period, 'Iron and steel' (Code 67) owns first position and is followed by 'Non-metallic mineral manufactures' (Code 66).

Trade value (US$) has clearly increased more vigorously compared to trade weight (kg), a possible indicative of global inflation in trade of manufactured goods costs. This fact seems to have its roots in significant population growth rates across Asia & Africa and technological improvements leading to lower trade and transportation costs. Moreover, the presence of items such as 'Iron and Steel'(Code 67), 'Manufactures of metals'(Code69) – together covering a very broad range of iron, steel and metal based manufactures – and indeed 'Non-metallic mineral manufactures' (Code 66) – including Lime, cement, and fabricated construction materials - have added strategic importance to SITC Section 6. All products mentioned above are central to economic development and countries in the AEA region, most of which being categorized under "developing states", are in urgent need of them to continue developing their infrastructure and economy. This growing demand is well confirmed & illustrated by means of this study.

Obtained regression coefficients of determination are satisfactory and regression models for both trade value and weight are considered to be reliable. As the last row of Table 1 highlights, models describing trade value trends are proved to be slightly more reliable than the weight models, which in turn may reflect the superiority of the comprehensive data collection procedure carried out for trade value data extraction versus the selective and representative approach deployed for trade weight data extraction. Nevertheless, both models appear to be efficient in explaining and thus, predicting trade trends.

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