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OKAN UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

A LOGISTICS MODEL PROPOSAL IN LINE WITH TURKEY'S FOREIGN TRADE TARGETS: TURKEY – AFRICAN CONTINENT APPLICATION

Murat DÜZGÜN

(112097004)

PHILOSOPHY OF DOCTORATE PROGRAM IN

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ADVISOR

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SUMMARY

Logistics comprises the movement of products such as raw materials, spare parts and finished goods from the place of origin to the place of consumption. It is a broad and exhaustive term, which is not limited to transportation management and involves planning, warehousing, material handling, packaging, inventory management, customs service, etc. An effective transpostation service increases the core competency of the market as it adds value to the products. Logistics and especially transportation costs, which actually cover an enormous portion of product costs, have a crucial role for companies' and therefore countries' competitiveness. In order to canalize this effect in a positive way, the transportation industry has to provide some specific performance criteria in terms of economic activity and service quality.

The increasingly intense global competitiveness and interdependence of world trade, as well as the requirements of their own operational and functional differences are making it harder for companies to survive in the international markets, and force them to act more carefully, plan in advance, and differenciate themselves from the other competitors. Therefore, they need to diversify in order to survive at the market and retain their customers. In order to do that, firms need to find or create innovations and models which will allow them to gain comparative advantage and could be applied in the trade process. In this conjuncture, Turkey's need for innovation and new models has become an increasingly important issue, as it would allow the country to increase its foreign trade volumes. This will ensure that Turkish companies achieve superiority and competitive advantage both domestically and internationally, enable sustainable economic growth, and eventually allow Turkey to occupy its worty place among the most developed world economies.

The aim of this thesis is to create a methodology that would allow Turkey to identify and evaluate its best logictics options, and enable improvement and growth in the sector of foreign trade. In this framework, the main objective is to increase the business volume of the companies which have foreign trade operations in Africa and to bring out a model suggestion which will support them in the creation of the right long- and short-run strategies. This study focuses on the logistics hinterlands, as well as the economic,

political, and social structures of Turkey and Africa, and evaluates the main characteristics of Turkey-Africa foreign trade.

In this context, the first part of this thesis emphasizes the research problem, the purpose and the importance of the study. The following second, third and fourth parts cover the main features of international trade and logistics management, give an overview of the current status of international trade and include detailed literature study about worldwide transportation and logistics. In order to make this study clear and understandable as a whole, the fifth part explains the details of both ANP and AHP models (with special focus on AHP) with multiple criteria, based on the model which has been developed in this study for the best logistic solutions.

The sixth part is the unique part of this study. In this part, all of the factors that can be effective in Turkey-African trade are presented for the evaluation of 2.044 companies from 6 different hinterlands in Turkey operating to 3 different African hinterlands, specifically selected by us. These factors are presented to 166 numbers of companies related of them which are selected via sampling in accordance with different product manufacturer groups, and lastly based on actual practices 25 effective criteria is identified and employed in our models. An applied survey has given us the opportunity to evaluate the relationship between the features of the companies and the trade patterns they are having with the Chi-square test. The factors that are beneficial for the companies involved in Turkey-Africa trade and the effect of the demographics of the companies are put forth with the hypothesis tests in accordance to how much companies value them, and in compliance with the distribution of possibilities. This inferential statistical analyzis continues with a regression model of the factors which affect the demographics of the companies in explaining the features of Turkey – African trade. This part also determines the most important factors of Turkey-Africa trade relations, and identifies the model which is most appropriate for their analysis.

There are 12 different trade models which can be applied in this case; we have selected the Analytical Hierarchy Process(AHP) as the most appropriate scientifically tested Multiple Criteria Decision Making model for the case of Turkey-Africa trade. The AHP application is used in the sensitivity analysis of the effecting way of other possible 11 trade models with the best model identified. It is put forth and based on the opinions of 5

experts and companies in this area, and allows us to determine the relative importance of the identified criteria. Furthemore, the proposed model is applied on a transportation project of a logistic service provider, which gives service in a multi-modal and multi-echelon transportation network, so that the results of the model could be compared with the current situation by using different scenarios.

Last but not least, this thesis contains a summary of the findings in the seventh part, and a list of suggestions presented in order to improve the current state of Turkey-African foreign trade. The performed research with the suggested models and determined crieteria is expected to benefit the companies which are currently involved or plan to involve themselves in trade with Africa, as they will allow them to reduce their logistics costs, improve the quality of their services, reduce the customer response time for start to better and faster respond to customer demands, and shorten the overall duration of the trade processes.

Keywords: ***A**nalytic **H**ierarchy **P**rocess**(AHP)** Model, Logistics Models, Turkey-Africa foreign trade.*

ÖZET

Lojistik; hammaddeler, yedek parçalar, nihai ürünler olarak ürünlerin çıkış noktasından tüketim noktasına kadar olan ilgili hareketleri dahilinde yapılan taşımacılık, depolama, gümrükleme vd. tüm faaliyetleri kapsamaktadır. Etkin bir taşıma hizmeti, ürüne katma değer sağladığı gibi, pazardaki rekabet gücünü de artırmaktadır. Ürün maliyetlerinin büyük bir kısmını oluşturan lojistik ve özellikle taşımacılık maliyetleri, işletmelerin ve dolayısıyla ülkelerin rekabet gücü üzerinde büyük bir etkiye sahiptir. Bu etkinin pozitif yöne doğru çekilebilmesi için, taşımacılık sektörünün ekonomik etkinlik ve hizmet kalitesi açılarından belirli performans kriterlerini sağlaması gerekmektedir.

Dünya dış ticaretinin giderek yoğun küresel rekabet içinde olması ve ilgili firmaların daha dikkatli davranarak, bu küresel liberal ekonomide elde etmek zorunda oldukları kendi farklılıklarına ait gereklilikler hızla zorlaşmaktadır. Dolayısı ile mümkün ise, her bir dış ticaret uygulaması için yenilik ve modeller bulunarak, firmalar kendilerine ait bu farklı olabilme ihtiyaçlarını karşılayabilirler. Bu konjonktür yapı içinde ülke olarak Türkiye'nin de kendisine layık olan yerini alabilmesi için dış ticaret hacmini arttırması ve ilgili firmalarının küresel rekabette üstünlük sağlayabilmelerini temin edebilmesi amacı ile yeniliklere ve yeni modellere olan ihtiyacı, geçmiş yıllara göre daha da önem kazanmıştır.

Bu tezin amacı; bir ülkenin dış ticaretinde lojistik seçeneklerin belirlenmesi ve değerlendirilmesine yönelik bir metodoloji oluşturmaktır. Bu çerçevede Türkiye'deki dış ticaret yapan firmaların Afrika ile iş hacmini artırmak ve doğru stratejiler üretmelerini destekleyecek bir model önerisi getirmektir. Bu çalışma, Türkiye ile Afrika arasındaki dış ticaret yapısının genel özelliklerinin ekonomik, politik ve sosyal yapıları ile lojistik hinterlandlarını değerlendirmektedir.

Bu kapsamda tezin ilk bölümünde araştırma problemi, çalışmanın amacı ve önemi vurgulanmakta, takip eden ikinci, üçüncü ve dördüncü bölümlerde sırasıyla çalışmaya yön veren uluslararası ticaret ve lojistik yönetimi, uluslararası ticaret ve lojistik, uluslararası ticaretin mevcut durumu, dünya genelinde taşıma ve lojistik modelleri hakkında kapsamlı literatür çalışması yer almaktadır. Çalışmayı bir bütün olarak ve tek başına anlaşır kılabilmek için beşinci bölüm, bu çalışmayla geliştirilen modele dayanak olan çok kriterli karar verme modellerinin detaylarını açıklamaktadır.

Çalışmanın özgün kısmını ise altıncı bölüm oluşturmaktadır. Bu bölümde, ilgili literatür taraması sonucunda Türkiye-Afrika ticaretinde etkili olabilecek faktörlerin tamamı Türkiye'mizde, tarafımızca belirlenmiş olan 6 farklı hinterland'dan, Afrika sınırları dahilinde tarafımızca belirlenen 3 ayrı hinterland'a, doğrudan ihracat konusunda halen faaliyet gösteren toplam 2.044 şirketten, uygun ama farklı ürün gruplarına bağlı olarak örnekleme ile seçilen 166 adet ilgili şirketin değerlendirilmesine sunulmuş ve gerçek uygulamaya dayalı olarak 25 adet etkili kriter dikkatlice tespit edilmiş ve modellerimizde kullanılmıştır. Uygulanan anket, ticaret yapan şirketlerin özellikleriyle yaptıkları ticaret arasındaki ilişkilerin Ki-Kare testi ile belirlenmesine olanak sağlamıştır. Yine Türkiye-Afrika şirketleri arasındaki ticarette etkili olan faktörleri, şirketlerin önemseme seviyelerine göre şirketlerin demografik özelliklerinin etkisi, verilen cevapların tespit edilen olasılık dağılımına uygun hipotez testleriyle ortaya konmuştur. Gerçekleştirilen bu çıkarımsal istatistik analizleri Türkiye-Afrika ticaretinin özelliklerini açıklamada şirketlerin demografik özelliklerinden etkili olan faktörlerin regresyon modelleriyle devam etmektedir. Türkiye-Afrika arasındaki etkili faktörlerin tespiti ile bu ticarette kullanılabilecek muhtemel 12 ticaret modelinden en uygunu, **A**nalitik **H**iyerarşi **P**roses **(AHP)** aracılığı ile bu alandaki 5 uzmanın görüşüne dayalı olarak ortaya konulmaktadır. Bu analiz aynı zamanda tespit edilen kriterlerin göreceleri, önemlerinin tespitine de olanak vermektedir. Oluşturulan AHP uygulaması tespit edilen en iyi modelle birlikte diğer 11 muhtemel ticaret modelinin belirlenen kriterlerden etkilenme şeklinin duyarlılık analizlerinde de kullanılmaktadır.

En son yedinci bölümdeki elde edilen bulguların özetlerini ve mevcut Türkiye-Afrika dış ticaretinin daha çok iyileştirilebilmesi için sunulan önerileri kapsamaktadır. Gerçekleştirilen bu araştırmanın, saptanan kriterler ve oluşturulan model(ler)den, Afrika ile çalışan ve çalışma niyetinde bulunan kuruluşların lojistik maliyetleri, müşterilerine karşı daha kaliteli ve hızlı cevap verebilme yetenekleri ve ayrıca ilgili süre ve süreçleri kısaltabilmeleri konularında faydalı olabilmesi beklenmektedir.

Anahtar kelimeler: ***A****nalitik* ***H****iyerarşi* ***S****üreci****(AHP)*** *Modeli, Lojistik Modeller, Türkiye-Afrika dış Ticareti.*

SYMBOLS (FOR AHP & STATISTICAL MODELS)

MAIN CRITERIA

C1 : Product Features
C2 : Reliability
C3 : Speed
C4 : Traceability
C5 : Cost
C6 : Security
C7 : Risks

SUB CRITERIA

PRODUCT FEATURES

C11 : Volume
C12 : Product Value
C13 : Insurance Necessities
C14 : Stacking Features
C15 : Product Sensitivity
C16 : Transportation Features
C17 : Product Life

RELIABILITY

C21 : Timely Deliveries
C22 : Responsibility on Delays

SPEED

C31 : Transportation Distances
C32 : Transportation Times
C33 : Transportation Speeds

TRACEABILITY

C41 : Traceability of Load and Vehicle
C42 : Traceability of Documents

COST

C51 : Transportation Costs
C52 : Handling and Packaging Costs
C53 : Warehouse and Transmission Point, Processing Costs
C54 : Communication and Information Costs
C55 : Wastage Costs
C56 : Delaying Costs

SECURITY

C61 : Product Damaging Possibility
C62 : Thief Possibility

RISKS

C71 : Warehousing Risks
C72 : Political Risks
C73 : Social Risks

ALTERNATIVES & LOGISTIC MODELS

A1 Istanbul Port - Algeria Annaba Port
A2 Istanbul Port - Ghana Tema Port
A3 Istanbul Port - Kenya Mombasa Port
A4 Istanbul Airport - Algeria Algiers Airport
A5 Istanbul Airport - Ghana Accra Airport
A6 Istanbul Airport - Kenya Nairobi Airport
A7 Izmir Port - Algeria Annaba Port
A8 Izmir Port - Ghana Tema Port
A9 Izmir Port - Kenya Mombasa Port
A10 Mersin Port - Algeria Annaba Port
A11 Mersin Port - Ghana Tema Port
A12 Mersin Port - Kenya Mombasa Port

LIST OF ABBREVIATIONS

AFDB : African Development Bank
AHP : Analytic Hierarchy Process
ANOVA : Analysis Of Variance
ANP : Analytic Network Process
ASEAN : Association of South East Asian Nations
AU NEPAD : Africa Union: New Partnership for Africa's Development
AUC : African Union Commission
AWB : Air Way Bill
BRIC : Brazil, Russia, India and China countries
CIS : Commonwealth Independent States
CR : Consistency Ratio
DF : Degree of Freedom
DRC : Democratic Republic of Congo
EME : Emerging Market Economies
EU : Europe Union
FAO : Food Agriculture Organisation of the United Nations
FDI : Foreign Direct Investment
G20 : The 20 major economies of the world
GATT : General Agreement on Tariffs and Trade
GDP : Gross Domestic Products
GVC : Global Value Chain
ICB : International Container Bureau
ICC : International Chamber of Commerce
IMF : International Monetary Fund
IMT : International Multimodal Transportation
INCOTERMS : Internationl Commercial Terms
- CFR : Cost and Freight
- CFR : Cost and Freight
- CIF : Cost, Insurance and Freight
- CIP : Carriage and Insurance Paid To
- CPT : Carriage Paid To
- DAP : Delivered at Place
- DAT : Delivered at Terminal
- DDP : Delivered Duty Paid
- EXW : Ex-works
- FAS : Free Alongside Ship
- FCA : Free Carrier
- FOB : Free on Board

ISO : International Organization for Standardization
ITC : International Trade Center
LPDR : Lao People's Democratic Republic
LPI : Logistics Performance Index

MENA	:	Middle East and North Africa region
MRP	:	Materials Requirement Planning
MTMAC	:	Ministry of Transport, Maritime Affairs and Communication
MTO	:	Multimodal Transport Operator
NVOCC	:	Non-Vessel Operating Common Carriers
OECD	:	Organization for Economic Co-operation and Development
RI	:	Random Index
SCM	:	Supply Chain Management
SME	:	Small and Middle size Enterprises
SPSS	:	Statistical Packages for the Social Sciences
SSA	:	Sub-Saharan Africa
STISA	:	Science Technology and Innovation Strategy for Africa
SWOT	:	Strengths, Weaknesses, Opportunities and Threats Analysis
TAH	:	Trans African Highways
TES	:	Turkish Exports' Strategy
TEU	:	Twenty foot Equivalent Unit
TIM	:	Turkish Exporters Assembly
TMS	:	Trade Map Statistics
TURKSTAT	:	Turkish Statistical Institute
UKTI	:	United Kingdom Trade and Investment
UN	:	United Nations
UNCTAD	:	United Nations Conference on Trade and Development
UNDESA	:	United Nations Department of Social and Economic Affairs
UNDP	:	United Nations Development Programme
WEF	:	World Economic Forum
WFO	:	World Food Organization
WFO	:	World Food Programme
WHO	:	World Health Organization
WMS	:	Warehouse Management Systems
WTO	:	World Trade Organization
WWII	:	World War II
YASED	:	International Investors Association in Turkey.

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1. INTRODUCTION

International trade can be described as the trade among different countries or across political frontiers. From a more complex perspective it can be perceived as a international transformation of inputs, technology and commodities aimed at the promotion of welfare and the stimulation of Global economic growth. International trade provides all participants with extended market for their output (goods, services, technology, know-how, etc.) beyond national borders to the international markets – a process beneficial for all parties involved, as it leads to global price optimization (through export-import activities), and increases the levels of international partnership and cooperation, Thus, a country's trade patterns are not determined by its character in isolation but by its relations with trading partners.

Modern international trade has made the world much more interdependent. It can be perceived as an outcome of the differences in resource endowment, the division of labour with varying skills on different territories, as well as the differences in specialisation in the countries of the world. It's a vast and constantly changing field, and one of the main determinants of economic growth and one of the main keys towards improved GDP, better life quality and higher levels of consumer satisfaction.

Nowadays the patterns of international trade are changing, and more and more international transactions are occurring between developed and developing countries. There has been a rising demand for developing economies in the last two decades, and now many developing countries, such as Turkey and some African countries, started to take over the developed countries' comparative advantage by increasing the quality, quantity and efficiency of their production, by improving the economic partnerships with other developing countries, and by producing high-quality finished and semi-finished knowledge-sensitive goods, which are later distributed through well-developed logistics and transportation channels.

Logistics can be described as the movement of commodities such as raw materials, spare parts, and finished goods from the place of origin to the place of consumption. The role of logistics in the modern interdependent business world has been steadily increasing in the last decades, as it has become one of the main factors

towards the growth of an effective, efficient, and sustainable global economy. It won't be an overstatement to say that logistics has become one of the most important factors for economic growth. It doesn't simply include the management of the flow of products from the place of origin to the place of consumption as it used to in the past. Modern Logistics is a much broader and exhaustive sector, involving planning, warehousing, material handling, transportation management, packaging, inventory management, shipping security, supply chain management, customs service, and procurement.

Figure 1.1: Turkey and Africa Locations on the World Map

An effective transportation and logistics network adds value to the goods at hand, and enhances their competitive power in the market place. It plays a crucial part in improving the overall competitiveness of the national economies and the international business environment. Furthermore, it improves the industrial structure, the investment environment, and promotes social informatisation and welfare.

The transportation costs in logistics constitute a big part of the total product costs and have a huge effect on the competition of the companies and even countries. In order to realize the potential benefits and to have positive effect on domestic and global economy, the transportation sector needs to formulate and implement specific

performance criteria which would eventually lead to increased economic efficiency and improved service quality.

Different companies have various requirements, mainly due to their own organisational and operational differences, their long- and short-term planning, and the strategies they use to compete in the global liberal economy. The increasing intensity of global competition in world trade is making it harder for enterprises to compete at the international markets and retain their customers Thus, companies need to differentiate themselves, and they achieve that by creating and finding innovations and models for each trade application.

In the case of Turkey, the need for innovation and new foreign models and markets is becoming more and more crucial, especially considering the country's goal to become one of the ten leading global economies by 2023 – the year when the 100th anniversary of the foundation of the Republic will be celebrated (in 2015 it was the world's 18-th economy). Turkey, in a sense, is a bridge between two continents – Europe and Asia. Its location often determines its domestic and international trade policies. In the last years Turkey started to implement more internationally open policies, which in time became more and more liberalised and globally integrated. As a result of this, the role of privatization and the importance of trade have risen even further for the development of Turkey's economy. Turkey's constantly increasing foreign trade volume and quality will give superiority and comparative advantage to Turkish firms, which will allow the country to take its worthy place among the global competition.

Africa has also gone through important changes and new developments, especially in the last two decades. The continent has become an important factor of the world's economic growth. As already mentioned before, the high income developed economies have been growing more and more dependent on the middle and low income developing market economies. This has led to increased interest towards the African continent and the great potential it holds for the future development of the global world. An analysis made by UNCTAD (2015) shows the steady progress of Africa: the numerous companies which have already been established in the region are increasing their international presence and boosting their growth by reinvesting their profits. Further intensive improvement is expected in the next decade.

The socio-economic relationship between Turkey and Africa has been constantly growing and improving since the beginning of the new millennium. Despite the fact that the relationships between Turkey and Africa are still in their initial stage of development, the importance of strong, well-established Turkey-Africa trade relations is increasing. Some of the main reasons behind Turkey's opening to Africa include (and are not limited to) Turkey's re-orienataion in the global political arena, Turkey's need for economic diversification, the realisation of Africa's potential, and the need for improved cooperation with other developing countries (Ozkan, 2012). The logistics sector, however, remains one of the main problems that Turkey has in its foreign trade with Africa, and the two most crucial elements of this problem are the time and cost necessary for the completion of the logistics processes. The Analytical Hierarchy Process Model (AHP) is a highly important solution method of improving the foreign trade between Turkey and Africa via the time and cost elements, and can be perceived as the most appropriate among the twelve logistics models used for decision-making and solution of logistics problems.

African and Turkey Hinterlands had been specified up to the Demographic and Economic charateristics of themselves as seen on Figure 1.2 and 1.3 also 1.4. The reason of the selection of number 1., 2. and 5. African Hinterlands' countries for this work are the most important and have brilliant economic future for Turkey in next 10-15 years from now on. Nevertheless Istanbul, Bursa, Izmir, Konya, Kayseri and Gaziantep which are specified in order, are the biggest exporters and semi-industrialized also economically developed cities in Turkey that used along this thesis. The future patterns of socio-economic development between Africa and Turkey are yet unclear. However, one is certain – Africa is going to play an increasingly important role for Turkey's economy as both, a source of new resources and a trade partner for Turkey's export. This thesis aims to create a logistics model proposal that will go in line with Turkey's foreign trade targets and will be applicable in Turkey – Africa trade relations.

Figure 1.2: Hinterlands of Africa

Figure 1.3: Hinterlands of Turkey

Figure 1.4: Geographical Regions of Turkey

This thesis proceeds as follows: the remaining parts of this section include problem statement, research questions, purpose and significance of the study. Part 2 represents a literature review of Turkey-Africa relations, and includes an insight into the fast development and growth of cooperation between these regions. Furthermore, the application of AHP in scientific literature is being described and analysed. The last section of Part 2 includes a detailed gap analysis of the existing literature and the practical implementation of AHP models in Africa-Turkey trade Part 3 gives an overview of the basic concepts of international trade and logistics management, describes the expending role of international trade, and provides a review of the international logistics sector, as well as a brief evaluation and some reflections on those topics. In addition to that, Part 3 gives a definition and a detailed overview of the concepts that will be described in this thesis, namely international trade, international logistics, incoterms, world and Africa transport and logistic models, as well as mixed mode transportation (intermodal, multimodal, and combined). Part 4 gives an overview of the current state of international trade. The first section of Part 4 is dedicated to the structure and properties of Turkey's foreign trade, including Turkey's position in the global economy, Turkey's foreign trade analysis, the changing patterns of Turkish foreign trade and the challenges and opportunities it faces, details about Turkey's export strategy 2023, the role of innovation and development for Turkey's economic growth, and the effect of trade growth on Turkey's logistics sector. The second section of Part 4 describes the structure and properties of African foreign trade, including the Continent's

position in the global economy, an overview of its foreign trade with its changing patterns, the challenges and opportunities of Africa's foreign trade, Africa's growth strategy 2063, as well as the science, technology and innovation strategy for Africa 2024. The last section of Part 4 is dedicated to the development of Turkey-Africa relations, and is mainly focused on Africa's hidden economic potential, Turkey's new policy towards Africa, as well as its interest and opportunities in the Continent, Africa's importance for Turkish small and middle size enterprises (SME), the potential risks of Turkey-Africa Cooperation, and the importance of Turkey's involvement in Africa's logistics. Last but not least, this part explores the potential of Algeria, Ghana, and Kenya – the African countries that are considered most advantageous for Turkey's logistics and trade sector in the coming decade. Part 5 is devoted to the multicriteria decision making models AHP and ANP, and their characteristics and properties. Part 6 describes the model practice: the determination of Turkey and Africa's criteria of AHP model (product features, flexibility criteria, security criteria, speed criteria, tracking criteria, incentives related criteria, cost items related criteria, security problems related criteria, risks related criteria), the selection criteria of Africa-Turkey logistics model, regression analysis, and discussion. The last part, Part 7, represents the evaluation and conclusion of the thesis and includes numerous suggestions for future research and development.

1.1. PROBLEM STATEMENT

The future is unclear, and although the potential of Turkish-African cooperation is yet to be observed, many scholars believe that the importance of the international economic relations between Turkey and Africa will only grow in the future. A lot of Turkish companies are already starting to discover the potential of African markets, and trying their luck there (Bektaş, 2015).

Algeria, Ghana and Kenya are among the countries with greatest trade potential for Turkey. There are already established trade patterns between Algeria and Turkey, and future of the cooperation between these countries seems bright and clear. Ghana is the centre of West Africa and it has the potential to become an important economic partner for Turkey due to its geographic position and capital endowment. Kenya is an

important player from Eastern Africa and with its rapid development is attracting foreign direct investment from all around the world, especially Europe and the USA.

The purpose of this thesis can be summarized into two main points, namely increasing the business capacity of foreign trade companies in Turkey, and the provision of a model suggestion which will support them to create correct strategies and apply effective and efficient policies towards Africa. This thesis is focused on the economic, political, social characteristics, as well as the logistics hinterlands of both – Turkey and Africa. The main characteristics of Africa's foreign trade will be evaluated by focusing on African countries' dispersion, which has been determined according to a number of specifically defined criteria. The regression analysis of the logistics field, is evaluated with the help of AHP (**A**nalytic **H**ierarchy **P**rocess) model.

The Analytic Hierarchy Process (AHP) is a special technique based on mathematics and psychology, which is used for complex decision-making. As AHP doesn't determine a "correct" decision but supports decision makers in defining the strategy that will help them to achieve their goal in an optimal way depending on their understanding of the problem, it can be considered the most appropriate model (among the scientifically tested Multiple Criteria Decision models) that could be applied to Turkish companies which export to African countries.

Currently logistics remain on of the main problem areas in Turkey-Africa foreign trade. Two of the most important elements of this problem are *"Time"* and *"Cost"*. AHP is one of the twelve logistics models used for problem-solving, and depending on the time and cost elements, is a higly important solution method for improving the foreign trade between Turkey and Africa, as it allows decision-makers to consider all of the time and cost elements and come up with an optimal solution.

4 main hypotheses are being formulated in this thesis: 1) The most important criteria in Turkey's trade with Africa, are the ones which are related to costs. 2) Decreasing the Lead Time increases the Logistics Cost. 3) Ocean Freight in "Africa FOB Port" will reduce logistics costs. 4) Africa's hinterlands 1., 2., and 5 are crucial for the development of Turkey – Africa and have to be improved in the future (Figure 1.2). The following variables will be used in this thesis:

Table 1.1: Variables Used in the Thesis

1. Variables' Group	Dependent Variable	Point of Export
	Independent Variables	Point of Destination, Type of Goods, Type of Container, Hinterland.
2. Variables' Group	Dependent Variable	Having a Logistics Company
	Independent Variables	Type of Service, Mode of Transportation, Point of Destination, Point of Exit, Exporter's Experience in Africa
3. Variables' Group	Dependent Variable	Distance
	IndependentVariables	Point of Export, Type of Goods, Product Ownership

1.2. OBJECTIVES OF THE STUDY

It is possible to list the objectives of the study as follows:

- To create a model that will potentially increase the business capacity of domestic and foreign trade companies in Turkey and Africa.
- To help firms and organisations to create correct strategies and apply effective and efficient policies towards Africa via a detailed model suggestion.
- To determine the attributes, factors and dimensions of successful implementation of efficient transportation and logistics practices that will affect the performance of the organizations and improve Turkey-Africa trade.
- To develop a model and offer empirical analysis for measuring and evaluating the impact of logistical factors on organizational performance.
- To line out the most important criteria and factors of economic and trade growth between Africa and Turkey in the coming decades.

To fulfil the objectives, it is proposed to: 1) Identify the elements based on a detailed literature review and by studying and evaluating specifically selected criteria via AHP practices. 2) Design a theoretical model. 3) Define a research method. 4) Analyze empirically the model with field work.

1.3. RESEARCH QUESTIONS

The formulation of the research questions was motivated by a detailed and in-depth literature review as well as by analysis of the recent events and developments of Turkey-Africa relations, and discussions with a number of academics and individuals

currently involved in trade relations with African countries. The main research questions that this study addresses are as follows:

- How to increase the business capacity of Turkish firms domestically and internationally (with special focus on Africa)?
- How to create a model that would support firms and organisations to create correct strategies and apply effective and efficient policies towards Africa via a detailed model?
- Which are the attributes, factors and dimensions of logistics that will affect the performance of the organizations and improve Turkey-Africa trade?

1.4. SIGNIFICANCE OF THE STUDY

This research is of importance not only for the sphere of business, but to the academic community as well. In current literature there are different articles about the development of Africa-Turkey political and economic relations. However little has been done to extend the theoretic debate to the context of the real-time business environment. In the literature there is not a model that not only investigates the effect of logistics on the development of economic partnership and cooperation between Africa and Turkey, but offers forecast of those for the next decades. The focus on such a model can be considered the contribution of this thesis.

We believe that the models suggested in this thesis will benefit a great number of companies doing business with Africa, as it will allow them to decrease their logistics costs, improve the effectiveness and efficiency of their logistical processes, increase the quality and speed of response to customers and decrease the lead time of all the included processes.

The proposed model is applied on a transportation project of a logistic service provider, which gives service in a multi-modal and multi-echelon transportation network, so that more objectivity could be achieved through the comparison of the results of the model with the current situation by using different scenarios.

2. LITERATURE REVIEW

This part of the thesis represents an in-depth literature survey of the development and main features of Turkey-Africa cooperation and an overview of the application of AHP in various fields, such as logistics and trade. The structure of this part is as follows: the first section will include a depiction of the current literature regarding Turkey-Africa economic and political relations. The second section will include an overview of the various applications of Analytic Hierarchy Process (AHP). The last section will include a gap analysis and will point out the uniqueness and significance of this thesis.

The main portion of this literature review has been conducted between May 2012 and February 2014. However, various databases are being regularely checked up after this period, so that this thesis could remain exhaustive and up-to-date by considering the most resent academic literature and innovations in the field. The main databases used for the search of articles and theses regarding Turkey-Africa trade and AHP include the library and subscribed databases of Okan University, Science Direct, Web of Knowledge, Springerlink Journals, Google Scholar, Ebrary, Ulusal Tez Merkezi (The Thesis Centre of Turkey's Council for Higher Education), ProQuest, EBSCOhost, JSTOR, World Wide Science, Microsoft Academic Search and Pubget.

The main keywords used during the search include: Trade+Logistics; International Trade+Logistics, Logistics+AHP, International Logistics+AHP, International Trade+AHP; Trade+AHP; Turkey+Africa+Trade; Turkey+Africa+Logistics; Turkey+AHP; Africa+AHP; Turkey+Africa+AHP; Turkey+Africa+Trade+AHP; Turkey+Africa+Logsitics+AHP; Trade Corridor, AHP+Trade Corridor; Transportation Corridor; AHP+Transportation Corridor; Africa+Turkey+Trade Corridor; Africa+Turkey+Transportation Corridor.

After detailed and widely research on the scientific texts under the keywords, as seen below in Table 2.1, there are lots of model have been and still being used for the best model selection worlwide. However, realized by authour, AHP is the most appropriate technique that matches his model which is being tried to establish. Furthermore, there is a big gap about Trade of Africa on usage of AHP technique(s) even detailed explaination can be found on chapter 5 about.

Table 2.1: Mostly used Decision-Making Methods for the Best Alternative Model selection

Single Systematic Methods	**Mathematical Methods**	***Analytic Hierarchy Process (AHP)***
		Analytic Network Process (ANP)
		TOPSIS
		ELECTRE
		VIKOR
		MAUT
		PROMETHEE
		MOORA
		PAPRIKA
		UTADIS
		MACBETH
		Data Envelopment Analysis
		Linear Programming
		Multi Purpose Programming
		Data Envelopment Analysis
		Heuristic (intuitive) Methods
	Statistical Methods	**Principal Component Analysis**
		Cluster Analysis
		Discriminant Analysis
		Simulation
		Multivariate Regression
		Naive Bayes (Classification)
	Artifical Intelligence Based Methods	**Artificial Neural Networks**
		Decision Tree
		Expert Systems
		Fuzzy Cluster Theory
		Case Based Reasoning
		Genetic Algorithm
Hybrid Methods		**AHP-ELECTRE**
		AHP-Linear Programming
		AHP-Goal Programming
		AHP-Fuzzy Logic
		ANP-Goal Programming
		TOPSIS-Fuzzy Logic
		AHP-Data Envelopment Analysis

2.1. TURKEY-AFRICA ECONOMIC AND POLITICAL RELATIONS

The socio-economic relationships between Turkey and Africa have been constantly growing and improving since the end of the last millennium. Despite the fact that the cooperation between Turkey and Africa is still in its initial stage of development, the importance of strong, well-established Turkey-Africa trade relations is increasing. Some of the main reasons behind Turkey's opening to Africa include Turkey's political re-

orientation on the global arena, Turkey's need for economic diversification, as well as the realisation of Africa's potential, and the need for improved cooperation with other developing countries (Ozkan, 2012). Africa has also been trying to start new political and economic partnerships and to improve the existing ties with Turkey, which resulted in increased levels of institutional cooperation and trade between Africa and Turkey. A lot of Turkish companies are already starting to discover the potential of African markets, and trying their luck there (Bektaş, 2015).

The future patterns of socio-economic development between Africa and Turkey are yet unclear. However, one is certain – Africa is going to play an increasingly important role as both, a source of new resources and trade partner for Turkey's export. There is an urgent need for trade and logistics models that will be in line with Turkey's foreign trade targets and will be applicable in the context of Turkey – Africa trade relations. Such kind of models will support and be of enormous help to the Turkish firms that are currently involved or plan to get involved in Turkey-Africa trade.

The aim of this thesis is to create and suggest an exhaustive, comprehensive and well-structured model, which could assist Turkish firms involving themselves in trade with Africa in dealing with the everyday business life problems they have to face and deal with in the constantly changing globalized world. And an initial and major step towards this aim is an in-depth analysis of current literature.

In modern literature there are number of different scientific articles about the development of Africa-Turkey political and economic relations. Below you can find a summarization of some of the main articles concerning the development of Turkey-Africa foreign policies in terms of their economic, trade, social and political dimensions, as well as a depict of the domestic and international effect a Turkey-Africa cooperation would have.

Mehmet Ozkan is one of the most prominent analysts of the development of Turkey-Africa relations. He is offering a detailed overview of the different social, political and economic aspects of the evolution and development of the ties between Turkey and the Continentin his numerous publications. In his article 'Turkey Discovers Africa: Implications and Prospects' (2008), Ozkan depicts the revival in Turkey's relation with Africa after 1998 and the main economic and political motives behind Turkey's 'offensive interest' in developing relations with the Continent since the mid-2000-s. He further analyses the

driving forces behind the increased Turkey-Africa cooperation in his article: ‘What drives Turkey's involvement in Africa?’ (Ozkan, 2010a).

M. Ozkan (2008) considers the mutual lack of knowledge and familiarity between the two regions, as well as the general uncertainty regarding the development of their relations in the future to be the key challenge towards future successful cooperation. That is why some main points related to a serious and long-term coherent Turkish opening-up-to-Africa strategy are being suggested for consideration. Firstly, Turkey should develop a divisive and regional approach to the five regions of Africa: North, South, Central, West and East, and consider and differentiate their characteristics, such as varying ethnic and religious compositions, colonial backgrounds, import and export strategies, resource endowment, etc. Secondly, a gateway country-based approach, considering the key countries of the various regions (e.g. Nigeria, Kenya, South Africa, etc.) is needed. The more Turkey strengthens itsrelations with these key countries, the more it can feel secure in Africa. In addition to that, Turkey’s Africa policy should have global dynamics, and expand the boundaries of the relations between Turkey and Africa by adding aninternational dimension.

Tepecikliogluu (2015), Akgun and Ozkan (2010), Tepedelen (2008), and Hazar (2000) analyse Turkey’s opening toAfrica. They argue that economically, both Turkey and Africa will benefit from the increasing trade between them, as it will eventually create employment and investment. Moreover, politically, Africa could expect Turkey’s financial and humanitarian aid, as well as support at internationalplatforms. Akgun and Ozkan (2010) also forecast that Turkey’s opening to Africa will develop far beyond the political and economicfields.

I. Afacan (2013) and K. Rudincova (2014) in turn explore Africa’s opening in Turkey’s foreign policy and trade. They argue that Africa has become the new centre of Turkish economic and political attention, as it has become crucial for the growth and increased competitiveness of its small to mediumsized firms, and eventually to Turkey’s economic and trade growth as a whole.

M. Ozkan further depicts Turkey’s rising role in Africa (2010b). *Ha* makes a point that the Africa policy developed by the Turkish government is incited by Turkey’s long-term orientation in international politics, and may eventually lead to a diversification of Turkey’s economic allies by reducing the country’s economic dependence on traditional European and Russian trading partners and via opening to Africa. Habiyaremye and Oguzlu

(2014) further explore Turkey's engagement with Africa in the context of the global East-West rivalry.

According to M.Ozkan (2010b, 2011) Turkey's opening to Africa can be considered a result of both Turkey's domestic transformation and change in the global political economy, as well as part of the changes of Turkish foreign policy in social, political, and economic terms. Last but not least, M. Ozkan forecasts that Turkey´s growing involvement in Africa islikely to continue in the near future, as since the 2010-s it has a solid economic and social base.

In addition to that, M. Ozkan (2011) analyses the scope, content and implication of Turkey's 'new' engagements in Africa and Asia by creating a framework of Turkey's post-2002 African and Asian openings and by developing a general perspective. The latter is achieved by a discussion of the economic, socio-political and intellectual grounds of Turkey-Africa relations, as well as their economic and political course, including problem areas such as lack of information and contiguity as well as limited financial and political resources for increased cooperation.

Kaya and Warner (2012), Bilgic and Nascimento (2014), and Enwere and Yilmaz (2014) also examine the causes, trends and challenges of Turkey's strategic economic relations with Africa and come to similar conclusions as Ozkan (2010b,2011). They argue that by opening up to Africa, Turkey has found a new way to increase its status as a global economic player and that its economic involvement in Africa will steadily increase. However, Enwere and Yilmaz consider Africa's industrial base not viable enough, and believe it should be improved significantly, so that symbiotic pay-offs may be received and the importance of Turkey-Africa trade for the global economy could increase.

M. Ozkan (2012) also seeks to portray Turkey's new engagement with Africa in terms of economic and political developments. He argues that nothing can summarize the remarkable change of Turkey–Africa relations better than the increasing trade and institutional cooperation between the two. There has been a striking increase of Turkey-Africa bilateral trade volume between 2003 and 2009: it increased almost three times from 5.4 billion USD to 16 billion USD in 2009, despite the 2008 economic crisis. Ozkan also summarizes some of the general factors which (according to the literature and society) are behind Turkey's increased interest in Africa, namely: energy resources, the exchange of competencies and technologies with Africa, the search of new markets and raw materials, as

well as Turkey's aim at supporting Africa's economic development and lending its manufacturing expertise to the Continent. According to K. Rudincova (2014) Turkey is exporting to Africa mainly building materials, processed food, textiles, furniture and otherhouse products, iron-steel, etc. and importing rawmaterials, minerals, gold and oil, even though Turkishpolitical and business representation is stressingthat it shares the technologies with African countries and is not interested solely in African markets. According to A.Akel (2014) however, Turkey has mainly humanitarian activities oriented approach towards Africa, unlike other countries aiming to simply secure access to raw materials, especially oil products and rare earth elements.

In conclusion, it can be argued that the changes the future global and domestic developments will bring in the nature and speed of Turkey–Africa relations are yet to be seen. However, there is no doubt the African Continent will play a major role in Turkey's development, and will be one of the global players that will help Turkey to increase its overall exports (Caglayan, 2011). Despite the rapid development of Turkey-Africa trade and economic relations, there is still a long way to go towards a well-established and considerable Africa-Turkey cooperation (Afacan, 2013; Bilgic and Nascimento, 2014; Ozkan, 2012; Rudincova, 2014; Habiyaremye and Oguzlu, 2014). However, according to the author of this thesis, the future of the Turkey-Africa cooperation seems bright.

2.2. APPLICATIONS OF AHP

The Analytic Hierarchy Process (AHP) is a multi-criteria decision method, which was developed by T.L.Saaty (Saaty, 1977). AHP counts both tangible and intangible factors and thus can be successfully applied to the subjective side of real-world problems. It provides a systematic structure for the evaluation and ranking of alternatives under different criteria and doesn't prescribe one and only "correct" solution. In addition to that, AHP assists the decision makers in finding the optimal solution that according to them the best suits the problem at hand. Furthermore, the hierarchical structure can include more than one time periods, criteria and decision makers,and thus facilitates the involvement of decision-maker(s) in the solution process and allows judgement reassessments when necessary (Saaty, 1977; Saaty, 1980, Saaty, 1994, Saaty, 2008).

R.W. Saaty (1987), T.L. Saaty (1908, 1994, 2008) and R. Ramanathan (2001) give a detailed and exhaustive overview of AHP and its main elements, while some scholars focus on a review of AHP applications (Subramanian and Ramanathan, 2012; Bruno et al., 2011;

Vaidya and Kumar, 2006; Boer et al., 2001). The topic of AHP will be further explained and expanded in Part 5 of this thesis.

AHP has been successfully used and implemented not only for academic questions and theoretical debates, but for real-life problems in various fields die to its effectiveness and well-known advantages. Some of the fields include Manufacturing (Verma and Paeteriya, 2013; Tahriri et al., 2008; Yurimoto and Masui, 1995), Marketing (Erbıyık et al., 2012; Wind and Saaty, 1980) and Engineering (Wu et al. (2009); Chan and Kumar (2007); Ramanathan and Ganesh (1995); Triantaphyllou and Mann, 1995).

In the last decades AHP has started to play a more prominent role in the analysis of the sectors of trade and logistics.In this context, one of the topics that have recently gained specific importance is the evaluation and ranking of suppliers. Weber et al. (1991) give a detailed overview of vendor selection criteria and methods. Narasimhan (1983), Çebi and Bayraktar (2003) developed integrated analytic approaches for supplier selection. Shahroodi et al. (2012) apply AHP for the evaluation and selection of suppliers in an effective supply chain. Akarte et al. (2001) depict the use of AHP in web based casting supplier evaluation, Partovi et al. (1989) analyse the application of AHP in operations management, and Tahriri et al. (2008) use an AHP approach for supplier evaluation and selection in a steel manufacturing company. Chan and Chan (2004) develop an AHP supplier selection model in the advanced technology industry. Kahramanet al. (2003) research multi-criteria supplier selection using fuzzy AHP. Aissaouiet al. (2006) focus on supplier selection and order lot sizing modeling, and Nydick and Hill (1992) use AHP to structure the supplier selection procedure.

Ye and Wu (2014), Ying (2012), Peng (2012), and Çakiret al (2009a, 2009b) focus their research on the use of AHP and information entropy for the selection, management and analysis of logistics providers. Percin (2009), and Gol and Çatay (2007) depict the use of AHP for the selection and evaluation of third‐party logistics (3PL) providers. Buyukozkan et al. 2008) analyse the selection of strategic alliance partners in the logistics value chain.

AHP has been used in the sphere of reverse logistics as well. Tavana et al. (2016) apply an integrated intuitionistic fuzzy AHP and SWOT method for outsourcing reverse logistics. Divahar and Sudhahar (2012) focus on the selection of reverse logistics provider

via AHP, and Zhang and Feng (2007) suggest a selection approach of reverse logistics provider based on fuzzy AHP.

AHP can be applied to various real-life business aspects of trade and logistics. One such aspect is location. Alberto (2000) focuses on AHP and the logistics of industrial location decisions research. Koç and Burhan (2015) apply AHP to a real world problem of store location selection.Regmi and Hanaoka (2011) use AHP for location analysis of logistics centers.

Another issue is transportation. Ko (2014), suggests an innovative DSS approach with fuzzy AHP which can be used to facilitate international multimodal transportation network. Piantanakulchai and Saengkhao (2003) evaluate alternatives in transportation planning using multi-stakeholders multi-objectives AHP modeling. Zoran et al. (2011) suggest an application of the AHP method for the selection of a transportatıon system in mine planning, and Jing and Xue-Fang, (2009) use an AHP hierarchy to evaluate the influencing factors in a logistics network distribution.

Table 2.2: AHP Applications in Logistics and Trade

AHP Overview	R.W. Saaty (1987), T.L. Saaty (1908, 1994, 2008), Ramanathan (2001)
AHP Applications	Subramanian and Ramanathan (2012), Bruno et al. (2011), Vaidya and Kumar (2006), Boer et al. (2001)
Evaluation & Ranking of Suppliers	Akarte (2011), Chan and Chan (2004), Kahraman et al. (2003), Çebi and Bayraktar (2003), Aissaoui (2006), Narasimhan (1983), Nydick and Hill (1992), Partovi et al. (1989), Shahroodi et al. (2012), Weber et al. (1991), Ying (2012).
Selection &Analysis of Logistics Providers	Ye and Wu (2014), Ying (2012), Peng (2012), Percin (2009),Çakir et al. (2009a, 2009b), Buyukozan et al. (2008), Göl and Çatay (2007).
Reverse Logistics	Tavana et al. (2016), Divahar and Sudhahar (2012), Zhang and Feng (2007)
Location Decisions	Alberto (2000),Koç&Burhan (2015), Regmi&Hanaoka (2011)
Transportation and Network Systems	Piantanakulchai and Saengkhao (2003), Zoran et al. (2011), Ko (2014), Jing and Xue-Fang (2009)
Global Trade & Logistics	Tansakul et al. (2013), Kim et al. (2014)

AHP can be used as a tool which could influence cross-border trade and decrease the risks related with global logistics processes. Tansakul et al. (2013) developed an Analytic Hierarchy Process (AHP) approach to evaluate factors that influence cross border trade facilitation a case study of east-west economic corridor route. Kim and al. (2014) analyse the risks of overseas advancement by logistics companies applying AHP. You can find a table summarising the different spheres of AHP applications, as well as the authors of AHP-related literature below.

2.3. GAP ANALYSIS

2.3.1. Turkey-Africa Relations

As it can be easily concluded from the literature overview of Turkey-Africa trade relations, there are numerous different articles about the development of Africa-Turkey political and economic relations. However, most of them are more theoretic in nature, and not much is done to extend the theoretic debate to the context of the real-time business environment. In this context, although there are various studies and internet resources that provide sufficient and detailed information about Turkey's interests and foreign policies in Africa, there is a shortage of studies that are focused on the firm-level exporter dynamics of Turkey's exports to Africa or empirically assesses the effects of Turkey's Africa Strategy on Turkey's exports to Africa.

A.Akel's article depicting the way Turkey's Africa strategies affect Turkey's exports to Africa (2014) can be considered an exception. The main objective of A.Akel's research is to examine whether Turkey's new Africa strategy has had significant contributions effect on Turkey's exports to Africa in the last decade or not. In this context, a descriptive firm-level analysis is being performed. Various definitions such as "Firm Entry, Exit and Survival Rates", as well as the breakdown of Turkey's exports to Africa by "Intensive and Extensive Margins of Exports" are being used, and annual firm-product-country level data for 2003-2012 is being collected, implemented and analysed in order to bring out characteristics of Turkish exports to Africa in detail. In addition to that, a dataset from 2005 to 2012 is used for the collection of data concerning the number of employees that work in firms that export to Africa, the cities that exporters are operating in, and showing whether the exporters are also producers or not.

A. Akel's research shows that between 2003and 2012 around 30,000 different firms exported from Turkey to Africa. Firstly, the analysed firms were determined by the number

of employees working there. Then, the firms were divided into 4 main categories: micro-sized firms with up to 9 employees, small-sized firms with 10 to 49 employees, medium-sized firms with 50 to 249 employees, and large-sized with more than 249 employees. The firms with less than 250 employees can also be referred to as Small and Medium-Sized Enterprises or SME-s.

The results of A.Akel suggest that Turkey's Africa Strategy has been successful in creating awareness among Turkish SMEs about Africa: the number of exporters that exported to Africa increased from 8110 in 2008 to 12988 in 2012. However, surviving in the African market can be a challenge for Turkish exporters. According to the study, there are three main challenges that firms have to face. Firstly, the contribution of new exporters to Turkey-Africa trade is limited in each year, while the main source of the exports growth are the changes in intensive margin. Secondly, the share of total exports that most of the firms send to Africa are below 20%, while the main exports destinations remain the EU and Middle East countries. Lastly, the exporters' interest in Africa is still concentrated into the North African countries, regardless of the growing market diversification into the South, and the increasing interest and activities of Turkey's competitors in Africa (e.g. China) makes it harder for Turkish exporters to survive in the market. In this context, A.Akel's study suggests that Turkey restructures its Africa strategy while considering both, the socio-economic realities of the Continent and the global developments in line with its primary needs, and by taking into account its competitors' strategies for sustainable economic relations in the continent.

As already mentioned before, there is a shortage of literature regarding the real-life business environment of Turkey-Africa trade. To our knowledge, A.Akel's study is first of its kind due to its empirical assessment of real-life business dynamics of Turkey-Africa trade. A. Akel gives suggestions which could be implemented by the Turkish government in order to improve Turkey-Africa trade. However, no suggestions are made for the concrete actions and procedures that Turkish firms should undertake. Also, no forecasts about the future of Turkey-Africa trade are being made.

2.3.2. AHP Application

Although currently there are no AHP models that can facilitate and influence Turkey-Africa trade, there is an important study that can be used to facilitate trade in the Association of South Asian Nations (ASEAN) countries. Tansakul et al. (2013) developed

an Analytic Hierarchy Process (AHP) approach to evaluate factors that influence cross border trade facilitation a case study of east-west economic corridor route. They propose a framework which analyses four ASEAN countries (Myanmar, Lao PDR, Vietnam, and Thailand) and evaluates the cross border trade facilitation occurring among them via the East-West Economic Corridor. Tensakul et al. (2013) study the factors which could facilitate trade relations among the East-West Economic Corridor. They focus on such criteria as time, cost and complication of overall trading processes and measure their influencing weights via AHP. In addition to that, they take interviews form leading logistics experts, such as entrepreneurs, academicians and policy makers, and obtain their expert opinions.

Later on, AHP geometric mean is used for determining the influencing weights of the different factors. It was revealed that the most important factor which facilitates trade is the complication of overall trading. The obtained results can help scholars and logisticians to identify the appropriate factors and weights for the route characteristic and can be further utilized in order to evaluate the trade facilitation in each of the four ASEAN countries.

We should mention a study that strongly influenced the creation of this thesis: the case study of Tuzkaya and Önüt (2008), which describes the application of a fuzzy Analytic Network Process based approach for the selection of a transportation mode between Turkey and Germany. The authors of the study evaluate and synthesize a large number of detailed criteria interacting with each other in order to obtain an optimal solution and to select the most suitable transportation mode. The combination of those criteria can be considered the main contribution of this study.

This model allows decision makers to select the most convenient transportation mode by considering the effects of the various criteria on the alternative modes and the relations among the criteria clusters and subcriteria. Tuzkaya and Önüt (2008) have determined thirty-two sub-criteria and eight main criteria clusters, namely: product features (PF), flexibility (F), reliability (RE), speed (S), traceability (T), costs (C), safety problems (SP), and risks (RI).

Similarly to the study of Tansakul et al. (2013), this thesis aims at identifying the key components and characteristics of foreign trade between Turkey and Africa and to determine the effective factors that are likely to be applicable for the case of Turkey-Africa trade. The study of Tuzkaya and Önüt (2008) was the starting point and the basis which

allowed the author of this thesis to highlight 7 main criteria (namely product features, reliability, speed, traceability, cost, security, and risks) and 36 sub-criteria, which will be used for the analysis of Turkey-Africa trade and the creation of an AHP model. All these features will be described in detail in Part 6 of this thesis.

During the next step expert opinions were obtained through interviews with leading logistic experts and academicians. Later on, a detailed statistical analysis was performed. The aim of the obtained results is to enable firms to use their African trade potential, identify the characteristics of African trade and relationships and the best existing practice in the current situation.

2.3.3. The Significance of the Thesis

A detailed and extended literature overview and analysis has allowed us to point out the main sources and determine the main gaps in current scientific literature regarding the development of Turkey-Africa relations, the role of trade and logistics in this cooperation and the application of scientific models (with special focus of AHP) which could depict future patterns and facilitatereal-life aspects of Turkey-Africa trade and logistics. Our analysis has helped us to determine five main 'gaps':

1) The literature devoted to the analysis of the development of Turkey-Africa relations is mainly descriptive and presents a theoretical debate related to such issues as economics, trade, logistics and politics. Little has been done to extend the theoretic debate to the context of real-life business environment and the actual involvement of Turkish firms in Africa.

2) To our knowledge, currently there are no concrete models depicting and/or forecasting the development of Turkey-Africa economic relations.

3) Furthermore, there is a lack of models that investigate the effect of logistics and trade on the economic development and the evolution of Turkey-Africa relations.

4) Currently there are no scientific models of Turkey-Africa trade or Turkey-Africa logistics that are applicable for the real-life business issues Turkish firms are dealing with, or could assist Turkish companies in the creation of correct strategies and the application of effective and efficient policies towards Africa.

5) Although there has been an extensive use of AHP in different spheres of logistics, currently there are no AHP models applied to Turkey-Africa continent logistics and trade.

From this perspective, this thesis provides a 'filling' to this gap. You can find a table with the current standing (gap) and the objectives of the thesis ('filling') below.

Table 2.3: Gap Analysis

	Current standing/Gap	Objectives/Action Plan
1.	Currently there are no scientific models of Turkey-Africa trade or logistics that could assist Turkish companies in the creation of correct strategies towards Africa and are applicable for the real-life business issues.	To design a theoretical model, which will help Turkish firms to create correct strategies and apply effective and efficient policies towards Africa, to increase their efficiency and business capacity.
2.	There is a lack of models that investigate the effect of logistics and trade on the economic development and the evolution of Turkey-Africa relations.	To determine the attributes, factors and dimensions of successful transportation and logistics practices which can improve Turkish firms' performance and intensify Turkey-Africa trade.
3.	The literature on Turkey-Africa economic relations is mainly descriptive, theoretic, and don't extend to the actual business environment or the involvement of Turkish firmsin Africa (Exception: Akel, 2014)	To suggest an empirical analysis for measuring and evaluating the impact of logistical factors on organizational performance.
4.	Currently there are no concrete trade and logistics models depicting and/or forecasting the development of Turkey-Africa economic relations.	To line out the most important economic development trends between Turkey and Africa and to make a forecast for the upcoming decades.
5.	Although there is an extensive use of AHP in different spheres of logistics, currently there are no AHP models applied to Turkey-Africa logistics and trade.	To create an exhaustive, real business life oriented, adaptable, versatile AHP model which will benefit both: the sphere of business and the Academia.

To our knowledge, this research is the first of its kind logistics AHP model proposal in line with Turkey's foreign trade targets which could be applied to real-life trade processed between Turkey and the African continent.

This thesis's main aim is the design of a theoretical model, as well as the definition of a research method and its empirical analysis with field work. This model's main goal is to help Turkish companies to increase thier business capacity of foreign trade with Africa by

providing suggestions which will support and guide them, so that they could create correct strategies and apply effective and efficient policies towards Africa.

This model will not only assist the firms, but also investigate the effect of logistics on the development of economic partnership and cooperation between Africa and Turkey. It will help decision makers to determine the attributes, factors and dimensions of successful implementation of efficient transportation and logistics practices that will affect the performance of the organizations and improve Turkey-Africa trade.In addition to that, an empirical analysis for measuring and evaluating the impact of logistical factors on organizational performance will be performed. Last but not least, the most important criteria and factors of economic and trade growth between Africa and Turkey in the coming decades will be lined out and a forecast of the development of Turkey-Africa trade relations in the coming years will be suggested.

This five-in-one approach (assisting Turkish firms, investigation and determination of best practices, empirical analysis framework,analysis of current trends and forecasting) and focus on real-life issues and the adaptability of the suggested model to the constantly changing global environment can be considered as the contribution of this thesis.We believe that the model developed and suggested in this thesis will benefit a great number of companies doing business with Africa, as it will allow them to decrease their logistics costs, improve the effectiveness and efficiency of their logistical processes, increase the quality and speed of response to customers and decrease the lead time of all the included processes.

We believe that this research will be of importance not only for the sphere of business, but will contribute to the academic community as well.

3. BASIC CONCEPTS OF INTERNATIONAL TRADE AND LOGISTICS MANAGEMENT

3.1. INTERNATIONAL TRADE

3.1.1. International Trade Concept

International trade can be described as the trade among different countries or across political borders. It refers to the exchange of goods and services between a place of origin in one country or region and a place of consumption in another part of the world. The interchangeable terms "*inter-regional"* or "*foreign"* trade are often used as well.

Another, more complex definition of trade was given by G. Vijayasri (2013). According to him, international trade is the "international transformation of inputs, commodities and technology" which promotes welfare in two main ways: firstly, it allows countries to gain access to international markets and thus ensure better prices for their exports; secondly, it allows them to import commodities, inputs and technology which are either not available or too costly in the domestic market. According to the law of comparative costs, one of the main principles of foreign trade, what a country exports and imports is not solely determined by its character in isolation but by its relations with its trading partners.

Modern international trade has made the world much more interdependent, and there are several reasons for that. To start with, society has numerous needs, but the resource endowment of our planet is limited. The endless needs and wants of the people cannot be fully satisfied by the scarce resources in their respective lands, thus making numerous states dependent on other countries with different factor endowment. Furthermore, different countries have different kinds of natural resources and technology at their disposal. Thus, they start to specialize in the kind of production they are superior in and which can transform their comparative advantage into absolute advantage. For example, some countries specialize in agricultural production, others – in manufacturing, etc. Another factor that should be mentioned is the human capital – the level of labour and entrepreneurial skills may differ in various countries, and the exchange of information and know-how across borders has become crucial. Last but not least, many factors of production

tend to be highly immobile, thus increasing the level of economic and trade dependency between the different countries.

Thus, international trade can be perceived as the outcome of the differences in resource endowment, the division of labour with varying skills on different territories, as well as the differences in specialisation in the countries of the world. It's a vast and constantly changing field, which is one of the main determinants of economic growth and one of the main keys towards improved GDP, better life quality and higher levels of consumer satisfaction.

3.1.2. The Changing Geography and Composition of Global Trade

The patterns of international have been dramatically changing in the last thirty years. In the past, most of the trade was between developed countries. Nowadays, although developed countries like USA and EU tend to trade predominantly among themselves, a constantly increasing share of their merchandise is exported to developing economies. More and more international transactions are occurring between developed and developing countries. The levels of trade between developing countries have been increasing as well. However, developed countries remain the main trade partners and the largest export and import markets of the developing countries.

In the 1990-ies, developing countries had to change their policies in the sphere of global trade, as the prices of primary goods, previously the main part of a developing country's economy, fell relatively to the prices of manufactured goods. Developing economies started to increase the export of manufactured goods and focused on labor-intensive, low-knowledge products (such as clothes) that would allow them to create more jobs and more efficiently use their labour. At the same time they continued to import knowledge- and capital-intensive manufactured goods such as technology and machinery from the developed economies, thus allowing them to maintain their comparative advantage (Soubbotina and Sheram, 2000).

However, the rising demand and the growing importance of developing economies in the 2000-s changed the old patterns, and now many developing countries are producing finished and semi-finished knowledge-sensitive goods, thus in a sense 'stealing' developed countries' comparative advantage.

3.1.3. Main Features of International Trade

The importance of the role of international trade has been constantly increasing, especially in the last six decades. The years after the end of the Second World War brought a major liberalization of the world trade, and one of the main factors behind this change was the creation of the General Agreement on Tariffs and Trade (GATT). In 1993 GATT was replaced by the World Trade Organisation (WTO), which is currently responsible for the worldwide trade.

In the last two decades the world has seen numerous improvements in world trade also due to the developing technologies and increased international cooperation. But dealing with international trade relationships is not an easy task, and one of the main reasons for that are the often conflicting interests between the parties involved (Thirlwall, 2000). The increasing international interdependence, although socially and economically beneficial, can also lead to the emergence of hidden or more evident trade conflicts. Another remaining problem is protectionism. Although there have been great improvements in such spheres as trade barriers reduction, process and document standardization, as well as multinational cooperation, protectionism remains one of the main problems preventing the developing countries from participating more actively in international trade and eventually escaping the chains of poverty. As it can be easily observed, the growth of international trade and investment is a double-edged knife, which comes with its specific features, advantages and disadvantages.

Raj Kumar (2008) identifies 6 main features of international trade, namely: immobility of factors, heterogeneous markets, different national groups, different political units, different national policies and government intervention, as well as different currencies.

The degree of **immobility of factors** (e.g. labour and capital) may vary significantly in different parts of the world, as it is affected by such factors as economy, national law, citizenship, educational level, immigration laws, etc. Sir Roy Harrod, an English economist, argues that domestic trade usually takes place between producers with similar life standards, whereas international trade takes place between producers with different life standards (Harrod, 1963). The price of a good in the country of production normally equals its cost of production. But in case of international trade, resources are comparatively immobile, and

the price and costs cannot get automatically equalized. As a result, a difference occurs between the cost of a good's production in the country of origin, and its price in the country of consumption (Nyilas, 1982). For instance, in the long run the price of a good produced in Africa must be equal its production cost. But in Turkey the price of this African good most probably will be noticeably higher

Global international markets are **heterogeneos**, i.e. they differ in terms of many factors, such as a country's climate, history, culture, economy, customer's preferences, language, habits, customs, etc. The behaviour of international traders and buyers will differ on a case-to-case basis. Furthermore, international trade takes place between **different socio-cultural groups** and **different political units**. Different nations exist in different business environments, affected by their cultural and historical past, as well as their political present. In addition to that, **various currencies** are being used in international trade, and the countries participating in global trade usually adopt different policies when dealing with such issues as currency selection, exchange rates, interest rates, etc.

Different national policies and government intervention. Different countries have different laws and apply different political, social and economic policies. The policies related with international trade, taxation, import and export of goods, etc., although more or less uniform within the borders of one country, tend to differ strongly among countries. The government uses such controls as tariff policies, subsidies, laws and regulations, customs and import controls in order to act as a 'visible hand' (opposed to Adam Smith's concept of the 'invisible hand' in the economy) and take part during the international trade processes.

3.1.4. Advantages and Disadvantages of International Trade

3.1.4.1. Advantages of International Trade

The main idea behind the existence of international trade is to sell something that we don't need and to get something that we need. Trade benefits the society in many ways, as it creates jobs, attracts investments, facilitates the emergence and spread of new technology and materials, as well as provides the people with a wider variety of goods and services. According to Schultz et al. (2003) there are five main ways by which international trade supports economic growth and development.

Firstly, **international trade helps us to satisfy our needs.** Ideally, fair trade must be balanced. Many enterprises have inventory surplus, which they can export and import the goods they need which are either scarce or too expensive from abroad. In this case, all of the parties involved in trade will obtain something they need by trading something they don't need, and will better satisfy their intermediate and final customers.

Secondly, **international trade creates jobs.**. When a foreign enterprise buys, let's say, a Turkish product, it creates extra jobs for Turkish citizens and provides the country with additional cash flow. Thus, international trade helps businesses and governments to grow and optimize their profits. Latest data shows that more than 50% of Turkish exports are produced by 15,000 foreign companies operating in Turkey which then export the products to their own countries (Today's Zaman, 2015).

Thirdly, **international trade attracts investment.** Investment comes with trade. Many enterprises invest in foreign countries' structures, such as factories, shops, farms, offices, and warehouses in order to gain benefits. These benefits can include (and are not limited to) cost reduction, profit maximization, and trade simplification. Foreign investment creates jobs, and attracts even more investment.

Fourthly, **international trade gives us access to new technology and materials.** New technology is one of the keys that can ensure a business's effectiveness, efficiency, competitiveness, and profit maximisation. An improved machine or a software innovation can make the operations faster and better, ensure cost and time minimisation, and potentially make any enterprise more competitive in the domestic and international market.

Last but not least, **international trade gives us access to diverse products and services, which we could not get otherwise.** Foreign trade has turned the world into a giant global market. Now it is possible to get almost anything from any part of the world: food, clothes, jewellery, technology, etc. New international services such as consultation, banking, online shopping, etc. have made our lives much easier. The competition is no longer domestic, but international, and consumers from all around the world can find goods of higher quality, better design and lower price.

3.1.4.2. Disadvantages of International Trade

Schultz et al. (2003) argue that buying and selling goods in the global market can be both, an advantage and a disadvantage in the same time. On one hand, it allows countries to

become more prosperous for a short time. On the other hand, however, it can lead to such long-term problems as economic exploitation, cultural identity loss, and even physical harm.

International trade may be an indirect way of supporting non-democratic systems, as people often make poor business decisions without considering the general population's welfare. **Cultural identity issues** may occur as well, especially if foreign consumers in the country of import get 'overwhelmed' by the cultural ideas and messages displayed by the product (Schultz et al., 2003).

Table 3.1: Advantages and Disadvantages of Foreign Trade

	Advantages of International Trade:	Disadvantages of International Trade:
1.	International trade allows firms to meet the customer's needs more effectively and efficiently	Direct or non-direct support of non-democratic systems in emerging economies
2.	Creation of new jobs	Potential declining domestic employment
3.	Attraction of foreign partners, investors, and foreign direct investment (FDI)	Exploitation of underdeveloped and developing countries by developed ones
4.	Flow, development and implementation of new technology and know-how	Environmental issues (e.g. pollution, resource exhaustion, climate change)
5.	Diversification and faster production of new goods and services	Overproduction and storage of goods, which the consumer doesn't need
6.	Optimum allocation of world's resources (ideal case)	Exhaustion of resources, such as essential raw materials and minerals
7.	Enhanced wealth, GDP, economic growth, quality of life	Diversification and decrease of the domestic savings of a country
8.	Enlargement of world's aggregate output	Mix of cultures; potential identity crises
9.	Harmonisation of international politics	International over – independence
10.	Increase of the world's prosperity and Dealing with Scarcity through imports	Foreign competition affecting new and developing infant industries at home
11.	Larger market size and gains of specialisation	Dumping tactics by advanced states harming the development of poorer ones.
12.	Increase of the economic welfare of each trading nation	Discouraged economic self-sufficiency and self-reliance
13.	Increased cultural exchange, strengthened ties among different countries	Potential conflicts because of varying and conflicting interests.
14.	Advantages of the increased competition: higher quality and lower prices	Problems with process, documentation and finance standardization.

Social welfare is another important topic, as firms spend a great deal of money on product standardization, safety standards and quality improvement of their merchandise, as well as salaries and benefits, minimum wages, health benefits for their workers. If some of these issues are not met, a good can be produced with lower costs and sold for a lower price.

However, the lack of minimum standards in the workplace can lead to major problems for the final consumer.

International trade can lead to a rise of **environmental problems** as well. Many world governments and environmental groups create laws and regulations which force the enterprises to be environmentally friendly. However, implementing green policies and following environmentally-friendly regulations can be very costly, and many firms prefer to outsource their operations to countries where those regulations are not so strict.

Last but not least, **political issues** must be taken in consideration when speaking about international trade. The wars for control over precious commodities such as oil, gold, diamonds, etc. are a good example of this. Political alliances that neglect the people and serve powerful corporations and foreign interest are often formed, especially in developing countries. You can find some additional advantages and disadvantages of foreign trade summarized in the table below:

3.1.5. Trade and Economic Growth

According to J. Vijayasri (2013)**,** there are five main ways in which international trade stimulates the economic growth of a country.

Firstly, international trade increases global competitiveness and the efficiency of the domestic business units. Entrepreneurs from all around the world can gain easy access to latest know-how and technological innovations, and later implement them in order to increase their productivity and boost their profits. Secondly, developing countries' have more protectionist policies than developed countries, and international trade allows them to enjoy the benefits of an open trade regime. Thirdly, labour-intensive merchandise like clothing, and textiles produced by developing countries can be exported to both developed and underdeveloped countries. Furthermore, international trade facilitates economic growth, generates financial resources, and allows countries to attract more foreign investors, thus decreasing the global levels of poverty and ensuring the provision of better educational and healthcare services. Last but not least, the absence of trade barriers for the agricultural produce of the developed countries will eventually lead to a decline in agricultural production and a global rise of prices. In the end, the developing countries will be better off, as they will be able to export their produce at a higher price.

3.1.6. Patterns of International Trade

The first years of the new millennium have seen important socio-economic shifts which are slowly and steadily reshaping the landscape of global trade.

Riad et al. (2012) have made an in-depth analysis of these changing patterns of global trade. Their research is focused on the evolving structure of global trade and the changes it brings along. The authors argue that the share of international trade in the global output has almost tripled since the end of WWII. Some of the main driving forces behind that include the integration of rapidly growing emerging market economies (EMEs) and the growth in non-commodity exports, such as computers, electronic devices, and other kinds of high-tech. Riad et al. (2012) have emphasized on three key recently emerging and developing trends: the rise of EMEs as systemically important trading partners; the growing role of global supply chains; and the ongoing shift of technology content toward dynamic EMEs.

These trends have triggered increased trade interconnectedness and stronger trade spillover channels. Some factors that underlined the current expansion in global trade and the development of the abovementioned trends include trade liberalization which lowered trade barriers in both – advanced and developing countries, the growth in vertical specialization in production, the convergence of income levels, as well as the emergence of global supply chains. Another factor that should be mentioned is the diffusion and growing number of players in trade.

Globalization is another important issue. It's no longer simply a trend; it is everywhere, becoming dominant in the business environment and also determining the appearance of new patterns of trade. Many countries have become part of the newly emerging global supply chains. As a result, the share of imported content in their exported has increased, and these countries have become more dependent on the intermediate inputs imported from other supply chain partners. Riad et al. (2012) argue that the integration of rapidly growing developing economies can bring a gradual shift in the sources of global demand away from advanced economies, and that a country's position along the global supply chains can determine the trading patterns in the future.

Depending on the percentage of imported inputs in its exports, a country can be described as either "downstream" or "upstream" in the supply chain. Downstream economies tend to predominantly involve themselves in assembly and processing activities,

while upstream economies tend to act as hubs of the supply chain. Usually, advanced economies are upstream in the supply chain – they have a small share of foreign contents in their exports and play a relatively big role in the exports of other downstream countries'. Meanwhile developing countries with emerging market economies are usually pretty much downstream in the supply chain and have high shares of foreign imported content in their exports. The extent of foreign content in exports of downstream and upstream economies has a strong influence on trade patterns and the sensitivity of relative price changes. The Table 3.2 compares the 'downstream' and 'upstream' countries:

Table 3.2: Upstream and Downstream Countries in Global Supply Chains

Downstream countries	Upstream countries
Usually developing countries with EME-s. E.g. China, Nigeria	Usually advanced countries E.g. Japan, USA
Engage heavily in assembly and processing activities	Act as hubs
Relatively high share of foreign contents in their exports	Relatively small share of foreign contents in their exports
Often influenced by the trade policies and decisions of more advanced countries	Play a relatively big role in the exports of other downstream countries
More dispersed supply chains	More monolithic supply chains
Potentially more vulnerable to disruptions of trade flows	As a whole less vulnerable to disruptions in trade flows

The last 2008 financial crisis caused a tremendous global economic recession. One of the effects of this recession was the net redistribution of wealth, as a result of which enterprises from rapid-growth markets have received the chance to challenge the giants of the developed countries' economies. The world is witnessing a flow of investment not only from West to East, but from East to West as well.

According to PwC's 'Transportation and Logistics 2030' study (2012, vol.5) new trade corridors between Asia and Africa, Asia and South America and within Asia will re-chart global supply chains in the coming decades. Trade volumes will shift towards emerging markets and least developed countries will make their first steps into the global marketplace.

Although the 2008 financial crisis as a whole downtrended global trade, the trade levels have been steadily going back to normal. Some of the reasons for that were the growing levels of trade among emerging markets, and the growth of the Asian supply chains which are more dispersed compared to those in Europe or Northern America and thus potentially more vulnerable to disruptions of trade flows, no matter whether they are naturally caused (e.g. earthquakes) or socio-economical (e.g. wars, political unions, preferential trade agreements, etc.)

The emergence of global supply chains has allowed developing economies to orient more towards technologies. They started to increase the number of exported finished goods, as well as semi-finished goods that are to become part of the high-technology exports of advanced countries. The presence of countries of the Asian supply chains (such as Japan and China) have significantly increased in many sectors, which were previously mainly dominated by advanced economies. According to R. Hausmann et al. (2007), the quality level of exports in several developing economies has reached higher levels than expected based on their GDP per capita. Their research suggests that dynamic developing economies with higher-than-expected income value of exports can expect another growth push in the future.

One of the key questions that remain unclear is whether the key trends of global trade that we have observed during the last two decades are going to remain in the coming years, or has the financial crisis managed to dramatically alter the dynamics of the economic environment, thus resulting in new patterns of international trade?

3.2. INCOTERMS 2010

3.2.1. Incoterms Concept

The Incoterms or International Commercial Terms are a series of uniform commercial terms and standards which are recognized internationally and published by the International Chamber of Commerce (ICC). First created in 1936, Incoterms specify the type of agreement used during the process of purchasing and shipping goods, and are extensively used all across the world for various domestic and international commercial and trade transactions. They provide internationally accepted definitions and rules of interpretation for most common commercial terms, and are used by governments, practitioners and legal authorities from various countries. (ICC, 2010)

Incoterms are used to define the relationship between the exporter and importer regarding some important questions in terms of ownership, tasks, costs, risks, and liability. The Incoterms specify the ownership of the goods, the liability for damage and the responsibility for the freight costs at different points of the shipment. They specify which transportation mode will be used for the delivery and which party will be responsible for custom clearance (customs duties, documents, licenses),. Furthermore, they define the point of the journey where the ownership of the goods and the transfer of risk and insurance responsibilities will take place between the buyer and the seller. Last but not least, Incoterms determine the delivery terms, the way transport costs are shared between the involved parties, as well as the time when the delivery is considered completed.

However, Incoterms do not define the legal obligations, liabilities and the contractual rights of the exporter or the importer. They do not dictate the way in which the title of goods is being passed, do not define obligations with regards to the shipment before or after its delivery, or protect any party from its personal risk of loss.

3.2.2. Incoterms 2010

INCOTERMS 2010			
Rules for all Modes Of Transport		**Rules for Sea and Inland Waterway Transport**	
EXW	Ex Works (place)	**FAS**	Free Alongside Ship (port of shipment)
FCA	Free Carrier (place of delivery)	**FOB**	Free on Board (port of shipment)
CPT	Carriage Paid To (place of destination)	**CFR**	Cost and Freight (port of destination)
CIP	Carriage and Insurance Paid to (place of destination)	**CIF**	Cost, Insurance and Freight (port of destination)
DAT	Delivered at Terminal (terminal at port or place of destination)		
DAP	Delivered at Place (place of destination)		
DDP	Delivered Duty Paid (place of destination)		

Incoterms® 2010
by the International Chamber of Commerce (ICC)

Figure 3.1: INCOTERMS 2010

Incoterms 2010 is the eighth set of international trade terms that was published by the International Chamber of Commerce. Incoterms 2010 came into effect on 1 January 2011. However, all contracts made under Incoterms 2000 remain valid even after 2011, so it is

important for Incoterms users to clearly specify the terms version they have chosen for their trade transactions.

Incoterms 2010 include 11 different three-letter trade terms. Each of the terms helps users to deal with different situations arising during the export and import of goods by clearly specifying the main tasks, costs and risks that the parties involved in the transportation and delivery process should consider (ICC, 2010). Incoterms 2010 are divided into two categories based on the delivery method used. The first group consists of seven rules applicable to any method of transport, while the second group defines four rules that can be used only for sales solely involving transportation by water, and cannot be used for containerized freight (Figure 3.1.)

1) **"Ex Works" (EXW)** indicates that the maximum obligations are set on the buyer, who bears all the risks related to delivering the cargo at the point of their destination. The seller has minimum obligations under this Incoterm, as his only responsibility is to make the cargo available on his/her own premises. The seller must make the goods available for the buyer at the seller's premises or at another previously agreed upon and named place (i.e. warehouse, factory, office, etc.). The seller has no responsibility to clear the goods for export or to load them on any vehicle for further transportation. The buyer owns the in-transit freight and is fully responsible for its pickup and further transportation. Furthermore, the buyer must clear the goods and prepare all export-related documents.

2) **"Free Carrier" (FCA)** implies that the seller must clear the goods for export, deliver them at his own premises or another named place, and make them available for the carrier or any other party nominated by the buyer. The place of delivery should be clearly specified, as the risk and the loading and unloading obligations of the involved parties pass at that point. If the delivery is taking place at the seller's premises, then he is responsible for loading the goods on to the buyer's carrier. Otherwise, the seller delivers when he has transported the goods to the named place. From that point onward the buyer is responsible for unloading the goods from the seller's vehicle and loading them to his own carrier.

3) **"Carriage Paid To" (CPT)** means that the seller must contract for and pay the costs related to the carriage of the goods to a carrier or another party selected by the seller at a named place of destination. When the goods are handed over to the first carrier at the place of destination in the country of export, the risk transfers from the seller. The shipper must

clear the goods and cover all transport costs to a named place (e.g. an airport, rail station, etc.), and has no responsibility for the delivery to the final destination.

4) **"Carriage And Insurance Paid To" (CIP)** specifies that the seller must cover all costs of delivering the goods to a carrier or another party nominated by the seller at a named place of destination. This term is almost completely equivalent to the CPT term; the only difference is that the seller must insure the goods while in transit. The insurance obtained, however, will be on minimum cover.

5) **"Delivered at Terminal" (DAT)** obliges the seller to cover all the transportation costs and assume all risks related with the transportation and the unloading of the goods at a port or terminal of destination. The seller is responsible for unloading the goods from the arriving means of transport and for making them available for the buyer at a named terminal, e.g. a warehouse, air/road/rail cargo terminal, container yard, etc.

6) **"Delivered at Place" (DAP)** is usually used for trade transactions during which multiple modes of transportation are being used. The seller is responsible and bears all the risks involved in the carriage and the delivery of the goods (which must be ready for unloading) to a named place

7) **"Delivered Duty Paid" (DDP)** indicates that the seller bears all the costs, risks and responsibilities (including clearing the goods for export and import, dealing with all customs formalities, and paying import duties and taxes) related to the delivery of the goods to a named place in the buyer's country. The seller is not responsible for unloading the goods. As an opposite of "Ex Works", "Delivered Duty Paid" indicates that maximum obligations lay on the seller and minimum obligations on the buyer: all risks and responsibilities are transferred to the buyer only after the seller delivers the goods to the named place.

The four Incoterms which are described below, namely FAS – Free Alongside Ship (named port of shipment), FOB – Free on Board (named port of shipment), CFR – Cost and Freight (named port of destination), CIF – Cost, Insurance and Freight (named port of destination), can be applied only in case of sea and inland waterway transportation.

8) **"Free Alongside Ship"** (FAS) indicates that the seller must clear the goods for export and place them alongside a vessel at a named port of shipment. From that moment on, the risk of loss and damage to the goods is transferred to the buyer.

9) **"Free On Board" (FOB)** signifies that the seller must clear the goods and bear all delivery costs until the goods are delivered on board a vessel at a named port of shipment. As soon as the goods are delivered on board the vessel, all costs and risks related to them are passed to the buyer

10) **"Cost and Freight" (CFR)** implies that the seller must cover all costs and bear all risks until the goods are delivered at a named port of destination on board a vessel. As soon as the goods are on board, the risk of loss and damage transfers to the buyer.

11) **"Cost, Insurance and Freight" (CIF)** is very similar to **"Cost and Freight" (CFR)**: the only difference is that the seller is required to obtain and pay for insurance of minimum cover of the goods.

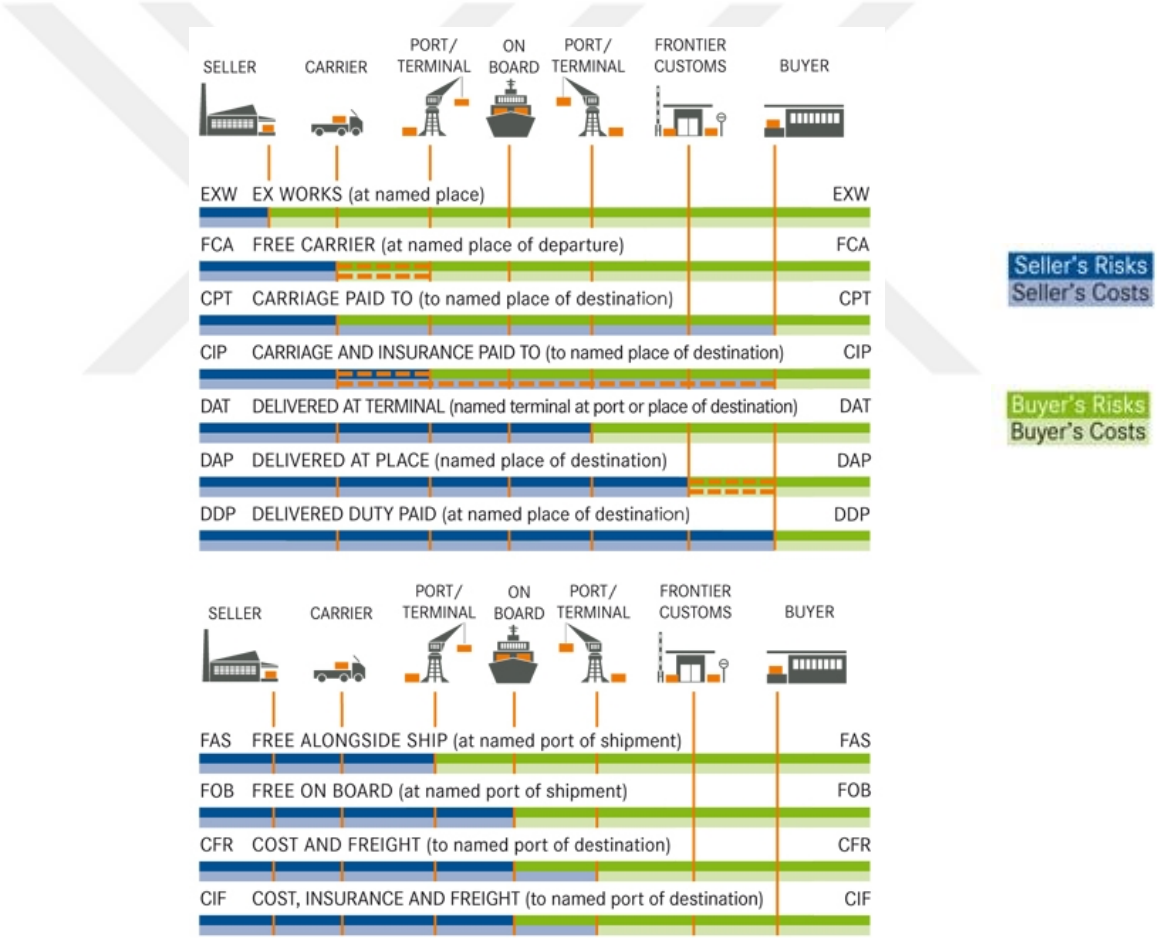


Figure 3.2: Types of INCOTERMS

3.3. CUSTOMS & CLEARANCE

Customs, *Customs* can be defined as a special government body (parts of which may be privatised), the main functions of which are to control the flow of people, vehicles and

goods (such as merchandise, living objects, hazardous items, food, etc.) that are getting in and out the country's borders, as well as to collect tariffs. Customs include special *migration authorities* that specifically monitor the movement of people into and out of the country, check the validity of their documents, etc. Furthermore, customs authorities impose the fulfilment of the country's regulations and laws regarding import and export processes.

Customs departments have offices not only at border gateways, but at all airports and sea ports, thus monitoring all exit and entry points of the country, supervising and supporting the continuous and flawless flow of people and cargo. Customs agencies have the authority to confiscate and check goods, arrest people, etc.

Customs Duties, Commercial goods must be cleared at customs, and customs duties should be paid. A *customs duty* is a special tax which should be paid on the import and/or export of various goods. During the process of custom clearance, goods are being held in special customs areas, also known as *bonded warehouses*. As soon as the goods are cleared, they leave the bonded stores and continue their journey towards their final destination.

Customs and Trade Logistics, Every country has it's specific laws, regulations and policies regarding international trade, which are being annually reviewed and modified. They define the provisions, regulations, customs rules and tariffs under which goods and services could be exported or imported. Furthermore, some goods may be banned from import or export, or special licenses may be required.

Customs Brokerage, is the process during which freight-forwarding specialists assist their clients by coordinating their international transportation and providing them with customs clearance services. Freight forwarders prepare and submit export and import documents (such as sales invoices, purchase orders, packing lists, shipping lists, certificates of origin, bills of lading, bills of entry, etc.) and represent their clients during the various steps of customs clearance, such as customs examinations, duty payment, after-clearance cargo delivery, etc.

3.4. INTERNATIONAL LOGISTICS

3.4.1. Logistics Concept

Logistics can be defined as the management of the flow of goods (such as raw materials, semi-finished goods and physical items) between a point of origin and a point of

consumption. The goal of logistics is to meet the requirements of customers by providing effective, efficient and timely services.

Modern logistics is an important link in the development of the global economy. It is a complex and advanced organizational and managerial concept, which can increase the overall competitiveness of various enterprises, facilitate economic growth and support national economies from all around the world. According to Z. Dong (2013) logistics optimizes the industrial structure, improves the investment environment and promotes social informatisation. Thus, it comes as no surprise that logistics has been valued by enterprises, governments and universities alike, and has shown tremendous growth and rapid development in the last two decades.

It won't be an overstatement to say that logistics is one of the most important factors or economic growth. Logistics doesn't simply include the management of the flow of products from the place of origin to the place of consumption; it is a much broader and exhaustive term, and involves planning, warehousing, material handling, transportation management, packaging, inventory management, shipping security, supply chain management, customs service, and procurement.

Some of the most eminent logistics fields include (and are not limited to): production logistics, procurement logistics, distribution logistics, green logistics, reverse logistics, humanitarian logistics, emergency logistics, and many others.

Task of Logistics, Consumers and companies have various needs, which have to be satisfied in a most effective and efficient manner. We all need various goods, such as food, clothes, technology, etc. The thing is we want them immediately, and as most of those goods are produced far from the place of consumption, logistics has a most serious task, the so-called **"Four R-s"**: logistics has to provide the **r**ight quantities of the goods in an optimal way, at the **r**ight place, at the **r**ight time, and in the **r**ight order.

Basic functions of Logistics, According to Gudehus and Kotzab (2009), logistics execute four basic functions, namely: transportation – bridging space; handling – adjusting quantities; storing – bridging time, and commissioning – order fulfilment.

Main features of Logistics, Zhaojiang Dong (2013) argues that modern logistics have four outstanding features, namely: unified collaboration, systematisation, informatisation, and standardisation.

1) **Unified collaboration.** While traditional logistics puts stress on warehouse-to-warehouse services, modern logistics emphasize workshop-to-workshop services. New and higher requirements and regulations regarding timing, accuracy, quality, normalisation of procedures and process standardization have been developed in the last two decades.

2) **Systematisation**. Modern logistics encompass numerous elements of traditional logistics (e.g. transportation, processing, packaging warehousing, etc.) and enables the coordination of all processes and sub-processes of the supply chain. Logistics enterprises have started developing new services, such as logistics system designing, logistics planning, management and consulting in order to reach their goals of systematising their processes, increasing their competitiveness, and better satisfying their customers.

3) **Informatisation**. Modern logistics allow the timely and precise exchange of information during every step of the logistical process. Softwares and modern networks help logisticians to dynamically manage the whole supply chain. The exchange of information helps to improve the speed of materials circulation, and to better satisfy the intermediary and final customers.

4) **Standardisation**. Logistics standardization specifies different technical standards that can be applied to different kinds of logistics systems and sub-systems. A thorough research and analysis of functioning logistical systems and sub-systems allows scholars to compare and match up these technical standards with functioning logistical standards.

There are two categories of logistics standards: *software standards* and *hardware standards*. Software standards can be used for unit standardization, bar code application, package sizing, receipt standardisation, etc. Hardware standards are used for palletising, containerization and loading processes, as well as for logistics equipment and facility standardisation.

3.4.2. Logistics and Economic Growth

In the last decades logistics have become one of the most important factors of economic growth. In 2011, the overall global logistics market volume was estimated to be more than €980 billion. Global logistics markets have been steadily and substantially growing since the beginning of the new millennium. According to Doll et al. (2014) global logistics sector is growing by 2.0-2.5 times the global GDP and the overall global logistics market is expected to grow with approximately 2.4-3.0% annually in the coming decade.

Some of the main reasons behind this tremendous growth are the constantly increasing overall domestic and international trade volumes, as well as the growing role of outsourced logistics.

The ratio of trade to GDP for the world as a whole has increased from 39% in 1990 to 59% in 2011, signifying an increasing level of economic openness in the modern globalized world. Currently the total value of global trade exceeds $20 trillion. The tremendous growth in global trade can be seen as a result of two main factors – the political changes and logistical innovations that have been changing the business environment in the last 20 years. These two factors have led to improvements and great cost reductions in many spheres of trade, such as goods shipment, service quality, customs, etc. (World Economic Forum, 2013)

According to a report published by Evotech (2014), the total global logistics market represented almost 10% of the global GDP and reached almost $4 trillion in 2013. The global transportation sector was among the fastest growing sectors with approximate annual growth of 7% in the last five years, and is expected to generate a revenue of $3.8 trillion in 2016.

The USA currently accounts for more than 42% of the global transportation services sector. However, scholars forecast that in the next decade the demand for international trade and logistics will gradually shift away from the developed Western economies to the developing countries and the emerging market economies in Africa, the Middle East and the BRIC countries – Brazil, Russia, India and China (Riad et al., 2012; Ernst and Young, 2011; Kumar, 2008).

3.4.3. Tasks and Objectives of Logistics

Every logistical task has specific and defined aspects, objectives and goals. The two most general aspects of logistics which, in a sense, correspond to macroeconomics and microeconomics are *Macrologistics* and *Micrologistics* (Gudehus and Kotzab, 2009; Mankiw, 2003; Samuelson and Nordhaus, 1998).

Macrologistics**,** ensure that customers are supplied with the goods they need in an effective and efficient manner. It also ensures the existence of continuous flow of goods between places of origin and destinations from all around the world. An effective and efficient logistics infrastructure is momentous for continuous economic growth.

The goal of ***Micrologistics*** is to provide customers and consumers with the goods they require in an effective, efficient, mobile and cost-optimising way. In order to fulfil the constantly rising customer expectations and ensure the optimal development of the national and global economy, logistics companies and service providers from various parts of the world plan, implement, operate and monitor various logistical networks and systems and manage transport and supply chains.

The main area of micrologistics is C*ompany Logistics*. According to Gudehaus and Kotzab (2009) there are three primary tasks of company logistics: performance, service quality, and cost efficiency. ***Company logistics*** consist of i*nternal logistics* and *external logistics*. ***Internal logistics*** (also known as *indoor logistics*, or *intralogistics*) connects sources, receiving docks, shipping docks and internal sinks of the same site. ***External logistics*** or **extralogistics** connects the shipping docks of one or several locations with the receiving docks of other locations.

The direction of the flow of goods allows us to differentiate between ***inbound (procurement) logistics***, ***outbound (distribution) logistics*** and ***reverse (disposal) logistics***. Inbound logistics focus on the supply of goods from the sources to the companies. Outbound logistics deal with the delivery of goods from the companies to the recipients.

3.4.4. The Benefits and Challenges of Global Logistics

Table 3.3: Benefits and Challenges of Global Logistics

Benefits of Global Logistics	Challenges of Global Logistics
Providing customers with better services (e.g. low cost sourcing, increased markets and economies of scale). Achievement of long-term socio-economic growth and maximum levels of customer satisfaction.	Providing customers with better services of higher value in an extremely competitive business environment with scarce resources and harsh time limitations
Logistics allows firms and customers to take advantage of lower costs and faster sourcing for components, labor, and expertise.	It may be hard to maintain supply chain velocity in markets of growing complexity.
Logistics helps firms to increase economies of scale by outsourcing and maintaining high levels of international cooperation.	Dealing with increased supply chain variability and environment of uncertainty and globalisation may be a challenge.
Logistics helps to lower per unit costs and maximize profits and service levels by centralizing global production and limiting the number of plants.	The maintenance of adequate supply chain visibility and provision of improved vulnerability management in a global environment is a hard task.

Global logistics are a constantly developing sector. Below you can see a short summarization of some of the benefits brings along and challenges it has to face (the table is partially based on the work of David Closs, 2004)

3.4.5. Trends of Modern Logistics

Key player on the global arena. Logistics plays a key role in the global economy. The market volume of logistics has reached high levels in many countries around the world, as it creates added value and focuses on the customer. The role of international logistics for the global economy is expected to grow further in the future, as a natural result of the rapidly shifting social, cultural, political and economic conditions across the globe. The topic of megatrends, such as globalization, internationalization of trade, interdependence, shortened product life cycles, growing environmental concerns, and last but not least, the evolution from a manufacturing-based society to a service society, will gain an even more prominent place in the global world, and further impact the development of logistics (DHL, Technical University Darmstadt, 2012)

Full providers, One of the trends for companies in the logistics sector is to become full service providers. The global leaders in logistics provide in all spheres of logistics: airfreight, seafreight, contract logistics, rail and road transportation. Many logistics companies are large, with diversified, often multinational operations, which require wide range of different set-ups structures and business operations (KPMG, 2011). Closely correlated to the development of trade flows, logistics markets are quite complex in respect of their regional structures, their different segments and the universe of key market participants (Doll et al., 2014). However, the varying policies and operations between different firms can be a problem.

Visibility and transparency, Visibility and transparency are becoming more and more crucial for the logistics sector in the modern era of globalisation and economic interdependence. It is a must for firm managers, investors and partners to be able to standardize their operations, and to get and exchange correct and full information about the activities and results of different sector segments in a timely and regular basis.

Efficiency, optimisation and maximisation, International supply chains and networks add value and are crucial factors of the development of global trade, as the produced goods often have to take a long journey through many countries and undergo processing in diverse settings before ending up in a retail store (World Economic Forum,

2013). The main idea behind the global supply chains is the pursuit of efficacy and efficiency. Companies strive to reduce their total costs by outsourcing some of the operations, as the main goal of any enterprise is to optimize costs, maximize profits, increase quality and satisfy the customers and consumers. Logistics is the critical link which makes this possible and adds viability to the global supply chains.

Information technology (IT), The growing complexity and dynamism of supply chains requires increasingly advanced Information Technology solutions (Nabben, 2014).

Urbanisation, Urbanization is one of the main trends in the last century. It strongly influences the world – geographically, politically and economically. The growth of the modern cities will require new logistical models and processes, which will allow the business to adapt more effortlessly to the changing environment and respond to the new requirements. Today's cities are centres of education, employment, and healthcare. Increased urbanization triggers demand for consumer goods and services, accommodation, healthcare, etc. It also triggers demand for better, faster, and more efficient logistical operations.

Growing population, Demographic changes be a challenge for many transportation and logistics companies, and may force them to overlook many of their current business models. It remains to be seen if the industry can cope and attract a skilled workforce (Transportation and Logistics 2030, 2012, vol.5). According to the "World Population to 2300 Report" prepared by the UN, over 8 billion people will live on Earth in 2030. That's around a billion more than in 2010, and 95% of this increased population will be born in developing and emerging markets (UN, 2004). By 2030 only 23% of the world's population is expected to inhabit the developed countries in Europe, North America and Australia. As a result, global distribution of goods and wealth will be reshaped. The increased population requires more production and increased levels of trade. According to the World Bank (2007) global trade in goods and services is likely to rise more than threefold to $ 27 trillion in 2030. The constantly growing levels of global trade are already posing numerous challenges towards the transportation and logistics industry. Growing populations in emerging economies will require more logistics providers, and transportation and logistics companies will need to develop special programmes in order to deal with the potential shortages of skilled labour.

Modernisation and globalization, Supply chain management is one of the main keys towards the growth and development of global trade. International competition is becoming more and more intense, consumers – more demanding. Going 'international' has become the standard and logistic solution providers need to enable that trend (Nabben, 2014). The deficiencies in costs, infrastructure and regulation should be dealt with, and new modernised and standardised logistics systems have to be developed in order to hold up the new forms and patterns of international trade.

Liberalisation, Over the last three decades many developed and developing economies have been greatly reducing trade barriers. Average tariff levels have fallen, and many goods enter global markets free of import duties. Trade liberalization is supported by the constant growth of international trade, the numerous advances in technology and managerial know-how, and the trend to outsource in order to minimize total costs of production. Specialization has also become a key to survival of many participants in the global business arena. International supply chains have become the veins of international trade, as well as the mechanisms through which the process of specialization is organized. But although barriers to trade have fallen dramatically, the costs associated with international transactions remain much higher than those that arise within countries. One of the keys to lower total costs is to decrease the share of logistics costs.

Green Logistics and Global Climate Change, According to Doll et al. (2014) "climate change is a major medium-term risk factor for the industry and for all other industries and consumers who now depend on efficient logistics for reliable access to goods, including products that are critical for life". Climate change is recognized as one of the biggest threats and challenges that our generation should face. Governments create new legislation, and implement 'green', ecologically friendly policies and regulations. *Green logistics*, defined as "the efforts to measure and minimize the environmental impact of logistics activities, and including a proactive design for disassembly", is quickly gaining resonance throughout logistics and supply chain management (Saroha, 2014).

Sustainability, Customers increasingly prefer products that are made and sourced in 'the right way'; minimising business' social, economic and environmental impact on society and enhancing positive effects. (Nabben, 2014)

Flexibility and Continuity, Modern transportation, logistics and supply chain service providers must be flexible and manage to adapt easily to rapidly changing circumstances

and situations in order to satisfy their customers and deliver the right goods in the right quantities, and condition, in the right speed, and at the right time and place. In addition to that, they must ensure the continuity of their services, i.e. to ensure higher speed and lower risk of delay (for example, by using multiple transport modes and routes)

Lowering costs, As already mentioned above, decreased shares of logistics costs are crucial for the current global economic environment: increased logistical efficiency and improved supply chain operations will create jobs and ensure economic growth. According to the World Economic Forum's 'Outlook on the Logistics and Supply Chain Industry' (2013), if all countries were to improve their logistics performance and reduce supply chain barriers to just half the level observed in the best-performing country in their respective regions, global GDP could increase by 2.6%. If countries were to improve their border management and transport-related infrastructure services to attain 50% of the global best practice level (as observed in Singapore), global GDP would jump by 4.7% – six times more than what could result from removing all import tariffs. Such large increases in GDP would diminish the unemployment levels, and eventually add millions of jobs to the global workforce. Thus, it would be a good idea if governments take more supply-chain oriented policies and foster greater external and internal coordination.

According to the author of this thesis, logistics costs remain one of the main problems that Turkey has in its foreign trade with Africa. Lowering these costs must be a top-priority of the logistics and trade industries in Turkey in the next decade.

According to the author of this thesis, logistics costs remain one of the main problems that Turkey has in its foreign trade with Africa. Lowering these costs must be a top-priority of the logistics and trade industries in Turkey in the next decade.

3.5. WORLD AND AFRICA TRANSPORT AND LOGISTIC MODELS

3.5.1. Maritime Transport and Logistics

Maritime shipping has always played a great role in history, as it has been the main way of connecting people and markets from all around the world. Today its role is as eminent as always, as ships from all around the globe carry daily enormous amounts of cargo. The companies involved in maritime logistics and transportation are called *shipping lines* or *ocean carriers*.

The use of maritime transportation in logistics has three main strengths: firstly, its high capacity allows the transportation of large and bulky commodities, raw materials of low value and containerized finished goods (e.g. minerals, farm products, crude oil, toys, clothing, etc.); secondly, the transportation costs are low relatively to the other modes of transport. Last and not least, the seaways are a never-ending source of international capacities, as large domestic and international shipments can be transported via rivers, canals, seas, and oceans. However, maritime transportation is pretty slow, and its accessibility - not sufficient.

Some of the main types of ships used for maritime logistics include: bulk, breakbulk, containerized, refrigerated, and mixed ships. *Bulk ships* are used for liquid or dry types of cargo, such as oil or wheat, which can be 'poured' into the ship. *Breakbulk cargo ships* can be used for the transportation of basically any type of cargo. *Containerized ships (or container liners)* are large, and can carry more than 5000 thousand containers. *Refrigerated ships* are usually similar to a breakbulk ship, however the cargo transported is refrigerated. Although this kind of service is pretty expensive, the number of its customers, especially in the growing market of fresh foods, is constantly increasing. There is a great variety of *mixed-use ships***:** for example, they can be part containerized and part breakbulk, or part tanker and part break-bulk.

3.5.2. Air Transport and Logistics

While the maritime industry is famous for its traditions and great historic importance, the air transport industry is eminent for its rapid development and innovative solutions. The air industry has been constantly growing and changing since its creation in a bit more than a century ago, when the first commercial freight flight took place in the USA in 1910. Some of the main reasons behind such extraordinary growth include the socio-political, scientific and technological changes the humanity has been going through, especially after the Second World War. Nowadays passenger revenues remain one of the most crucial sources of income for various airlines. However, the importance of air freight services is constantly increasing.

The role of air freight industry is relatively small, especially when compared to other modes of transport with longer history of development, such as sea, road, and railroad. such as road, sea, and rail. According to David and Stewart (2010), air freight currently accounts only for 1% of the total weight of transported goods; nevertheless, it accounts for more than

40% of the total value of goods in global trade. Thus, the economic growth and the constantly expanding international economic importance of air freight transportation should not be underestimated.

The main strengths of air freight transportation are its high speed, great flexibility, and high levels of freight protection. However, there are some limitations as well: the air freight services are more expensive than the services of any other type of freight; the accessibility is limited, and the capacity for carrying goods is pretty low. Considering this, it comes as no surprise that this kind of transportation is used mainly for more urgent domestic shipments and smaller shipments of international freight. Usually low volumes of high value, time sensitive cargo, such as high-tech products, capital equipment, documents, periodicals, jewelry, etc., is being carried via air freight transportation. The type of cargo carried via air transportation depends on the region in which trade occurs. For example, North America exports a great amount of high-tech capital to Europe, Asia, and South America, while Europe is mainly exporting capital equipment.

According to Doganis (2002), there are four main types of air freight carriers, namely *combination carriers* (including scheduled passenger flights, scheduled all cargo flights and combi aircraft carriers), *all cargo carriers* (which can be either independent or niche), *integrators*, and *contract freight operators*.

3.5.3. Rail Transport and Logistics

Railroad transportation, also known as train transport, is the best option for the carriage of high capacity low cost commodities, which are going long distances, such as coal, lumber, chemicals or grain. The rail transport is not suitable for high value, fragile, time sensitive goods because of its limited accessibility, inconsistent service and high rates of damage, mainly because of rail problems, Furthermore, the rail industry has one of the highest entry barriers, as train tracks need to be laid down, which is pretty costly even the shortest routes.

The logistics and freight operations are being performed by railway companies which must provide transportation between train stations and/or freight facilities, such as warehouses. Their main source of income generally comes from passenger ticket revenue and fees for cargo shipment. Railways, in general, are among the safest types of land transportation. They can utilize high numbers of passengers and high volumes of cargo in an energy efficient way, despite of them being less flexible and capital-intensive than highway

transportation. You can find a map of the main lines of Africa's railway network below (The Times Atlas of the World, 1990)

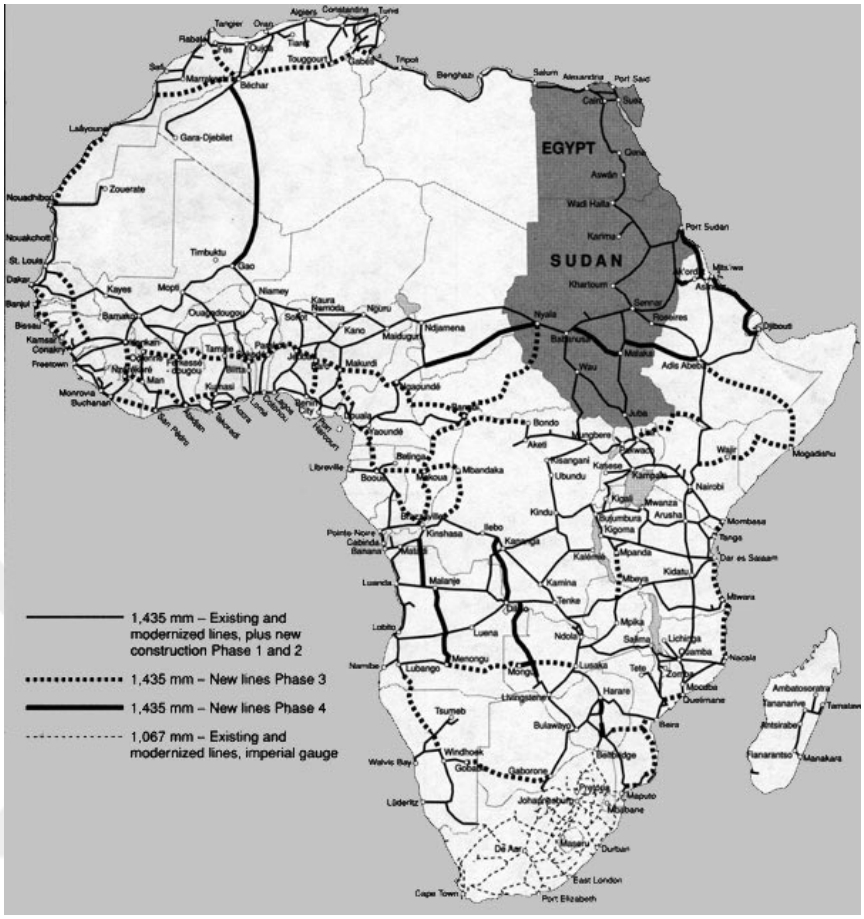


Figure 3.3: Africa's Railway Network

3.5.4. Road Transport and Logistics

Road transportation is among the most popular and commonly used modes of transport due to its indisputable advantages. It is easily accessible, versatile, flexible, and allows fast and timely delivery of different kinds of goods. Road transportation has its limitations as well, such as limited capacity, and relatively high costs (especially when compared to water and railroad transportation). The above mentioned characteristics of highway transportation make it perfect for smaller shipments in local, regional, national and international markets. The main goods transported are of relatively low volume and of middle to high value, such as food, clothing, furniture, electronics, books, toys, etc.

3.5.5. Transportation Corridors

A transport corridor can be defined as "a geographic area between two points, linking multiple centres, and moving people and freight. Both the transportation infrastructure (e.g.

the roadbed, rails and stations) and the new and existing development that surrounds that infrastructure are being included in this definition" (Douma and Kriz, 2003). Based on the purpose they serve, transport corridors can be divided into three main groups. The first group includes *foreign trade corridors*, which are used for international trade transactions, export and import of goods. The second group includes *domestic trade corridors*, which are used for the distribution and delivery of freight on the territory of a given country.

Sub-Saharan African countries, despite their significant transportation network and infrastructure deficit, have been very active in promoting regional transport corridors in recent years, especially for those landlocked countries which rely entirely on foreign trade corridors for their exports and imports.

You can find a description of the most important transportation corridors of the Sub-Saharan region (Table 3.4), a map of the transport corridors in Africa (Figure 3.4), and a plan of the TAH - Trans-African Highways (Figure 3.5) below.

Table 3.4: Main Transportation Corridors of Sub-Saharan Africa

Transportation Corridor	Territories Crossed
Lagos – Niger Corridor	Nigeria and Niger
Abidjan–Lagos Corridor	Nigeria, Togo, Ghana, Benin, Côte d'Ivoire
Lagos – Niger – Mali; Lagos – Chad	Nigeria, Niger, and Mali
Trans-Sahara Highway of the TAH	Algeria, Niger, and Nigeria
Dakar – Ndjamena Highway of the TAH	Senegal, Mali, Burkina Faso, Niger, Nigeria
Abidjan – Burkina Faso – Mali	Cote d'Ivoire, Burkina Faso, Mali
Douala – Central African Republic – Chad	Cameroon, Central African Republic, Chad
Dakar – Mali	Senegal and Mali
Lagos – Mombasa Highway of the TAH	Nigeria, Cameroon, Central African Republic, Congo, Uganda, Kenya
Cairo – Dakar Highway of the TAH	Egypt, Libya, Tunisia, Algeria, Morocco, Mauritania, Senegal
Dakar – Lagos Highway of the TAH	Benin, Cote d'Ivoire, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Senegal, Sierra Leone, Togo.

Last but not least, there are *transit trade corridors*, which are used for the transport and distribution of cargo to other countries. Transport corridors support economic and

regional growth and development, as they promote trade and welfare across the geographical regions, countries and cities that are connected along them, more effective and efficient services. When properly built, managed and developed, transport corridors can reduce logistics and transportation costs in various supply chains; allow more timely and speedy delivery of goods, and help firms and countries to improve their competitiveness levels.

The "quick access to the sea" strategy has always been one of the main drivers for identifying priority trade corridors in the region although regional trade integration and cooperation are now equally important in the choice of primary trade routes.

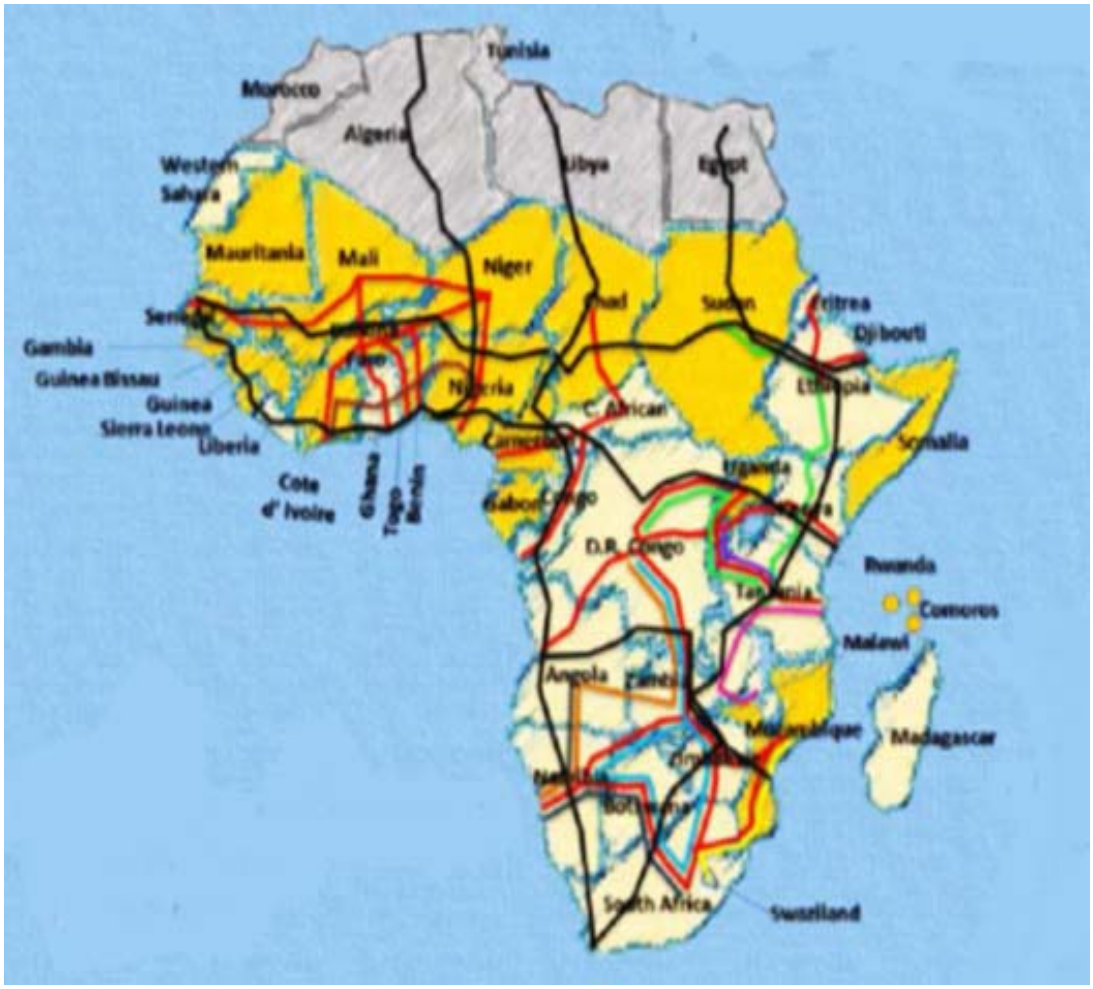


Figure 3.4: Transportation Corridors in Africa

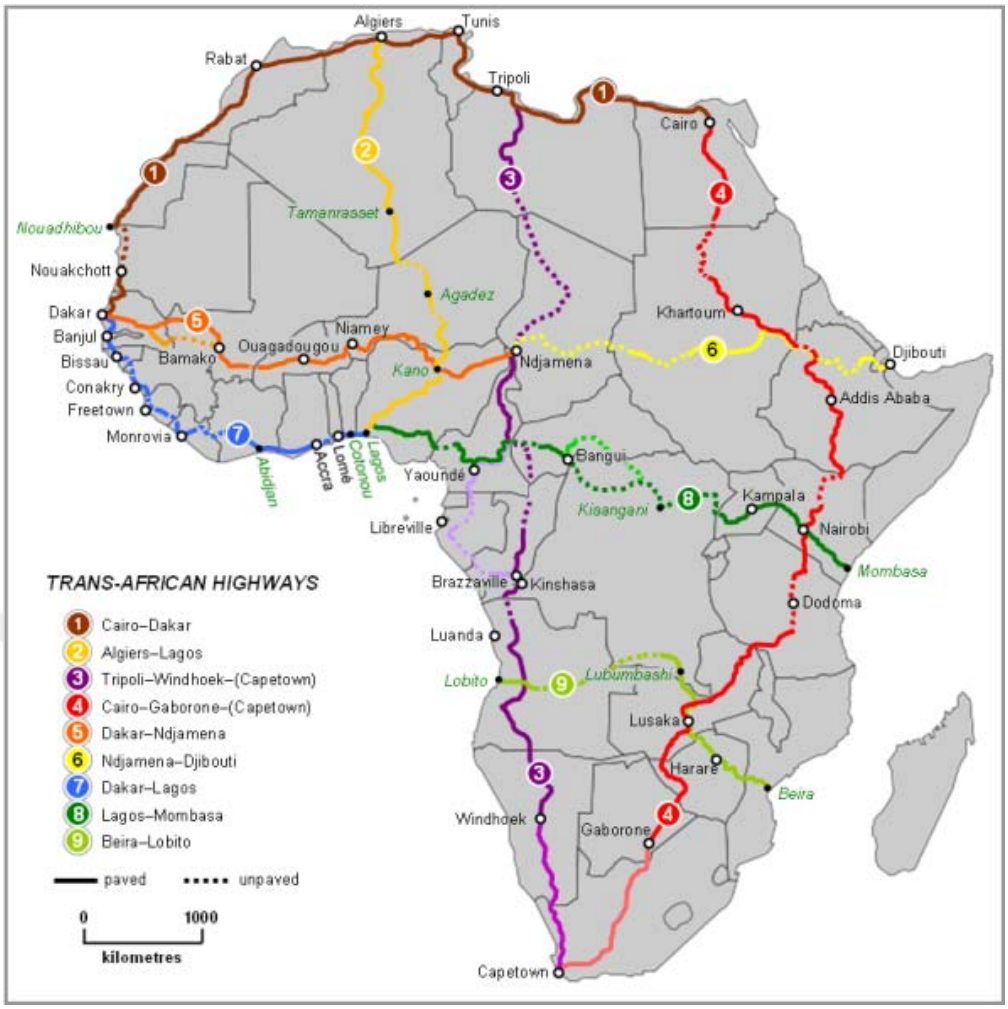


Figure 3.5: Trans-African Highways

3.6. MIXED MODE TRANSPORTATION

3.6.1. Intermodal Freight Transportation

Intermodal freight transportation can be defined as the transportation of goods in an intermodal vehicle or container via multiple transportation modes, such as rail, truck, ship, etc., without handling the goods during the switch of the modes. This method is widely used, as it ensures high levels of security, reduced risks and levels of loss and damage, higher transportation speed, as well as reduces the handling of the goods. In cases of intracontinental transportation, intermodality helps to reduce road trucking costs and delivery time.

The term *'piggyback transportation'* can be used when during intermodal or combined transportation, one transportation unit is carried by something else. For example, trailers or semi-trailers can be carried on rail flatcars, trucks can be carried on trains for part of their journey (also known as 'rolling road'), small ships can be carried by larger ships, smaller

aircrafts – by smaller ones, etc. The term *'birdyback transportation'* is normally used when containerized goods are being transferred from trucks to airplanes, and the term *'fishyback transportation'*, when containers are being transferred from trucks (or other modes of highway transport) to ships.

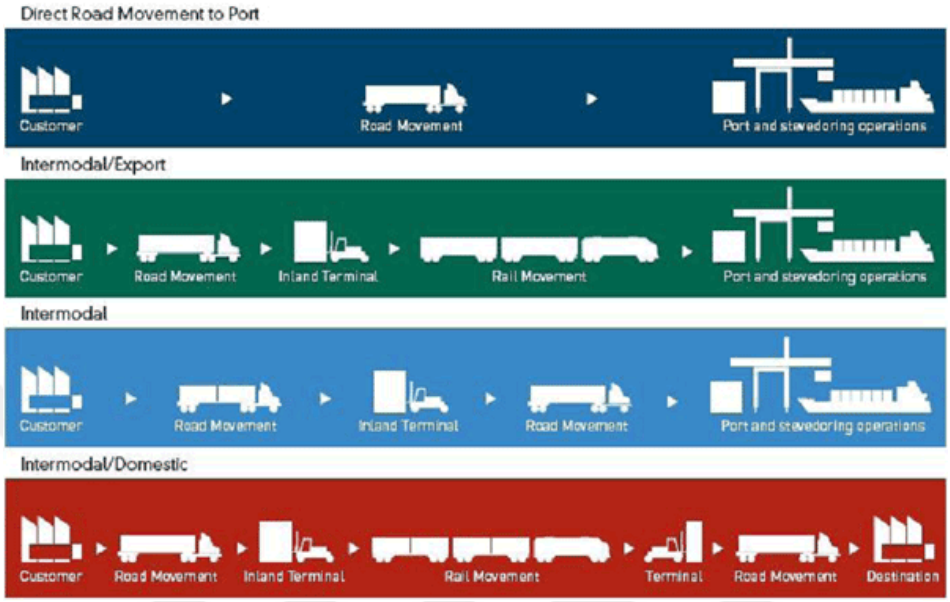


Figure 3.6: Intermodal Freight Transportation

In other words, *'piggybacking'* implies a combination of rail and road, *'fishybacking'* – the combination of road and water, and *'birdybacking'* – the combination of road and airways, usually for international shipments.

Intermodal Containerisation. The International Container Bureau (ICB) has established internationally recognized rules and regulations about the obligatory standard parameters of all the containers used in international trade and logistics. In the last two decades, double-stack rail transportation has become extremely used, as it reduces the risk of damage and provides greater security during the transit of the goods.

Intermodal containers which are often known as *ISO containers* due to the fact that their dimensions have been defined by the International Organisation for Standardization (ISO) are the type of equipment which is used most often for intermodal transportation. Containers can be of various sizes: they can be 2.4 m (8 foot) wide and 2.59 m (8 foot-6 inches), 2.90 m (9 foot-6-inches) or 3.20 m (10 foot-6 inches) high. The container length which are mostly used are 6.1 m (20 feet), 12 m (40 feet), 14 m (45 feet), 15 m (48 feet) and 16 m (53 feet).

There are various types of containers, such as *standard containers, tanktainers* (a tank full of liquid is placed inside a standard container), and *reefers* (also known as refrigerated containers, used for perishable items).

Containers are often transported by sea in *container ships*. The capacity of those ships is normally measured in TEU-s (twenty-foot equivalent units) and FEU-s (fourty-foot equivalent units). Nowadays, some of the container ships can carry up to 15,000 TEU-s. Containers can also be transported by rail in special *flatcars*, or *container well cars*. Trucks are often used for the portion of inland transportation which connects the sea and rail segments of good carriage. Other often used modes of transportation include barges, landbridges, and planes.

3.6.2. Multimodal Transportation

Multimodal transportation is performed under a single contract, and with minimum two transportation means. The carrier who bears all the legal responsibility for the freight during all stages of transportation via different modes (e.g. sea, road and rail) is called *multimodal transport operator* (MTO). The MTO does not necessarily possess all of the transportation means. More often than not sub-carriers, also called as actual carriers, perform the logistics and transportation functions related with the carriage.

International multimodal transportation **(IMT)** implies that the transportation of freight is performed in more than one country and by two or more means of transportation. Usually, the whole process is performed under a contract made in one country; the goods are taken from that country (their place of origin) by a multimodal transport operator, usually a freight forwarder, and delivered to their destination in another country.

It is important to mention that the terms *'multimodal transportation'* and *'container transportation'* are not equivalent or interchangeable, and should not be confused: multimodal transport doesn't necessarily require any form of container, while container transport can be performed by a single transportation mean.

Furthermore, the terms *'intermodal'* and *'multimodal'* transportation also cannot be used interchangeably, as there is an important difference between those two concerning the contract and responsibility of movement. In *intermodal transportation* the freight is being transported by numerous modes and by multiple carriers during, each of whom bears responsibility for the goods during a single journey; whereas in *multimodal transportation*

the cargo is being transported by different sub-carrier transport providers, under a single contract, with a single carrier bearing the responsibility for the whole carriage.

3.6.3. Combined Transportation

Combined transportation is a type of intermodal freight transportation, during which the cargo is moved by multiple successive modes of transport, usually in different countries or even continents, separated by long distances. The cargo is put inside a loading unit (a container, vehicle, etc.), which is being loaded and transferred, while the cargo itself is left untouched. Usually, the biggest parts of the trip are carried out via railroads or water transport, while road transportation (e.g. trucking) is normally used for the initial and final portions of the whole transportation process.

Combined transport is considered to be one of the most economical and secure ways to move cargo over big distances. As the cargo is left untouched during the whole journey, there is practically no risk of loss or damage. However, this kind of transport lacks flexibility, and carriers often have to face time and schedule limitations, because of the existing railway and seaway timetables. To conclude, combined transport is a relatively fast, very safe and economical way to transport cargo internationally.

3.7. EVALUATION AND REFLECTIONS

Since the beginning of the new millennium trade has been an essential component of economic growth and development, and has positively affected the lives of millions of people. Many developing countries have been integrated in the global trade environment, and have achieved tremendous economic growth, which in turn has boosted per capita incomes, helped countries to achieve broader socio-economic goals, and improved their access to information, high-tech and know-how. All these factors are a sign of stable growth in the future. The last two decades have also brought rapid socio-economic and scientific developments, which have led to the emergence of new trading patterns and practices.

Average rates of economic growth have tripled compared to the 1990s. Economic growth led to increasing trade flows and lowered tariff barriers, and brought improved levels of human development and more equitable income distribution. The recent socio-economic and political developments of the newly-industrialized Eastern Asian economies, Japan, India, China and Africa show their potential to catch up to the economies of their traditional partners from the developed Western countries.

Global value chains have also substantially increased and improved in the recent years. As a result, developing countries have greater and less costly opportunities for integration into the international market. The developments in communication technologies and logistics have minimised transportation costs, stimulated globalisation, and furthered international cooperation and interdependence. More and more businesses that were operating in a single office or country are being sent out or outsourced to different countries in order to obtain competitive and cost advantages, as well as to achieve operational optimisation and profit maximisation. Countries start to further specialize in different sectors, and export and manufacture specific semi-finished goods and components instead of selling final products. Many developing countries of Eastern Asia and Africa have started to participate more actively in the global value chains due to the favourable business environment, good logistical infrastructure, lower tariffs and investment barriers which allow them to expand their business networks and achieve higher economic growth.

However, the access to global value chains can have some disadvantages as well. To begin with, a country that wants to get integrated into these value chains needs to have a well-developed economy, and produce goods of high quality and efficiency which could compete at the global market. Furthermore, it should be able to attract foreign investors without geeing drawn into a costly and complicated race to the bottom on regulatory standards.

There has been a growing demand for new cheaper sources for commodities, agricultural products and natural resources in the last decades. Many developing countries specializing in these sectors have benefitted a lot from this trend (for example, such resource-rich emerging economies as Saharan Africa and Latin America have been experiencing significant per capita GDP growth). The global demand for such kind of goods (especially originating from developing and newly emerging economies) is expected to make the prices of natural resources and agricultural goods steady and relatively stable in the next decade. In the long run, the agricultural sector may become one of the main forces that could help developing economies to escape poverty. In order for this to happen, however, global tariff barriers should be lowered, international subsidies should become less distortive, and the agricultural sector must continuously improve in terms of efficiency, productivity and quality.

The global interdependence is another crucial feature of the modern economic environment. The 2008 financial crisis would be a good illustration of this phenomenon: although it was caused by problems in the financial markets of a rather small number of developed economies, the consequences of the crisis spread world-wide. It caused a rapid decline of trade, investment and aggregate demand and was a cause for economic shock not only for traders, producers and consumers from the developed countries, but for the 'innocent' citizens of the developing countries as well. However, the crisis didn't cause an outbreak of protectionism on a great scale, thus once again signifying that new, globalised patterns of economics and trade have emerged internationally.

Logistics is of increasing importance for this 'new world' of economics. While acting as the veins of international trade, it allows economies from different parts of the world to exchange goods and service, increase their GDP, optimise their costs and profits, and eventually improve their standards of life. The growth of emerging and developing market economies has become one of the key factors in global business. The increasing share of developing countries in the global economy is striking: their share in world output almost doubled from 23% in 2000 to 40% in 2012.; their share in world trade also rose significantly: from 33% in 2000 to 48% in 2012 (World Bank, 2007).

The eleven "G-20 developing economies", namely Turkey, South Africa, Argentina, Brazil, China, India, Indonesia, the Republic of Korea, Mexico, the Russian Federation, and the Kingdom of Saudi Arabia, have been of special importance for global trade. More and more research is commonly being developed regarding the global impact of these countries on developed economies and the international business as a whole. However, there is not enough research about the effect of those countries amongst each other.

Turkish and African economies have also been growing tremendously in the last three decades. And although Turkey is recognized as a developing economy of great international importance, the potential of economics of African countries have been somehow underestimated. The next part will provide an overview of the current state of the Turkish and African economies, and the potential for future cooperation and partnership between them.

4. OVERVIEW OF THE CURRENT STATE OF INTERNATIONAL TRADE

4.1. STRUCTURE AND PROPERTIES OF TURKEY'S FOREIGN TRADE

The countries around the world are very different. They have different land endowment, population size economic capacity, social, political, and economic structures. Turkey, in a sense, is a bridge between two continents – Europe and Asia. Its location is very influential for its trade policy. In the last years Turkey started to implement more internationally open policies, which in time became more and more liberalised and globally integrated. As a result of this, the role of privatization and the importance of trade have risen even further for the development of Turkey's economy.

Turkey is now a part of the Group of Twenty also known as G20 - the 20 major economies of the world, and the European Union Custom Union, the Economic Cooperation Organization, as well as the General Agreement on Tariffs and Trade (GATT). Turkey is among the top global producers of textiles, agricultural products, construction materials, consumer electronics, home appliances and transportation equipment such as ships, motor vehicles, etc.

4.1.1. Turkey's Foreign Trade

4.1.1.1. Turkey's Trade Policy

In the last three decades, Turkey has been implementing a more outward oriented trade policy. It has been gradually opening its markets and lowering its customs tariffs, in order to sustain high levels of international trade and economic growth. One of the major events that historically influenced the new direction of Turkey's foreign trade was the membership of the country in WTO and EU's Customs Union, which lead to increased commitment from the Turkish side towards free trade and liberalisation in the international arena.

4.1.1.2. Foreign Direct Investment (FDI)

According to the UNCTAD World Investment Report, Turkey, with its inflow of $12,4 billion, is one of the most attractive countries in the world for FDI. Turkey's FDI between 2003 and 2013 was $136 billion (UNCTAD, 2013). In the last decade Turkey has attracted a great number of investments from European businesses, and has become more

integrated withing the EU supply and production chains. Latest statistics show that 78% of Turkey's overall Foreign Direct Investment is coming from the EU (UKTI, 2015).

4.1.1.3. Exports, Imports and Foreign Trade

The share of exports and imports to GDP in Turkey has been steadily increasing in the last three decades. Between 1980-2011 the share of exports to GDP has increased more than 4 times, reaching 17,5%. During the same period, international imports have almost tripled, reaching level of 31,2%.

Foreign trade has also had a sizeable growth. The levels of exports between 2002-2012 increased 3,5 times, reaching $126,3 billion. The level of imports increased almost 5 times, from $36 to $196 billion, with a peak of $241 billion in 2011. The trade deficit has increased almost 7 times between 2002 and 2011, reaching levels of $105,9 million (Şit, 2012).

Statistics from the Turkish Statistical Institute (TSI) reveal that the total amount of exports in 2011 constituted $111,4 billion; 56.3% of the exports were to Europe (49.6% of which to EU), 7.5% to Africa (4.9% to North Africa), 5.8% to America (4.9% of which to North America), 28% to Asia (20.4% of which to Near and Middle East), and 2.3% to other regions of the world (TurkStat, 2012). Turkey's exports to the EU consisted mainly of vehicles and textiles, while its exports to the Middle East and North African region included mainly metals, textiles and machinery (World Bank, 2014).

According to TIM statistics the total amount of Turkish exports in 2013 increased to $145,4 billion to seven world regions. $6,4 billion dollars (4,4%) came from exports to North American Countries; 2,7 billion (1,9%) from South American Countries; 61.9 billion (42.6%) from Europe, 27,5 billion (18,9%) from Middle Eastern Countries. CIS countries contributed with $18,2 billion (12,5%), Far Eastern and Other Asian countries with 7,6 billion (5,2%). The share of the African continent was 9,7% or $14,1 billion. The remaining $7 billion came from exports with other countries, not included in the abovementioned seven regions (Mente, 2015).

According to statistics of the Organisation for Economic Cooperation and Development (OECD), 38,4% of Turkey's exports in 2013 were to low-technology industries. The levels for high technology industries were 3,4 %. Medium-high technology industries and medium-low technology industries reached levels of 25,3% and 29,5%

respectively. World Bank statistics (2014) reveal that the average firm-level export growth came mainly from new firms (11%), new markets (15%), new products (9%), and by current exporters in current products and markets (65%).

According to the World Trade Organisation (WTO), exports can be classified in 4 main groups: *agricultural products, mining products, manufactures* and *others*. In 2012 agricultural products constituted 10,1% of Turkish exports, with foods and live animals constituting 8%, and beverages, tobacco and constituting around 2%. Mining products, such as mineral fuels, metal scrap and ores constituted 9%. The biggest share of exports, 71%, were manufactures: iron and steel (8,8%), chemicals (5,8%), manufactures of metals (3,8%), automotive products (9,6%), textiles (7,2%), and clothing (9,4%). Other sectors constituted 9,9% of the total exports (Şit, 2012).

TIM statistics reveal that in 2013 the agricultural sector in Turkey exported 3% of the total exports, the mining sector– 4%, and the industrial one – 93%. Furthermore, the total services exports in 2012 were $42 billion, 23,8% of which were from tourism, 13,2% from transportation, 1,3% from communication services, and 4,4% from other services (Mente, 2014).

Turkey's Comparative Advantage There are four main agricultural products, that have been of great historical significance in the Turkish economy – hazelnuts, dried apricot, dried figs, and raisins. Tukey has a comparative advantage in growing these goods due to its warm climate, fertile land, and relatively cheap labour. These factors give Turkey a sizeable advantage in various labour intensive and resource industries. According to the Food and Agriculture Organization (FAO, 2013) Turkey exports 73% of the hazelnuts, 74% of the dried apricots, 63% of the dried figs and 27% of the raisins sold in the EU, USA and the Middle East countries (Seker, 2010; FAO, 2013).

In the last decades, Turkey has developed comparative advantage in new sectors, such as iron and steel export, agricultural resource-based export sectors including those related to metals (e.g. iron and steel), agricultural merchandise (fruit, vegetables, wheet, sugar, tobacco), chemical products, and textiles. Another secotrs that have experience tangible growth include vehicle manufacturing, and textile dying, colouring and tanning. The country also developed comparative advantage in building road vehicles and power generating equipment and machinery; dying, tanning, colouring of materials, production of fertilizers and furniture (World Bank, 2015).

4.1.2. Changing Patterns of Turkey Foreign Trade

Turkey's exports have been steadily increasing since 2002. The structural domestic reforms and improved international relations have allowed Turkish exports to increase from $36 billion in 2002 to over $150 billion in 2012, with an average annual growth of 15%, which is more than 6% above the average global growth of exports, and as big as the growth in the BRIC countries (World Bank, 2014).

The change of Turkish foreign trade and its new more outward oriented and open direction has led to many changes, especially in the last decade. Turkey has started to gradually diversify its export markets and product mix. The export of commodities and services has become one of the most crucial determents of Turkey's sustainable economic growth. The correlation between export growth and economic growth was found to be almost 60% for the time period between 1999 and 2011. Exports increase productivity through the creation of economies of scale and innovation, which are stimulated by international competition. Imports are important as well, as they support fair competition, innovation, and ensure efficient allocation of resources (Çağlayan, 2011).

The market for Turkish exporters has grown tremendously, reaching more than 137 countries in 2014. In comparison, Turkey exported to 90 markets in 2000 (World Bank, 2014). In 2012 40% of Turkey's total international trade volume went to the EU and North American countries (Civan et al., 2013). Currently, the Western countries remain one of the main partners and export markets for Turkish trade. The increased levels of international trade and the flow of FDI from the EU and USA, especially in terms of technology and managerial and marketing know-how, has helped Turkey to generate solid value and to upgrade it's export range. However, Turkey starts to focus more and more on its relationships with neighbouring countries and other states in Africa, Asia, and the Middle East. This new direction will allow Turkey to optimise its economic strength, implement new policies, obtain economic benefits, and achieve its 2023 vision.

Turkey's export mix changed as well. The inexpensive intensive labour products were switched with capital-intensive and institutions intensive products. Turkey used to be highly reliant on its textile production. However, the importance of apparel slowly declined, and nowadays the automotive sector has taken its place. Such exports as metal goods, machinery and agricultural produce are crucial for Turkish foreign trade. The last few years have brought the rise of such goods as chemicals and plastics (World Bank, 2014).

Furthermore, Turkey's exports have become more sophisticated and competitive on the global arena. The increased importance of the automobile sector was one of the main reasons behind this change: the more sophisticated mid-tech exports, such as automobile parts and automobiles, replaced the less sophisticated production of the previous decades. As for Turkish export competitiveness, it was determined by three main factors: the increased levels of market share, the higher amount of complex technological content of the exported products, and the higher quality perception of the merchandice of Turkish firms, which allows them to charge higher prices for similar products (OECD, 2013).

The quality of the Turkish exports has increased, especially in such standard-sensitive sectors as technologies, manufacturing, and machinery. The higher the quality and standards of the exports, the higher are the chances of the exporters to survive in global markets.

4.1.3. Challenges and Opportunities of Turkey Foreign Trade

4.1.3.1. The Main Problems of Turkey Foreign Trade

Alongside with its rapid economic development, Turkey must face numerous challenges. According to World Bank's report on Turkey's economy (2014) the country is currently facing six main problems.

Firstly, although Turkey has been experiencing strong growth in the export sector, this growth has not been among the main triggers of income rise in the country in the last decade. The ratio of exports to GDP was around 23% in the last five years – a level of increase smaller than in other developing countries with similar economic levels.

Secondly, Turkey has specialized in the mid-tech industry, although the demand for the goods it can offer has not grown much globally. In the same time, while increasing its medium-technology exports, Turkey started to neglect its high-tech exports, and started losing its comparative advantage in higher growth products. Nevertheless, Turkey has a potential to move up the Global value chains (GVC), and its low trade costs and well developed logistics infrastructure will play a crucial role in this process.

Thirdly, one of the main constraints to export growth and quality improvements in Turkey has been the insufficient levels of FDI. Increased levels of foreign direct investment will allow Turkey to fully utilize the technological and knowledge-related spillovers, to benefit from them and move up the value chain. According to surveys conducted by the International Investors Association of Turkey (YASED), the main reasons behind the lower

levels of FDI are mainly related to Turkey's microeconomic, tax and incentive policies, and the lack of legal; assurance (YASED, 2013). Innovatiion and improved work skills, however, can be a key factor in attracting investors from all around the world.

The fourth problem is related to the small and middle size enterprises (SME) in Turkey which have been performing relatively poorly in the last decade. Their dynamism and productivity growth are low; this negatively affects the growth and upgrading of exports. Small and mid-size exporters must become more flexile, sustainale and dynamic in order to improve their performance and support Turkey's economic growth. Furthermore, evidence from advanced economies suggests that dynamic SME sectors are going to play an extremely important role in Global trade in the upcoming decades.

The fifth challenge is related to Turkey's service sector, which has lagged behind competitors from other growing economies. Turkey's commercial services exports have pretty sluggish in the last years. In the future, the export of competitive products will depend on two main factors: Turkey's access to raw materials and the growth of the service sector and its development in terms of efficiency, competitiveness, pricing, cost-efficiency, etc. However, Turkey's use of trade policy flexibilities may negatively affect trade flows and resource allocation. (World Bank, 2014)

4.1.3.2. Turkey's Road to Success.

In the last decade Turkish economy has had Gross Domestic Product (GDP) growth of 5% on average. Currently, Turkey has one of the youngest and fastest growing populations in Europe, with more than 700,000 graduates per year. Istanbul and Ankara are among the cities with highest GDP in the world. According to the Organisation for Economic Co-operation and Development (OECD), Turkey will be the second fastest growing country in the world by 2018. The Turkish government has invested more than $60 billion in various sectors, such as communications, maritime, and transportation, and Turkey's access to markets is valued at GDP of $25 trillion and with more than 1.5 billion customers in the EU, Eurasia, and the MENA region (UKTI, 2015).

The TIM industrial export report (2014) outlines the main reasons behind Turkey's tremendous export growth in the last 10 years:

1. Turkey's liberal and reformist investment climate, with business-friendly environment and long tradition of market economy

2. Turkey's geographical position and easy access to the MENA Region (Middle East and North African countries), as well as Turkey's proximity to EU Markets. Turkey is a huge country, occupying an area of more than 300,950 square miles. It has borders with Armenia, Bulgaria, Georgia, Greece, Iran, Iraq and Syria, and has easy land and sea access to the Gulf States, Near East and North Africa (UKTI, 2015).
3. Turkey's infrastructural development. Growth of well-established transportation routes, organized industrial zones and techno parks.
4. Turkey's qualified and competitive labour force, which consists of 27 million young and well educated people.
5. Turkey's large domestic market with a population of 77 million people, with median age of 30 years.
6. The newly emerging Turkish consumer brands, aiming to reach foreign consumers
7. FDI flows, supporting and boosting export.
8. University-industry cooperation, which creates efficient specialists and ensures future economic growth.
9. Turkey's economic adaptability and huge incentives for innovation, as well as research and development processes.

4.1.4. Turkey's Export Strategy, 2023

The Turkish Exports' Strategy (TES) for 2023 was initiated by the Ministry of Economy and Turkish Exporters Assembly in 2009. The main goal of TES was to achieve a 12% annual average increase in exports and 500 billion USD of exports volume by 2023, when the centenary anniversary of the Turkish Republic will be celebrated (Republic of Turkey, Ministry of Economy, 2009). This strategy is not focused on short term targets; rather, it has a long term perspective. The 2023 vision of Turkey is to reach 80% imports/exports ratio, to account for 1,5% of the world trade, and to become one of the world's top-10 largest economies.

In order to achieve these objectives, the Turkish government has come up with various strategies that encompass both production and exports components. These strategies establish a production plan towards export performance, and aim to shift production from low-tech to high value-added sectors and to attract foreign direct investment.

The Turkish government has implemented several new policies that should support and promote the goals of the 2023 strategy. Some of the priorities include:

- Carrying out R&D (research and development) projects related to international competitiveness, so that the sectoral exports capacity could be expanded.
- Increasing the number of Turkish participants taking part in international fairs, general and sectoral trade delegations and buying missions in target markets
- Implementation of a new export diversification strategy
- Focus on trade activities of target markets
- Enhancing the export capacity of small and middle enterprises (SME-s)
- Increasing the number of world-known international Turkish brands
- Making Istanbul an international fashion, fair and trade centre
- Providing crucial inputs for exports
- Creation of sectoral clusters, achieving competitiveness in Global markets
- Improvement of logistic facilities of Turkey
- Development of new export finance tools

To conclude, the main idea behind 'Turkey's Export Strategy for 2023' is the establishment of modern and flexible export structure based on advanced technology and R&D (research and development), which will be able to modernize current Turkish export processes, and eventually respond to the demands of the constantly changing and developing international business environment.

4.1.5. The Role of Innovation and Development for Turkey's Economic Growth

Turkey has set a very ambitious vision and specific targets for some of the key industries towards 2023. In order to fulfil its 2023 vision, Turkey will need to increase the value per kilogram of its manufactures and of its exports. The manufacturing of higher value added goods will be possible only through the attainment of a higher sophistication level in every step of the economy.

According to the Turkish Exporters Assembly (TIM), the Turkish government should put special stress on the importance of innovation, which is one of the main driving factors of export growth, and the key to economic growth, which will turn Turkey into an advanced economy.

TIM supports the 2023 vision for Turkey and aims to transform Turkey's creativity potential into high value-added products and services through the creation of an innovation culture, enhancement of innovation awareness and capability landscape in Turkey. TIM is

currently implementing a National Innovation Strategy 2023. This project will outline a roadmap at macro level for Turkey to realize the ambitions of innovation driven export growth as a key element to economic growth and will support Turkey at micro level to reach world best practices by moving from creative ideas pool towards profitable innovative goods and services (TIM, 2014).

4.1.6. The Effect of Turkish Trade Growth on the Logistics Sector

According to Turkey's Investment Support and Promotion Agency Turkey's GDP is expected to grow more rapidly than the average of all 27 EU countries, as well as the Eastern European and CIS countries between 2013 and 2017 (ISPAT, 2013). 10-15% of the total Global GDP are annually achieved by the logistics industry, which makes it a crucial player for Turkey's economy. TurkStat (2014) indicates that the average growth in the fields of transportation, storage and communication in Turkey between 2003 and 2012 was 6.4%.

Due to its geographical position and historical development, Turkey is a significant trade and logistics hub. Its proximity to suppliers and customers in both, Europe and Asia, makes Turkey an attractive Partner for the export and import of goods. Currently, some of Turkey's main export partners are Germany, Italy, Iraq, Russia and the UK, while its main import partners are China, Germany, Italy, Russia, and the US. If Turkey's rapid growth continues, Turkey will be able to reach its full potential as a hub in international trade and logistics in the coming decades. According to statistics from the International Monetary Fund (IMF), Turkish exports will grow on average more than 5% from 2013 to 2017, while import growth will exceed 9.5% during the same period (ISPAT, 2013).

Logistics plays a crucial role in the development of foreign trade. It comes as no surprise that Turkey has very high expectations and hopes for the development of logistics industry by 2023. Turkey's 2023 foreign trade target of $1.1 trillion, in which $500 billion will be exports, will strongly depend upon the innovations and improvements in the logistical sector. In the last decade Turkey has been diversifying its modes of transportation and improving its logistical infrastructure. According to the Ministry of Transport, Maritime Affairs and Communication of Turkey (MTMAC) 80% of the freight and 90% of the passengers within Turkey were transported via roads, and only 5% of freight and 2% of passengers via railway. Turkey need to diversify the modes of transportation used in logistics and to achieve a more balanced state of transportation. In order to achieve that,

Turkey needs to decrease the amount of freight carried via roads and increase the share of railway transport (MTMAC,2011; ISPAT, 2013).

In 2012, Turkey was ranked 27-th among 155 countries in the Logistics Performance Index (LPI, 2011). The levels of "friendliness" of the Turkish logistics sector were evaluated in six key areas, and Turkey had excellent results in all of them. The criteria were as follows: efficiency of the clearance process with border control agencies and customs; infrastructure quality in terms of trade and transport; level of arrangement of competitively priced shipments; quality and expertise of logistics services; the quality of the systems by which consignments are tracked and traced, as well as the rate at which shipments reach their destination within the scheduled and/or expected delivery time. Turkey has shown a great improvement in its logistics performance in the last couple of years: it was ranked third in the top 10 upper middle income performing countries, and performed better than 3 out of 4 BRIC countries - Brazil, Russia and India (ISPAT, 2013).

Although the BRIC economies have been attracting high levels of foreign investment for the last decades, in the last 5 years alternative markets such as Turkey have been presenting increasing opportunities for logistics companies. Although Turkey's size is smaller compared to the BRIC countries, it is attractive for the logistics industry as a whole, as it could offer a stable environment and fast growth opportunities.

According to the Agility Emerging Markets Logistics Index (2015) Turkey is the 10th best country in the logistics sector out of 45 emerging markets. Furthermore, it showed that apart from Russia, Turkey is the only European country to be perceived as a major and high profile logistics market.

4.2. STRUCTURE AND PROPERTIES OF AFRICA'S FOREIGN TRADE

4.2.1. Africa's Foreign Trade

4.2.1.1. Africa's Trade Policy

According to UNCTAD Handbook of Statistics (2010) Africa remains marginalised in Global trade. In 2009, it accounted for only 3% of world merchandise exports, corresponding roughly to its share in Global GDP. At the same time, Africa's trade remained more outward-oriented than in any other continent, with approximately 12% of its total merchandise trade being directed to intra-regional trade (UNCTAD, 2010).

In the last two decades there has been an increased international interest towards Africa. Since then the Continent as a whole has been attempting to implement more liberalised and outward oriented trade policies, by gradually opening its markets and lowering its customs tariffs, in order to attract international partners and foreign investments, sustain higher levels of international trade and economic growth. It has also shown increased commitment towards free trade and liberalisation of its economy.

4.2.1.2. Foreign Direct Investment (FDI)

Over the past two decades Foreign Direct Investment (FDI) has become a crucial and irreplaceable source of funding and economic development for the African continent, as it can help African countries to achieve their development objectives in a faster and more effective manner. One of the most effective ways to attract domestic and foreign investors is to have a dynamic and growing domestic private sector with favourable political environment (Vickers, 2011).

The levels of FDI increased more than 12 times between 1995 and 2008 – from 6 billion USD to $72,2 billion. However, the global financial and economic crisis of 2008 negatively affected the global investment flows into Africa, and 2009 marked the end of the steady and sizeable increase of FDI which Africa was experiencing between 2003 and 2008. In 2013 the amount of FDI was almost identical to the 2009 data and equalled 57,2 billion USD. Total investment as a percentage of GDP has remained stable in Africa in recent years: it slightly increased 19,1% in 2005 to 21,6% of GDP in 2008 (UNOSAA, 2011). FDI remained concentrated in resource extraction. In order to attract market-seeking or efficiency-seeking FDI instead of resource-seeking FDI, the African Continent has to create a growing and efficient domestic market.

Africa's share of Global FDI flows has been slowly improving, and in 2013 it reached 5,7%, the highest level of FDI projects since 2003. Latest surveys reveal that Africa's perceived attractiveness has improved dramatically over the last couple of years. Africa has managed to moved from the third-from-last position to become the second-most attractive investment destination in the world in 2011. In 2014 North America was the only region that ranked ahead of Africa in terms of investment attractiveness (Ernst and Young, 2014).

An analysis of United Nations Conference on Trade and Development revealed a story of Africa's steady progress: companies already established in the region are bolstering their

presence and reinvesting their profits for growth. They see the vast improvements in the region, and expect further improvement in the next two years (UNCTD, 2015).

4.2.1.3. Exports, Imports, and International Trade

After a period of rapid development, Africa has started to enjoy improved and more sustained levels of economic growth. Although on average, African economies trail the rest of the world in competitiveness (14 out of the 20 least competitive economies are from Africa), African countries have had growth rates of around 5 % since 2000. In addition to that, the continent's population exceeded 1 billion which, alongside with Africa's advances in information and communication technologies, has raised the levels of international optimism about Africa's economic prospects and rapidly growing new consumer base (World Bank, World Economic Forum, 2013).

Despite the increased interest toward the continent from developing and developed market economies from all round the world, Africa remains rather marginalized in the Global economy. Despite Africa's vast territories and huge natural resource endowment, its share in world production and trade remains rather insignificant. Let's take Sub Saharan Africa (SSA) as an example. Its population exceeds 819 million people (12.2 % of the world population), but the regional economic activity ensures only 1.7% if the world production. Furthermore 72% of SSA's countries (or 34 out of the 47) are least developed countries. In addition to that, the African continent has the largest number of least developed countries: 87% of the least developed countries in the world are situated in Africa, and in 2008 12 Sub-Saharan African states had populations of less than 2 million, 19 had a gross domestic product of less than $5 billion, of which six had a GDP of less than $1 billion (Vickers, 2011).

The recent political and economic events around the world have changed the international view on Africa. Currently more and more countries (Turkey included) are turning their heads toward Africa and starting to realize its hidden potential. They don't see Africa only as a place of constant conflict, poverty and war, but rather as a potential international Partner of great, but yet undiscovered importance for the global economic growth.

In order to utilize the newly emerging opportunities for economic and trade growth, Africa needs to diversify its market. There are several ways in which this could be achieved. Firstly, Africa needs to become less dependent on the markets of its historical trading

partners in the developed world. Secondly, it has to decrease its dependence on the export of commodities vulnerable to price shocks. Thirdly, it should orient towards emerging markets. Last but not least, African countries should focus on production of goods with higher added value and invest more in trade infrastructure and simplified customs procedures in order to reduce the time and cost required to get products to the market. According to latest research, Africa will benefit greatly from potential investment in trade-related infrastructure: it is forecasted to achieve up to 51% beyond the baseline growth forecast, and a GDP increase of $20 billion per year by 2025 (International Trade Centre (ITC), 2012).

The State of African Exports Recently many African countries have been putting a lot of effort in order to diversify their export base. Nevertheless, African exports remain highly commodity-focused. Fuels and mining products account for over 50% of Sub-Saharan exports, while in developed economies and developing Asia they account for only 10%. Furthermore, mineral products account for 30-90% percent of the total exports in more than half of all African economies (TMSO, 2015).

Export diversification will lead to a substantial increase of Africa's productive capacities. Value-addition per capita must be achieved through stable and supportive macroeconomic and regulatory environment, appropriate skills development and education systems creation, so that Africa's trade won't have to rely so heavily on its traditional commodities. (Vickers, 2011).

High dependence on commodity exports means that terms of trade and government finances fluctuate with commodity prices, which may not only have a negative effect on the countries' growth, but jeopardize governments' fiscal stability and leeway (World Bank, World Economic Forum, 2013). Export diversification in goods and services is becoming a crucial factor necessary to raise Africa's resilience to external shocks.

Africa's markets are poorly connected with each other, and informal border flows comprise up to 90% of Africa's trade. The share of Africa's intra-regional goods trade in total goods exports is just 12%, compared with 25% in the Southeast Asia, 65% in the European Union, and 49% in North America (World Bank, World Economic Forum, 2013). Furthermore, the improvement of regional connections is very important as it has the potential to increase food security and reduce poverty.

The low regional integration and high transaction costs force African countires to import agricultural products from foreign markets instead of producing them domestically. Recent World Bank data reveals that African farmers produce only 5% of Africa's cereal imports (World Bank, 2014). With the market of food staples and production estimated at annual $50 billion, it equals 75% of the total agricultural output, and signifies that enormous growth opportunities remain unexploited (World Bank, World Economic Forum, 2013).

The large share of non-African imports makes the food prices in Africa volatile, thus affecting the income of the poor and hampering macroeconomic stability through rising inflation. Furthermore most African economies are small buyers and have very limited power to bargain an negotiate prices on an international scale. Thus, regional integration is the key to diminished hunger and poverty, as it facilitates the trade from food-abundant areas to areas with a food deficit (World Bank, 2014).

Africa's Export Trends As a whole, Africa has not been able to overcome the constraints imposed by the nature of its insertion into the international division of labour - or global economy - enforced during colonialism. Africa continues to produce and export primary products in exchange for imports of higher value added, manufactured goods (Vickers, 2011).

As already mentioned above, African exports tend to be concentrated on commodities, which suffer from fluctuating world prices. However, Africa has strong potential in other sectors, such as clothing (via cotton production and garment manufacturing sectoral integration), or in agribusiness by linking crop production with food and beverage processing. (International Trade Centre, 2012)

The share of Africa's total trade in the world in the last three decades remained pretty low, at levels of 2-3%. One of the main reasons behind that are the industrial base and the continental infrastructure, which need serious upgrade. However, in recent years Africa has increased its exports, and gained market share practically in very region in the world, except for Latin America. Its share growth has been particularly high in the Asia-Pacific market with a growth from 0.8% to 1.2%, followed by markets within the region with a growth from 9% to almost 14% over the past 15 years (International Trade Centre, 2012).

Between 1995 and 2010, African exports have mostly increased in vehicles (with 15% annual growth) and mineral products (with 12% share of global imports). There has been a

steady increase in transport equipment (8%), skins and leather (4%), as well as in machinery and electronic appliances (4%). Processed foodstuffs and beverages industry has also increased its exports. However, there has been a decrease of cotton and textiles (in terms of African exports and Global market share) (AEO, 2015). The main products exported by African countries include palm oil, cocoa, timber, gold and diamonds, oil fuel, precious metals, while the main imported products are foodstuffs, chemicals, petroleum products, scientific intsruments, as well as machinery and equipment (Vickers, 2011).

Yet, Africa's share of global trade remains very small, at around 2 % of world trade, and overall exports are focused on commodities. Africa remains focused on low value primary resource goods and minerals. Between 2004 and 2006, 60% of Africa's export to the world was composed mainly of fuel, ores, metals and precious stones as well as primary commodities; mining and related manufacturing dominated Sub Saharan Africa's exports, reaching 91% 2006. However, in the same time about 70% of Africa's imports from the world were composed of high value manufactured goods (Vickers, 2011). Trade Map statistics reveal that during the last two decades mineral products and base metals have been dominating African exports to all world regions, but their market shares outside Africa remain pretty small.

Between 2000-2010 non-oil exports of processed and semi-processed goods have grown faster than exports of raw products, which have lost their leading position in African exports. Nevertheless, raw and semi-processed goods remain crucial in Africa's trade with Asia, accounting for an increasing share of exports. However, exports to traditional markets in Europe include mainly raw and processed food and beverages (AEO, 2015; TMSO, 2015; International Trade Centre, 2012).

4.2.2. Changing Patterns of Africa's Foreign Trade

Africa's role in the global economy is changing. On one hand, Africa's growing economic significance and expanded consumer markets make the Continent more attractive for international partners and foreign investors, who want to establish a win-win partnership, which will ensure mutual benefits and long-term growth. Curiously, a recent study by the Economist Group revealed that according to 65% of 217 global companies surveyed across 45 countries consider doing business with Africa as either an "immediate priority" or "priority within the next decade", while only 2% believed the continent to be "irrelevant" to their future plans (Freemantle, 2015).

On the other hand, Africa is no longer relying only its "traditional" trade partners – the developed economies of Europe and the US. Currently, the emerging market economies of the developing countries are playing increasingly important role for the Continent. Africa‘s total trade of merchandice with non-Africa developing countries increased almost 9 times between 1995 and 2008, reaching an amount of 283 billion USD. While primary products accounted for 55% of Africa’s exports to non-African developing countries in 1995, their share rose to 75% in 2008 with fuel accounting for a large proportion of that trade (Vickers, 2011).

Seven main developing countries have been supporting the rapid growth of Africa’s trade by providing aid and foreign direct investment: Turkey, Brazil, China, India, Korea, Russia and Malaysia (UNOSAA, 2010). These countries play a crucial role by switching the foreign trade dynamics and influencing the direction of Africa’s economic and geopolitical development.

Since 2014 USA is no longer the major export partner for Africa. In 2014 the US-Africa trade totalled had a 15% annual decrease, reaching $73 billion, or 13 billion less than in 2013. US-Africa trade flows are now half as substantial as they were at their peak in of $145 billion, when the US was easily the continent’s largest single trade partner (Freemantle, 2015). One of the main reasons behind that was the 2008 financial crisis and the resulting decreased demand for crude oil. The African producers were negatively affected, as the US imports of African crude oil halved between 2008 and 2009. By 2014 Nigeria’s crude oil exports to the US have fallen with more than 90% and Angola’s with around 27%.

The change of Africa-US trade allowed the growth of other trade partnerships. In 2014 China-Africa trade was almost three times greater than US-Africa trade. BRICS-Africa trade increased with 4% in 2014, and Africa-India trade reached almost 80% increase since 2008, constituting $41 billion, a number greater than the whole trade between USA and Africa (Freemantle, 2015). Since 2008, Tukey has also been an important trade partner for Africa, especially in the sphere of construction.

Since 2008, there has been a 10% decline of Africa’s trade with France and Germany and 20% since 2012 with the UK. Despite this, Africa’s trade with Europe remains much more stable and diverse than with many of its newly emerging partners.

To conclude, Africa's role in the global economy is shifting, and so are the Continent's partnerships. The coming decade will show us the meaning behind those changes. What is certain is that Africa will play a crucial role in reshaping all spheres of the global environment – economic, political, and social.

4.2.3. Challenges and Opportunities of Africa's Foreign Trade

As already mentioned before, Africa has been experiencing a rather high and continuous economic growth in the last decade. Africa's average growth rate since the beginning of the new millennium has been higher than the average growth rate of the world economy. Even in the aftermath of the last financial crisis (2008-2012) Africa's average growth rate remained around 2% higher than the world's average (UNCTAD, 2014). The main factors behind this impressive growth are both internal (i.e. better macroeconomic policies, higher domestic demand, more stable political environment) and external (appropriate commodity prices, cooperation with EME-s, increased FDI, etc.).

Despite Africa's good economic performance in the last years, many countries in the continent are struggling with such issues as poverty, lack of water, food insecurity, energy insufficiencies, high unemployment, inequality, economic dependence, low domestic and international integration, lack of political change, etc.

According to UN Development Programme (UNDP), a major challenge for African countries will be to achieve and preserve political and social stability. Sustainable and more inclusive growth, as well as decreased poverty levels will reduce political and social tensions. In order to achieve that, African governments will have to implement new macroeconomic policies, increase the access to key public services, such as education, health and security, and further improve institutions and regulations for the activity of the private sector (ADBG, OECD, UNDP, 2014). And while Africa has made some progress in the recent years, there is a lot to be done in order for the Continent to catch up to the more developed global economies. You can find a table summarizing the opportunities and challenges of Africa's foreign trade next page (Table 4.1).

Table 4.1: Opportunities and Challenges of Africa's Foreign Trade

	Opportunities	Challenges
1.	Africa's tendency for stable, continuous and high levels of economic growth.	Africa's marginalized position in the global economy.
2.	Population of over 1,1 billion people	Africa's yet undiversified market.
3.	Vast underdeveloped territories.	Insufficient amount of FDI.
4.	Rich endowment of natural resources, such as oil, gas, ore, etc.	Africa's insignificant share in world's trade and production.
5.	Increasing levels of urbanization with emerging consumer markets with massive growth potential.	Africa's dependence on low value primary resources and minerals, as well as commodity exports.
6.	Increased global attractiveness towards Africa's 'hidden blooming' potential.	Africa's high number of least developed countries and economies.
7.	Great opportunities for foreign trade, business and economic growth.	Africa's dependence on traditional trade partners, e.g. Europe, USA.
8.	Africa's increasing attractiveness for international businesses and FDI.	Africa's underdeveloped infrastructure and lack of economic transformation.
9.	Africa's recent advances in information and communication technologies.	Volatile commodity prices and tendencies for inflation.
10.	Rapidly developing agricultural sector.	Underdeveloped energy sector.
11.	Developing consumer/retail sector.	Lack of political stability.
12.	Developing business/finance sector.	Insecurity, conflict, social tensions.
13.	Developing foods/drinks sector.	Low domestic market integration.
14.	The commodity boom since the 2000-s.	Low international economic integration.
15.	Potential for international cooperation and trade development with developing and developed countries.	Social problems: poverty, food and water insecurity, high unemployment, inequality, commodity dependence.
16.	Africa's increased commitment towards more liberal and outward oriented policies.	Social fragmentation and lack of homogeneity.
17.	Africa's socio-economic, political and infrastructural improvements (e.g. good governance, institution building, etc.)	Vast cleavage between the rich North and the poorer African South; underdeveloped middle class and high income inequality.

One of the main issues to be addressed is poverty – although statistics indicate that poverty rates in Africa have gone down, the number of people in poverty has increased. Reversing this trend is a challenge that African policymakers have to address effectively and as soon as possible, as that's the only sure way towards an integrated, prosperous and peaceful Africa (UNCTAD, 2014).

4.2.4. Africa's Growth Strategy, 2063

Just like Turkey, African states have their own vision for the future development of the Continent. The only difference is that this vision is more long-term oriented, concerning the four decades after 2023, up till 2063.

'Agenda 2063: The Africa We Want' is an initiative of the African Union Commission (AUC), and its final edition was published in 2015 (African Union Commission, 2015). The Agenda is rooted in the philosophy of Pan Africanism and African Renaissance, and aims at the creation of a stable and well developed framework, which will allow the Continent to realise its potential and achieve high levels of economic and social development in the next five decades.

According to the Agenda, there are some crucial issues that should be dealt with in the next decades. Firstly, Africa should become more independent, and less reliant on foreign countries for its development. In additions to that, new, self-financed, capable, inclusive and accountable states and institutions at all levels and in all spheres should be established. Last but not least, the role of Regional Economic Communities should increase, and new blocks for continental unity must be built.

The 2063 Agenda includes seven main aspirations for the future development of Africa:

1. A prosperous Africa based on inclusive growth and sustainable development
2. An integrated continent politically united and based on the ideals of Pan-Africanism and the vision of Africa's Renaissance.
3. An Africa of good governance, democracy, respect for human rights, justice and the rule of law.
4. A peaceful and secure Africa.
5. An Africa with a strong cultural identity, common heritage, shared values and ethics.
6. An Africa whose development is people-driven, relying on the potential of African people, especially its women and youth, and caring for children.
7. Africa as a strong, united and influential Global player and Partner.

The Agenda envisions a Continent, where people are highly skilled, well educated, and enjoying high standard of living, high life quality, sound health and well-being. Cities and other settlements are forecasted to become hubs of cultural and economic activities, with modernized and well-developed infrastructure, which will allow African economies to create shared growth, decent jobs and economic opportunities for all citizens.

Furthermore, the authors of the Agenda believe that by 2063, Africa's collective GDP will be proportionate to the Continent's share of the world's population and natural resource endowments. African countries are expected to find their place amongst the best performers in Global quality of life measures. These improvements will be attained through the implementation of strategies of inclusive growth, job creation, investments in science, technology, research and innovation; gender equality, youth empowerment and the provision of basic services including health, nutrition, education, shelter, water and sanitation.

These are some very serious issues, and it's clear that the goals of the 2063 Agenda will not be achieved immediately. The transformation of the Continent will require long-term, gradual, conscious and deliberate efforts, so that an 'integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in the international arena' may emerge.

4.2.5. Science, Technology and Innovation Strategy for Africa, 2024

Currently, innovation and development can be perceived as one of the crucial factors that can influence the economic change processes in Africa. According to African Union's New Partnership for Africa's Development initiative (AU-NEPAD) Innovation, both in terms of policy implementation and technological development, is a key trigger of export and economic growth, which will lead to higher standards and better quality of life on the Continent (AU-NEPAD, 2010). Innovation is present in most of the developing countries in Africa; however, its level and nature depend on the stage of development of the economy. For example, more low-income countries have more innovation processes, mainly expressed via improved products and processes (Oyelaran-Oyeyinka, Sampath, 2007).

African countries become more and more dependent on knowledge, technologies, and innovation, which play an important role in new resource management and strategic development policies in various sectors, such as logistics, trade, and agriculture, to name a few. Africa needs to diversify its market, and switch its focus towards the development of more technology-oriented value-adding markets.

After almost thirty years of trial and error, new innovation policies are finally being implemented in Africa. The African Union has come up with a new strategy called the 'Science, Technology and Innovation Strategy for Africa 2024' (STISA-2024). The Strategy

aims to accelerate Africa's transition to an innovation-led, knowledge-based economy, by improving Africa's science, technology and innovation readiness in terms of infrastructure, professional and technical competence, and entrepreneurial capacity. Specific policies and programs in science, technology and innovation which will sustainably address the societal needs are planned to be developed and implemented in the next decade, and the private sector will be playing a more and more crucial role in the development of Africa's economic growth and development (AUC, 2014).

The STISA-2024 Strategy is aimed at supporting the vision expressed in Africa's Growth Strategy 2063. The main objectives and priorities of the Strategy are oriented towards research and capability development, human resource development, building of research networks, innovation, technology and infrastructure development, institutional capacity enhancement, as well as private sector strengthening and integration. Apart from these priorities, several countries focus on different issues, depending on their visions and policies for future development. For instance, Namibia and Rwanda stress on the importance of research infrastructure and university support, while Ethiopia stresses the importance of national quality infrastructure and the meeting of international standards (UNUPB, 2015).

The success of both, the STISA-2024 and Africa's Growth Strategy will depend on the active engagement and devotion of all of Africa's 54 states, as well as the international support of such agencies as the World Bank and the United Nations. In case of successful implementation, the policies and visions described in these documents will lead to a rise of African people's prosperity and well-being, as well as an increased importance of the Continent's role in the international arena.

4.3. THE DEVELOPMENT OF TURKEY-AFRICA RELATIONS

4.3.1. Overview of Turkey-Africa Relations

In the last almost two decades the socio-economic relationships between Turkey and Africa have been constantly improving and their importance increasing. Despite its long-term Ottoman involvement in the development of the African continent, Turkey did not show any specific interest in economic cooperation with Africa until the late 90-ies. It can be argued that Turkey's opening to Africa has been mainly driven by two factors: Turkey's re-orientation in Global politics and its need to for economic relations diversification. (Ozkan, 2012).

Currently, the relationships between Turkey and Africa are still in their initial stage of development. The future of the two countries' cooperation will depend on the domestic and international policies of Turkey, as well as the development of Africa's international relations and economy, and interest towards trade partnerships with Turkey.

Modern Turkish foreign policy is becoming more and more complex and proactively oriented. Until mid-2000 Africa did not play such an important role for the Turkish political agenda. However, since 2005, when the foreign minister Ali Babacan declared that Africa has a special importance to Turkey within the context of new foreign policy Turkey and announced 2005 as 'the year of Africa', Turkish foreign policy toward Africa has become more tangible, steady, and visible for the international community (Babacan, 2008). During the last decade, the image of Africa has completely changed in the eyes of the Turkish society – the associations with poverty, hunger, wars, hunger, poverty, downtrodden human rights, desperation, and constant conflicts have been replaced by a vision of cooperation, possible partnership, hope, economic growth and improved political and trade relations.

In 1998 a document titled 'Opening up to Africa Policy' has been adopted in Turkey (Afacan, 2013). The main idea behind it was the strengthening and development of the socio-economic, political and cultural relations of Turkey with the African continent. The authors of the document stressed on the importance of the implementation of new special policies in the political and economic spheres of Africa-Turkey cooperation. Some of the political measures proposed included the establishment of political consultation mechanisms, increased contacts between Turkey and African countries, as well as increased Turkish involvement in different programmes, aiming to fascilitate and assist the development of African states. Economic measures were a crucial part of the document, and included such spheres as trade, technical, economic and scientific cooperation and organization of short-term training programmes for African experts; mutual promotion and protection of investments; Turkey's membership in the African Development Bank and the African Exports and Imports Bank, as well as the creation of joint business councils or chambers of commerce (Ozkan, 2012; Ozkan, 2011; Hazar, 2000).

Turkey shows a strong desire to widen its cooperation with Africa and implements a great variety of projects related to trade, aid and international cooperation on the continent. Turkey has allocated $50 million to development projects in African countries. It has also donated $7,5 million to various African countries via international organisations such as the

World Health Organization (WHO) and the World Food Programme (WFP) (Ozkan, 2010). As a result of the booming economies in many African countries, Turkey has also invested in communications through Turkish Airlines, which currently flies to 38 destinations in 23 countries in Sub-Saharan Africa (MFA, 2015; Bilgic, Nascimento, 2014).

In the same time, although African reactions to Turkey's initiative have so far been 'a mixture of mild expectation and confusion', Africa has also been trying to start the new political and economic partnerships or to improve the existing ones with Turkey. One of the results of these changing attitudes was the increased levels of institutional cooperation and trade between Africa and Turkey. Turkey became a strategic Partner of the African Union and joined the African Development Bank in 2008, and new Turkish business councils and embassies have started their operations in such countries as Egypt, Algeria, Sudan and Tunisia (Ozkan, 2012).

Turkey's political engagement with Africa has also led to an intensification of economic and commercial relations. Statistics show that the development of trade relations between Africa and Turkey were even more crucial: currently African countries are importing Turkish furniture, apparels, durable house products, home textiles, processed food, packaging devices, iron–steel, electrical devices and construction materials, while Turkey is mostly buying oil, raw materials, gold and minerals from Africa (Akgun, Ozkan, 2010). Turkey's trade volume with African countries has increased more than three times between 2003-2010, and Turkey's target for 2023 is to double the current trade volume with Africa to more than 30 billion USD (DTM, 2015; TIM 2010). Despite the world economic crisis, the growth of African-Turkish trade did not lose its pace, and achieved around $16 billion in 2009. Yet, in comparison to Turkey's total trade volume with other regions in the world, this trade volume seems not significant enough (Ozkan, 2010).

The 2008 economic crisis also increased the importance of Africa for Turkish trade, as it had a negative effect on the EU and USA, one of the main importers for Turkish goods, and forced Turkish business to search for new markets. Some argue that Turkey's new foreign policy towards Africa may signify a new goal of diversifying economic partners, reducing economic dependence on EU and Russian partners (Neylan, 2008).

Economically, both sides will benefit from the improved trade and development cooperation, as it will create employment and attract investment. The development of a strong economic and political relationship with developing strong Africa will allow Turkey

to expand its export markets, diversify its energy resources, as well as to "consolidate its image as an emerging Global power with a human-centred and conciliatory approach". While the African continent, which is now opening to the Global market, may find Turkey a 'reliable and more benign Partner' to collaborate with and 'create a just, peaceful and more equal international environment for future economic development' (Akgun and Ozkan, 2010).

The future is unclear, and the potential of Turkish-African cooperation is yet to be observed. However, lots of Turkish companies are already starting to discover the potential of African markets and trying their luck there (Bektaş, 2015). What is certain is that the African-Turkish relationship will continue its rapid development in the next decade, and international trade will be of great importance for the growth of the developing economies in both, Africa and Turkey.

4.3.2. Africa's Hidden Potential

An official statement regarding the Turkish-African relations has been published on the official website of the Ministry of Foreign Affairs of Turkey (MFA, 2015). According to this statement, Africa has incredible potential, and is "an impressive surge of growth, urbanization and modernization, endowed with abundant and diverse natural and human resources". It is perceived as a "new, re-emerging continent with many promising developments, which, although once regarded as the byword for ethnic conflict, disease and natural disaster, is currently a destination with high level of foreign visits for trade, construction and natural resource deals".

According to the statement, Africa has recorded an annual growth rate of 5% over the last decade and is expected to continue this trend in the coming years. 6 out of 10 fastest growing economies in the world are in now Africa, and economic predictions indicate that Africa will be a $29 trillion economy in 2050, and will have a GDP larger than the 2012 combined GDP-s of the US and the Eurozone. Furthermore, 70 % of the Continent's people live in countries that posted average growth rates in excess of 4% over the past decade. There is a middle class of about 313 million people, 34 % of the population.

It is noted that the trade levels between Africa and the rest of the world has increased by 200% since 2000, mostly due to Africa's economic reforms, increased productivity, urbanization and good governance. The levels of urbanisation have also significantly

increased: in 1980-ies only about 28% of Africans lived in cities, and nowadays 40% live in urban areas. School enrolment in Africa has also increased by the incredible 50%.

The Continent is said to have made a remarkable progress in the fields of democracy, regional cooperation, integration, conflict prevention, and economic development – "socio-economic and social trends, which have permanently changed the economic and political landscape of the Continent, and demonstrated its real potential".

To conclude, this official statement of the Turkish Ministry of Foreign Affairs is yet another proof of the fact that the relations with Africa have become one of the prime orientations of Turkey's foreign policy.

4.3.3. Turkey's New Policy towards Africa

According to the statement by the Ministry of Foreign Affairs of Turkey which was described above (MFA, 2015), Turkey's policy of opening up to Africa "is not just the reflection of a transient political and economic expectation, but a product of long-term historical and cultural process, which is also the expression and natural result of the firm feelings of friendship and partnership between Turkish and African peoples".

The period between of 2008 to 2013 can be perceived as a period of rising cooperation and transformation towards a reinforced political and economic partnership between Turkey and Africa. According to the MFA's statement (2015), Turkey is currently pursuing a comprehensive policy in Africa, which can be summarized in 7 main points:

1) Establishment of closer political relations, protection of the legitimate rights and interests of African countries in Turkish-African bilateral and multilateral talks.
2) Provision of economic support, aiming to help Africa overcome its difficulties through trade, investment and humanitarian assistance.
3) When requested, diplomatic assistance aiming at the peaceful settlement of disputes in the Continent.
4) Provision of assistance in the areas of democracy and good governance.
5) Support to the international and regional organizations of the Continent, with the goal of achieving increased dialogue, understanding and peace in the region.
6) Active participation in peacekeeping missions in Africa.
7) Upholding of the principle of "African solutions for African problems" in accordance with the policy of the African Union.

Turkey is amongst the top 20 largest economies in the world with a GDP of over $800 billion, and according to Turkey's Deputy Prime Minister Bulent Arinc, "Turkey has a liberal economy, qualified manpower, broad domestic market, competitive industry and a strategic location which African nations can exploit". According to Bulent, the world is on the verge of a defining moment", and Turkey is obliged to take a position in accordance with the course of history, and adjust to the changes and developments of the modern world (New Vision, 2012).

4.3.4. Turkey's Interest and Opportunities in Africa

Turkey's engagement in Africa has become an interesting phenomenon in the current international environment. It signified the redirection of Turkey from the mainly Western-centred foreign policy to a more diversified approach. The Turkey's involvement in Africa has two main dimensions. The first one is political, and related to the official representation of the State. The second, less visible but still extremely important dimension, is related to the sphere of economics and trade, and is mainly performed by the civil sector of Turkish society, such as business organisations, trade agencies, non-govermental organizations (NGO-s), etc. (Rudincova, 2014).

The 2014 TurkStat statistical bulletin revealed that exports are one of the driving forces of the Turkish economy. Turkey's main export destinations are mainly in the Western market, and five out of the top 10 Turkish export markets are EU member states. However, the 2008 financial crisis underlined the need to diversify for stability, and Turkish firms attempted to strengthen their relations with the African continent (TurkStat 2014; Turkish Review, 2014).

Over the last decade, Turkey has initiated new policies and trade connections with Africa, which has led to a significant growth in Turkey's exports to the Continent. Latest TurkStat statistics reveal that the top five African countries receiving Turkish exports are Algeria ($750 million), Morocco ($544 million), Tunisia, ($320 million), South Africa ($180 million) and Nigeria ($160 million). The rates of Turkey's imports from African countries remain rather unstable, with North African countries being relatively more successful in Turkish markets over the past three years (TurkStat, 2014)

In the last years Turkey has been implementing foreign policies, which show its preparedness to become a political and economic leader and a regional power. It comes as

no surprise that Turkey's interest in Africa, which was very limited since early 21st century, has been increasing gradually. Turkey is trying to expand its existing relations with the entire African continent as a whole, and is enhancing its relations with the African Union (AU) to meet this goal. Since 2010, when Turkey officially introduced its new Africa strategy, Turkey has been trying to build a sustainable path for the relations with African countries (Akel, 2014).

Not only Turkey, but many countries from all around the world have economic interest in the African continent and are developing international relations with African countries. The last decade has seen the rise of emerging economies. As a result, demand for some key raw materials has stimulated many developed and developing countries, such as India, South America and Korea, to strengthen their economic ties with emerging market economies in many African countries. Furthermore, between 2004 and 2008 the traditionally existing cooperation between Africa and countries like the USA, China, EU and Japan have been re-defined and invigorated, aiming at increased industrialization, infrastructure improvement, acquisition and development of technology and know-how, as well as development of human capital (African Union, 2011). The policies of Turkish competitors in Africa have a great influence on Turkey's Africa Strategy; Turkish policy-makers must consider all the factors of the constantly changing global market and develop and adopt unique strategies that will fit the latest developments in Africa.

The increased Global demand for raw materials has forced developed economies to start working on new raw materials related strategies. Turkey's approach towards Africa, although highly oriented towards humanitarian activities as well, is no exception. Some of the strategies are directed towards the attainment of rare earth elements. One of the reasons for that is the fact that 97% of the Global production of rare earth elements, which are mainly used for green and/or high-tech products, belongs to China, and the Chinese government implements strict export restriction policies (Hurst, 2010).

The increasing Global demand for raw materials has greatly influenced the development of international supply and demand, and economies from all around the world are trying to ensure that they will have access to them. Recent statistics show that the African continent is endowed with almost 12% of the world's oil reserves, 42% of the world's gold, 80–90 % of chromium and platinum group metals, 60 % of arable land, as well as to vast timber resources (UN, et al., 2013). This is one of the factors which can

explain the increased international interest towards cooperation in Africa. For years now, Turkish companies have been involved in construction, communication and energy sectors, thus supporting the economy in Africa (New Vision, 2012).

In September 2013 Mr. Ahmet Davutoğlu, former Minister of Foreign Affairs and current Prime Minister of Turkey (2016), had a speech in which he described Turkey's Africa Strategy (Davutoğlu, 2013). He announced that the humanitarian aspect of the Strategy was as important as its political and economic aspects, thus showing the unique approach that Turkey has towards Africa compared to any other countries with interest in the continent (Akel, 2014). Mr. Davutoğlu explained that the strategic goal behind the Strategy was to turn Turkey into a Global power and a global actor, which is present in every sphere of the globalised interdependent world.

The main opportunities for Turkey in Africa were highlighted as well, and can be summarised into five main points (Akel, 2014; Davutoğlu, 2013):

- Africa's rich natural resources,
- Africa's increasing young population and growing human resources,
- The need for higher levels of urbanization in many countries in the continent,
- The need for better infrastructure in many countries in the continent,
- The promising structure of the continent in the long run, ensured by the activities and policies of the African Union.

The main tools that will be used concerning the strategy are as follows:

- Increased number of humanitarian assistance, carried out by the Turkish International Cooperation Agency,
- Construction of new Embassies and Commercial Counsels,
- Signing of new bilateral trade and investment agreements,
- Increased number of destinations of Turkish Airlines in Africa,
- Encouragement of Turkish entrepreneurs to invest and do business in Africa,
- Promotion of education and cooperation by increasing the number of scholarships given to African students to study in Turkey.

P. Pham (2010) and K. Rudincova (2014) argue that Turkey's increased interest in Africa is significant in many ways. To begin with, Turkey can serve as a better political and economic development model for African countries than China or India. In addition to that,

African states may diversify more of their sources of foreign investments. Furthermore, Turkey may diversify its diplomatic relations, and avoid its dependency on the West. Last but not least, the Turkish state will be finally able to obtain the power necessary to reduce the Western influence on the African continent.

4.3.5. Overview of Turkey-Africa Trade

The Turkish-African economic relations were significantly influenced by the 'Strategy for Improving Economic Relations with Africa' (2003). The plan had three main goals: firstly, to support Turkish small and medium-sized investments in Africa; secondly, to increase the commerce volume with African countries; and last but not least, to transfer technologies from Turkey to Africa (Kaya and Warner, 2013; Tepedelen, 2008).

Another reason for the boost of Turkish-African trade relations in the last years was the world financial crisis of 2008, and the following decreasing demand from Turkey's main trade partners - the EU, and USA. As a result, Turkish exporters began to search for new markets for their products, and Africa turned out to be a perfect opportunity, due to its geographical position and steady foreign demand. Prof. Augustus Nuwagaba of Makerere University says that "with the collapse of the Eurozone, Turkey sees Africa as the emerging market for their products". According to him, the fact that Europe is no longer competitive has given a big opportunity to Africa to emerge as a potential market (New Vision, 2012).

Data from the Turkish Statistical Institute show that Turkey has been experiencing a steady increase in exports to Africa in the last decade. The total trade volume increased from $1,7 billion in 2002 to $14,1 billion in 2013, thanks to an almost steady increase throughout the last decade.

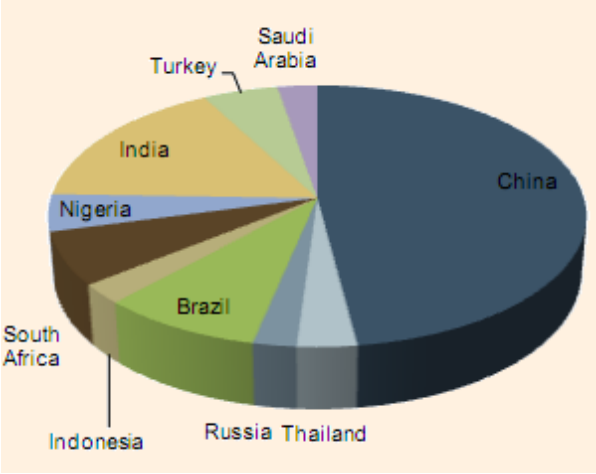


Figure 4.1: Africa's Share of World Trade

In the same time, Africa's total imports increased almost 5 times and reached a level of $599,5 billion in 2013. As a whole, the share of Turkish imports in the African economy has doubled in the last decades and has increased from 1,17% in 2002 to 2,3% in 2013. Turkey's imports from Africa increased 5 times, and reached its peak of $6,8 billion in 2011. Eventually, the trade volume between the Africa and Turkey has increased almost 7 times since 2002 - from $2,9 billion to $20,1 billion in 2013. In 2012 TIM, Turkish Exporter's Assembly, proposed their 2023 Vision for Turkey and issued the "Turkey's 2023 Export Strategy and Sectoral Breakdown". They expressed a desire that Turkey achieves its goal of 100 billion USD trade volume with Africa by 2023 (TIM, 2009).

Africa's share in Turkey's foreign trade has changed as well. Africa's share in Turkey's total exports has doubled – from 4.7% in 2002 to 9.3% in 2013, with a peak of 9.9% in 2009. On the other hand, its share in Turkey's imports has remained almost steady, at a rate around 2.5% since 2002. These figures imply that Africa has an increasing importance in Turkey's exports, while Turkey's demand from Africa has a parallel trend with Turkey's overall imports demand (Akel, 2014; TUIK, 2015).

Example: Turkey-Sub-Saharan Africa Trade

The table below illustrates the economic relations between Turkey and Sub-Saharan Africa between January 2005 and July 2009, expressed in thousands of US dollars (Turkish Statistical Institute, 2011). It can serve as an example of the increasing importance of the Turkish-African relations (TurkStat, 2011).

Table 4.2: Turkey - Sub-Saharan Africa Import-Export between 2005-2009

Year	Import	Export	Year	Import	Export
2005	1,632,270	1,086,849	2010	1,725,916	2,257,898
2006	2,233,388	1,469,127	2011	3,424,658	3,633,016
2007	2,821,104	1,946,661	2012	2,613,447	3,913,246
2008	2,060,486	3,212,341	2013	1,560,207	2,460,291
2009	1,700,198	2,738,866	Total:	19,771,674	22,718,295

Table 4.2, shows that the trade volume between Turkey and sub-Saharan Africa has been steadily increasing since 2005. However, if we are to compare this trade volume with other countries, for example the USA, Russia and Germany, the total trade of the Sub-Saharan countries will look relatively small. Curiously, the trade volume between Turkey and Sub-Saharan Africa remains low even if compared with the Turkey-North African trade

volume, as it constitutes around 40% of all Turkish-African trade volume (Tepeciklioglu, 2012; Rudincova, 2012; TurkStat, 2012; Afacan, 2012)

According to Sedat Aybar, an economist from Istanbul's Aydin University, Turkey is at the "point of no return" in the region, and its opening-up to Africa should be supported for the country to reach "the strategic place Turkey has drawn for herself as a global player in world affairs" (Daily Sabah Business, 2014). According to Daily Sabah, Turkish trade with Sub-Saharan nations has increased by more than 30% between 2005 and 2009, while total trade volume of the country has surged by more than 20%, with trade volume reaching $7,5 billion in 2012. Adding in North African countries, where Turkey's closest business partners are located, the trade volume figure almost triples to more than $20 billion. Despite the huge increase, this number is 10 times smaller than the trade volume between Africa and China, which in 2013 exceeded $200 billion and was expected to rise to $280 billion by the end of 2015.

According to the International Monetary Fund's (IMF) “Economic Outlook 2014”, six of the world's 10 fastest-growing countries were on the African continent (IMF, 2014). Thus, it’s in Turkey's best interest to promote cooperation rather than competition, especially with other emerging countries, so that its investments could provide "complementary sectorial inputs," especially in infrastructure (Daily Sabah Business, 2015).

According to M.Ozkan (2012) and K. Rudincova (2014) Turkey’s exports to Africa consist mainly of building materials, processed food, textiles, furniture and other house products, iron-steel, while its imports constitute of raw materials, minerals, gold and oil, even though Turkish political and business representation is stressing that it shares the technologies with African countries and is not interested solely in African markets and raw materials. In addition to that, Turkish enterprises that are doing business in Africa normally hire local people for their projects, and thus create jobs and increase levels of employment. In time, Turkey has managed to establish economic ties mainly with big African countries, which are economically developed and rich in natural resources. Examples of such countries include such as South Africa, Nigeria, Algeria, Ghana and Kenya, which hold a significant trade potential for Turkey. Vicky (2011) argues that Turkish products have a good reputation among African consumers, as they have better quality than the Chinese and Indian merchandise, and are considerably cheaper than the EU ones.

4.3.6. Africa's Importance for Turkey's SMEs (Small and Middle Size Enterprises)

Trade with with Africa is expected to be especially beneficial for small and middle size Turkish enterprises, as it will allow them to gain considerable profits, and in the same time play an important role in the economic growth of Turkey. Recently around four hundred Turkish businesses, mostly small- and medium-sized enterprises, had invested over $500 million in various African countries (Pham, 2010). Furthermore, Turkish firms have been involved in many construction and agricultural projects.

A research conducted by A. Akel (2013) showed that between 2003 and 2012 around 30,000 different firms exported from Turkey to Africa. Considering the number of exporters and exports values, North African countries were the main export destinations for Turkey. In 2012, 4617 out of 12988 exporters to Africa exported to Egypt, while 4440 firms exported to Libya and 2610 firms exported to Morocco. Each year, on average, 93% of the exporters were SMEs, where 33% were micro-sized, 36% were small-sized and 18% were medium-sized. In addition to that, around 52% of the exporters each year were producer-exporters. The share of SMEs in Turkey's exports to Africa has decreased from 63,2% in 2005 to 53,7% in 2012, while the share of producer-exporters has increased from 57% in 2005 to 63,7% in 2012 (Daily Sabah Business, 2015).

Interestingly, this research showed that each year, almost 90% of the exporters had an annual exports value below 1 million USD to Africa. 41% of the exporters exported between $10.000and $100.000, while those exported between $100.000 and $1 million constituted almost 30% of the exporters in each year. On the other hand, those exported below $1 million constituted only 15% of Turkey's total exports to Africa on average in each year, with a decreasing share from 22,5% in 2003 to 12,4% in 2012. In addition, a limited number of firms that had an annual export value over $100 million to Africa began to play a significantly more important role, increasing their share from 5% in 2003 to 25,3% in 2012.

The main Turkish exporters to Africa were from Istanbul, Bursa, Izmir, Ankara and Konya. They constituted almost 75% of total exporters that exported to Africa in each year, where exporters from Istanbul constituted more than 50% of the exporters to Africa itself. In addition, exports from Istanbul, Kocaeli, Izmir, Gaziantep and Ankara constituted almost 77% of Turkey's exports to Africa in each year, while exports from Istanbul had 50% annually share on average (Akel, 2014).

4.3.7. Potential Risks of Turkey-Africa Cooperation

The change of Turkish foreign trade and its new more outward oriented and open direction has led to many changes. Even though Western countries remain one of the main partners and export markets for Turkish trade, Turkey starts to focus more and more on its relationships with Africa, Asia, and the Middle East. Turkey strives to achieve its political goals, obtain economic benefits, and achieve its 2023 vision.

Regional conflicts in the Middle East and African countries are among the biggest risks behind the development of Turkey-Africa trade relation. In addition to that, when compared to other countries like China, Turkey's industrial substructure is not as developed, which leads to many discussions and doubts about when and how much Turkey should rely on foreign trade. Civan et al. (2013) argue that in order for Turkey to be able to survive in the strong competition of the region, the status of its trade should be widely accepted, supported on different levels, and efficiently practiced.

While Western countries are still facing problems related to the last financial crisis, Turkey's potential Eastern markets will be facing problems related to conflict and political instabilities. Security issues can lead to lost markets. Thus, we can say that Turkey can see Africa as an alternative market also due to the rising conflicts in the Middle East.

4.3.8. Algeria, Ghana, Kenya: the African Countries Advantageous for Turkey's Logistics and Trade

According to PwC's 'Africa Gearing Up' report (2013) there are ten main African countries which can be currently perceived as transportation & logistics hotspots, namely Algeria, Angola, Democratic Republic of Congo (DRC), Egypt, Ghana, Kenya, Mozambique, Nigeria, South Africa, and Tanzania.

Table 4.3, contains information and overview of the main issues regarding Algeria, Ghana and Kenya, as well as a comparison of the three countires in terms of 1) Geographical position, 2) Population (size, growth, life expectancy), 3) Socio-economic indexes (GDP, GDP per capita, GDP growth; aid per capita, education index, gender inequality index), 4) Business environment, 5) Labour characteristics, 6) Growth industries, 7) Strategic Outlook and Conclusions (BTI, 2014; UNDP, 2015; World Bank, 2013)

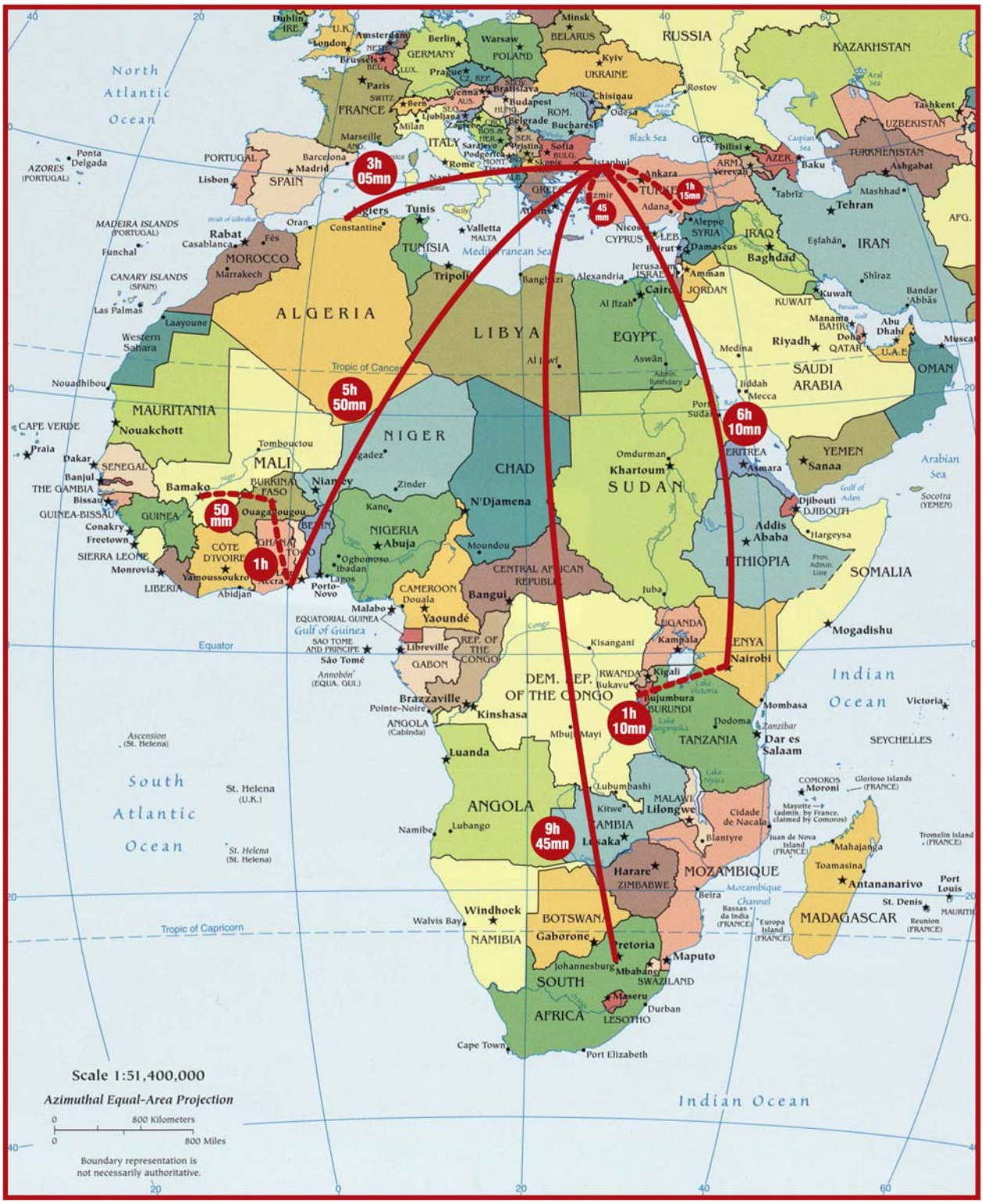


Figure 5: Turkey - Africa Sample Air Lines and Distances in hours

Figure 4.3: Turkey - Africa Sample Sea Lines and Distances in days

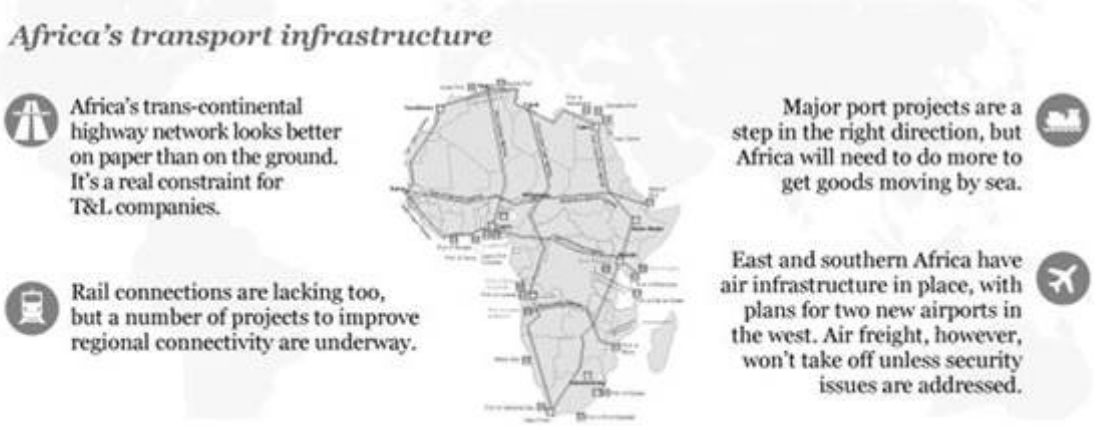
Table 4.3: Comparative Tables of Algeria, Ghana and Kenya

	Algeria	Ghana	Kenya
Capital	Algiers	Accra	Nairobi
Population size (million, 2012)	38,5	25,4	43,2
Pop. Growth (avg. p.a.2012-2020)	1,6 %	2,0%	2,6%
Life expectancy (years)	70,8	60,8	60,4
Urban population	73,7 %	52,5%	24,4%
GDP (US$ billion, 2012)	$ 209,3	$40,4	40,7
GDP per capita (US$, 2012)	$ 5582	$1622	$967
GDP growth forecast (avg., y/y rate 2012-2017)	3,6%	5,9%	6,2%
Aid per capita (USD,2012)	$4,9	$39,3	n/a
UN Education Index (2012)	0,679	0,596	0,584
Gender Inequality Index (2012)	0,391	0,565	0,608

	Algeria	Ghana	Kenya
Logistics Performance Index (2012; global rank/155; 1-5)	125 (2,41)	108 (2.51)	122 (2.43)
Logistics Performance Chart			
Business Environment	Algeria's challenging business environment and low competitiveness constrain economic prospects. Other problems include low FDI because of restrictive regulations and terrorism. Still, foreign investors are granted tax exemptions. The Government uses price ceilings, tariffs and redistribution schemes to control prices for some large consumption products.	Ghana has pretty favourable and less restrictive business environment with good macroeconomic policies. The civil liberty in the country and its developing legal and regulatory framework increases investment attractiveness. Ghana's banking sector and market efficiency are well developed in the African context. Nevertheless, there are some legal issues, related to corruption, property rights violation, and general weakness in the rule of law. Still, Ghana as a whole suffers less from corruption than other countries in the region, and attracts FDI from all around the world.	Kenya faces large trade and budget deficits. Its biggest trading partner is EU, and the sluggish EU economy negatively impacts Kenya's exports. This may be dealt with in the future by strong regional growth and partnerships with countries like Turkey and China. According to IMF by 2020 Kenya will be producing commercial quantities of oil, and despite its low GDP, maintains good demographic profile. Kenya presents a relatively more conducive business environment than its regional peers. Despite the low political risk and the favourable conditions for business development, Kenya has a restrictive tax regime, and faces serious security problems.

	Algeria	Ghana	Kenya
Growth industries	Mining; oil and gas sectors; consumer goods industries; trade; logistics and transportation.	Agriculture; mining; manufacturing; service industry; real estate; storage; transportation; trade.	Financial sector; retail; agriculture; manufacturing; oil sector; transportation infrastructure building.
Logistics	Algeria's logistics infrastructure is poor, with insufficient quality and too complicated and overly bureaucratic custom procedures. The country has recently improved its performance in such spheres as customs, track and trace, timeliness. According to the latest Logistics Performance Index (LPI), Algeria has improved its overall ranking from 140th (2007) to 125th (2012). However, such spheres as logistical infrastructure, international shipments and logistics competence show a slightly declining performance.	Ghana's logistics performance and customs procedures tend to be better than those of its regional peers. Ghana has shown great improvement in international shipments, logistics quality, customs clearance speed, simplicity, formalities predictability, as well as competence. However, Ghana has to deal with problems in tracking, tracing, infrastructure, and timeliness. Customs remain a huge problem for international shippers.	In the recent years Kenya's logistics performance has deteriorated.Although international shipments, infrastructure and logistics competence have improved marginally in the last ten years, customs, track, trace and timeliness have all declined significantly over the period. The time to import goods, and the number of necessary documents documents are comparable with the average levels in sub-Saharan Africa; however, the import costs are significantly higher. The declining logistics efficiency is a key concern and a crucial business risk forlogistics service providers and import and export companies operating from or doing business with Kenya.
Transport Infrastructure	The decade of the Algerian Civil war (1991-2001) led to a huge backlog in infrastructure maintenance and improvement. To make matters worse, the country's vast deserts are constantly hindering infrastructure development attempts. Transport sector upgrade and expansion has become one of the main government priorities in the last 15 years, and it comes as no surprise that Algeria spends a massive amount of public	Ghana has an advanced infrastructure platform when compared with other low-income countries in Africa. However, its transport infrastructure needs to be upgraded to meet the needs of a middle-income country. Ghana will need to focus on its infrastructure, as it presents a major constraint to its economic growth. Ghana's oil reserves will allow the country to raise additional public funding for infrastructure. The	Despite its significant progress in recent years, Kenya's transport infrastructure is inadequate to fully satisfy the country's needs. Kenya's infrastructure indicators seem relatively good, especially when compared with other low-income African countries. However, they remain below the levels found in Africa's middle-income economies like Nigeria or Egypt. Bringing Kenya's infrastructure up to the level of the region's middle income countries could boost annual growth by

	Algeria	Ghana	Kenya
	investment for the development of its transportation programmes. Most of the population, and a great part of the total economic activity is focused in the North of the country. Road connections are focused on long-distance East-West and North-South connectivity. In addition to the four main modes of regional and international transport, namely air, shipping, roads and railways, pipelines are of special importance in Algeria, as they connect the Algerian oil and gas industry to Europe. Algeria has three transcontinental export gas pipelines: two transporting natural gas to Spain and one to Italy. The largest pipeline runs from Algeria via Tunisia to Italy. One to Spain passes through Morocco and the newest pipeline to Spain, which came online in 2011, stretches across the Mediterranean.	Government has established long-term partnership with China, and is looking for partners from the private sector as well. According to PwC (2013), Ghana's infrastructure situation is hopeful, as its infrastructure backbone covers the entire national territory, thus integrating its different regions. However, the infrastructure distribution generally reflects the spatial distribution of economic activity, with a greater density of transport, power, and information and communications technology (ICT) infrastructure in the South and Southwest of the country than in the North.	more than three percentage points. Kenya's development plans include significant improvements to roads, railways, seaports, airports, water and sanitation, as the country attempts to increase its competitiveness in the global market. Road and rail connections with neighbouring countries are still limited, but Kenya could become an important regional hub for air transport, railways, and ports in the near future. Kenya's population and agricultural activity are heavily concentrated in the Southern half of the country. The Northern half of the country, by contrast, is sparsely populated and characterized by fragmented infrastructure coverage.



	Algeria	Ghana	Kenya
Labour	Algeria has a large labour force with relatively high levels of human development. However, the well-developed workforce is restricted by inefficient labour market. On one hand, Algeria has good healthcare indicators, high life expectancy, low prevalence of HIV/Aids, high productivity levels. On the other hand, poverty remains widespread, and the unemployment rates are high.	Ghana has the advantage of high levels of education and human development in its region. Although the population is small in absolute terms, its density is much greater than in most other sub-Saharan countries. The growing workforce is well educated by sub-Saharan standards (nearly 54% of the population has at least secondary education). Education expenditure is higher than in Kenya or South Africa, facilitating fast-rising labour productivity. Nevertheless, the country offers a large, low-cost labour pool, and around 60% of the Ghanaians work in the agriculture sector. Ghana's human development indicators have reached medium levels	Kenya has a large population of 43.2 million, with urbanisation levels of around, and 70% of the population under 24 years old. The Government strives to provide free secondary education in order to boost technical and vocational skills. Kenya's workforce is relatively well-educated compared to other countries in the region. But still, there are a lot of spheres that need improvement, as labour productivity and human development indicators in Kenya remain pretty low.
Ports	Algeria's economy is dependable on its Mediterranean ports. Shipping is also essential, as most of Algeria's commercial trade moves through the infrastructure of national ports, such as Arzew (with stress on petrochemical exports) and Skikda. Algiers is the second most important port for containers after Arzew, handling more than half of the traffic. Algiers is a congested port: congestion surcharges and delays are common. Port congestion as a whole is problematic for Algeria, and despite the heavy	Ghana strives to become a maritime hub for West Africa, and in the last decade has been constantly modernising the sector. Still, the main ports in Ghana struggle to keep up with the demands of the expanding African and global economy. Domestic maritime trade and 90% of the foreign trade volume is served by two ports: Tema in the East of Accra, and Takoradi in the West of the country. Takoradi is mainly serving the gas and oil fields, while Tema is serving as an outlet for Ghana's	Ports are one of the keys to Kenya's future growth. Currently there are three main ports: Mombasa, Lamu and Malindi, with Mombasa being the main port not only for Kenya, but for its neighbours (such as Uganda) as well, and annually handles more than 800 000 TEUs and 3.7 million tons of cargo. Mombasa is the second-largest port in sub-Saharan Africa in terms of both – tonnage and containers handled. Mombasa is also one of the key trading centres a natural transshipment for the East African region. However, the port

	Algeria	Ghana	Kenya
	involvement of the private sector, it is not likely to solve the problem anytime soon. In 2011 the Algerian Transport Ministry announced construction plans for a new port between Algiers and Tenes aiming to diminish congestion at ports such as Tenes, Bejaia and Oran.	landlocked neighbours, such as Niger and Mali. The ports at Tema and Takoradi are relatively well equipped to service international and local parties. However, the constantly increasing demand leads to congestion and capacity constraints, which hold further development. The threat of potential pirate attacks and the sluggish and overcomplicated clearance procedures speak of a huge capacity gap in the maritime facilities. The Algerian Government is already trying to address these problems with expansion plans for the Tema and Takoradi harbours, and strives to become the clear maritime hub that West Africa currently lacks. Ghana's political stability, better economic policies and strong economic growth give it strong potential to become a regional gateway.	faces serious capacity constraints and congestions, as well as delays in cargo clearance. The World Bank considers the port a major infrastructure constraint, although it has the potential to become a major link between the East African market and global shipping services. In terms of performance, Mombasa fares relatively well compared with other ports in Eastern and Southern Africa. Kenya aims to increase technical and port wide productivity, and to achieve improved port access better space utilisation. Work is also being undertaken on a new container terminal, which must add 1.2 million additional TEUs to Mombasa's capacity. Kenya is also looking to develop a new mega port project in the north of the country at Lamu, where aid for Somalia and transit cargo for Northern Uganda, South Sudan and Ethiopia could be shipped.
Air Transport	Air transport and airport construction are among Algeria's agenda for further Development. Currently there are 52 airports, and the primary airport is Houari Boumediene Airport; the main domestic carrier is Air Algérie. There are regular scheduler flights to Europe (mainly France), as well as other African countries and the Middle East. Currently the Algerian Government is committed to spending US$520	Ghana's air transport market is small in global terms and average for Africa. The low volumes in the aviation are a vast source of future potential. Ghana has seven domestic airports, and one International – Kotoka in Accra, with regular flights to many destinations. Most of the air transport market is international and divided between intra-African and intercontinental flights. Although Ghana faces	Kenya has well developed aviation and airport infrastructure. Latest statistics show that Kenya has 225 airports, with Jomo Kenyatta International Airport in Nairobi being a major international gateway in sub-Saharan Africa. The domestic air transport sector in Kenya is constantly growing, and according to the World Bank (2012) it has become the fourth-largest in sub-Saharan Africa. Kenya Airways is among the top 3 most

	Algeria	Ghana	Kenya
Railways	The 1990s Civil War ruined the Algerian railways, and even since then rail network renewal, upgrade and expansion, as well as congestion alleviation have been major government priorities. Currently the Government is implementing a long-term railway development and modernisation plan for the state-owned rail company, Société Nationale des Transports Ferroviaires, and invests significant sums in railroad infrastructure and transportation development. Algeria is also investing US$87 billion in order to increase long-distance connectivity along the North coast – from Tunisia to Morocco.	Ghana's railways network is largely underestimated and with negligible freight and passenger volumes of less than 2%. The rail infrastructure is designed mainly for commodities export, and concentrated in the South. Currently only around 30% of the lines are partially operational. In recent years, the Ghana Railway Company (GRC) has been unable to carry the full volume of mining traffic and is severely limiting the development of the mining sector, as well as the emerging oil and gas industries. As a result, the Government has been planning and developing projects aimed to upgrade and expand the railway network in Ghana. However, not so many significant changes have been implemented yet.	Kenya's rail corridors are of strategic importance for the whole region: it is a key channel for bulk freight, and provides additional capacity along the northern corridor. However, the infrastructure is still underdeveloped, and needs urgent renovation and modernisation. The improved rail infrastructure will lead to increasing trade throughout the East Africa Region. However, the whole proves will require investment of around US$2.1 billion, but Kenya Railways Corporation (KRC), is reportedly insolvent, with annual profit of only $13.2 million in 2012. Thus, the revival of the railway sector, although crucial and of necessary for the Continent's development, will be extremely challenging.
Roads	Roads are the main mode of transport in Algeria, with more than 85% of goods and passengers using road as primary transportation mode. The road network is especially developed in the Northern coastal region with the biggest concentration of population and economic activities. The infrastructural quality and conditions vary significantly, particularly in the South on the trans-Saharan corridor, where even newly paved portions of the road disappear under tons of sand.	Road transport is the most crucial means of freight movement in Ghana, and thus requires great amount of consideration and investment. In 2012, 95% of the passengers and 98% of the country's freight were carried via road transportation. World Bank reports show that Ghana's road transport indicators are strong, and in general are ahead of those found among other low-income peers, reaching levels of middle-income country. However, there are still some challenges, such as	Kenya has a reasonably well-developed road network, but the condition of most roads is only fair, and need improvement. Kenya has a sufficient amount of trunk roads, but there is a shortage of decent rural roads leading to urban areas, thus it is hard for farmers to deliver food directly to city markets. Investments are being made, and there are plans to improve road connections at Mombasa to help handle growing freight traffic, some of which are being financed by a Japanese Official Development

	Algeria	Ghana	Kenya
	In 2011 Algeria's most important road project started. The construction of the US$11-billion East-West highway project is changing the highway profile of the country, as it runs through Morocco and Tunisia, and connects Algeria's major coastal cities. It is said to be one of the largest public works projects in the world, which will diminish the isolation of the Eastern and Western provinces and facilitate better connections with Morocco and Tunisia. Future development is expected to focus on the North-South highway in order to increase the connectivity with the more remoted Southern areas.	bad roads in the North, insufficient rural connectivity, and urban congestion. The Government is spending 1.5% of GDP, one of the highest levels in West Africa, on roads repaving and upgrading, and road network modernisation, especially near the oil-rich South-West region of the country.	Assistance (ODA) loan. Kenya has established a sound system for funding road maintenance snd has made great strides with institutional reforms. The country's road fund meets most of the good practice design criteria and the fuel levy is set at a level adequate to fund the road maintenance requirements of Kenya. Despite these positive strides, the quality of public investment still needs to be improved before the trunk network can be considered to be in a maintainable condition
Strategic Outlook	Algeria is a big player on the African continent, not only because of its substantial land area, but also because of its sizeable GDP. The 2011 Arab Spring gave Algeria both an opportunity and an imperative to engage in political and economic reforms.Although Algeria's significant oil wealth and $200 billion in foreign exchange reserves gives the country a positive short-term macroeconomic outlook, there are numerous long-term challenges that should be dealt with. Firstly, there is the need to diversify the economy, so that Algeria could get	Ghana on its way of becoming an important player on the West African market, due to its richness in natural resources, economic liberalism and political stability. Ghana's strategic challenges for the coming years are twofold. Firstly, the government must manage the growing oil revenue in a most effective and efficient way that will please the electorate and meet the standards of proper financial administration (e.g. transparency, avoidance of corruption, etc.). Secondly, Ghana must put a special stress on regional security and	Kenya's long-term growth prospects appear to be solid. Key supporting factors will be its increasingly broadbased economy, youthful population and strategic location in the East African Community (EAC). In the next few years, Kenya is expected to face two principal challenges. First of all, the country will need to implement new laws and constitutional provisions, and deal with its domestic problems which may hamper the international legitimacy of the president and the government. The next decisive step is the transition to a devolved governance

	Algeria	Ghana	Kenya
	away from its oil and gas dependency, create jobs, ensure a more sustainable energy policy, and improve the business environment. Secondly, the civil service should be strengthened and modernized, so that the Government could implement its ambitious programs, such as the reinforcement of the rule of law, development of the justice system, ensuring transparency, etc. Thirdly, the health and education systems need serious investment in terms of infrastructure, training and better conditions for health care and education professionals. Last but not least, Algeria has become a central player in geostrategic terms for the whole region, and can influence international politics. Algeria has the potential to develop a strong foreign policy with the West, which will contribute to improved regional cooperation, and potentially lead to a stronger negotiating position for Algeria in general. In such a position, Algeria would have more opportunities to pursue its current policy of gradual liberalization, while ensuring that its own domestic market is not damaged.	stability, the absence of which could seriously endanger both political and economic progress. In order to face these challenges, Ghana's government has to maintain and increase its vigilance against the possible negative consequences of "easy money" coming into the country, and continue its close cooperation and financial monitoring activities with international partners. Tackling the socio-political problems within the country remains crucial for the future development of the country. Effective and efficient distribution of funds will be essential for the democratic legitimacy of the state and the willingness of the general population to support democracy despite all its pitfalls. Thus, strengthening of planning and implementation capacities in many ministries continues to be a task as well, and more urgently than ever. In regard to security policy, aside from close cooperation within the West, a modest investment in Ghana's own security apparatus might be necessary, especially to ensure effective and easily deployable armed forces, to avoid spill-overs from regional conflicts	structure, as this reform could resolve many structural deficiencies within the country, particularly real and perceived inequality between regions. A new land commission must be established and put to work to address, among other things, past injustices and illegal allocation of land. Furthermore, a police reform must be completed. The market economy reforms begun under the Vision 2030 must be continued. The role of donor contributions should be further streamlined and harmonized. Furthermore it is important that the dominance of Kenyan and regional cartels be reduced in order to create fair conditions for emerging SMEs. For the sake of ensuing generations free primary education must continue and truly free secondary education must be introduced. More public secondary schools are required to ensure the access to secondary education. The government must also create jobs for youth in order to prevent poverty and the violence which results from it.

4.4. EVALUATION AND REFLECTIONS

Turkey's new foreign policy strategy in Africa Strategy has been successful in creating awareness among African states and the Turkish society about the benefits of a long-term cooperation and partnership. A lot of Turkish enterprises have directed their attention to Africa – the number of businessmen that exported to Africa increased from 8.110 in 2008 to 12.988 in 2012, while the number of new exporters to Africa has been increasing significantly (Akel, 2014). However, too little time has passed, and Africa has not yet become one of the most popular destinations for Turkish exporters. Some of the main problems for Turkish businessmen involved with trade in Africa include survival in the African market, diversifying markets, and increasing the number of exported products.

Aggressive competitors are another crucial problem. The increasing interest and activities of such countries as China and India can hinder and undermine the efforts of Turkish traders to survive in the African market. Turkey should take this factor in account while developing and adapting its African strategies, if it wants to achieve its great 2023 visions and achieve stable and sustainable economic relations in the continent.

Africa is a huge continent, with very diverse political and economic situations in its different parts. Thus, Turkey has to be selective and focus on those African regions, the cooperation with which will be most beneficial in the long term, The author of this study suggest that Algeria, Ghana and Kenya are such countries.

In order to further decrease the potential negative impacts of the political chaos in the MENA countries on Turkish exports, the Ministry of Economics has prepared a list of 11 countries which will be major export markets in the region: Tunisia, Egypt, Libya, Bahrain, Jordan, Yemen, Saudi Arabia, Oman, Morocco and Algeria. The Turkish government has also come up with a list of fifteen target countries, which will increase the overall level of Turkish exports, and seven of the included countries are in the MENA region: Egypt, Iran, Saudi Arabia, Algeria, Libya, Jordan, Qatar (Caglayan, 2011). Last but not least, Turkey has to develop policies that will stimulate Turkish firms to invest do business in Africa.

To conclude, everything stated above confirms the undeniable fact that Turkey's relations with African countries have been developing in the last decade, slowly reaching peak levels. Both, Turkey and Africa, are trying to establish collaborative relations, defined by mutual understanding and trust. Due to the increasing political negotiations and bilateral

relations, trade between the regions has increased significantly, and Turkey has set an ambitious goal to increase the trade volume with Africa 4 times until 2023. The future of African-Turkish relations seems bright, however an important question remains: will Turkey manage to achieve and sustain stable business relations with steady economic growth with Africa, considering its aggressive international competitors, such as India and China, which are also trying to increase their influence and power among African states.

Turkey's involvement in Africa is complex and multidimensional. It will be extremely interesting to observe the development of the Turkish-African economic, cultural, and political relations in the coming years, as well as Turkey competition with such global powers as EU, USA, India and China on the international economic arena.

5. ANALYTIC HIERARCHY PROCESS (AHP) AND ANALYTIC NETWORK PROCESS (ANP)

5.1. AHP MODEL: CHARACTERISTICS AND PROPERTIES

5.1.1. The AHP Concept

The Analytic Hierarchy Process (AHP) is a structured technique used to organize and analyse complex decisions. It was developed by Tomas L. Saaty in the 1970-ies, and has its roots in mathematics and psychology (Saaty, 1977; Saaty, 1980). AHP has been extensively studied and refined since its first appearance four decades ago. (Majumder, 2015).

Analytic Hierarchy Process (AHP) is a special and unique technique, which is often used in a variety of multi-criteria decision making problems. It provides a systematic structure for the evaluation and ranking of alternatives under different criteria. AHP is especially useful when alternatives under both, qualitative and quantitative criteria, have to be evaluated, and is also an irreplaceable tool for group decision making. Therefore, it comes as no surprise that AHP is used globally in a great variety of situations in such fields as economics, governance, business, manufacturing, healthcare, tourism and, last but not least, supply chain management, logistics and trade. The AHP is implemented via a special software named *Expert Choice***,** and can be used for various decision problems even has been used in this thesis also.

Tomas L. Saaty (1994) created the Analytic Hierarchy Process as an effective system for solving complex decision making problems, which could assist the decision maker to set priorities and make the best decision. Thus, AHP doesn't prescribe one and only one "correct" decision. Rather, it assists the decision makers in finding the Optimal solution, which will best suit their objective and perception of the problem at hand. It provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions (Ameri, 2013).

5.1.2. Creating an AHP Framework

According to Saaty (1995) AHP is based on three main principles of methodical processes: 1) Constructing hierarchies, 2) Establishing priorities, and 3) Reasonable consistency.

5.1.2.1. Structuring AHP Hierarchies

The AHP users have to decompose their decision problem into a hierarchy of simpler sub-problems, which can be independently analysed. These elements can be related and applied to any aspect of the decision problem: tangible and intangible, carefully measured and roughly estimated, well or poorly understood (Garcia Marquez and Lev, 2015).

AHP consists of three levels of hierarchy (Saaty 1977; Saaty, 1980). The first one is the *goal* – the objective of the decision making. The second one is *criteria*, representing how each of the existing criteria contributes to the achievement. And the last one is *alternatives,* which are showing how each of the alternatives contributes to each of the criteria.

Various approaches can be used for the creation of a hierarchical structure. Some of the most wildly used approaches include extensive team discussions and brainstorming. Decision-makers should be extremely careful while structuring the hierarchy, as the structure should present the problem in a best way, all side factors that affect the problem should be considered, various information sources that may help solve the issue at hand must be taken into account and last but not least, all of the participants who take part in the decision-making problem should be considered and defined in advance (Saaty, 1990).

According to Saaty et al. (2012), there are eight main steps that decision makers should consider before structuring a hierarchy. They can be considered guidelines within a structured hierarchical model. Firstly, the main problem and goal at hand should be recognized and clearly formulated. Secondly, the sub-goals of the main goal should be formulated. Thirdly, criteria conforming to the sub-goals of the main goal should be identified. Fourthly, sub-criteria can be selected for each criterion. Furthermore, actors involved to this process can be named, and their goals and policies – identified. Last but not least, decision makers may identify alternative results. You can see an example of a basic hierarchical structure below (Saaty et al., 2012).

It is important to mention that more elements could be added to the hierarchical structure, at any level, and more levels. However, how many elements are too many? A general rule is that the hierarchy should be complex enough to capture the situation, but small and nimble enough to be sensitive to changes (Saaty, R.W., 1987).

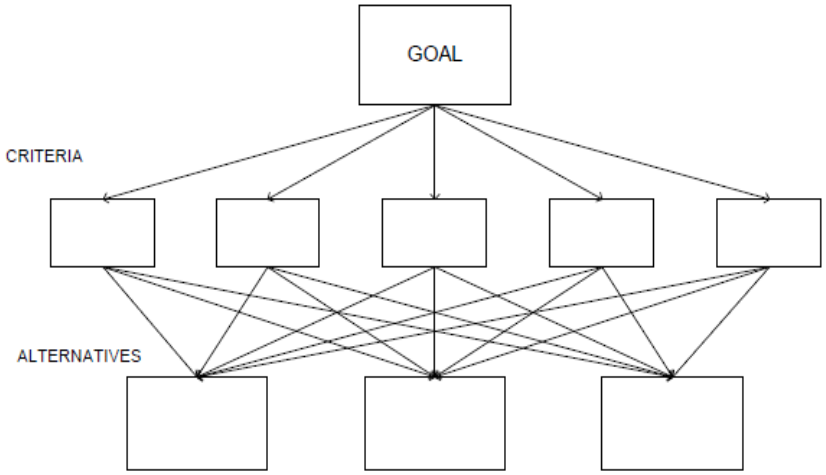


Figure 5.1: Three Level Hierarchy Framework Design

Decision making with AHP involves ranking of alternatives and a process of their re-structuring called *rank reversal* must be performed. Rank reversal implies that the ranking of the alternatives remains unchanged even when new alternatives are added

5.1.2.2. Establishing Priorities for AHP, Reasonable Consistency.

According to Saaty (2008), the decision-making process should be strictly organized and decomposed in four main steps, so that the final decision could generate 'correct' priorities. The steps are as follows.

1) The problem and the kind of knowledge sought must be defined.

2) The decision hierarchy should be structured from the top to the bottom following a three level hierarchy: from the goal of the decision (the long-term, broad objectives), through the intermediate levels (criteria on which subsequent elements depend), to the lowest level (the set of alternatives).

3) A set of pairwise comparison matrices should be constructed. Each upper-level element is used for comparison with the elements in the level immediately below it. One of the main values of AHP is that while making the comparisons, the decision makers can use both: concrete data about the elements at hand, or/and their own judgments about the relative importance of the issue at hand. In addition to that, the AHP design usually involves significant discussion and research effort and can be changed and expanded in time, with alternatives added, deleted, or changed.

4) The priorities obtained from the comparisons should be used for weighing the priorities in the level immediately below. The process should be repeated for each element,

so that an overall (global) priority could be obtained. The process of weighing and adding will be finalized when the alternatives in the bottom level are obtained.

The AHP methodology compares criteria, or alternatives with respect to a criterion, in a natural, pairwise mode. In order for the decision-makers to make comparisons, a scale of numbers that indicates the relative importance and dominance of each element over another element with respect to the comparison criteria, was developed. The AHP uses a fundamental scale of absolute numbers that has been proven in practice and validated by physical and decision problem experiments. The fundamental scale has been shown to be a scale that captures individual preferences with respect to quantitative and qualitative attributes just as well or better than other scales (Forman and Gass, 2001; Saaty 1980, 1994). The table below exhibits the fundamental scale of absolute numbers created by Saaty (1980, 2008).

Table 5.1: The Fundamental Scale of Absolute Numbers

Intensity of Importance	*Definition*	*Explanation*
1	Equal Importance	Two activities contribute equally to the objective
2	Weak or slight	
3	Moderate importance	Experience and judgement slightly favour one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favour one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favoured very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
Reciprocals of above	If activity *i* has one of the above non-zero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*	A reasonable assumption
1.1–1.9	If the activities are very close	May be difficult to assign the best value but when compared with other contrasting activities the size of the small numbers would not be too noticeable, yet they can still indicate the relative importance of the activities.

AHP converts the decision makers' evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way (Marquez and Lev, 2015). The latter feature distinguishes AHP from other decision making techniques. In the final step of the process, numerical priorities are calculated for each of the

alternatives. These numbers represent the relative ability of the different options to achieve the decision goal, thus allowing a straightforward consideration of the various courses of action.

After all criteria have been compared with the priority scale pair by pair, a paired comparison matrix is being formed and a priority vector calculated (Saaty, 1990).

$$A=(a_{ij})=\begin{bmatrix} a11 & a12 & . & . & a1n \\ a21 & a22 & . & . & a2n \\ . & . & . & . & . \\ . & . & . & . & . \\ an1 & an1 & . & . & ann \end{bmatrix} (i,j=1,2,\ldots,n)$$

Figure 5.2: Paired Comparison Matrix

There are 3 main axioms for this method: 1) If Ai is 9 times bigger than Aj, then Aj is 9 times smaller than Ai. 2) The compared items shouldn‘t differentiate too much because the judgments may cause failure. 3) Elements on different stages should be independent from one another, so that priorities don’t change when alternatives are added to or taken from the structure (Saaty, 1990)

Once the judgemental matrix of comparisons of criteria with respect to the goal is available, the local priorities of criteria are obtained and the consistency of the judgements is determined. It has been generally agreed (Saaty, 1980, 2000) that priorities of criteria can be estimated by finding the principal *eigenvector w* of the matrix A. That $Aw=\lambda_{max}w$

When the vector *w* is normalized, it becomes the vector of priorities of the criteria with respect to the goal. λmax is the largest *eigenvalue* of the matrix A and the corresponding eigenvector *w* contains only positive entries. The consistency of the judgmental matrix can be determined by a measure called the consistency ratio (CR), defined as: $CR=\frac{CI}{RI}$ (Ramanathan, 1999).

Errors in judgment are common; thus, the term *consistency ratio* (CR) is used to measure the consistency in pair-wise comparisons (Saaty, 1994). Consistency cannot be guaranteed, no matter what type of measurement is used. Even if professional measurement tools are used, failure and inconsistent results can be encountered. Furthermore, it may turn

challenging to measure features that change often. Last but not least, it may be hard to create the suitable structure of the problem and determine the priorities.

CI is called the *consistency index* and RI, the *random index*. RI is the consistency index of a randomly generated reciprocal matrix from the 9-point scale, with reciprocals forced. Saaty (1980, 2000) has provided average consistencies (RI values) of randomly generated matrices for a sample size of 500. If the consistency ratio (CR) of the matrix is higher, the input judgements are neither consistent nor reliable. In general, a consistency ratio of 0·10 or less is considered acceptable. If the value is higher, the judgements may not be reliable and have to be elicited again (Ramanathan, 1999). The RI values for matrices of different sizes are shown below:

Table 5.2: The Average Consistencies of Random Matrices (The Random Index – RI Values)

Size	1	2	3	4	5	6	7	8	9	10
RI	0·00	0·00	0·58	0·90	1·12	1·24	1·32	1·41	1·45	1·49

5.1.2.3. The AHP Framework in a Glance.

Taylor (2013) has summarized the steps of AHP framework construction as follows:

- Determine the goal, the main- and sub-criteria, alternatives and construction of the hierarchy. Make pairwise comparisons of the criteria.
- Make pairwise comparisons of alternatives for each criterion.
- Prepare pairwise comparison with normalized matrices.
- Calculate the priority vector (each line is obtained by taking the average).
- Determine the weights and thee alternative criterion of benchmark scores.
- Calculate and check consistency ratio.
- Analyse the AHP scores.

5.1.3. Uses and Applications of AHP

AHP is universally and globally applicable: it can be used both, by individuals working on concrete decisions, and by teams of people working on complex multidimensional problems. AHP is especially useful when dealing with issues where the stakes are high, either involving human perceptions and judgments, or having long-term repercussions (Marquez and Lev, 2015). It has unique advantages, especially when dealing

with decisions concerning delicate elements which are difficult to quantify or compare, or where decision makers of different backgrounds, opinions, specializations or perceptions are involved.

According to Jacobczak (2015) AHP can be applied to a great variety of sectors (e.g. international trade and logistics) and situations, including and not limited to: benchmarking (comparing one's own organizational processes with the best organizations in the sector), choice (selection of one alternative from a given set of alternatives; opportunity cost), conflict resolution, prioritization (determining the relative merit of a set of alternatives, as opposed to selecting a single best one or merely ranking them), quality management, ranking (arranging the elements from most to least desirable), and resource allocation (apportioning resources among a set of alternatives). Furthermore, AHP can be used for problems including planning, forecasting, total quality management, business process re-engineering, setting of piorities, selection among alternatives, and many others.

5.1.4. Advantages and Disadvantages of AHP

Since its creation AHP has been used extensively in literature. Despite its unquestionable advantages, AHP has been criticized in terms of application and theory.

Kuruuzum and Atsan (2001) have formulated three main critics of AHP: Firstly, the validity of rank reversal is still discussed in the literature, and it should be considered carefully before and during the application of AHP, if the decision-makers want to come up with an Optimal solution. Secondly, Kuruuzum and Atsan consider the subjectivity of the modelling process to be a constraint of AHP, as it cannot guarantee that the decisions are necessarily true and correct for the current problem. Last but not least, the creation of an AHP model may take too much time and effort, because of the fact that when the number of the hierarchy levels increases, so does the number of pair comparisons. Last but not least although special computer softwares may assist decision-makers and minimize the time and effort spent for the creation of an AHP hierarchy, argue that there are other more effective and efficient methods, requiring less time and effort that can be applied.

However, the critiques of AHP must not be overestimated, as the model has many unquestionable contributions. To start with, it provides decision-makers with an easily understandable and applicable methodology which could simplify the complex problems at hand and could assist them into precisely considering all the factors related to the goal

which they want to achieve. In addition to that, AHP helps decision-maker to better and easier structure and formulate the objective and subjective, qualitative and quantitative pieces of information that they have regarding the issue at hand. Furthermore, AHP allows users to work in groups, measure the consistency of their judgements, as well as the elasticity of their decisions via sensitivity analyses. Last but not least, the use of special softwares allows AHP users to apply the model in a fast, easy, and efficient manner.

5.2. ANP MODEL: CHARACTERISTICS AND PROPERTIES

5.2.1. The ANP Concept

Thomas L. Saaty (1999) describes the Analytic Hierarchy Process (ANP) as "a general theory of relative measurement used to derive composite priority ratio scales that represent relative measurement of the influence of elements that interact with respect to control criteria". ANP can be perceived as a generalization and a special case of the Analytic Hierarchy Process (AHP), which takes into consideration the various sources of dependence between the numerous elements of a given hierarchy. As many problems cannot be represented in a hierarchy because of the simultaneous interaction and dependence of elements from different levels, ANP is represented by a network instead of a hierarchy.

The main goal of ANP is to define the outcomes of the mutual dependence and feedback within and between clusters of elements. Its main structure represents an influence network of clusters and nodes contained within those clusters. Priorities in ANP are established via personal judgement and pairwise comparison, just like in the case of AHP.

Many scholars perceive ANP as a new and essential phase in decision making. According to T.L. Saaty (1999), ANP is a useful tool used for prediction as well as for representation of the interactions of one's numerous competitors and their relative strength to wield influence in decision-making.

The ANP is implemented via a special software named *Super Decision***,** and can be used for various decision problems. ANP uses the same *fundamental comparison scale of absolute number*s (1-9) as the AHP (please check Table 5.1.). When a problem is being solved via ANP, it is usually studied via four so-called *control hierarchies*, namely a system of benefits, a system of costs, a system of opportunities, and a system of risks. After all the costs, risks, benefits and opportunities are rated separately for all of the alternatives, all of the results are combined so that the best outcome could be determined by the decision-

maker. As a result, a set of priorities is being created for the numerous alternatives, and a sensitivity analysis is used to find out the sensitivity of the alternatives in case of priority and criteria change.

5.2.2. Outline of the Steps of ANP

T. L. Saaty (1999) outlines 12 basic steps of ANP.

1) The user of ANP must thoroughly understand the decision problem, with all of its details, objectives, main- and sub-criteria, the parties involved, their aims, and the possible outcomes.

2) The control criteria and sub-criteria must be defined according to the four control hierarchies (benefits, opportunities, costs and risks). Paired comparison matrices should be performed and priorities must be obtained.

3) A complete set of network clusters and the elements relevant to the control criterion must be determined. In order to organize the construction of the model in a better way, it is preferable to arrange the clusters and their elements in a convenient way, e.g. a column.

4) For each control criterion or sub-criterion, a subset of appropriate clusters must be determined and their element connected according to the various dependence influences.

5) A specific approach of analyzing the clusters and elements should be determined and followed during the whole process.

6) For each control criterion, a supermatrix must be constructed the clusters must be laid out in the order they are numbered with all of the elements in each cluster put both vertically on the left and horizontally at the top. The priorities derived from the paired comparisons must be entered as subcolumns of the main columns of the supermatrix.

7) Paired comparisons of the elements within the clusters themselves and the elements they influence in another clusters they are connected to must be performed.

8) Paired comparisons on the clusters as they influence each cluster to which they are connected with respect to the given control criterion must be performed. The derived weights are used to weight the elements of the corresponding column blocks of the supermatrix. No influence is assigned a zero. After that a weighted column *stochastic supermatrix* is obtained.

9) The limit priorities of the stochastic supermatrix should be computed. Either all of the columns of the matrix will be identical and each will give relative priorities of the elements from which the priorities of the elements in each cluster are normalized to one, or the limit cycles in blocks and the different limits will be summed and averaged and again normalized to one for each cluster.

10) The limiting priorities must be synthesized by weighting each idealized limit vector by the weight of its control criterion and adding the resulting vectors for each of the four groups, namely costs, risks, opportunities and benefits. As a result, only the alternative that is ideal for all the control criteria under a merit will receive the value one after the synthesis for that merit. The alternative with the largest ratio will be chosen for some decisions.

11) Strategic criteria and their priorities should be determined in order to rate the top ideal alternative for each of the four merits one at a time. The four ratings obtained must be normalized and used for the calculation of the overall synthesis of the four vectors.

12) A sensitivity analysis on the final outcome concerned with "what if" kinds of questions must be performed.

5.2.3. Key Advantages of ANP

As already mentioned before, ANP was built on AHP. However, it has gone beyond AHP by considering the interdependence, as well as the inner and outer dependence between different sets of elements, thus becoming a special case of AHP. Furthermore, ANP has forsaken the strictly hierarchical linear nature of AHP and has obtained a looser nonlinear network structure dealing with cycles, sinks and sources. This improved structure can allow decision-makers to represent various kinds of problems without thinking about the hierarchy of the elements: it doesn't matter which elements come first or last, the goal is not necessarily on the top level, neither are the alternatives always at the bottom.

It is important to mention that ANP doesn't simply prioritize selected elements, but groups of clusters and elements as well. It applies the idea that control networks and hierarchies can be used in different situations, and leads to an analysis of costs, risks, benefits and opportunities. As a result, ANP has become an irreplaceable tool for prediction and decision-making in numerous fields of human life (including logistics and international trade).

6. GENERAL MODEL PRACTICE

This study aims at identifying the key components and characteristics of foreign trade between Turkey and Africa, based on the current situation of this trade. To achieve this high level work, first widely a literature review and then statistical analysises have been carried out to specify the main and sub-criteria which are inserted to the model. Right after the specifying the criteria, AHP process has applied for determining the "Best Logistics Model" among the twelve alternative logistic models. The details of the model development procedures of this dissertation are available in the form of flow chart in Figure 6.1. Firstly, statistical inferences about the trading company's demographic characteristics and their trading operations are stil being made. Secondly, effective factors that could explain the variation in trading operations are being determined. Thirdly, a set of pre-determined key factors (based on literature review) that are likely to be effective in African trade are being exposed to the evaluation of a variety of trading companies. This provides an opportunity to appraise whether the companies' characteristics are affecting their perception of the importance of the key factors determined through the literature review.

In order to conduct statistical inferences a questionnaire that consists of 9 sections was designed (see Appendix A). The first section contains the demographic characteristics of the trading companies as well as the properties of African trade. The remaining sections consist of 5-Likert items (1: Not important at all, 2: Not important, 3: Slightly important, 4: Important, 5: Very important) used to figure out the trading companies' perceived importance about the potential of the 7 criteria as well as the sub-features for each criterion according to their practice.

It also enables the modeler to determine the key factors in reasonable sizes for the Analytic Hierarchy Process' pairwise comparisons through statistical analysis based on the overall importance levels of the companies to the pre-determined key factors. Eventually, in addition to the statistical inferences based on five experts in the field and using AHP, this study aims to determine the most suitable trading practice (model) among the twelve existing models and the influence of a variety of key factors to this best practice.

After this chapter covers the explanation of the methods used as well as their actual application through statistical analysis and later AHP model setup.

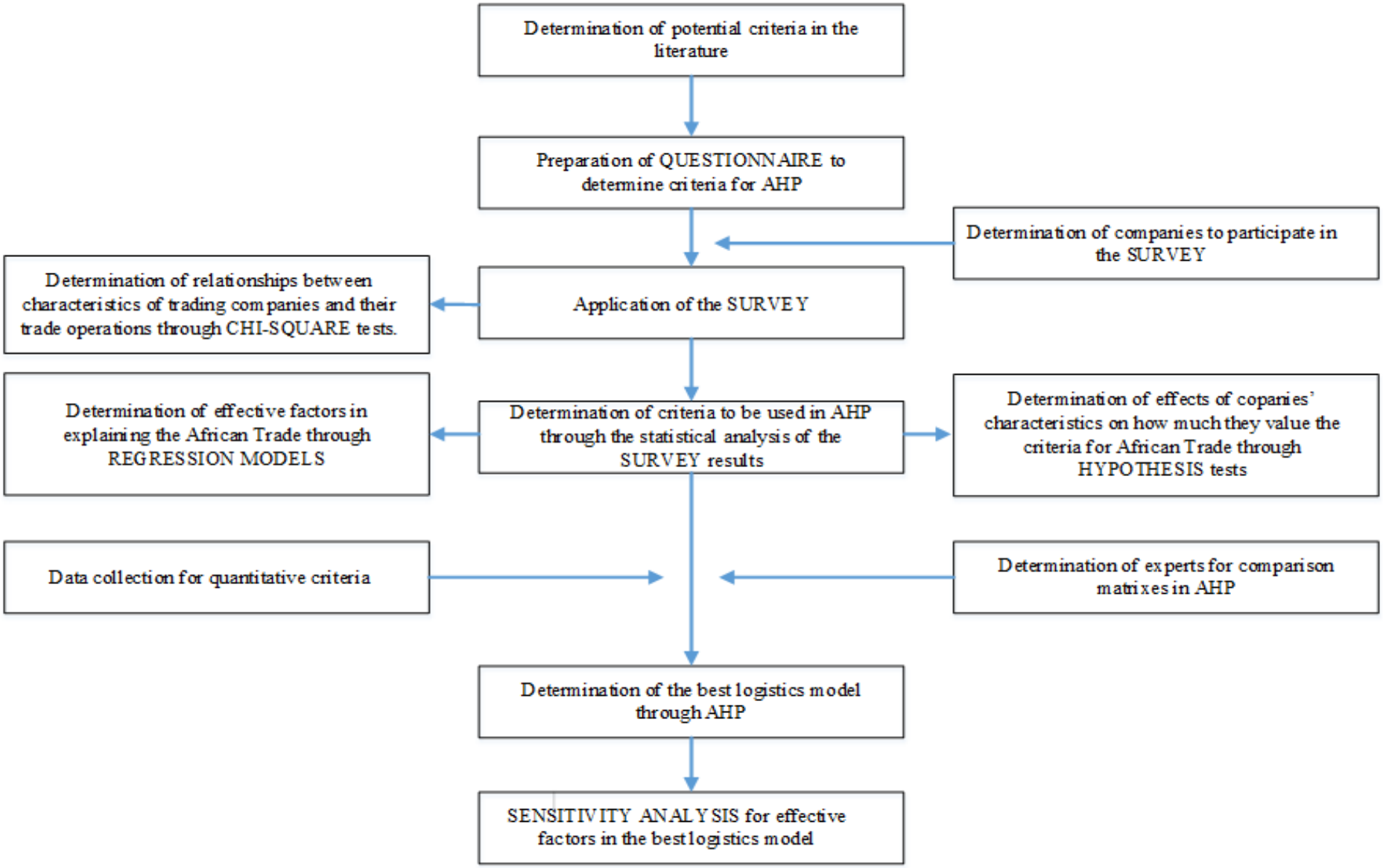


Figure 6.1: Flowchart of the Model

6.1. STATISTICAL METHODOLOGY

As explained earlier, a questionnaire consisting of 9 sections was prepared. The first section contains questions related to the company's demographics as well as to the characteristics of African trading. The remaining sections contain 5-Likert items indicating the level of importance the firms give to the criteria/sub-features based on their experience: 1: Not important at all, 2: Not important, 3: Slightly important, 4: Important, 5: Very important. 166 out of 2.044 companies that are located in 6 different Hinterlands of Turkey which is pointed out on Figure 1.3 also 1.4 and at the same time they are still having trade with 3 different Hinterlands of Africa which is pointed out on Figure 1.2 also 1.3 has been determined to have trade with Africa were selected to participate in this study through convenience sampling (Appendix B). Convenience sampling is often used as preferable in relation to human-centered studies as it is practical and economic (Monette *etc*., 1990).

4 different Product Group had been choosen for this work, 1- Machinery and Automobile, 2- Textiles and Apparel, 3- Iron and Steel and 4- Wooden Products that constitutes big part of Turkey-African mutual trade and also "others" (All Other Product Group) forms the rest of the groups. Our high level work consist of only "SEA" and "AIR" Transportation mode as obligational because of Turkey and Africa location on the World.

The statistical analysis starts with a descriptive display of the demographical and trading characteristics of the participating companies. Later on, the relationship between the demographical and the trading characteristics, as well as the role that the former play for the determination of the level of importance of the criteria for African trading are being explored through relational models (Karasar, 1999).

Furthermore, the trading companies' annual revenue, export point in Africa, and logistics activities are being explored and investigated through a set of regression models.

The sample size is determined assuming 0.635 standard deviation, (σ), and 0,1 sampling error (e). Then with 95% Confidence Level ($Z_{0.025}$ = -1.96) the required sample size is found to $n = \frac{Z^2_{\alpha/2}\sigma^2}{e^2}$, $n = \frac{(1.96)^2(0.635)^2}{(0.1)^2} \approx 155$. Therefore, the obtained sample of 166 participating companies is assumed to be large enough according to the above mentioned assumptions.

The gathered data is analyzed by *SPSS v22.0* and *Mini Tab v17.0*. Firstly, the demographic characteristics of the participating companies (demographic and African trading)

are presented descriptively. Secondly, normality tests are being run in order to decide the appropriate method. Kolmogorov-Smirnov test results are being considered for the groups higher than 50, and Shapiro-Wilk normality tests results for the groups less than 50 (Appendix C). According to the normality test results for the factors that have two levels and are normally distributed, the factor's effects are analyzed through independent sample T-Tests; the effect of those that have two levels and are not distributed normally is analyzed through Mann – Whitney U Tests.

The effect on emotional intelligence levels of those factors which have multi-levels and are distributed normally, is analyzed through ANOVA; while the effect of those that have multi-levels and are not distributed normally is analyzed by Kruskal Wallis Tests. The differences obtained through Analysis of Variance (ANOVA) among the means are further compared through Tukey Post-hoc Tests. For the relationship between demographic and trading characteristics, Chi-square tests are used. For the cross-tabulation representing the relationship, if every group has at least expected number of counts of 5, Pearson's Chi-square tests are applied; otherwise, Fisher's Exact Tests are considered (Boyacıoğlu and Güneri, 2006). For all of the analysis, the significant level is assumed to be $p<0.05$.

The analysis of the survey starts with the final criteria determination. To determine the most important factors to be included in AHP analysis, One-way Analysis of Variance is being conducted for sub-features of each of the seven main factors with the post hocs of Tukey Tests at 95% confidence levels using *Mini Tab v17.0*. First of all, the normality assumption of the 5-likert evaluations is being checked as displayed in Appendix C through *SPSS v22.0* via Kolmogorov Normality Test. According to Appendix C none of the 7 main criteria has a normal distribution in terms of importance levels by African trading company considering their sub-criteria.

In fact, considering that the responses to the 5-likert survey constitute ordinal data the above non-normality result is not suprising. According to Norman (2010), although the data is not normally distributed, it can still be more appropriate to use parametric tests (such as ANOVA) compared to non-parametric tests. He claims that parametric tests tend to give "right answer" even when statistical assumptions—such as a normal distribution of data—are violated, even to an extreme degree.

The results (Tukey pairwise comparisons of mean importance levels for sub-criteria) of One-way Analysis of Variance conducted for sub-features of each of the seven main factors are presented in Appendix D. This helps to reduce the sub-criteria for each main criterion

depending on their mean importance levels. The sub-criterion with statistically different mean importance levels are eliminated from further consideration in order to achieve a reasonably sized AHP model.

Table 6.1: Final Criteria and Sub-criteria based on Trading Companies' Preferences

Main-Criteria		**Sub-criteria**		$\bar{X}$	S
C1	*Product Features*			*4,38*	*0,71*
		C11	Volume	2,98	1,11
		C12	Product Value	4,24	0,82
		C13	Insurance Necessities	4,06	0,97
		C14	Stacking Features	3,92	0,97
		C15	Product Sensitivity	3,96	0,98
		C16	Transportation Features	3,95	0,94
		C17	Product Life	3,95	1,03
C2	*Reliability*			*4,38*	*0,71*
		C21	Timely Deliveries	4,50	0,85
		C22	Responsibility on Delays	4,08	0,93
C3	*Speed*			*4,01*	*0,93*
		C31	Transportation Distances	3,93	1,07
		C32	Transportation Times	4,12	0,86
		C33	Transportation Speed	4,02	0,91
C4	*Traceability*			*3,80*	*0,88*
		C41	Traceability of Load and Vehicle	4,09	0,90
		C42	Traceability of Documents	4,28	0,77
C5	*Costs*			*4,43*	*0,73*
		C51	Transportation Costs	4,48	0,68
		C52	Handling and Packaging Costs	3,92	0,90
		C53	Warehouse and Transmission Point Processing Cost	3,90	0,96
		C54	Communication and Information Costs	3,81	0,91
		C55	Wastage Costs	3,84	1,07
		C56	Delaying Costs	4,09	0,88
C6	*Security*			*4,24*	*0,86*
		C61	Product Damaging Possibility	4,36	0,75
		C62	Thief Possibility	4,15	0,89
C7	*Risks*			*4,04*	*0,84*
		C71	Warehousing Risks	4,07	0,90
		C72	Political Risks	4,00	1,04
		C73	Social Risks	3,80	1,03

According to the results displayed in Appendix D, for each main criterion, sub-criteria which have statistically lower mean importance levels in comparison to other criteria are

being eliminated when appropriate. As a result, the number of sub-criteria for Product Features is reduced to seven (Sub-criteria Packing Features, Weight, After Sales Services Need and Reverse Logistics Need are eliminated). For Reliability main criterion, Implementation of Transportation sub-criterion is eliminated. For Speed, the sub-criterion of Time Spent on Transmission is ignored for further analysis. In addition, Traceability of Transporting Device; Communication and Information Costs and Warehouse and Transmission Point Investment Costs; Diversity of Accident Causes and Lost Product Rate; Environment Risks are eliminated from Traceability Cost; Security and Risks respectively. The final sub-features for further connsideration in analysis along with their descriptive statistics are presented in Table 6.1.

When descriptive statistics presented in Table 6.1 are explained along with Appendix D and Appendix E, inferential statistics for main-criteria tests related to Tukey are being provided; it is seen that the most important criteria for participating trading companies are Costs ($\overline{X} = 4,43$), Product Features ($\overline{X} = 4,38$) and Reliability ($\overline{X} = 4,38$). The most important sub-criteria (the sub-criterion with the highest level of mean importance) are found to be Product Value ($\overline{X} = 4,24$); Timely Deliveries ($\overline{X} = 4,50$); Transportation on Time ($\overline{X} = 4,12$); Traceability of Documents ($\overline{X} = 4,28$), Traceability of Load and vehicle ($\overline{X} = 4,09$); Transportation Costs ($\overline{X} = 4,48$); Product Damaging Possibility ($\overline{X} = 4,36$); Warehouse Risks ($\overline{X} = 4,07$) for main criteria Product Features, Reliability, Speed, Traceability, Costs, Security and Risks respectively. It is apparent that all criteria and sub-criteria have a mean importance level near 4 or above 4 indicating that African trading companies find all of the selected criteria important for their trade with Africa.

Eliminated Sub Criteria List

Product Features:	1- Weight 2- Packaging Features 3- After Sales Services Need 4- Reverse Logistics Need
Reliability:	1- Implementation of Transportation Tariffs
Speed:	1- Time Spended on Transmission
Traceability:	1- Traceability of Transporting Device
Cost:	1- Warehouse and Transmission point, investment costs
Security:	1- Diversity of Accident causes 2- Lost Product Rate
Risks:	1- Environmental Risks

The rest of the sub-section of this part focuses on inferential and relational statistics based on selected criteria and demographic characteristics of the participating companies. It is followed by the construction of an AHP model based on the opinion five-experts with the objective of figuring out the best existing trading model with Africa as well as its most important criteria and sub-criteria. The AHP analysis will also provide findings which will be compared with real-life results based on the experience of practitioners who are involved in trade with Africa. The part ends up with evaluation of findings.

6.1.1. Descriptive Statistical Analysis for Demographic, African Trade, and Logistics Characteristics

This section provides a descriptive statistical analysis based on the empirical findings obtained through the conducted survey. Firstly, statistics for the sample of 166 participating African trading companies are presented in Table 6.2, Table 6.3, and Table 6.4. Later, based on the demographic characteristics of the sample, the relationships between *demographic characteristics* (operating years, and total experience in foreign trade), *African trading characteristics* (experience in foreign trade with Africa, product group in African trade, African country they trade the most with, percent of revenue obtained through African trade in total export, the most used transportation mode in African trade, the hinterlands in Turkey for African trade, ports used for African trade, distance for African Trade, logistics provider after sale in African trade, logistics services provided after sales in African trade, annual revenue obtained in African trade, ownership of the products in African trade, common methods for damaged products, delivery methods used for African trade, delivery point in Africa, most used agreement model for African trade) and the relationships between *characteristics of the firm's African trade* (experience in foreign trade with Africa, product group in African trade.

African country, they trade the most, the hinterlands used in Turkey for African trade, ownership of products in African trade) and their *logistics characteristics for African trade* (transportation mode, ports used most in Turkey, logistics provider for after sale, logistics services provided after sales, common methods for damaged products, delivery methods in African trade, delivery point in Africa, most used agreement model for African trade, percent of revenue obtained through African trade in total export and annual revenue obtained in African trade) are investigated through Chi-Square Tests in the subsequent subsection.

This is followed by a hypothesis test on the effects of the demographic characteristics, general African trade characteristics and selected logistics characteristics on the importance level of the main criteria that are given most significance on average, and their sub-criteria that are given the highest level of importance on average. Finally, a set of regression models explaining the trading companies' annual revenue, export points in Africa, and logistics activities are built and analyzed in the last subsection of the statistical analysis.

Table 6.2: Descriptive Statistics of the Participants of the Survey: Demographic Characteristics

General AfricanTrade Characteristics of the Company		**N**	**%**	**Cumulative Percent**
Position of the Participant in the Company	Owner	30	18,1	18,1
	Export Marketing Manager	48	28,9	47,0
	Export Marketing Supervisor	26	15,7	62,7
	Other	62	37,3	100.0
Operating Years	0-3 years	5	3,0	3,0
	4-7 years	10	6,0	9,0
	8-11 years	12	7,2	16,3
	12-15 years	15	9,0	25,3
	16 years and more	124	74,7	100,0
Experience in Foreign Trade	0-3 years	6	3,6	3,6
	4-7 years	21	12,7	16,3
	8-11 years	25	15,1	31,3
	12-15 years	34	20,5	51,8
	16 years and more	80	48,2	100.0

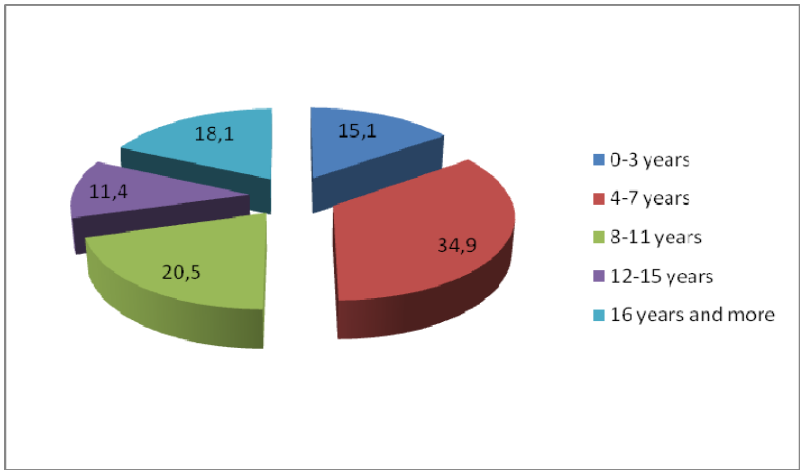


Figure 6.2: Operating years of the Companies in African Trade

According to Table 6.2., most of the participants (37,3%) are at a position other than Export Marketing Manager (28,9%), owner (18,1%) or Export Marketing upervisor (15,7%) in the African trading companies. The vast majority of the companies have operating

experience of 16 years and above (74,7%), while almost half of them (48,2%) have foreign trade experience of 16 years and above as well.

Table 6.3: Descriptive Statistics of the Participants of the Survey: African Trade Characteristics

General African Trade Characteristics of the Company		**N**	**%**	**Cumulative Percent**
African Trade Experience	0-3 years	25	15,1	15,1
	4-7 years	58	34,9	50,0
	8-11 years	34	20,5	70,5
	12-15 years	19	11,4	81,9
	16 years and more	30	18,1	100.0
Product Group	Machinery and Automobile	73	44,0	44,0
	Textiles and Apparel	9	5,4	49,4
	Iron and Steel	23	13,9	63,3
	Wooden Products	14	8,4	7
	Other	47	28,3	100,0
African Countries Traded the Most	Algeria	56	33,7	33,7
	Morrocco	18	10,8	44,6
	Nigeria	37	22,3	66,9
	Ghana	15	9,0	75,9
	Ivory Coast	6	3,6	79,5
	Kenya	20	12,0	91,6
	Other	14	8,4	100.0
Hinterland in Turkey Used the Most for African Trade	Istanbul	92	55,4	55,4
	Bursa	18	10,8	66,3
	Izmir	17	10,2	76,5
	Konya	11	6,6	83,1
	Kayseri	13	7,8	91,0
	Gaziantep	12	7,2	98,2
	Other	3	1,8	100,0
Ownership of the Products in African Trade	Own Firm	109	65,7	65,7
	Other Firms	19	11,4	77,1
	Own Firm and Other Firms as well	31	18,7	95,8
	Some Time Own Firm Sometimes Others	7	4,2	100,0

In terms of the participants' general African trade characteristics, it is observed that participants have mostly 4-7 years of African trade experience (34,9%), their main product group in African trade is machinery and automobiles (44,0%), the African country they export most is Algeria (33,7%), the hinterland in Turkey used most often for African trade is Istanbul (55,4%), and the ownership of the products exported to Africa belongs mostly to the companies themselves (65,7%).

It is worthwhile to note that although the analyzed firms have high level of foreign trade experience in general, their African trade experience is apparently low, although steadily

increasing. This signifies that Africa has recently started to get greater attention in export from Turkey's side, and companies in Turkey have started to explore more actively the trade opportunities with Africa.

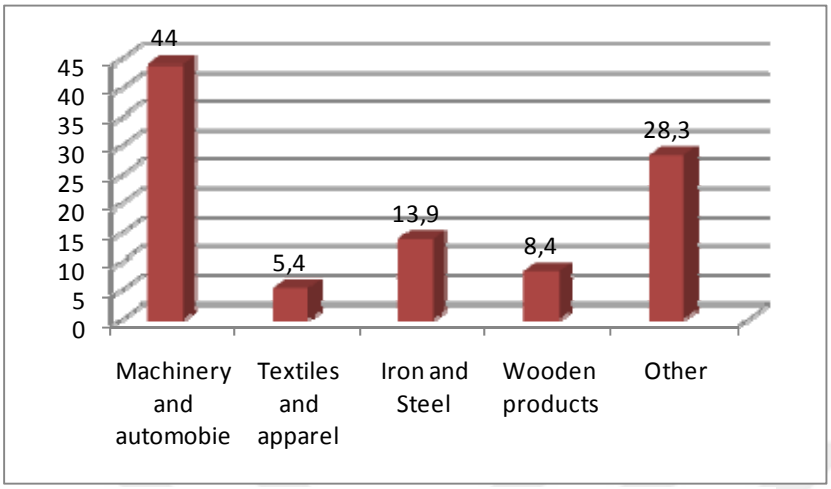


Figure 6.3: Selected Product Group's Export Percentage

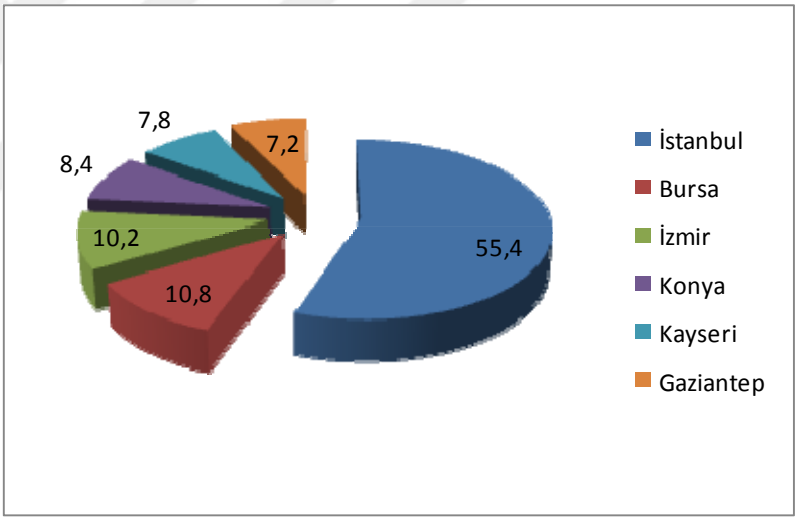


Figure 6.4: Hinterlands' Percentage in Turkey for Africa Export

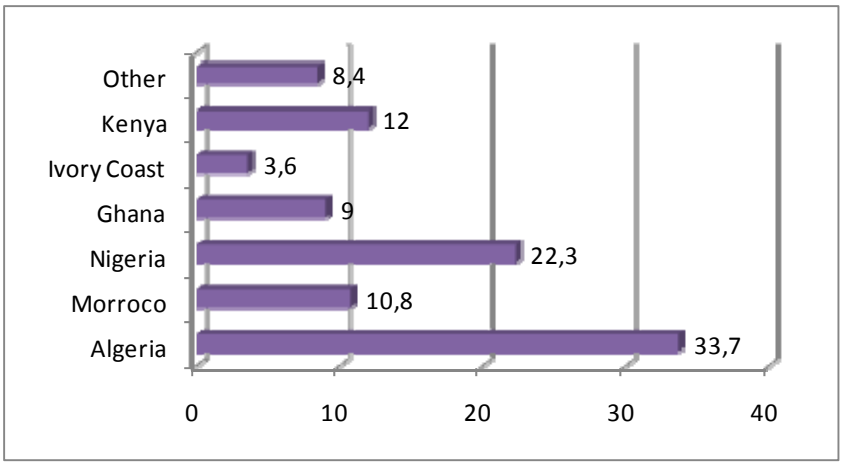


Figure 6.5: African Countries Traded the Most Percentage

Table 6.4: Descriptive Statistics of the Participants of the Survey: Logistics Characteristics in African Trade

Logistics Characteristics of the Company in African Trade		N	%	Cumulative Percent
Transportation Mode used the Most	Maritime	135	81,3	81,3
	Air	6	3,6	84,9
	Intermodal	25	15,1	100,0
Ports used the most for African Trade	Istanbul Port	96	57,8	57,8
	Izmir Port	18	10,8	68,7
	Mersin Port	35	21,1	89,8
	Istanbul Ataturk Airport	2	1,2	91,0
	Other	15	9,0	100,0
Logistics Provider After Sale	Seller Firm	69	41,6	41,6
	Buyer Firm	74	44,6	86,1
	Outsource (3PL, Forwarder)	19	11,4	97,6
	Other	4	2,4	100.0
Logisitcs Service(s) provided the most after sale	Customs Clearance	36	21,7	21,7
	International Transposration	13	7,8	29,5
	Warehousing	1	0,6	30,1
	Custom Clearance And Int. Transportation	82	49,4	79,5
	Custom Clearance And Warehousisng	11	6,6	86,1
	Custom Clearance Int. Trans. Warehousing	21	12,7	98,8
	Other	2	1,2	100,0
Methods used the most for Damaged Products	Backorder	35	21,1	21,1
	Paying the Product Amount Back	58	34,9	56,0
	Change of Product	63	38,0	94,0
	Write-off the Product	3	1,8	95,8
	Other	7	4,2	100,0
Delivery Method in African Trade	Ex-works	47	28,3	28,3
	FOB	70	42,2	70,5
	CIF	38	22,9	93,4
	Other	11	6,6	100,0
Delivery Point in Africa	Free Trade Area	13	7,8	7,8
	Port	137	82,5	90,4
	Customs	11	6,6	97,0
	Other	5	3,0	100,0
Most used Agreement Model for African Trade	Logistics Agreement	13	7,8	7,8
	Trade Agreement	126	75,9	83,7
	Finance Agreement	19	11,4	95,2
	Other	8	4,8	100,0
% of Revenue from African export in Total Export	0%-15%	89	53,6	53,6
	16%-40%	52	31,3	84,9
	41%-65%	9	5,4	90,4
	66% and above	16	9,6	100,0
Annual Revenue from African Export (in millions $)	0-1	77	46,4	46,4
	2-5	74	44,6	91,0
	6-10	7	4,2	95,2
	11+	8	4,8	100,0

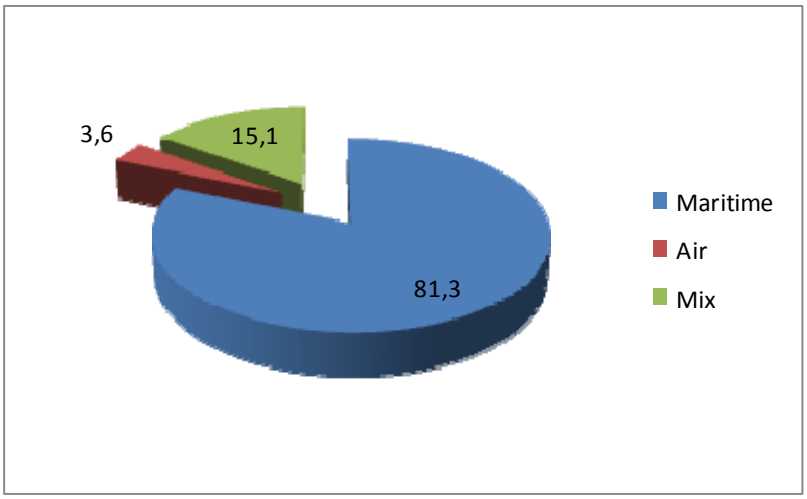


Figure 6.6: African Trade Transportation Type Percentage

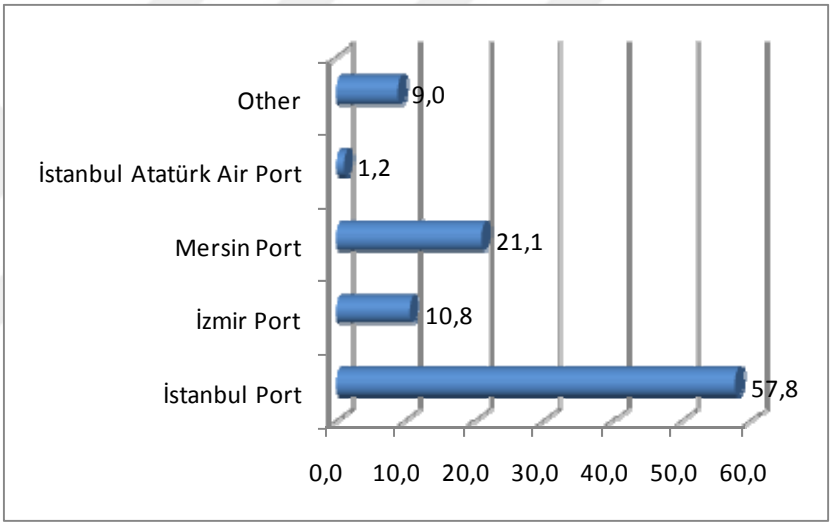


Figure 6.7: Ports used the Most for African Trade Percentage

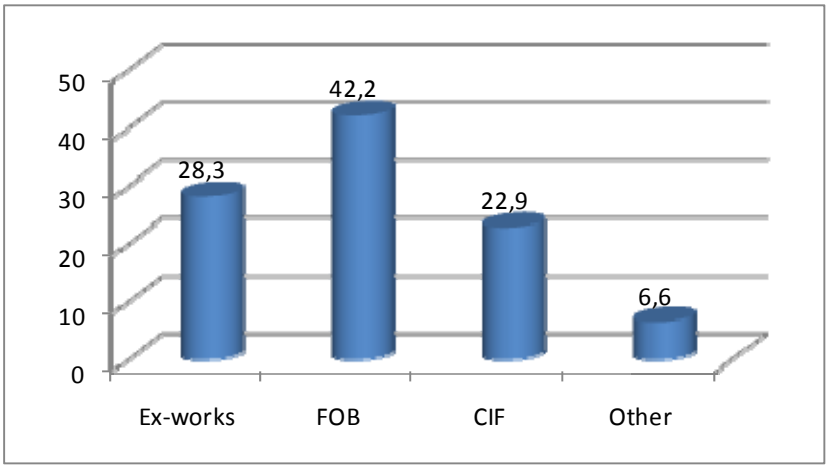


Figure 6.8: Delivery Method in African Trade Percentage

When the main logistics characteristics of Turkey-Africa trade are considered (Table 6.4), vast majority of participants (81,3%) are using maritime transportation for their exports to Africa, and the port that is used the most is the Istanbul Port (57,8%). The buyer's firm (44,6%) or the seller's firm (41,6%) are mainly responsible for after sales logistics, and the logistics services provided the most after sale are custom clearance and international transportation (49,4%). In case of damaged products, the firms most often change the product (38,0%) or pay the product amount back to the customer (34,9%). The most used delivery method is FOB (42,2%), the delivery points used the most are ports (82,5%). Trade agreements are mostly used for African trade (75,9%). African export constitutes 0%-15% in their overall revenue obtained from export (53,6%), and the average annual revenue obtained from African trade is mostly around $0-1 million (46,4%) or $2-5 million (44,6%).

While analyzing the current percentages in total exports and the total export revenue obtained from African export, it can be concluded that is very important for Turkish firms to put special effort to enhance/facilitate African trade especially in order to reach the 2023 goals in exports. This also constitutes one of the main goals of this dissertation: firstly, to enable firms to use their African trade potential to identify the characteristics of African trade and relationships and secondly, to help them to select the best existing practice in the current situation.

6.1.2. Reliability Analysis for Data

Reliability, an essential quality of the scale used, is an indicator of the stability of the measurement values obtained from the measurements repeated under the same conditions with a measuring instrument (Beyazıt M., Oğuz B., 1998). The first approach is about the stability of the individual's rank among the group during consecutive measurements, and the second approach is about the magnitude of the measuring errors during consecutive measurements, in other words, obtaining almost the same measurement values from the same subject in repeated measurements with the scale, therefore having a low standard error of measurement. Reliability is not only an aspect of the measuring instrument but also an aspect of the results obtained with it. It is necessary to have confidence in the fact that the data obtained with the scale are characterized as stable, in other words, it is free from any error, and a second measurement to be performed for the same purpose would provide the same results. A scale which is not reliable will be unpractical. A reliable scale, however, is the one resulting in error free measurements. As an error free measurement is not possible, the reliability of the measurement could be improved by minimizing the errors. Identifying any

source of error and trying to keep it under control is a key to minimizing the errors. The source of error might stem from the measuring instrument or other elements apart from the measuring instrument. It is necessary to study the reliability with some methods in order to reduce the sources of error relating to the measuring instrument.

The coefficients, which define the reliability of the scales, such as “Likert”, “q” type, etc. where there are total points in question will be calculated with a method developed to evaluate the characteristics and the reliability of the tests, questionnaires or scales used for measuring. There are two major reasons for making a reliability analysis:

1. To measure whether the questions in the questionnaire form are understood in the same manner by all the subjects, and
2. To identify whether the target variable is measured (Kalaycı 2010).

There are several techniques for identifying the internal consistency coefficient. If the scale consists of one dimension, the method of dividing the scale into two halves to obtain the consistency coefficient can be applied for the entire scale, and if the scale has sub-dimensions it can also be applied by considering each sub-dimension as a whole in its own right.

The techniques such as Sperman Brown, Stanley, Cronbach Alfa, Rulaon, Flanagen, etc. are used for forecasting the internal consistency coefficient starting from those points pertaining to the two halves of a scale. The Alpha coefficient [(Cronbach’s Alpha) which shows the internal consistency of the measurement by calculating the average correlation for the items constituting the scale in the test] is used as the coefficient which best reflects the reliability of the scale in our application.

The criterion for evaluating the Alpha coefficient is as follows:

$0{,}00 \leq \alpha \leq 0{,}40$ scale is not reliable.

$0{,}40 \leq \alpha \leq 0{,}60$ scale has low reliability.

$0{,}60 \leq \alpha \leq 1.00$ scale is quite reliable.

The questions subject to consideration cover some basic demographical or logistic questions defining the companies’ commercial and structural characteristics. The question categories defined in a goal-oriented manner are used for the analysis made as a part of the study, and the values observed in connection with the results are as mentioned below.

A) Main Criteria: Firstly, 7 main criteria have been analyzed throughout the Reliability Analysis.

Main Criteria			
	Mean	Std. Deviation	N
S2 Product Features	4,3916	,72005	166
S2 Reliability	4,3795	,70963	166
S2 Speed	4,0241	,93389	166
S2 Traceability	3,7952	,89116	166
S2 Cost	4,4458	,72619	166
S2 Security	4,2530	,85057	166
S2 Risks	4,0301	,85582	166

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,687	,687	7

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
S2 Product Features	24,9277	9,280	,356	,153	,663
S2 Reliability	24,9398	8,881	,467	,245	,637
S2 Speed	**25,2952**	**7,955**	**,480**	**,270**	**,627**
S2 Traceability	25,5241	8,663	,362	,154	,663
S2 Cost	24,8735	9,505	,296	,133	,677
S2 Security	25,0663	8,717	,382	,174	,656
S2 Risks	25,2892	8,461	,435	,220	,641

As Cronbach's Alpha value is 0,687 according to the criteria obtained from the Hierarchy Framework in Table 18, it can be noted that it has quite sufficient reliability. In addition to this it appears that the criterion “Speed”, one of the 7 main criteria, is far more effective in explaining the reliability compared to the others.

B) Sub-Criteria: Secondly, 25 sub-criteria have been analyzed throughout the Reliability Analysis.

Sub-Criteria			
	Mean	Std. Deviation	N
S3 Volume	3,9398	1,11028	166
S3 Weight	3,7831	1,05656	166
S3 Product Value	4,2470	,82709	166
S3 Packing Features	3,8313	,95116	166
S3 Insurance Necessities	4,0602	,97669	166
S3 Stacking Features	3,9217	,97229	166
S3 Product Sensitivity	3,9699	,98734	166
S3 Transportation Features	3,9578	,94293	166
S3 Product Life	3,9578	1,03486	166
S3 After Sales Services Need	3,7169	1,07786	166
S3 Reverse Logistics Need	3,3675	1,08596	166
S5 Transportation Distances	3,9458	1,08016	166
S5 Transportation Times	4,1265	,86810	166
S5 Transportation Speeds	4,0241	,91421	166
S5 Time Spent on Transmission	3,8313	,96382	166
S7 Transportation Costs	4,4819	,68510	166
S7 Handling and Packing Costs	4,0361	,88002	166
S7 Warehouse and Transmission Point Processing Costs	3,9036	,96753	166
S7 Warehouse and Transmission Point Investment Costs	3,7771	1,04084	166
S7 Communication and Information Costs	3,8193	,91644	166
S7 Wastage Costs	3,8494	1,07092	166
S7 Delaying Costs	4,0964	,88234	166
S9 Warehousing Risks	4,0723	,90498	166
S9 Political Risks	4,0060	1,04154	166
S9 Social Risks	3,8012	1,03409	166
S9 Environmental Risks	3,7590	1,05129	166

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,899	,901	26

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
S3 Volume	98,3434	170,372	,434	,593	,897
S3 Weight	98,5000	170,445	,458	,585	,896
S3 Product Value	98,0361	174,374	,418	,284	,897
S3 Packing Features	98,4518	171,910	,456	,402	,896
S3 Insurance Necessities	98,2229	169,326	,547	,485	,894
S3 Stacking Features	98,3614	170,717	,493	,436	,895
S3 Product Sensitivity	98,3133	171,307	,461	,447	,896
S3 Transportation Features	98,3253	171,857	,463	,383	,896
S3 Product Life	**98,3253**	**175,348**	**,284**	**,251**	**,901**
S3 After Sales Services Need	98,5663	171,508	,408	,408	,897
S3 Reverse Logistics Need	98,9157	172,332	,375	,398	,898
S5 Transportation Distances	98,3373	167,352	,561	,597	,894
S5 Transportation Times	98,1566	173,369	,440	,460	,897
S5 Transportation Speeds	98,2590	175,442	,327	,404	,899
S5 Time Spent on Transmission	98,4518	170,964	,488	,463	,896
S7 Transportation Costs	97,8012	176,124	,418	,404	,897
S7 Handling and Packing Costs	**98,2470**	**169,096**	**,626**	**,553**	**,893**
S7 Warehouse and Transmission Point Processing Costs	98,3795	169,619	,541	,553	,894
S7 Warehouse and Transmission Point Investment Costs	98,5060	167,936	,562	,542	,894
S7 Communication and Information Costs	98,4639	169,196	,594	,531	,894
S7 Wastage Costs	98,4337	167,883	,546	,460	,894
S7 Delaying Costs	98,1867	173,268	,437	,359	,897
S9 Warehousing Risks	98,2108	169,343	,596	,490	,894
S9 Political Risks	98,2771	168,420	,543	,531	,894
S9 Social Risks	98,4819	168,106	,560	,637	,894
S9 Environmental Risks	98,5241	169,899	,481	,547	,896

As Cronbach's Alpha value is 0,901 according to the criteria obtained from the Hierarchy Framework in Table 19, it can be noted that it has quite robust reliability. In

addition to this it appears that the criterion “Product Life”, one of the 25 sub-criteria, is the least effective one in explaining the reliability compared to the others.

6.1.3. Chi-Squared & Hypothesis Tests

6.1.3.1. Introduction

The chi-square test is based upon the principle of whether the difference between the frequencies observed (G) and the frequencies expected are statistically meaningful.

The data specified qualitatively are used in the chi-square test, and the continuous variables indicated by measurement could also be characterized as less or more than a certain degree so as to apply the chi-square test. If, however, the data is specified in ratios or percentages, it will not be possible to apply the test.

The chi-square test is characterized by the Degree of Freedom (DF or df). The average of distribution is equal to DF whereas its variance is equal to twofold of DF. The chi-squared values range from zero to plus infinite values. Even though the distribution is flat in lower DF’s, it will draw close to normal distribution as DF increases. The chi-squared distribution is characterized as continuous distribution.

The chi-squared distribution is used to test two independent qualitative criteria in general. The null hypothesis (H_0) will indicate that two criteria are independent whereas the study hypothesis (H_S) indicates that two criteria are interrelated.

Let us discuss the observations relating to two qualitative criteria with an example with “a” random volume “n”. It can be noted that the observations are independent because the selection of one observation does not affect the selection of another observation. Let us say such data are distributed to cross categories as specified in Table 6.5 below.

Table 6.5: Classification of independent observations for two qualitative variables

	Second classification criterion				
First classification criterion	Category I	Category II	…	Category c	Total
Category I	G_{11}	G_{12}	…	G_{1c}	$n_{1.}$
⋮	⋮	⋮	⋮	⋮	⋮
Total	$n_{.1}$	$n_{.2}$	…	$n_{.c}$	n

Subject to the assumption that both Gs in each cell in Table 6.5 and H_0 are correct Bs shall be calculated as follows:

$$B_{ij}= \frac{n_{i.}.n_{.j}}{n} \qquad (3.1.1)$$

B is a frequency that is likely to occur based upon a specific definition in an experiment. The Gs listed in Table 6.5 will be compared to the Bs calculated in (3.1.1). If there are small differences between B and G, the chi-squared value to be calculated will be low and H_0 will not be rejected. And if the said differences are big, H_0 which expresses the independency of the criteria of one another will be rejected. The chi-squared value calculated, (χ^2_{hes}), will be compared to the chi-squared value found in the chi-squared table, (χ^2_{tab}), in the relevant DF. In case of the following,

$$\chi^2_{hes} \geq \chi^2_{tab} \qquad (3.1.2)$$

H_0 will be rejected. If otherwise, H_0 will be accepted. The value χ^2_{tab} will be obtained from the chi-squared tables based upon the likelihood of error (α) defined and DF. Here the equations for χ^2_{hes} and DF will be respectively as follows (Ress, D.G., 1987):

$$\chi^2_{hes} = \sum_{j=1}^{c}\sum_{i=1}^{r}\frac{(G_{ij}-B_{ij})^2}{B_{ij}} = \sum_{j=1}^{c}\sum_{i=1}^{r}\frac{G_{ij}^2}{B_{ij}} - n \qquad (3.1.3)$$

and

$$DF = (r-1)(c-1) \qquad (3.1.4)$$

In the chi-square test the non-acceptance region will be applied in the right tail unilaterally in general. In case of double-sided H_S or one-sided H_S on the left tail in the chi-square test for the variance, however, the said double-sided non-acceptance region or the one-sided non-acceptance region on the left tail will be applied. Double-sided chi-squared confidence limits will be used in interval estimation about the variance as well.

6.1.3.2. Areas of Use

In general the chi-square test is used for:-

a) Testing whether there is any difference between two or more than two groups,

b) Testing whether there is any correlation between two variables,

c) Intergroup homogeneity testing,

d) Testing whether the distribution obtained from the sampling matches with the desired theoretical distribution (in the goodness of fit testing),

e) Chi-square testing for variance,

f) Interval estimation about variance, and

g) Calculating the coefficient of contingency.

6.1.3.2.1. Independence Test

The chi-square test can be used for finding whether there is any meaningful statistical relation between two qualitative variables. It is argued that no relation exists and there is independence at H_0 whereas a relation exists and there is no independence at H_S.

In order to calculate the test statistics Bs will be found. The test statistics will be calculated according to (3.1.3) and DF will be calculated according to (3.1.4). If (3.1.2) is achieved, then H_0 will be rejected.

6.1.3.2.2. Homogenity Test

The chi-square test can be used for determining whether two samplings are homogeneous in terms of the same categories. It is argued that the samplings are homogeneous at H_0 whereas they are not at H_S. The other steps of the test are mentioned in 6.1.3.2.1.

6.1.3.2.3. Compliance Test

The compliance test is used for determining whether a variable observed complies with an expected distribution or two variables observed have the same distribution. It is argued that it complies with the said distribution at H_0 whereas it does not at H_S (Masoom, M.A., Umbach, D., and Saleh, A.K.MD.E., 1992).

In compliance test Gs will be listed in a single line or a single column consisted of the category “k”. Bs corresponding to Gs shall comprise a separate line or column including the category k in the nature of things. Therefore the data will consist of k number of components in a single line or column. For this reason the expression will be written as follows:

$$\chi^2_{hes} = \sum_{j=1}^{k} \frac{(G_j - B_j)^2}{B_j} = \sum_{j=1}^{k} \frac{G_j^2}{B_j} - n \qquad (2.3.1)$$

Here B_j represents the value pertaining to the distribution asserted at H_0. Because the total lines or columns create a constraint in this test, DF will be:

$$DF=k-1 \qquad (2.3.2)$$

As each parameter forecast creates a new constraint if some parameters are also forecast based upon the sampling and m number of parameters are forecast, DF will be expressed as follows:

$$DF=k-m-1 \qquad (2.3.3)$$

For instance it will be assumed that m=0 for normal distribution and binomial distribution accordingly. Additionally it will be assumed that m=1 if λ is forecast based upon the sample in case of binomial distribution and p and poisson distribution whereas it is assumed that m=2, if the average and standard deviation are forecast based upon the sample in case of normal distribution (Hogg, R.V., and Craig, A.T., 1978). The other steps of the test are mentioned in 6.1.3.1.

6.1.3.2.4. Chi-square test for Variance

In case of a hypothesis test relating to a main mass variance, the sampling variance could be used as test statistics. Accordingly the test statistics will be calculated as follows:

$$\chi^2_{hes} = \frac{(n-1).s^2}{\sigma_0^2} \qquad (2.4.1)$$

Here n and s^2 represent the sample size and the sample variance respectively, and σ_0^2 represents the main mass variance in the light of H_0. If it is assumed that the sampling stems from a main mass with normal distribution, the sampling distribution for the statistics defined with (2.4.1) will come close to the chi-squared distribution. Here DF will be found as follows:

$$DF=n-1 \qquad (2.4.2)$$

And the values $\chi^2_{1-\alpha/2;sd}$ and $\chi^2_{\alpha/2;sd}$ will be found based upon the chi-squared table, and will be compared to (2.4.1) if the hypotheses are

$$H_0 : \sigma^2 = \sigma_0^2 \qquad (2.4.3)$$

$$H_S : \sigma^2 \neq \sigma_0^2$$

If;

$$\chi^2_{1-\alpha/2;sd} < \chi^2_{hes} < \chi^2_{\alpha/2;sd} \qquad (2.4.4)$$

H_0 will be accepted. If otherwise, H_0 will be rejected. Here if the hypotheses are

$$H_0 : \sigma^2 \geq \sigma_0^2 \qquad (2.4.5)$$

$$H_S : \sigma^2 < \sigma_0^2$$

and

$$\chi^2_{hes} > \chi^2_{1-\alpha;sd} \qquad (2.4.6)$$

H_0 will be accepted, or if the hypotheses are

$$H_0 : \sigma^2 \leq \sigma_0^2 \qquad (2.4.7)$$

$$H_S : \sigma^2 > \sigma_0^2$$

and

$$\chi^2_{hes} < \chi^2_{\alpha;sd} \qquad (2.4.8)$$

H_0 will be accepted (Beyazıt M., Oğuz B., 1998). The abovementioned (2.4.5) and (2.4.6) are the hypotheses for the one-sided left tail test and the acceptance region for H_0 respectively where as (2.4.7) and (2.4.8) are the hypotheses for the one-sided right tail test and the acceptance region for H_0 respectively.

6.1.3.3. Assumptions

Users should know two crucial key assumptions very well to be able to use the chi-square test accurately. These assumptions are as follows:

i) Groups should be independent of one another. Ordinary chi-square test could not be applied in case of dependent groups for which the chi-square test will be carried out with a different method.

ii) The chi-squared distribution is a continuous distribution. If any B is lower than 5 the distribution will be discontinuous and irregular. For this reason the chi-squared value obtained as a result of the test will not be consistent with the chi-squared distribution in which case

a) Fisher's exact chi-square test will be used for 2×2 sequences;

b) If the chi-squared is planned to be applied for $2 \times c$ or $r \times 2$ sequences, the lines or columns will be combined in an attempt to eliminate the value lower than 5. If this is not possible, Kolmogorov-Smirnov test will be applied;

c) The relevant authors indicate that B which is lower than 5 will not affect the test result substantially for $r \times c$ sequences. It would be more appropriate to combine the lines or columns to eliminate the value lower than 5.

6.1.3.3.1. Two sample Kolmogorov-Smirnov test:

This method is used to test whether two groups that are independent of one another in terms of any variable have similar distributions, that is to say, whether these two groups extracted from the same main mass or two separate main mass with identical distribution.

It is possible to compare two groups in terms of any variable with the Kolmogorov-Smirnov test. If the number of groups is more than 2, this test will not be used. This test will remain unaffected from low frequencies in the cells. If there is any B lower than 5 in any of the cells, the Kolmogorov-Smirnov test could be applied instead of the chi-square test for this reason for $r \times 2$ and $2 \times c$ sequences.

In the Kolmogorov-Smirnov test the detailed classification of the variable analyzed will enhance the test strength. That is to say the more sub-groups there are, the more sensitive the test result will be.

The processes will be conducted on the cumulative distributions of both groups in the Kolmogorov-Smirnov test. If two groups are extracted from the same main mass or separate main masses with identical distribution, the cumulative distribution for these two groups should also be similar.

If the number of observations is higher or lower than 40 and the hypothesis tests are double-sided or one-sided in this test, separate processes will be conducted.

Where the number of observations in both groups is higher than 40: The highest of the absolute values for the difference between the cumulative percentages calculated will provide the value D observed. If the hypothesis is double-sided, the value D expected will be expressed as follows:

$$Expected \quad D = K\sqrt{\frac{n_1 + n_2}{n_1 . n_2}} \qquad (3.3.1)$$

Where as K is the table value in the likelihood of error defined. In this case D expected and D observed will be compared for the decision. If the hypothesis is one-sided, the following value will be calculated:

$$\chi^2_{hes} = 4.D^2 \frac{n_1 . n_2}{n_1 + n_2} \qquad (3.3.2)$$

The decision will be made according to (1.2). In the Kolmogorov-Smirnov test DF will be accepted as follows:

$$DF = 2 \qquad (3.3.3)$$

Where the number of observations in both groups is 40 or less, or equivalent: The number of observations in both groups should be identical if the number of observations is 40

or less. If otherwise, this test will not be applied. The highest of the differences observed among the cumulative frequencies will provide the value D observed in order to apply the said test. And the value D expected will be found in the relevant table according to $n_1 = n_2 = n$ and α (Murray R. Spiegel, Larry J. Stephens, 1998). The value D expected and the value D observed shall be compared for the decision.

6.1.3.4. Chi-Square Test Applications

The chi-square tests are addressed and analyzed separately as follows on the basis of three groups of variables identified according to the assumptions specified in Table 6.5.

6.1.3.4.1. First (1st Variables Group) Chi-Square Tests

RELATION BETWEEN CONTAINER TYPE AND PORTS EXPORT							
			CONTAINER TYPE				
			20" DC	40" DC	HC	OpenTop	Total
PORTS EXPORT	İstanbul Port	Count	43	38	9	8	98
		% of Total	25,9%	22,9%	5,4%	4,8%	59,0%
	İzmir Port	Count	6	4	6	2	18
		% of Total	3,6%	2,4%	3,6%	1,2%	10,8%
	Mersin Port	Count	14	17	15	4	50
		% of Total	8,4%	10,2%	9,0%	2,4%	30,1%
Total		Count	63	59	30	14	166
		% of Total	38,0%	35,5%	18,1%	8,4%	100,0%

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14,246[a]	6	,027
Likelihood Ratio	14,282	6	,027
Linear-by-Linear Association	5,397	1	,020
N of Valid Cases	166		
a. 3 cells (25,0%) have expected count less than 5. The minimum expected count is 1,52.			

H_0: The Port Export and Container Type categories are independent.

H_S: The Port Export and Container Type categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

20” DC & 40” DC containers sent from Istanbul Port are more than those sent from the other ports. On the other side it is the exact opposite for Mersin Port. And our theoretical expectations were based upon the assumption that this relation would be concluded in this manner. Consequently our expectations have coincided with the relevant situation which occurred in the same manner.

The chi-squared distribution is a continuous distribution. If any theoretical value in the cells is lower than 5 the distribution will be discontinuous and irregular. For this reason the chi-squared value obtained as a result of the test will ruin the conformity to the chi-squared distribution. However our assessments will continue in our subsequent analyses as well starting from the assumption that the result will remain the same when we increase the sample size to such extent which would eliminate this problem.

RELATION BETWEEN HINTERLANDS AND PORTS EXPORT

			HINTERLANDS						
			Istanbul	Bursa	Izmir	Konya	Kayseri	Gaziantep	Total
PORTS EXPORT	İstanbul Port	Count	83	12	1	2	0	0	98
		% of Total	50,0%	7,2%	0,6%	1,2%	0,0%	0,0%	59,0%
	İzmir Port	Count	2	1	14	1	0	0	18
		% of Total	1,2%	0,6%	8,4%	0,6%	0,0%	0,0%	10,8%
	Mersin Port	Count	7	5	2	11	13	12	50
		% of Total	4,2%	3,0%	1,2%	6,6%	7,8%	7,2%	30,1%
Total		Count	92	18	17	14	13	12	166
		% of Total	55,4%	10,8%	10,2%	8,4%	7,8%	7,2%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	201,727[a]	10	,000
Likelihood Ratio	168,453	10	,000
Linear-by-Linear Association	99,264	1	,000
N of Valid Cases	166		

a. 8 cells (44,4%) have expected count less than 5. The minimum expected count is 1,30.

H_0: The Port Export and Hinterlands categories are independent.

H_S: The Port Export and Hinterlands categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

The location of the Hinterlands in Turkey is directly linked to the ports to be used by them at the same time. Accordingly our opinions are entirely substantiated by the fact that there is a high density of exits through "Istanbul Port" for Istanbul Hinterland, on the other hand the situation is the exact opposite for the exits from Izmir Port for Istanbul resulting in low density exits.

6.1.3.4.2. Second (2nd Variables Group) Chi-Square Tests

RELATION BETWEEN PROVIDER AFTER SALE AND LOGISTICS SERVICE

			LogisticsService							
			Customs Clearance	International Transportation	Warehousing	Customs Clearance and International Transportation	Customs Clearance and Warehousing	Customs Clearance International Transporation and Warehousing	Other	Total
	Seller Firm	Count	11	5	1	40	2	10	0	69
		% of Total	6,6%	3,0%	0,6%	24,1%	1,2%	6,0%	0,0%	41,6%
	Buyer Firm	Count	23	3	0	31	7	8	2	74
		% of Total	13,9%	1,8%	0,0%	18,7%	4,2%	4,8%	1,2%	44,6%
	Out Source (3PL, Forwarder)	Count	1	2	0	11	2	3	0	19
		% of Total	0,6%	1,2%	0,0%	6,6%	1,2%	1,8%	0,0%	11,4%
	Other	Count	1	3	0	0	0	0	0	4
		% of Total	0,6%	1,8%	0,0%	0,0%	0,0%	0,0%	0,0%	2,4%
Total		Count	36	13	1	82	11	21	2	166
		% of Total	21,7%	7,8%	0,6%	49,4%	6,6%	12,7%	1,2%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	43,142[a]	18	,001
Likelihood Ratio	33,375	18	,015
Linear-by-Linear Association	,786	1	,375
N of Valid Cases	166		

a. 19 cells (67,9%) have expected count less than 5. The minimum expected count is ,02.

H_0: The Provider After Sale and Logistics Services categories are independent.

H_S: The Provider After Sale and Logistics Services categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

Buyer and seller firms would assign 3PL companies the responsibility pertaining to Custom Clearance, International Transportation, Warehousing processes at a low rate which is 6,6%. On the other hand if a buyer firm makes purchases subject to ex-works they would carry out the "Custom Clearance and International Transportation" process themselves. And if

a seller firm makes sales subject to FOB (Africa Port), they would complete all of the processes above themselves.

RELATION BETWEEN PROVIDER DELIVERY TYPE AND AFTER SALE							
			DELIVERY				
			Ex-works	FOB	CIF	Other	Total
AFTER SALE	Seller Firm	Count	16	25	22	6	69
		% of Total	9,6%	15,1%	13,3%	3,6%	41,6%
	Buyer Firm	Count	27	37	8	2	74
		% of Total	16,3%	22,3%	4,8%	1,2%	44,6%
	Out Source (3PL, Forwarder)	Count	3	6	8	2	19
		% of Total	1,8%	3,6%	4,8%	1,2%	11,4%
	Other	Count	1	2	0	1	4
		% of Total	0,6%	1,2%	0,0%	0,6%	2,4%
Total		Count	47	70	38	11	166
		% of Total	28,3%	42,2%	22,9%	6,6%	100,0%

Chi-SquareTests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21,444[a]	9	,011
Likelihood Ratio	22,289	9	,008
Linear-by-Linear Association	,190	1	,663
N of Valid Cases	166		
a. 8 cells (50,0%) have expected count less than 5. The minimum expected count is ,27.			

H_0: The Provider After Sale and Delivery categories are independent.

H_S: The Provider After Sale and Delivery categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

The delivery type put in the first rank by buyer and seller firms would be FOB by a percentage ranging from 25 to 37. Subsequently buyer firm would prefer ex-works by 16,3% and seller firm would prefer CIF by 13,3% as the delivery type. The preference for the delivery types of ex-works or FOB would vary depending upon the situation until complete mutual trust is built between Buyer and Seller firms. If, however, Seller firm is bigger and stronger than buyer firm, ex-works would be preferred for Africa trade in general.

RELATION BETWEEN PROVIDER DELIVERY POINT AND AFTER SALE							
			DELIVERY POINT				
			Free Trade Area	Port	Customs	Other	Total
AFTER SALE	Seller Firm	Count	9	54	5	1	69
		% of Total	5,4%	32,5%	3,0%	0,6%	41,6%
	Buyer Firm	Count	2	65	5	2	74
		% of Total	1,2%	39,2%	3,0%	1,2%	44,6%
	Out Source (3PL, Forwarder)	Count	1	17	0	1	19
		% of Total	0,6%	10,2%	0,0%	0,6%	11,4%
	Other	Count	1	1	1	1	4
		% of Total	0,6%	0,6%	0,6%	0,6%	2,4%
Total		Count	13	137	11	5	166
		% of Total	7,8%	82,5%	6,6%	3,0%	100,0%

Chi-SquareTests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19,327[a]	9	,023
Likelihood Ratio	16,375	9	,059
Linear-by-Linear Association	3,299	1	,069
N of Valid Cases	166		
a. 11 cells (68,8%) have expected count less than 5. The minimum expected count is ,12.			

H_0: The Provider After Sale and Delivery Point categories are independent.

H_S: The Provider After Sale and Delivery Point categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

The delivery point put in the first rank by buyer, seller and 3PL firms would be the Port delivery. If seller firm carries out the production or warehousing processes in a Free Trade Area, they would prefer to deliver them from there by 5,4%. Only 10,2% of 3PL firms, however, would recommend the type of delivery at Free Trade Area for the companies operating in the said region.

6.1.3.4.3. Third (3rd Variables Group) Chi –Square Tests

RELATION BETWEEN PRODUCT GROUP AND DISTANCE								
			PRODUCT GROUP					
			Machinery and Automobile	Textiles and Apparel	Iron and Steel	Wooden Products	Other	Total
DISTANCE	100 km and less	Count	32	3	14	5	28	82
		% of Total	19,3%	1,8%	8,4%	3,0%	16,9%	49,4%
	101 km - 200 km	Count	12	0	2	0	5	19
		% of Total	7,2%	0,0%	1,2%	0,0%	3,0%	11,4%
	201 km - 300 km	Count	14	2	0	3	2	21
		% of Total	8,4%	1,2%	0,0%	1,8%	1,2%	12,7%
	301 km - 400 km	Count	8	4	2	3	4	21
		% of Total	4,8%	2,4%	1,2%	1,8%	2,4%	12,7%
	401 km - 500 km	Count	2	0	1	2	2	7
		% of Total	1,2%	0,0%	0,6%	1,2%	1,2%	4,2%
	501 km and above	Count	5	0	4	1	6	16
		% of Total	3,0%	0,0%	2,4%	0,6%	3,6%	9,6%
Total		Count	73	9	23	14	47	166
		% of Total	44,0%	5,4%	13,9%	8,4%	28,3%	100,0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33,662[a]	20	,029
Likelihood Ratio	36,232	20	,014
Linear-by-Linear Association	,002	1	,964
N of Valid Cases	166		

a. 19 cells (63,3%) have expected count less than 5. The minimum expected count is ,38.

H_0: The Product Group and Distance categories are independent.

H_S: The Product Group and Distance categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

Producer or seller firms would deploy at those areas close to the port to reduce the time of transportation to the port and the costs for heavy products such as Machinery and Automobile (32%) and Iron and Steel (14%). This is not applicable to Textile and Apparel (3%) because closeness to labour is important rather than closeness to port as they are

lightweight, high-volume, labour-intensive products. Obviously the industry will improve in the Central Anatolia if local transportation costs can be reduced at railway or other means of transportation level in those regions far from the port.

RELATION BETWEEN PORTS EXPORT AND DISTANCE

			PORTS EXPORT			
			İstanbul Port	İzmir Port	Mersin Port	Total
DISTANCE	100 km and less	Count	56	13	13	82
		% of Total	33,7%	7,8%	7,8%	49,4%
	101 km - 200 km	Count	13	2	4	19
		% of Total	7,8%	1,2%	2,4%	11,4%
	201 km - 300 km	Count	8	3	10	21
		% of Total	4,8%	1,8%	6,0%	12,7%
	301 km - 400 km	Count	5	0	16	21
		% of Total	3,0%	0,0%	9,6%	12,7%
	401 km - 500 km	Count	4	0	3	7
		% of Total	2,4%	0,0%	1,8%	4,2%
	501 km and above	Count	12	0	4	16
		% of Total	7,2%	0,0%	2,4%	9,6%
Total		Count	98	18	50	166
		% of Total	59,0%	10,8%	30,1%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38,552[a]	10	,000
Likelihood Ratio	40,885	10	,000
Linear-by-Linear Association	6,692	1	,010
N of Valid Cases	166		

a. 8 cells (44,4%) have expected count less than 5. The minimum expected count is ,76.

H_0: The Distance and Ports Export categories are independent.

H_S: The Distance and Ports Export categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

It appears that the exports with a distance of "100 km and less" to Istanbul Port where there is a high density of exits for Africa account for 33,7%, which is the highest level among the product ranges selected. It is followed by "101 km – 200 km" by 7,8%. Another

eye-catching thing is that the exits from Mersin port appear to be nearly 10% even in case of a distance of "200 km to 400" km particularly such as Konya and Kayseri and high local transportation costs.

RELATION BETWEEN COST AND SPEED							
			COST				
			Not important	Slightly important	Important	Very important	Total
SPEED	Not important	Count	1	1	6	4	12
		% of Total	0,6%	0,6%	3,6%	2,4%	7,2%
	Slightly important	Count	0	2	17	15	34
		% of Total	0,0%	1,2%	10,2%	9,0%	20,5%
	Important	Count	1	5	23	29	58
		% of Total	0,6%	3,0%	13,9%	17,5%	34,9%
	Very important	Count	2	3	12	45	62
		% of Total	1,2%	1,8%	7,2%	27,1%	37,3%
Total		Count	4	11	58	93	166
		% of Total	2,4%	6,6%	34,9%	56,0%	100,0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16,617[a]	9	,055
Likelihood Ratio	17,221	9	,045
Linear-by-Linear Association	5,932	1	,015
N of Valid Cases	166		
a. 9 cells (56,3%) have expected count less than 5. The minimum expected count is ,29.			

H_0: The Speed and Cost categories are independent.

H_S: The Speed and Cost categories are **not** independent.

Decision: Up to significance level $\alpha = 0.05$, H_0: is rejected.

As the table above is analyzed carefully it will be noticed in an instant that home delivery of the product ranges in the fastest way possible and total logistics costs are "very important" by 27,1%, and "Time" and "Cost" are the most significant elements of the Logistics costs for Turkey – Africa trade, which is the subject matter of the thesis. It is observed that following this the cost is "very important" and the speed is "important" by 17,5%.

6.1.4. Logistic Regression

6.1.4.1. Introduction

It is essential to know the measuring level underlying the data for the analyses to be performed in order to determine the method of analysis to be used. As a matter of fact the logistic regression analysis is one of the analysis techniques that can be used in case of a variable obtained at classifying or sequencing measuring level called a categorical variable.

The main purpose of the logistic regression analysis is to model the relation between one independent variable or several independent variables and a dependent variable as the others (Hosmer D. & Lemeshow S., 2000). It should be added that independent variable is continuous in traditional linear regression analysis whereas it is categorical in logistic regression analysis. Besides all independent variables can be categorical, continuous, or a combination of categorical and continuous variables.

If the analysis includes only one independent variable it will be characterized as logistic regression and if it includes multiple independent variables it will be characterized as multiple logistic regression. On the other hand when a dependent variable has only two categories it will be characterized as binary logistic regression. If, however, it has more than two categories measured at classifying measuring level then it will be characterized as Multinomial logistic regression.

Logistic regression analysis is an alternative to Discriminant Analysis and crosstabs where various assumption breaches occur (such as normality or having a shared covariance) (Tatlıdil H., 1996). If independent variables are a combination of categorical and continuous variables, the assumption of multivariate normality will not be applicable in which case logistic regression analysis that does not make any assumption about the distribution of variables could be used (Sharma S., 1996). The fact that the analysis offers ease-of-use and the model obtained from the analysis is quite flexible and easy to interpret mathematically makes it get more attention.

The main reasons why Logistic Regression is chosen for the thesis are as follows: A-The data are limited, B-Scale types would not allow it. However it was necessary to also conduct a Reliability Analysis in addition to the study due to the abovementioned reasons. The issue of two different scales used throughout the thesis (Categorical & Multinomial) is also briefly discussed in this section.

6.1.4.2. Testing the Parameter Forecasts and the Meaningfulness of Statistics

Maximum likelihood method is used to predict the parameters in logistic regression analysis. The following function is used to express the contribution of the observation pair (x_t, y_t) to the maximum likelihood method (Hosmer D. & Lemeshov S., 2000):

$$\xi(x_t) = \pi(x_t)^{y_t}[1 - \pi(x_t)]^{1-y_t} \quad (1)$$

The likelihood function for β will be expressed as follows considering the assumption that the results of observation are independent of one another:

$$l(\beta) = \prod_{i=1}^{n} \xi(x_i) \quad (2)$$

Maximum likelihood forecasts could be obtained by calculating β which makes l(β) maximum. But the logarithm of the equation number 2 will be taken to facilitate the process before finding the value β which makes the likelihood function maximum.

$$L(\beta) = ln\,[l(\beta)] = \sum_{i=1}^{n} \{y_i\, ln\,[\pi(x_i)] + (1 - y_i)\, ln\,[1 - \pi(x_i)]\} \quad (3)$$

The derivation of L(β) will be calculated based upon β0 and β1 in order to find the value which makes L(β) maximum, and the equations will be made equal to zero in which case the following equations are obtained for the constant (β0) and the gradient (β1) respectively (RushSloan,http://www.trinity.edu...)

$$\sum_{i=1}^{n} [y_i - \pi(x_i)] = 0 \qquad \sum_{i=1}^{n} x_i[y_i - \pi(x_i)] = 0$$

Likelihood Ratio Tests: Likelihood ratio statistics is used to test the meaningfulness of the regression coefficients in logistic regression analysis. The said statistics is as follows:

D=-2ln[Likelihood of forecast model / Likelihood of saturated model] (4)

Where as saturated model is defined as the model which includes all the parameters and all the effects of interaction. In order to measure the meaningfulness of an independent variable in the logistic regression model the value D as applicable in case of the model being included in the model and the model being excluded from the model will be referred to and the following statistics will be obtained:

G=D(model not including a variable) –D(model including a variable) (5)

When the equation number (5) is set up the following will be obtained (Hosmer D. & Lemeshov S., 2000):

G=-2ln[Likelihood of model not including a variable/ Likelihood of model including a variable] (6)

The degree of freedom and the distribution for the said statistics will be (J-1)(I-1) and x2 respectively to show the number of categories of the dependent variable J and the number of parameters forecast at I (Agresti A., 1990). And the hypothesis pair devised for the meaningfulness of the coefficients will be as follows (Sharma S., 1996):

$$H_o: \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix} H_o: \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_p \end{pmatrix} \neq \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{pmatrix} \quad (7)$$

Wald Statistics: Wald Statistics which consists of the squares of "t" values will be used to determine the statistical meaningfulness of each independent variable included in the logistic regression model. Wald Statistics that features a degree of freedom of 1 and a asymptotic distribution of x2 will be calculated as follows (Sharma S., 1996).

$$w_j = \left[\hat{\beta}_j / \widehat{SE}(\hat{\beta}_j)\right]^2 \quad (8)$$

Testing the Overall Meaningfulness (Goodness of Fit) of the Model: Pearson x2 and deviation statistics will be used to test the overall meaningfulness of the model in logistic regression analysis.

Pearson

$$\chi^2 : r(y_j, \hat{\pi}_j) = \frac{(y_j - m_j\hat{\pi}_j)}{\sqrt{m_j\hat{\pi}_j(1-\hat{\pi}_j)}} \Rightarrow \chi^2 = \sum_{j=1}^{J} r(y_j, \hat{\pi}_j)^2 \quad (9)$$

Deviation

$$d(y_j, \hat{\pi}_j) = \pm\left\{2\left[y_j \ln\left(\frac{y_j}{m_j\hat{\pi}_j}\right) + (m_j - y_j)\ln\left(\frac{(m_j - y_j)}{m_j(1-\hat{\pi}_j)}\right)\right]\right\}^{1/2} \quad (10)$$

The symbol "+" or "-" included in the formula is identical to the symbol of $(y_j - m_j\hat{\pi}_j)$. Here it shows the total value pertaining to the category $m_i j$. From this point of view the following will be obtained (Hosmer D. & Lemeshov S., 2000):

$$D = \sum_{j=1}^{J} d(y_j, \hat{\pi}_j)^2 \quad (11)$$

And both statistics measuring the goodness of fit will have a degree of freedom calculated in the following manner, the number of parameters for saturated model – the number of parameters for forecast model, and a distribution of x^2.

Pseudo R^2: This statistics, which has the same meaning as R^2 in the linear regression and ranges from 0 and 1, will be obtained by subtracting the likelihood of the model including all independent variables from the likelihood of the model only including a constant and dividing it into the likelihood of the model only including a constant (Hair J. & Anderson R. & Tatham R. Black W., 1998).

$$Pseudo\ R^2 = \frac{-2LL_{(fixed\ polynomtal\ model)} - \left(-2LL_{(saturated\ model)}\right)}{-2LL_{(fixed\ polynomtal\ model)}} \quad (12)$$

6.1.4.3. Multinomial Logistics Regression Analysis

Two logistics model will be set up where a dependent variable has three categories, that is to say, the categories of ***Y*** are coded as 0, 1 and 2. Those models are as follows: ***Y*=0 vs. *Y*=1** and ***Y*=0 vs. *Y*=2**. Here ***Y*=0** represents the reference category and the logistics function comparing ***Y*=1** vs. ***Y*=2** is obtained from the differences of the logistics functions relating to the two comparisons defined above (Tatlıdil, 1996; Hosmer D. & Lemeshov S., 2000). These functions will be defined as:

$$g_1(x) = ln\left[\frac{P(Y=1|x)}{P(Y=0|x)}\right] = \beta_{10} + \beta_{11}x_1 + \beta_{12}x_2 + \cdots + \beta_{1p}x_p = x^i\beta_1$$

$$g_2(x) = ln\left[\frac{P(Y=2|x)}{P(Y=0|x)}\right] = \beta_{20} + \beta_{21}x_1 + \beta_{22}x_2 + \cdots + \beta_{2p}x_p = x^i\beta_2 \quad (13)$$

It is suggested below that the conditional probability for each dependent variable category will provide the vector for independent variable (Powers D. & Xie Y., 2000).

$$P(Y=0|x) = \frac{1}{1 + e^{g_1(x)} + e^{g_2(x)}},$$

$$P(Y = 1|x) = \frac{e^{g_1(x)}}{1 + e^{g_1(x)} + e^{g_2(x)}}$$

$$P(Y = 2|x) = \frac{e^{g_2(x)}}{1 + e^{g_1(x)} + e^{g_2(x)}} \quad \textbf{(14)}$$

in which case the overall expression for the probabilities will be indicated as follows:

$$P(Y = j|x) = \frac{e^{g_j(x)}}{\sum_{k=0}^{2} e^{g_k(x)}} \quad \textbf{(15)}$$

6.1.4.4. Parameter Forecasts in Multinomial Logistics Regression Analysis

Three variables with two separate values will be used in order to determine the group affiliation of an observation when creating the likelihood function for multinomial logistics regression. These variables will be coded as follows:

"If *Y*=0, then Y_0**=1,** Y_1**=0,** Y_2**=0", "If *Y*=1,** then Y_0**=0,** Y_1**=1,** Y_2**=0"** and **"If *Y*=2,** then Y_0**=0,** Y_1**=0,** Y_2**=1"**

Whereas $\sum_{j=0}^{2} Y_j = 1$. The conditional likelihood for ***n*** volume sampling where the observation results are obtained independently of one another will be as follows:

$$l(\beta) = \prod_{i=1}^{n} [\pi_0(x_i)^{y_{0i}} \pi_1(x_i)^{y_{1i}} \pi_2(x_i)^{y_{2i}}] \quad \textbf{(16)}$$

The logarithm of this equation will be taken to obtain the likelihood function.

$$L(\beta) = ln[l(\beta)] = \sum_{i=1}^{n} y_{1i} g_1(x_i) + y_{2i} g_2(x_i) - ln\left(1 + e^{g_1(x_i)} + e^{g_2(x_i)}\right) \quad \textbf{(17)}$$

First partial derivations for L(β) will be obtained and the equations will be made equal to zero to find the likelihood equations. These equations will be generally expressed as follows (Hosmer D. & Lemeshov S., 2000):

$$\frac{\partial L(\beta)}{\partial \beta_{jk}} = \sum_{i=1}^{n} x_{ki}(y_{ji} - \pi_{ji}) \quad \textbf{(18)}$$

Whereas $\pi_{ji} = \pi_j(x_i)$. However the second partial derivative matrix for the likelihood function will be used to find the covariance matrix estimator and data matrix for maximum likelihood estimator. All the criteria used for the meaningfulness and the goodness of fit of the coefficients in logistics regression analysis are also used in Multinomial Logistics Regression.

6.1.4.5. Logistics Regression Analysis Application

The Multinomial Logistics Regression Analyses below are applied in line with the used Thesis Variables defined in Table 1.1.

Nominal Regression (Analysis 1)

Dependent Variable	Independent Variables
Points of Export	Point of Destination
	Type of Goods
	Type of Container
	Hinterland

Model Fitting Information				
	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	246,936			
Final	117,656	129,279	6	**,000**

It is observed that the model is statistically meaningful as Sig. < 0.05 when we look at the model fitting information.

Pseudo R-Square	
Cox and Snell	,541
Nagelkerke	,645
Mc Fadden	,426

The coefficient of Pseudo R-Square has the same meaning with R-Square found in case of the linear regression. It is 64,5% based upon the coefficient of Nagelkerke that is the most recognized measurement when we look at the said table, and it can be noted that it is a sufficient relatability level.

Analysis 1 Likelihood Ratio Tests				
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	173,474	55,818	2	,000
Hinterlands 2	239,151	121,495	2	,000
Container Type 2	118,156	,500	2	,779
Product Group	119,561	1,905	2	,386

The likelihood ratio test is used to measure the meaningfulness of an independent variable included in the logistic regression model. Looking at the Table **"Analysis 1 Likelihood Ratio Tests"** as above, it is observed that the Hinterland variable is accepted at a meaningfulness level of 5% in the model. As for the "Product Group" aspect it can be noted that it is at the secondary importance level even though its meaningfulness is rejected.

Parameter Estimates							
PORTSEXPORT3[a]		B	Std. Error	Wald	df	Sig.	Exp(B)
Istanbul Port	Intercept	4,904	,925	28,106	1	,000	
	Hinterlands 2	-2,034	,310	42,976	1	,000	,131
	Container Type 2	,098	,308	,101	1	,751	1,103
	Product Group	,001	,165	,000	1	,998	1,001
Izmir Port	Intercept	-,144	,970	,022	1	,882	
	Hinterlands 2	-,562	,199	7,970	1	,005	,570
	Container Type 2	,213	,302	,500	1	,480	1,238
	Product Group	,203	,170	1,428	1	,232	1,225
a. The reference category is: Mersin Port.							

Nominal Regression (Analysis 2)

Dependent Variable	Independent Variables
Having a Logistics Company	Type of Service
	Mode of Transportation
	Point of Destination
	Point of Exit
	Exporter's Experience in Africa

Case Processing Summary			
		N	Marginal Percentage
WHO OWNS PRODUCTS	Own firm	109	65,7%
	Other firms	19	11,4%
	Own firm, and other firms as well	31	18,7%
	Sometimes own firm, sometimes others	7	4,2%
HINTERLANDS	İstanbul	92	55,4%
	Bursa	18	10,8%
	İzmir	17	10,2%
	Konya	14	8,4%
	Kayseri	13	7,8%
	Gaziantep	12	7,2%
EXPERIENCE FT	0-7	27	16,3%
	8 +	139	83,7%
EXPERIENCE FTA	0-3 years	25	15,1%
	4-7 years	58	34,9%
	8-11 years	34	20,5%
	12-15 years	19	11,4%
	16 years and more	30	18,1%
CONTAINER TYPE	20" DC	63	38,0%
	40" DC	59	35,5%
	HC	30	18,1%
	OpenTop	14	8,4%
COUNTRY A MOST	GHANA	15	9,0%
	KENYA	37	22,3%
	ALGERIA	56	33,7%
	OTHERS	58	34,9%
Valid		166	100,0%
Total		166	

a. The dependent variable has only one value observed in 159 (99,4%) sub-populations.

Up to the tables above, the parameter estimates produce similar results at the meaningfulness levels after those pertaining to the model are reviewed in general. B values associated with Wald statistics show that the effect of hinterland according to Istanbul port is quite high compared to Izmir when Mersin port serves as a point of reference. It appears that 1 unit of change in Istanbul port affects the hinterland at a rate of 2,034 negatively; and the effect of Izmir port on the hinterland, on the other hand, is ca ¼ lower compared to Istanbul port when Mersin port serves as a point of reference. Even though the

meaningfulness of the variable “Product Group” is rejected for both ports, the effect of the variable on the model is higher for Izmir port compared to Istanbul port.

As is also seen in the Table “Case Processing Summary”, it appears that “Algeria” is the number one country for exports, 20" DC is the most frequently used container for export, the departures for export are mostly from Istanbul, and the export companies mostly export their own products.

Model Fitting Information				
	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	321,041			
Final	220,930	100,111	60	,001

When we look at the model fitting information, it appears that the model is statistically meaningful due to Sig. < 0.05.

Pseudo R-Square	
Cox and Snell	,453
Nagelkerke	,529
Mc Fadden	,310

When we look at Pseudo R-Square table, it can be noted that it is 53% based upon the coefficient of Nagelkerke that is the most recognized measurement, and it is a sufficient relatability level.

Likelihood Ratio Tests				
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	220,930[a]	,000	0	.
Product Group	236,905	15,975	3	,001
Transportation Mode	221,244	,314	3	,957
Port Export	223,564	2,634	3	,451
Delivery Point	224,442	3,512	3	,319
Hinterlands	246,354	25,424	15	,045
Experience FT	221,778	,848	3	,838
Experience FTA	230,329	9,399	12	,668
Container Type	238,533	17,603	9	,040
Country A Most	231,054	10,123	9	,341

Looking at the Table "**Analysis 2 Likelihood Ratio Tests**" the factor effects of "Hinterland", "Product Group", "Container Type" in the model are apparently considered to be influential in the relatability of the model at a meaningfulness level of 5%. It can be noted that the importance level of "Delivery Point" and "Country the Most", however, is relatively better compared to other variables even though their meaningfulness is rejected.

Nominal Regression (Analysis 3)

Dependent Variable	Independent Variables
Distance	Point of Export
	Type of Goods
	Product Ownership

Case Processing Summary

		N	Marginal Percentage
DISTANCE	100 km and less	82	49,4%
	101 km - 200 km	19	11,4%
	201 km - 300 km	21	12,7%
	301 km - 400 km	21	12,7%
	401 km - 500 km	7	4,2%
	501 km and above	16	9,6%
HINTERLANDS 2	İstanbul	92	55,4%
	Bursa	18	10,8%
	İzmir	17	10,2%
	Konya	14	8,4%
	Kayseri	13	7,8%
	Gaziantep	12	7,2%
CONTAINER TYPE 2	20" DC	63	38,0%
	40" DC	59	35,5%
	HC	30	18,1%
	OpenTop	14	8,4%
EXPERIENCE FT	0-3 years	6	3,6%
	4-7 years	21	12,7%
	8-11 years	25	15,1%
	12-15 years	34	20,5%
	16 years and more	80	48,2%
EXPERIENCE FTA	0-3 years	25	15,1%
	4-7 years	58	34,9%

	8-11 years	34	20,5%
	12-15 years	19	11,4%
	16 years and more	30	18,1%
Valid		166	100,0%
Missing		0	
Total		166	
Subpopulation		152[a]	

a. The dependent variable has only one value observed in 146 (96,1%) subpopulations.

As is also seen in the Table "Case Processing Summary", the distance to the port "100 km and less" is the distance subject to the most shipments. It is seen that the experience period for the companies engaged with export is "16 years and more".

Model Fitting Information				
	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	479,558			
Final	292,098	187,459	95	,000

When we look at the model fitting information, it appears that the model is statistically meaningful due to Sig. < 0.05.

Pseudo R-Square	
Cox and Snell	,677
Nagelkerke	,714
Mc Fadden	,382

When we look at the said table, it can be noted that it is 71% based upon the coefficient of Nagelkerke that is the most recognized measurement, and it is a sufficient relatability level. It is seen that the relatability is much higher compared to the first model.

Likelihood Ratio Tests				
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	292,098[a]	,000	0	.
Ports Export	305,851	13,753	5	,017
Who Owns Products	306,173[b]	14,074	5	,015
Product Group	298,748	6,650	5	,248
Hinterland	370,975	78,877	25	,000
Container Type	302,522	10,424	15	,792
Experience FT	318,026	25,927	20	,168
Experience FTA	322,740	30,641	20	,060

Looking at the Table "**Analysis 3 Likelihood Ratio Tests**" the factor effects of ""Hinterland", "Port export", "Experience fta" in the model are apparently considered to be influential in the relatability of the model at a meaningfulness level of 5%. It can be concluded that when the model is considered as a whole it is more successful compared to the first model. It can be noted that "Product Group" is at the secondary importance level and "Experience fta" is an influential factor even though the meaningfulness for both is rejected.

6.1.5. Statistical Evaluation

It is basically analyzed in the study whether the target variables are adequately measured, subject to reliability analysis, addressing it in terms of the scale structure of the questions used in the study and the subjects included in the sample. Correspondingly it is found that there is a high level of adequacy on the basis of question groups defined according to the reliability coefficient method used for internal consistency.

The following remarks can be made for some of the said questions. For instance, it can be noted that the variable "Speed" is much more effective in explaining the reliability compared to the other variables in the group. On the other hand "Product Life" appears to be the least effective one in explaining the reliability among the question group.

The Chi-Square tests are made for the purpose of analyzing the patterns of dependency between the variables according to 3 separate "Variables Groups" targeted in the application. The locations of the Hinterlands in Turkey are also directly interrelated with

the ports to be used by them according to the Group I parallel to the pattern designed earlier. It is observed that there is a high interrelation between “Provider After Sale” and “Logistics Services Categories” based upon the analysis conducted according to the Group II. It appears that Buyer and Seller firms divide the services among those companies specialized in the respective field one by one for Logistics Services in 6 specified categories depending upon the type of delivery rather than a single "3PL" company. In addition to this it is found that a pattern of dependency has emerged between Buyer and Seller firms in the form of “Delivery Type”. Accordingly the Delivery Type “FOB” is the primary reason for choice for both parties. The underlying reason for this is presumed to be related with the issue of mutual trust and the logistics models created by the parties specifically for themselves. Finally the dependency between “Product Group” and “Distance” in the Group III, which is quite high, draws the attention right away. Predictably the firms which have a high level of export products in terms of “Weight” and “Volume” carry out their production or Logistics operations through those locations close to the Ports. And it can be noted that there is an adequate level of dependency between “Cost” and “Speed” in this respect, which highlights the most important rationale for the study. It is explicitly defined that the options “Very important” and “Important” are particularly significant for both.

The results of the analysis performed with Logistics Regression are mentioned below. It appears that the independent variable which best explains “Dependent Variable”, “Point of Export” is “Hinterland” in the Logistic Regression Model I. In addition to this the variable “Product Group” is relatively more effective in explaining the model compared to “Container Type”. In the Logistic Regression Model II, however, the most effective variable explaining “Having a Logistics Company” is “Product Group”. As a result Logistics companies tend to direct their choices and operations to various “Product Groups” depending upon the sector-specific specialization today. In the Model III where the dependent variable “Distance” is discussed it is clearly defined that the variables “Product Ownership” and “Port of Exit” are also quite effective in explaining the model together with the results. Companies exporting their products to Africa have to reduce the local shipment costs, which are highly influential, especially for short distance in order to reduce the total cost. For this reason exporter companies or Logistic services companies have to carry out their operations inside the port if possible, or a location close to the port if not. Several Case Studies in Turkey can be cited as an example to be analyzed in this respect.

The importance and influence of the variables “Time” and “Cost”, the main subject matter of the study, compared to the other variables is proved to a considerable extent under the above mentioned models and evaluations. If the sampling size is increased in similar future studies, the confidence in and the consistency of the results will considerably improve. Therefore if the questionnaire study covering 155 companies defined as a result of the thesis sampling size calculation is extended by 40 or 50 percent for a much higher reliability level (98,3%), the results will be more consistent.

6.2. BUILD UP OF AN AHP MODEL

Apart from the statistical analysis, Analytic Hierarchy Process (AHP) is also employed as a multi-criteria technique to find out the best practice out of twelve existing models based on the judgements of five experts in the field. The resulting best practice determined is further analyzed according to criteria' priority weights through sensitivity analysis. Steps of AHP and sensitivity analysis are conducted through *Expert Choice v2000*.

In accordance with AHP process steps as explained in chapter 5.1.2.3., Firstly it has been specified AHP model main objective as selection of the best African-Turkey logistics model among 12 alternatives which are still available and used. Secondly, the model development of the research effort is initialized through an exhaustive search of current literature also is to identify potential 7 main criteria and related sub criteria of them explained later on crucial for foreign trade with special focus on the African continent. Finally, an AHP model which consists of three levels hierarchy developed accordingly as presented in Figure 6.9 and 6.10.

First, expert 9 companies and later on replied back only 5 of them which are still having trade actively with Africa have been choosen for composing the best pairwise comparison matrices. As AHP model is based on experts' opinion, about 12 existing models (see Symbols) for African trade achieved through pairwise comparison matrices for each criterion (attribute), the current total 36 sub features are likely to be too cumbersome and prevent the experts from providing consistent judgements.

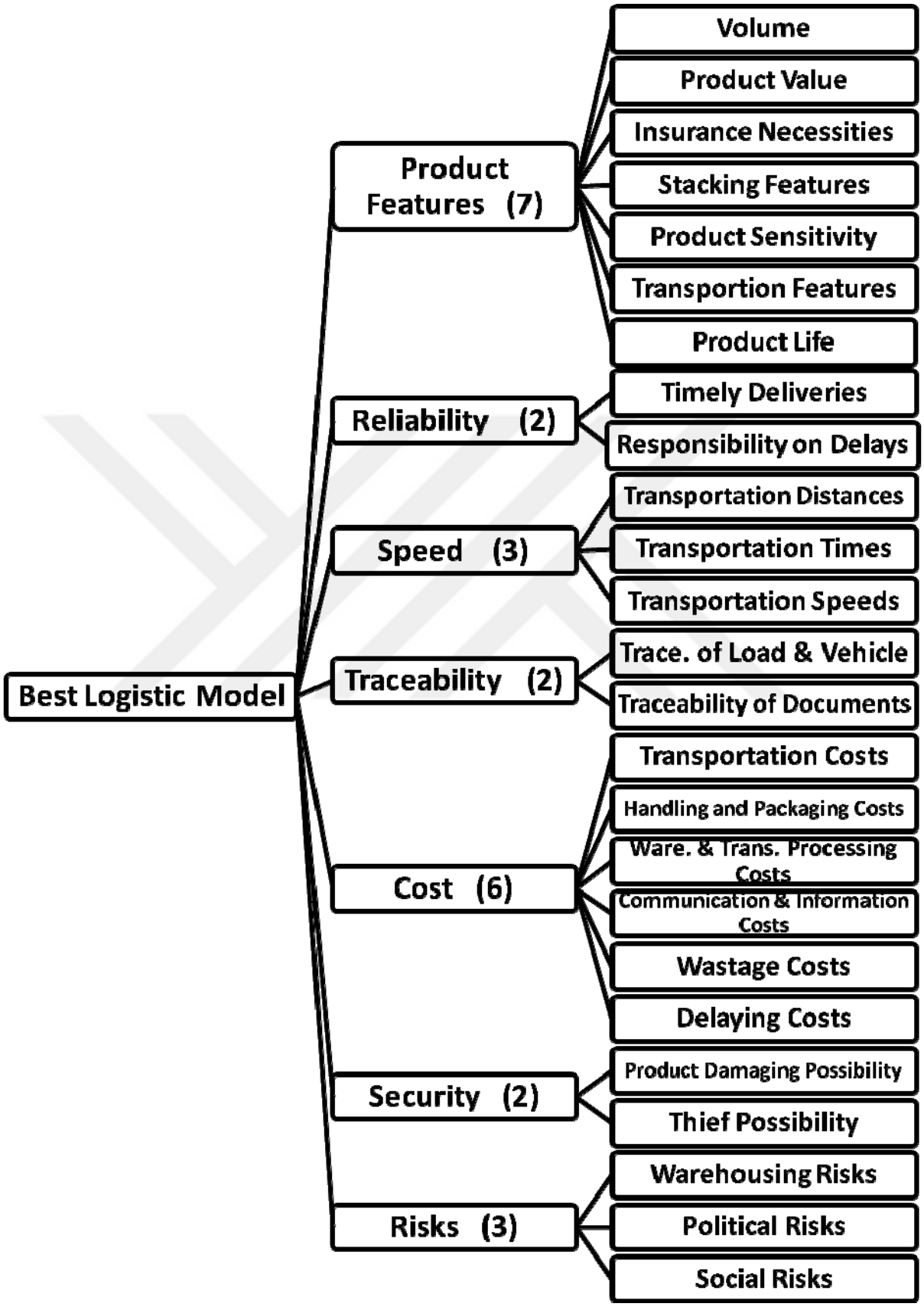


Figure 6.9: Main and Sub Criteria List

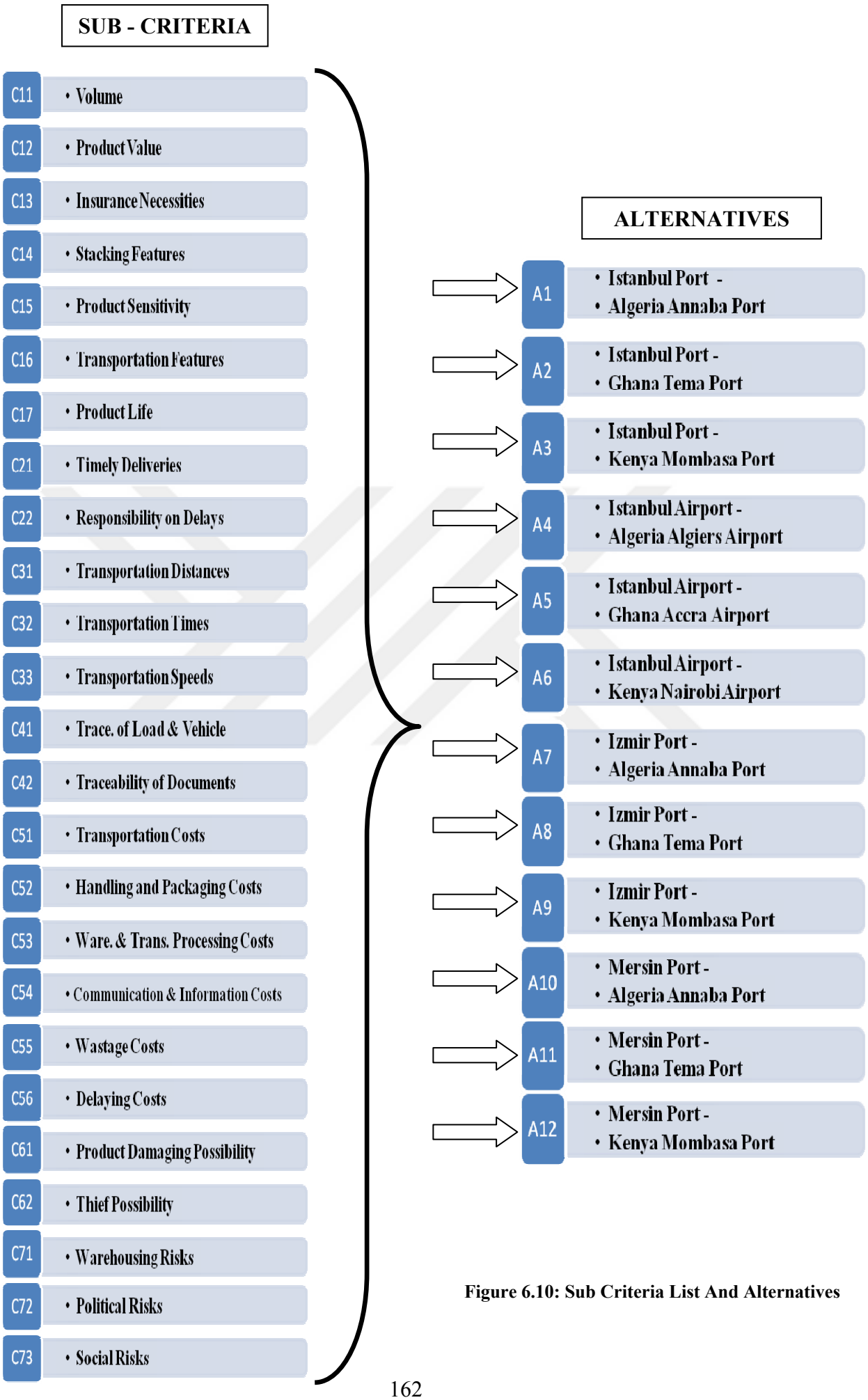


Figure 6.10: Sub Criteria List And Alternatives

Considering that the experts are also likely to have limited time, the sub features are reduced according to the statistical inferences on average scores of importance to finalize the key factors for African trade. Expressed above 7 main criteria (symbols) on the first level and related sub criteria can be highlighted as follows:

1. ***Product*** features with 11 sub features: volume, weight, product value, packaging features, insurance necessities, stacking features, product sensitivity, transportation features, product life, after sales services need and reverse logistics need.

2. ***Reliability*** with 3 sub features: timely deliveries, implementation of transportation tariffs and responsibility on delays.

3. ***Speed*** with 4 sub features: transportation distances, transportation times, transportation speeds and time spent on transmission.

4. ***Traceability*** with 3 sub features: traceability of load and vehicle, traceability of transportation device and traceability of documents.

5. ***Cost*** with 7 sub features: transportation costs, handling and packing costs, warehouse and transmission point processing costs, warehouse and transmission point investment costs, communication costs, wastage costs and delaying costs.

6. ***Security*** with 4 sub features: product damaging possibility, thief possibility, diversity of accident causes and lost product rate.

7. ***Risks*** with 4 sub features: warehousing risks, political risks, social risks and environmental risks.

1- Product Criteria Group

There are numerous transportation criteria which will change depending on the load that is being transported. They will have an impact on the selection of the transportation modes, as well as the comparison of the other criteria groups in terms of product features. (Bontekoning and Priemus, 2004; Çancı and Erdal, 2003)

Volume: the volume of the freight which will be transported.

Weight: the weight of the freight which will be transported.

Product Value: the economic value of the freight which will be transported.

Packaging Features: shape, material type and durability of the package in which the load will be transported.

Insurance Necessities: insurance necessities which will occur proportionally with the risks that can happen during the transportation.

Stacking Features: the specific features required for transport containers, which will be stacked in interim warehouses during the processes of handling and transferring.

Product Sensitivity: the durability of the product against the risks of damage during transportation.

Transportation Features: the features and conditions of the transportation will vary depending on the kind of goods loaded.

Product Life: the useful life of the load which will be transported. While the life of products such as newspapers, magazines or cut flowers is short, the useful life of any kind of white goods will be relatively longer.

After Sales Service Need: the need of maintenance and repair services for products with longer economic and useful life, after the product has been delivered to the delivery address, during the warranty period or after its expiration.

Reverse Logistics Need: the needing of re-transportion the product and its original package (the one it was delivered in) at the end of their useful life.

2. Reliability Criteria Group

The Reliability Criteria group includes the criteria which measure the transportation performance in terms of time. (Çancı and Erdal, 2003)

Timely Deliveries: the ratio of cases when the loads are transported to the right places in the right condition to all cases of transportation.

Implementation of Transportation Tariffs: the ratio of cases of transportation with implemented transportation tariffs and pre-determined time of departure to the all cases of transportation.

Responsibility on Delays: the level of responsibility carried by logistics companies in cases when the transportation did not happen in the previously specified time. Also, the level of sanctions in the contract and the application of these sanctions.

3. Speed Criteria Group

This group includes criteria which impact the rapidity of the transportation processes via the use of single or multiple logistics modes. (Çancı and Erdal, 2003; Crainic, 2002; Bontekoning and Priemus, 2004)

Transportation Distance: the distance between supply and demand points and all other points between them.

Transportation Time: the time required to get from the point of supply to the point of demand, and all other points between them.

Transportation Speed: the ratio of the distance between supply and demand points and all points between them to the time needed to cover these distances.

Time Spent on Transmission: the total amount of time spent during the processes of handling, stacking, loading and unloading of the freight in the transfer points.

4. Traceability Criteria Group

This group includes the criteria that are important for transportation traceability, including freight, package, vehicle traceability, etc. (Çancı and Erdal, 2003)

Traceability of the Load and Vehicle: provides information about the freight that is being transported or the location and the physical status of the load.

Traceability of the Transporting Device: provides information about the location of the transporting device, especially in cases when reverse logistics is necessary.

Traceability of Documents: includes all other factors, which must be traced during transportation, such as official papers and bureaucratic procedures.

5. Cost Criteria Group

This group includes criteria related to the costs accrued during transportation via single or multiple modes. (Çancı and Erdal, 2003; Racunica and Wynter, 2005)

Transportation Costs: the sum total of all costs accrued between supply and demand points (e.g. fuel costs, etc.).

Handling and Packaging Costs: costs that are accrued during the unloading of goods from one transportation mode and their loading to another transportation mode at the transfer points.

Warehouse and Transmission Point, Processing Costs: the sum total of all the variable and fixed costs that occur during the running of the transmission point.

Warehouse and Transmission Point, Investment Costs: the total amount of investment a logistics firm needs in order to start its own transmission point.

Communication and Information Costs: the total amount of costs related to the provision of information regarding the load and the transportation vehicle, as well as the communication between all transportation points. These types of information and communication are crucial for the successful management of all transportation processes.

Wastage Costs: costs occurring because of scrap and lost load during transportation or at transfer points.

Delaying Costs: the percentage of money lost in production and sales in case of late delivery.

6. Security Criteria Group

This group is very important, as the lack of security criteria can cause load damage during the transfer to different modes or during the interim storage at the transfer points. (Çancı and Erdal, 2003)

Product Damage Possibility: the possibility of damage because of product features, warehousing, and transportation conditions.

Theft Possibility: possibility of robbery because of product features, warehousing, and transportation conditions.

Diversity of Accident Causes: a number of various causes of accidents, which depend on product features and transportation conditions, e.g. weather conditions, line density, etc.

Lost Product Rate: the rate of products lost during transportation in a specific period of time over all products.

7. Risks Criteria Group

This group includes a set of four main risks which can threaten any transportation process, namely warehousing risks, political risks, social factors and environmental conditions. (Crainic, 2002)

Warehousing Risks: risks, which might occur during short time warehousing processes at the transferring stages of the transportation network.

Political Risks: sanctions or embargos on product supply and demand, or quotas on quantity, variety, and many other related risks.

Social Risks: the risk of a social reaction towards various transportation conditions. Strikes of Logistics service company employees, lockout decisions, and related actions might be considered social risks.

Environmental Risks: these are the risks of environmental damage, which may occur during the transportation process, because of various carriage conditions (e.g. pollution, spill of dangerous materials, etc.)

The collected data are also utilized in order to make statistical inference not only about the demographic and trade characteristics of different trading companies, but also about the effect of demographic characteristics on average perceived importance levels of the criteria.

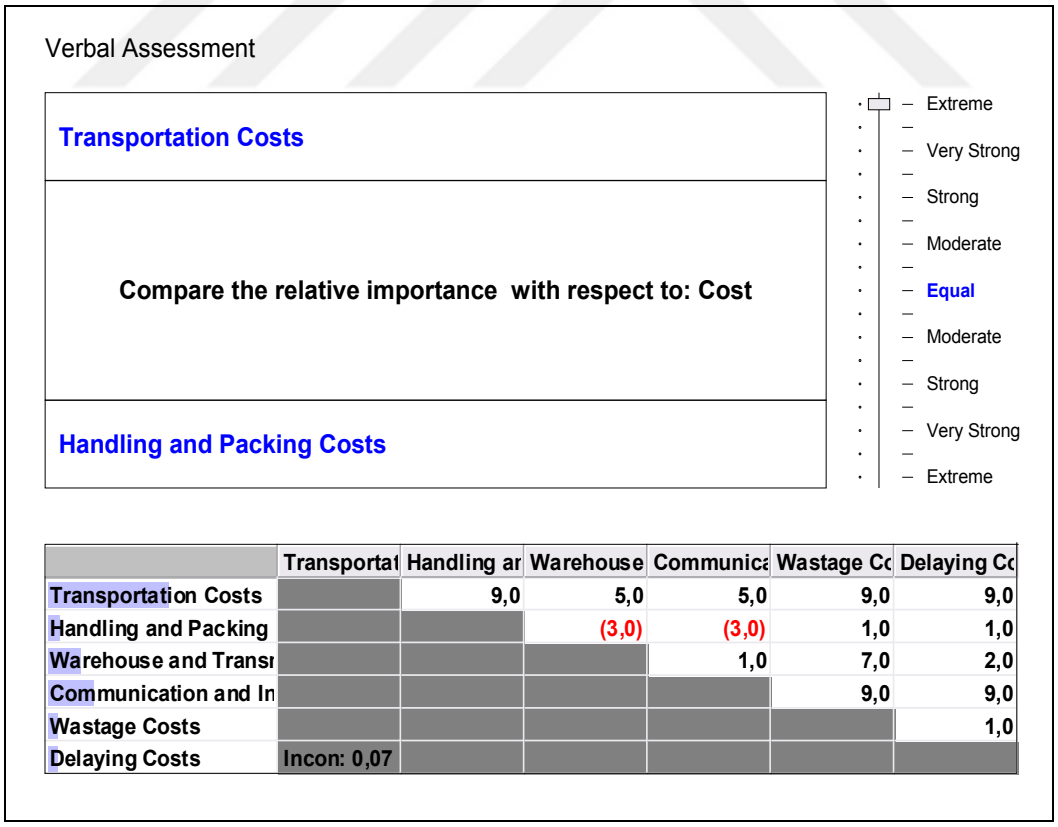
Besides, a set of logistic regression models explaining the trading companies' annual revenue, export point in Africa, and logistics activities are planned to be built and analyzed. In order to generate objective evaluation for AHP the existing 12 African trade models (alternatives) are being compared. When suitable, numerical performance values are collected and utilized as direct assessments of the priority weights of the 12 alternatives rather than based on pairwise comparisons.

The results of best practice are obtained from the individual experts' opinion as well as the combination of the opinions of the five experts. It is noteworthy to mention that the importance of the criteria are obtained both, statistically and based on experts' judgements. This fact is likely to enrich the value of the current study as it can provide comparative results between perceived levels in practice and experts' judgements. The best African trade models among the existing twelve models are further analyzed according to each criterion through sensitivity analysis.

6.3. THE MODEL DEVELOPMENT ON EXPERT CHOICE PROGRAM

Since the program has a structure formed based on judgments of more than one decision-maker, model development is a problem of making a decision based on a group. Therefore, judgments made by each and every decision-maker based on their personal experience and opinions are in the form of reaching a final result by calculating geometric mean at the stage of each criterion comparison and consideration of alternatives via *Expert Choice* program.

Expert Choice is a program which is a quite usable one in that it enables sensitivity analysis to be carried out easily thanks to easy to understand structure offered to the user. Matrix values created for qualitative data and pre-defined priorities of quantitative data were first exported to the program. Following exporting of matrices to the program, the program will calculate consistency ratio for each comparison matrix. Thus, when the consistency ratio is beyond acceptable limits, it is ensured that data taken by the expert are reviewed once again.



	Transportat	Handling ar	Warehouse	Communica	Wastage Cc	Delaying Cc
Transportation Costs		9,0	5,0	5,0	9,0	9,0
Handling and Packing			(3,0)	(3,0)	1,0	1,0
Warehouse and Transı				1,0	7,0	2,0
Communication and In					9,0	9,0
Wastage Costs						1,0
Delaying Costs	Incon: 0,07					

Figure 6.11: Costs basis Sub criteria Comparison Matrix Table on Expert Choice

As can be seen in the Figure 6.11, it is observed that criteria constituting the hierarchical structure appear on the left-hand side while same criteria appear on the right-hand side. Values seen here are priority values of sub-criteria according to one another over a scale of 1 to 9. Tables in Appendix G were entered in the program in such manner and "Inconsistency value" stemming from such values is seen on the lower left-hand corner of the table. As can be seen in the Figure 6.12, 5 different decision models were defined on the program with a view to solving the problem (P2, P3, P4, P5 and P6), in the model 1.

Model Name: COMBINED AHP MODEL

List of Participants

PID	PersonName	Combined	Participating	Weight	Organization	Keypad	Wave	Password	Age	Sex
0	Facilitator	☐	☐							
1	Combined	☐	☐							
2	P2	☐	☑			2	1			
3	P3	☐	☑			3	1			
4	P4	☐	☑			4	1			
5	P5	☐	☑			5	1			
7	P6	☐	☑			7	1			

Figure 6.12: Facilitator and Participants' Table on Expert Choice

Main and sub- criteria pertaining to the model and model structure were defined on the program as can be seen in Figures 6.13 and 6.14. As seen in the Figure 6.13, the first hierarchy of the model has seven main criteria while, as is seen in the Figure 6.14, there are twenty five selected sub-criteria linked with main criteria. At the last stage of the model, there are 12 Alternatives to which all these main and sub-criteria are connected (A1 - A12). These are displayed on the upper right-hand corner of *Expert Choice* program's home page.

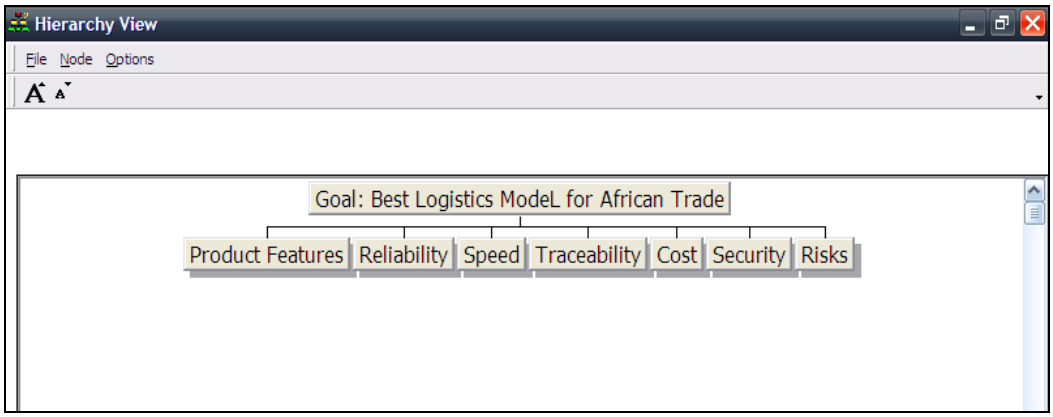


Figure 6.13: Main Criteria Hierarchical View

List of main criteria and ranking of the Hierarchic structure entered into *Expert Choice* program can be seen in the Figure 6.13. Ranking was entered into the program based on the order of questions posed to Experts.

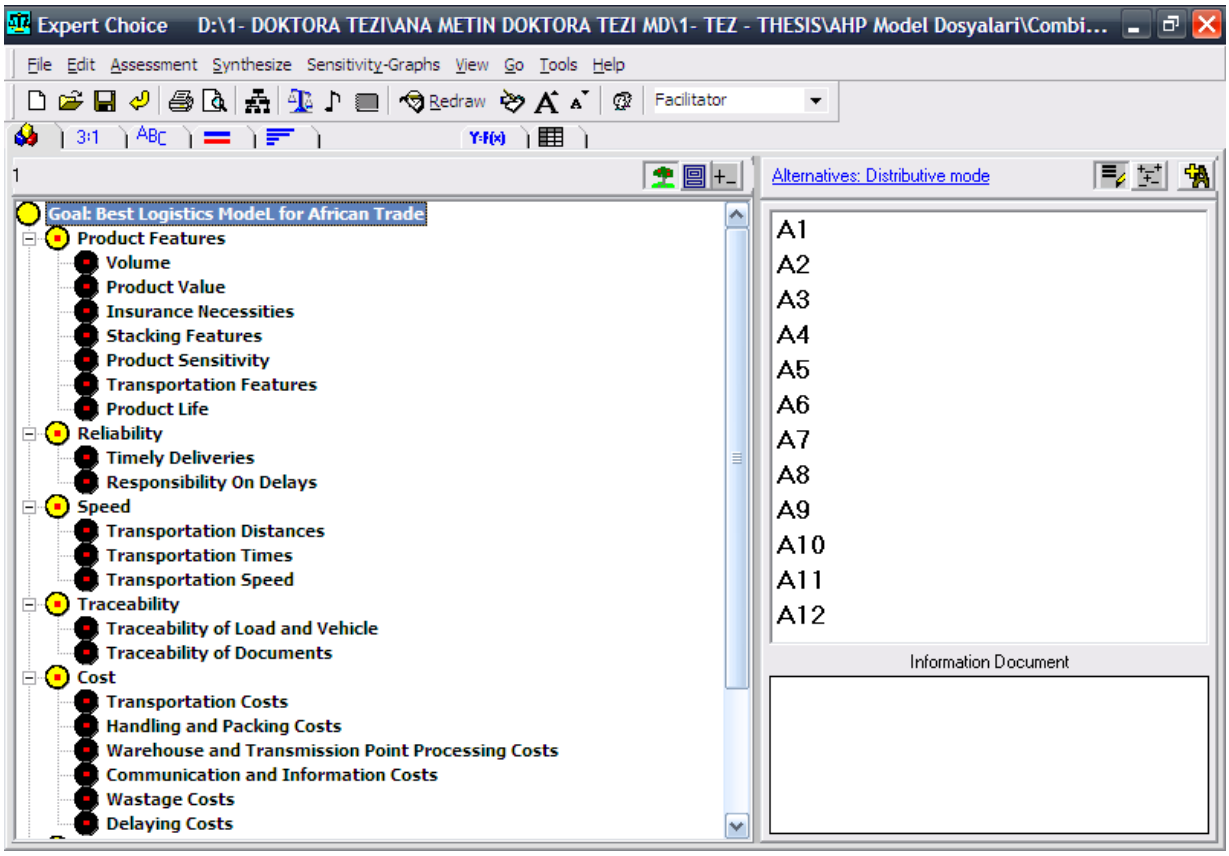


Figure 6.14: Main, Sub-criteria and Alternatives in Combined AHP Model Model View

8 sub-criteria such as Transportation Distances, Transportation Times, Transportation Speed, Transportation Costs, Handling and Packaging Costs, Warehouse and Transmission Point Processing Costs, Communication and Information Costs, Wastage Costs are quantitative. Therefore, as can be seen in the Appendix H, weights for these sub-criteria were incorporated in the program by calculating weights of real data, not in the form of "Pairwise Comparison" while remaining 24 sub-criteria and main criteria, as can be seen in the Appendix G, were incorporated in the model by calculating the same over matrices indicating qualitative choices at a scale of 1 to 9.

6.3.1. Combined AHP Model Solution

Relative importance of main criteria and sub-criteria solved through program are shown in the Figure 6.15 and 6.16. In the Figure 6.15, with a descending order from the highest relative importance, criteria include "Security" (0,231), "Cost" (0,190),

"Traceability" (0,164), "Risks" (0,148), "Reliability" (0,147), "Product Features" (0,062) and "Speed" (0,059). Following analysis of the model, as can be seen in the Figure 6.16, top 4 alternatives are as follows according to their relative importance degrees ; A12 (0,10), A11 (0,094), A5 (0,089) and A10/A6 (0,088). According to these results, A12 (Mersin Port – Kenya Mombasa Port) are chosen as the best Alternative Logistics model.

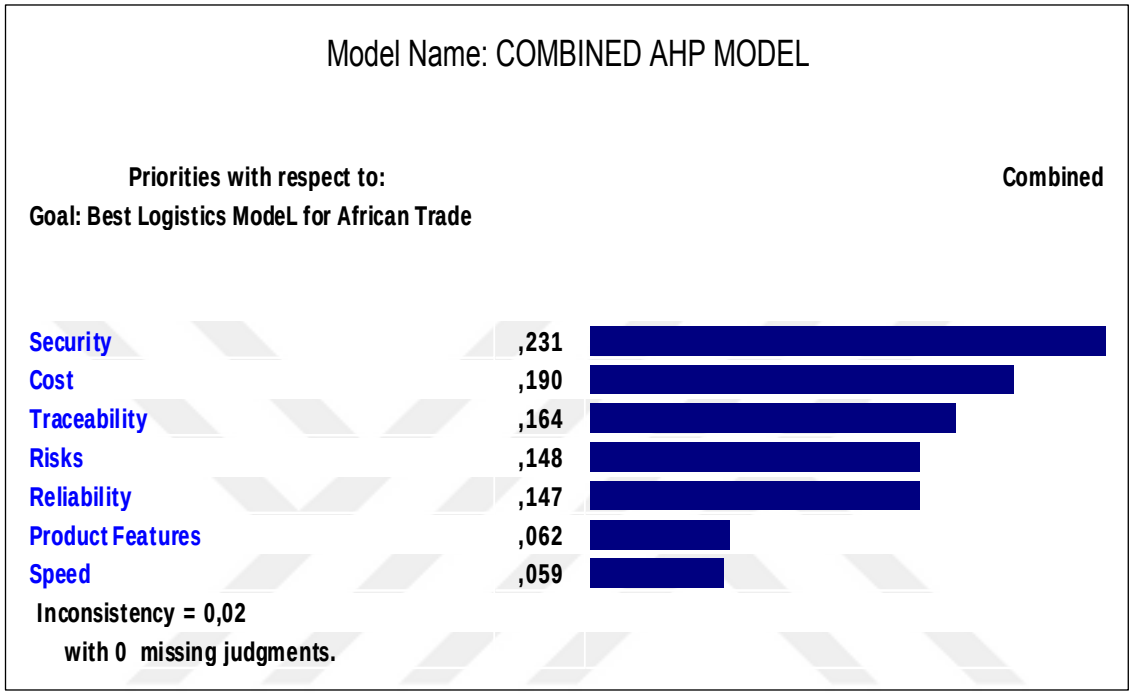


Figure 6.15: Main Criteria's Priorities on Expert Choice

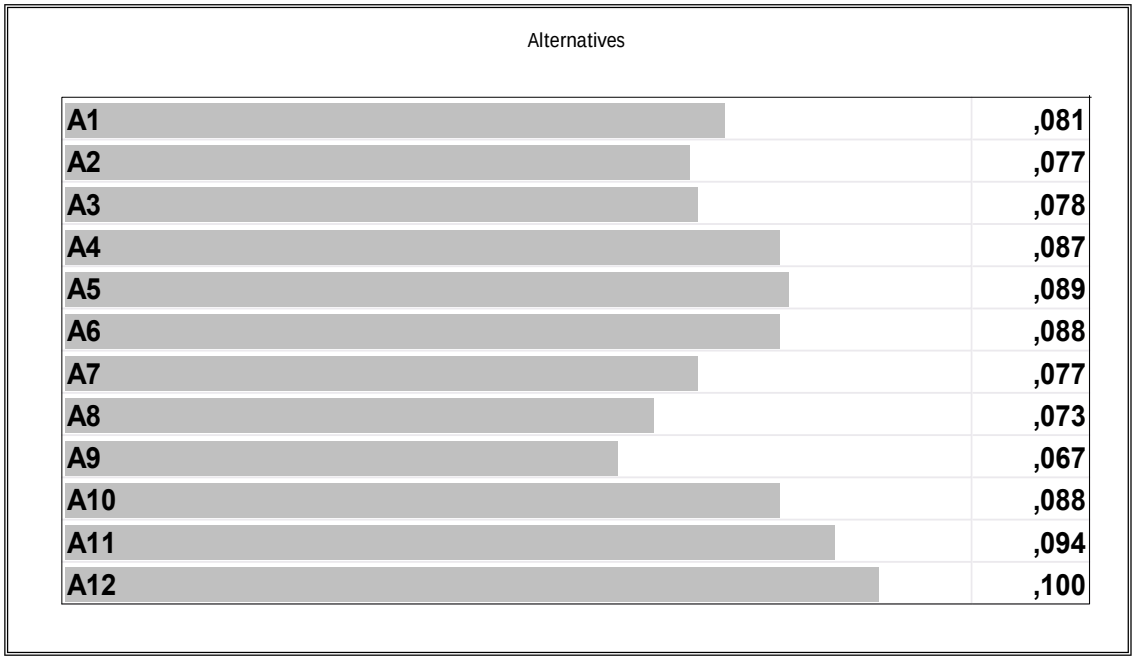


Figure 6.16: 12 Alternatives' Priorities in Combined AHP Model

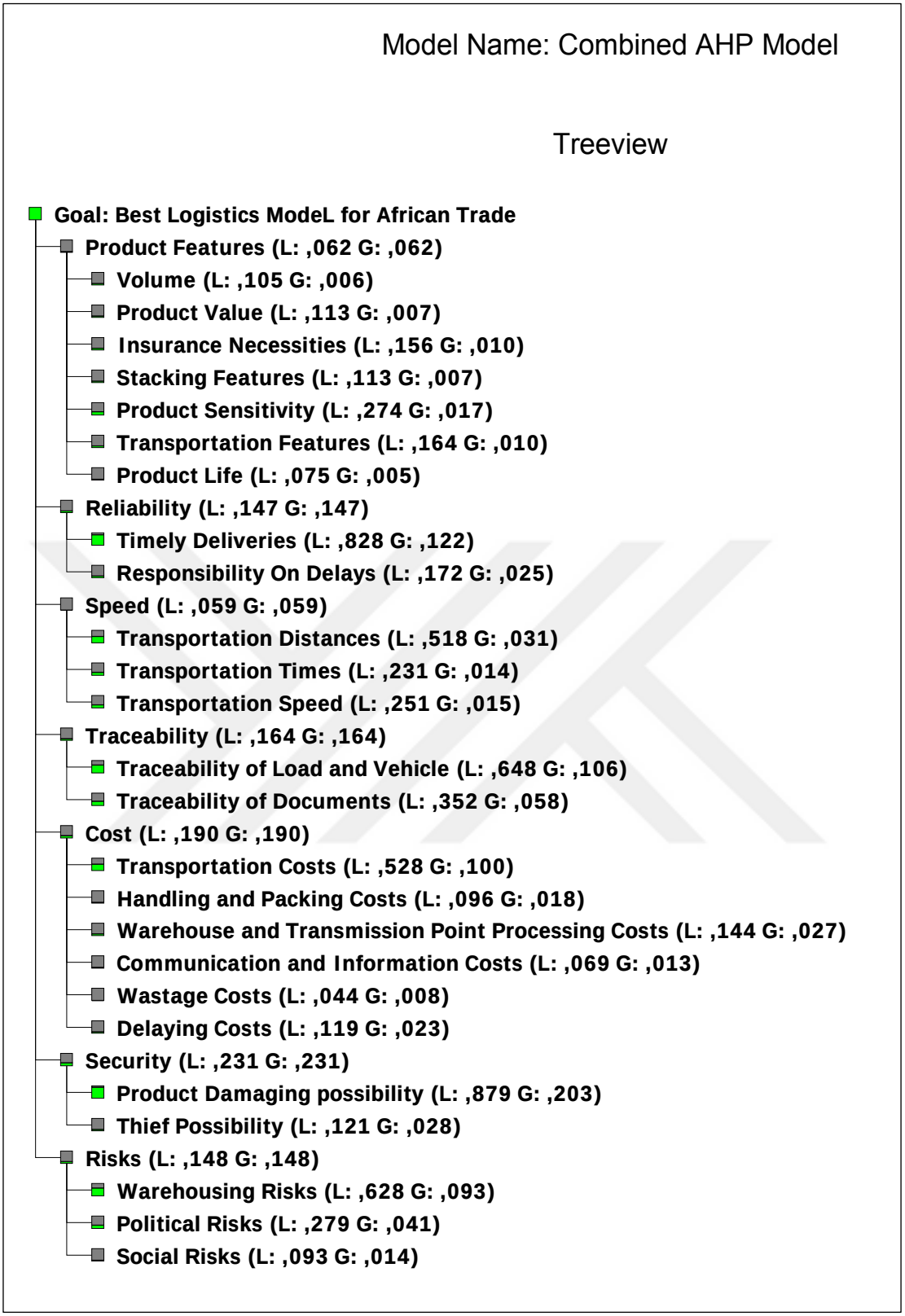


Figure 6.17: Priorities of Main and Sub-criteria in combined AHP model

"Relative Importance degrees" Main and Sub-criteria arising from the analysis of AHP model (L: Local – G: Global) are seen in the Figure 6.17.

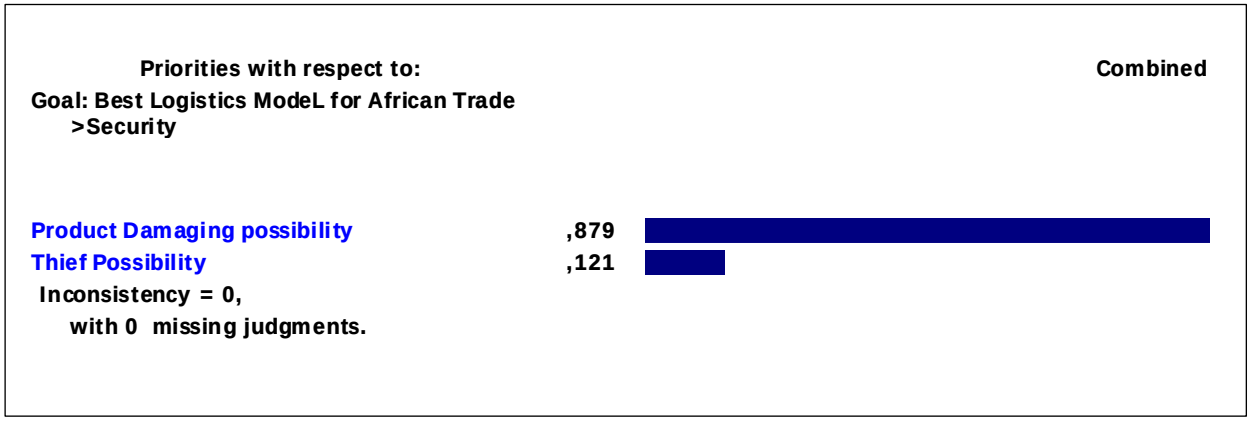


Figure 6.18a: Combined Priorities based on Security

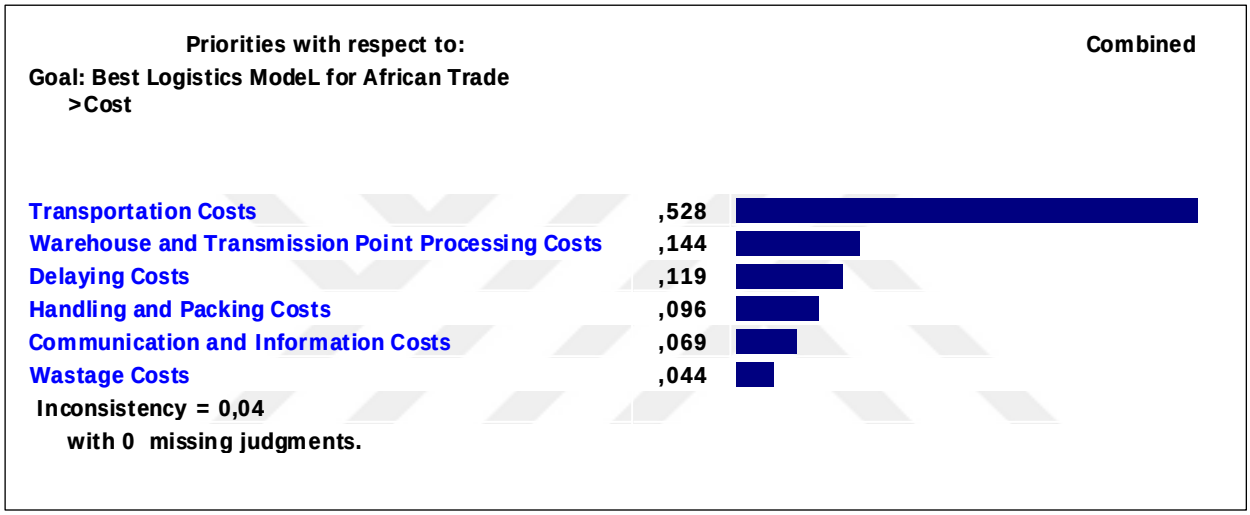


Figure 6.18b: Combined Priorities based on Cost

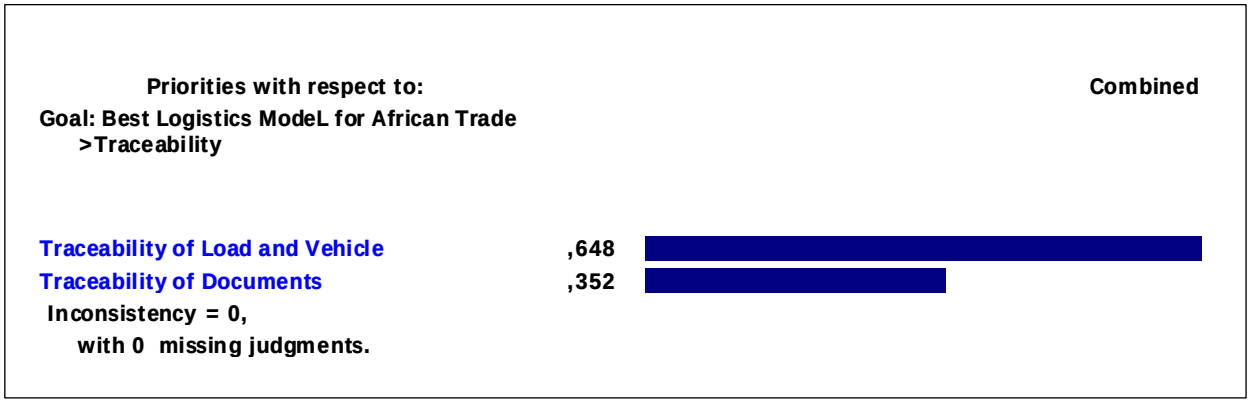


Figure 6.18c: Combined Priorities based on Traceability

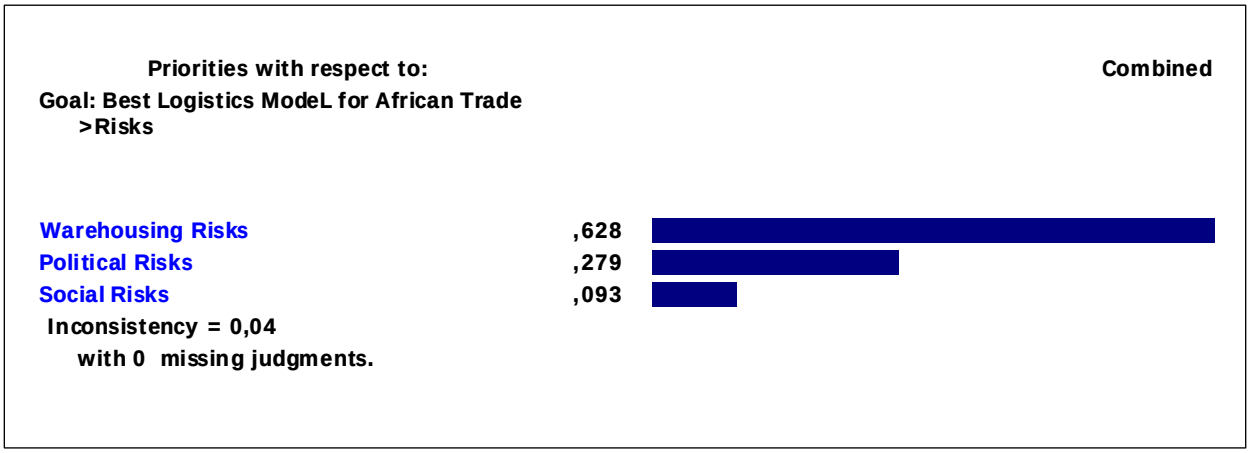


Figure 6.18d: Combined Priorities based on Risks

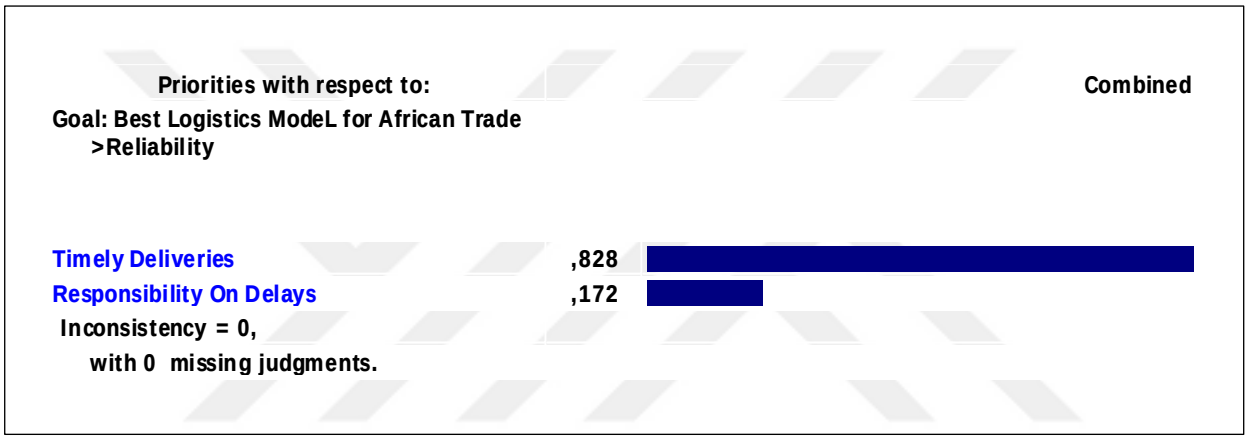


Figure 6.18e: Combined Priorities based on Reliability

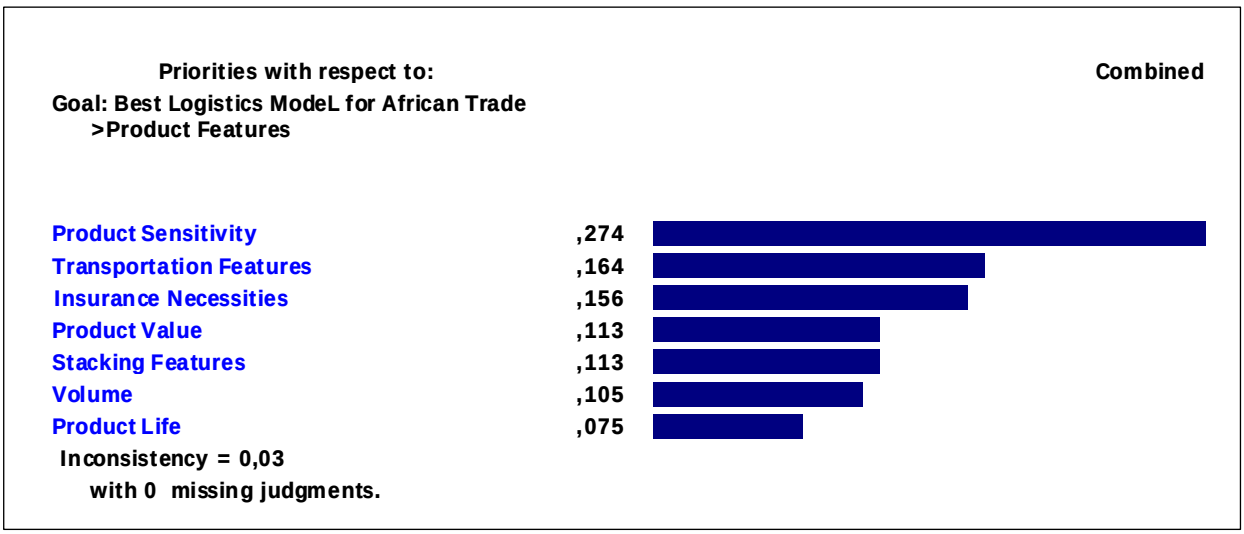


Figure 6.18f: Combined Priorities based on Product Features

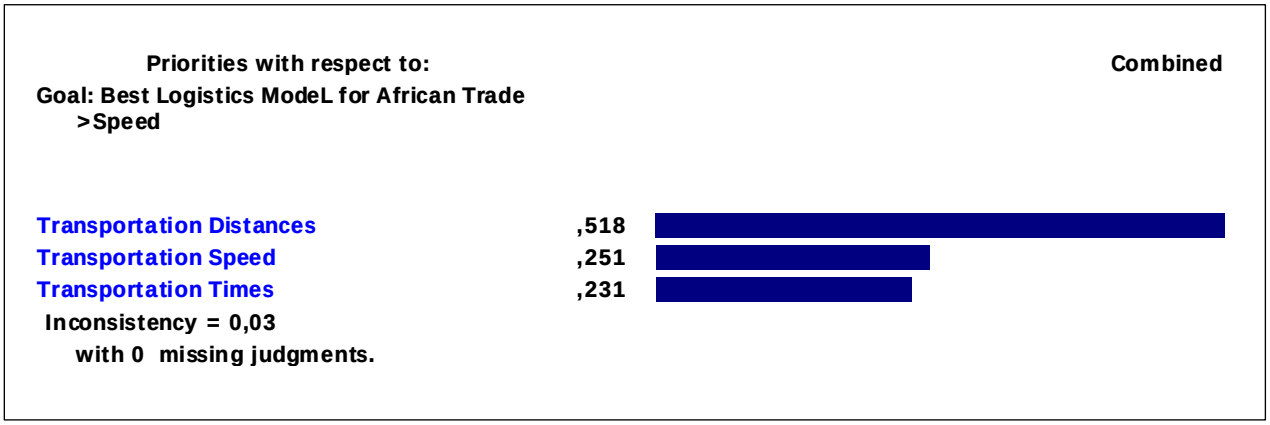


Figure 6.18g: Combined Priorities based on Speed

Figure 6.18a-g; shows relative importance degrees of sub-criteria linked with Main criteria arising from model analysis in a descending order.

6.3.2. Participant Views on Expert Choice

Screen displays showing analyses of AHP models made of 5 independent parts can be seen in the Figure 6.19a-e. Details of pairwise comparative matrices of each individual model are clearly demonstrated in Appendix I.

P2 – AYMED HEALTH PRODUCTS

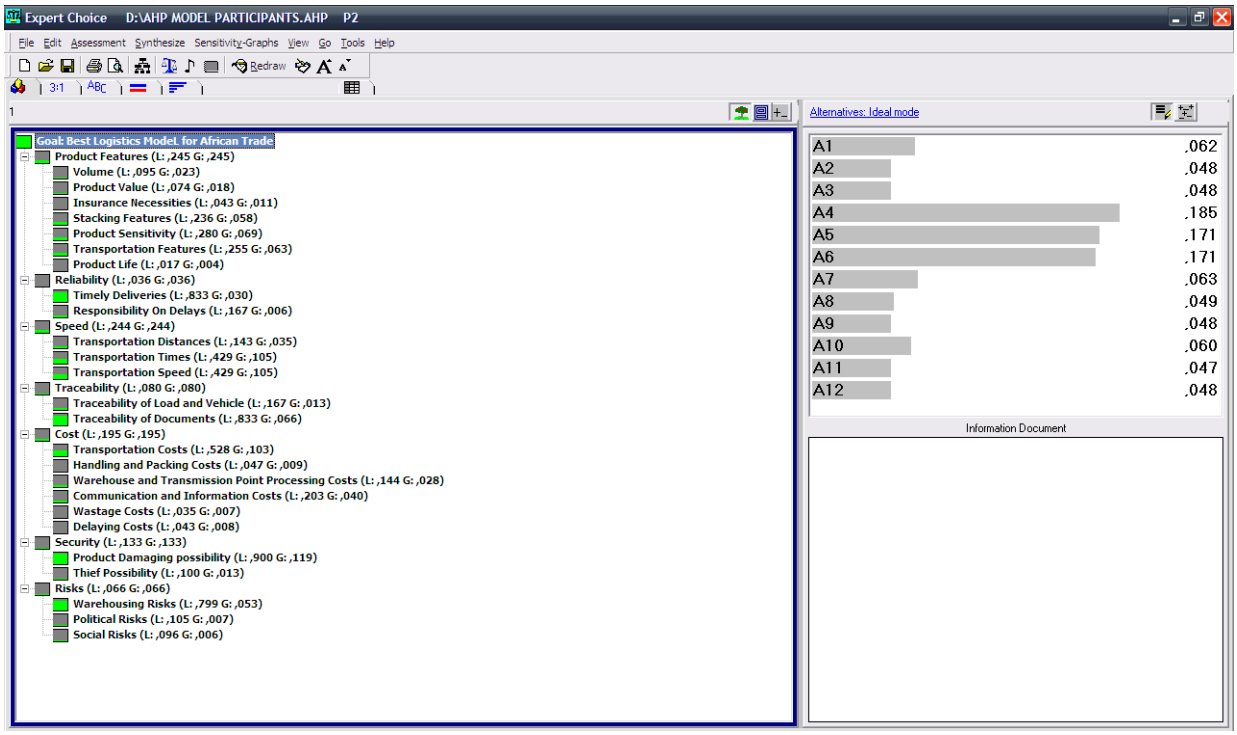


Figure 6.19a: Individual AHP Model Solutions for Aymed company

P3 – KENYA TURKISH TRADE CONSULAR

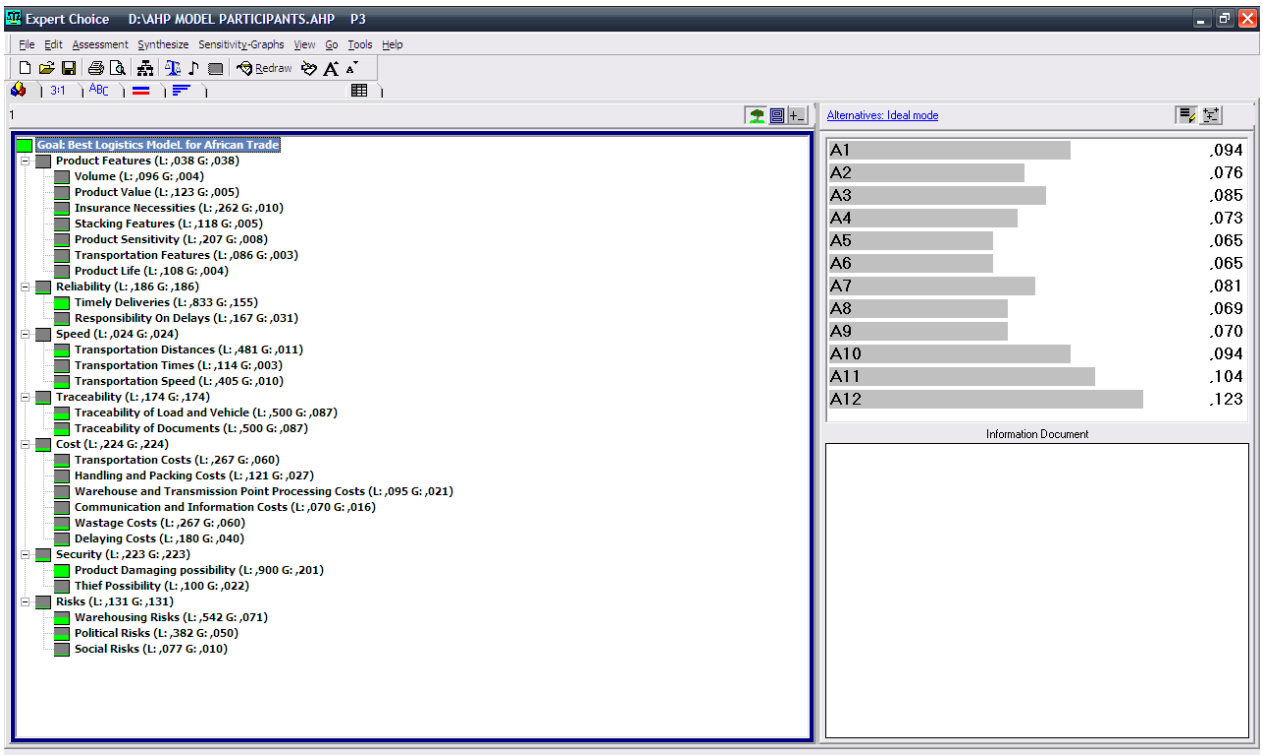


Figure 6.19b: Individual AHP Model Solutions for Kenya Turkish Trade Consular

P4 – IPEK AIR CARGO AGENCY

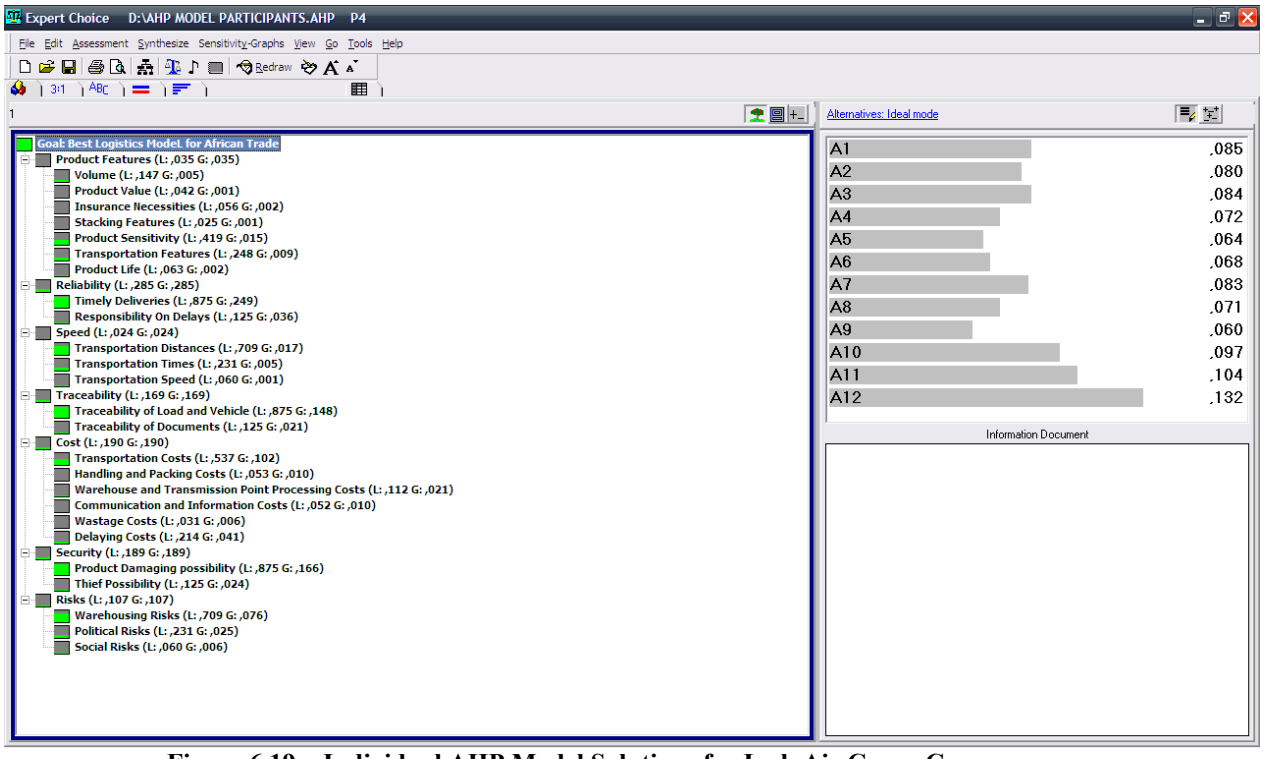


Figure 6.19c: Individual AHP Model Solutions for Ipek Air Cargo Company

P5 – MAERSK SEA LINES TURKEY

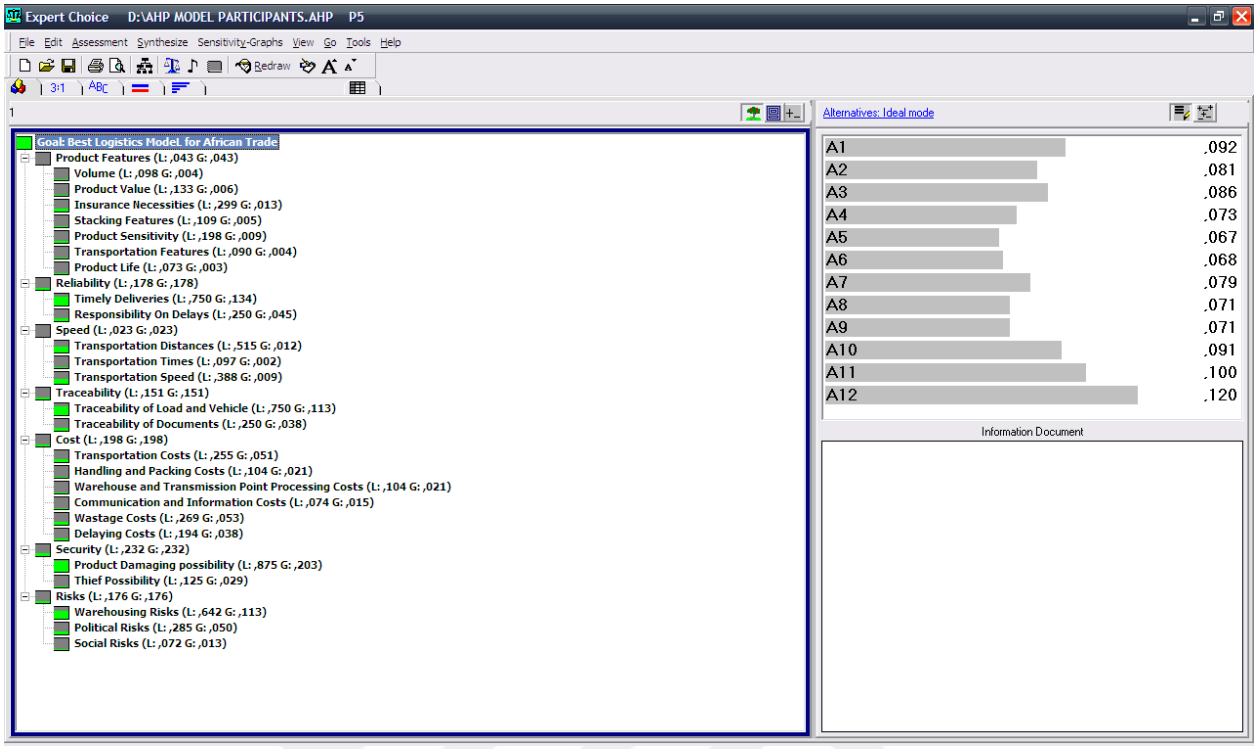


Figure 6.19d: Individual AHP Model Solutions for Maersk Sea Lines Turkey

P6 – KGM MACHINERY

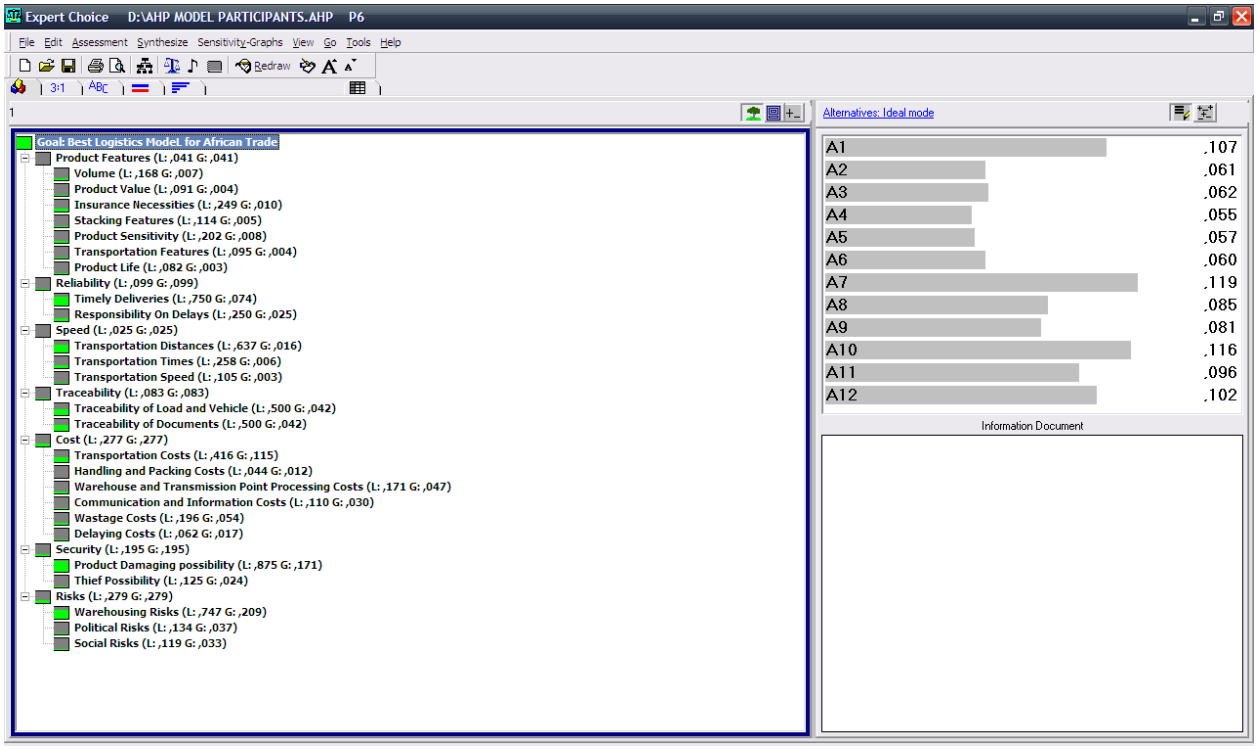


Figure 6.19e: Individual AHP Model Solutions for KGM Machinery Company

6.3.3. Sensitivity Analysis (What-if) for Verification

Sensitivity Analysis is a tool explaining how and to what degree other criteria or alternatives are influenced in the event that priority of any given criterion changes. Expert Choice program has 4 different types of graph illustrating sensitivity as a result of analyses. These are “Performance”, “Dynamic”, “Gradient” and “Head to Head”.

As can be seen in the Figure 6.20, the model has a “Performance Sensitivity” graph.

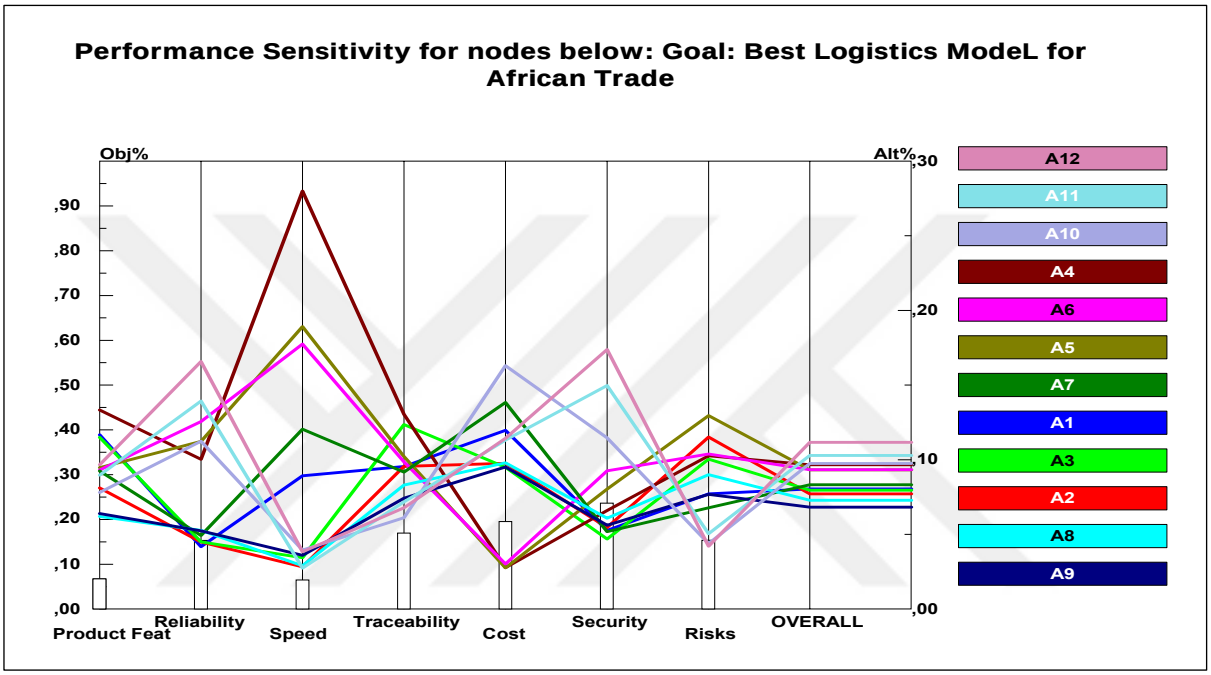


Figure 6.20: Performance Sensitivity on Expert Choice for the AHP Model

According to the criterion “Product Features”, performance percentages of the top three alternatives are, as seen in the Figure 6.20, A4 – 45%, A1-39% and A3-38%. According to the Reliability criterion, top three alternatives are A12-55%, A11-45% and A6-42%. As can be expected from Speed criterion, since these are airline logistics, they perform at A4-94%, A5-62% and A6-58%. Traceability A4-43%, A3-41% and A5-36% are top three alternatives with the best performance. According to the Cost criterion, the top three alternatives are naturally A10-54%, A7-47% and A1-41% which are representatives of the cheapest sea line logistics. Based on the Security criterion, A12-57% A11-49% and A10-40% are the top three logistics models representing the best general alternative. According to the risk criterion, top three alternatives are A5-44%, A2-38% and A6-33%.

In this sensitivity analysis, when the value of any criterion is changed, concurrent change of other values and criteria can be observed depending on such change. To illustrate,

while the model is sensitive to changes in criteria such as “Speed”, “Traceability” and “Product Features”, it does not demonstrate much sensitivity to changes in criteria such as “Security”, “Cost”, “Risks” and “Reliability”.

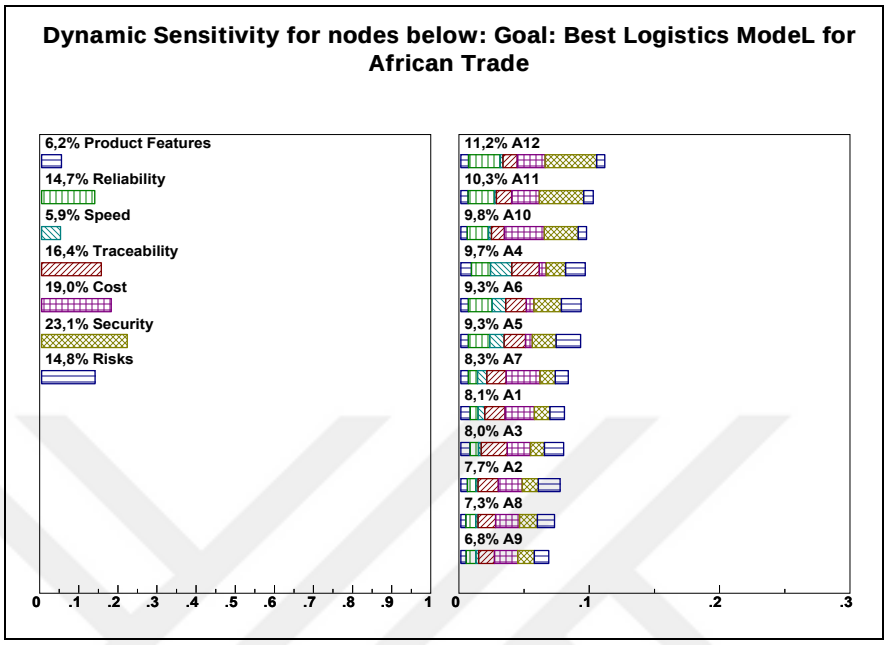


Figure 6.21a: Dynamic Sensitiviy Graph for Main Criteria on Alternative Basis

In view of a proportional change by 100% at Security, Cost and Speed, the most important main criteria, changes in main criteria and alternatives can be observed as is seen in graphs below.

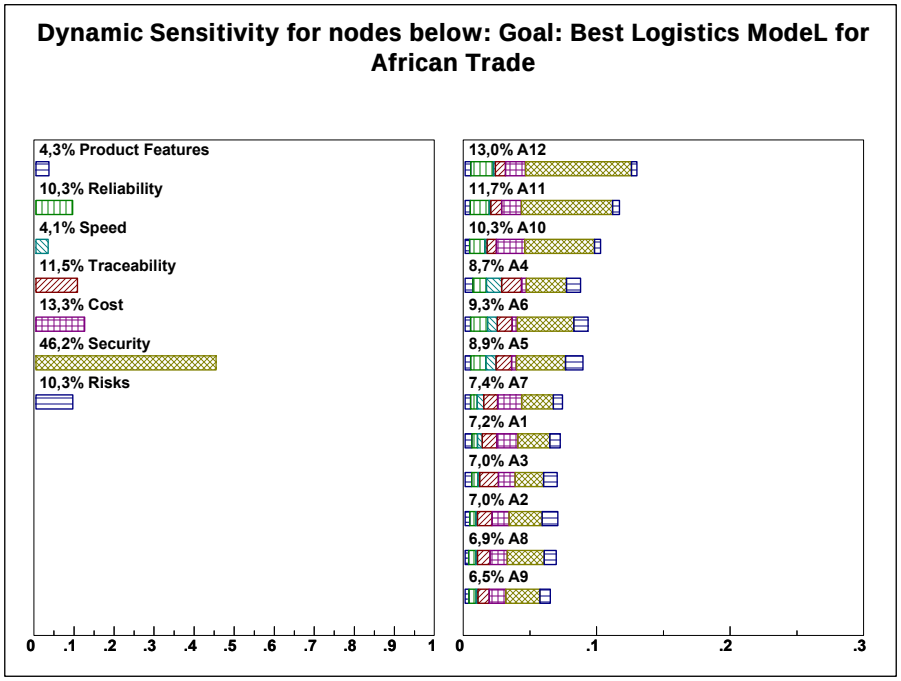


Figure 6.21b: SECURITY Changed Dynamic Sensitiviy Graph and reflection on Alternatives A1 – A12

A rise in the main criterion Security by 100% causes an approximate decrease of 26% on average in alternatives such as A4, A6, A5, A7, A1, A3, A2, A8 and A9 and leads to an increase of 23% in A12, A11 and A10.

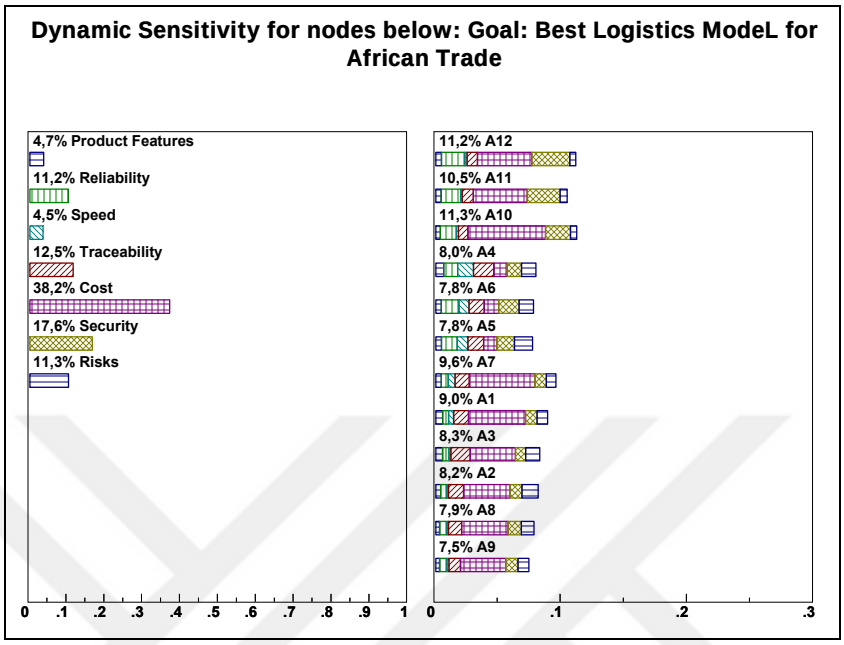


Figure 6.21c: COST Changed Dynamic Sensitiviy Graph and reflection on Alternatives A1 – A12

A rise in the main criterion Cost by 100% causes an approximate decrease of 57% on average in alternatives such as A4, A6 and A5, and leads to an increase of 25% in A11, A10, A7, A1, A3, A2, A8 and A9.

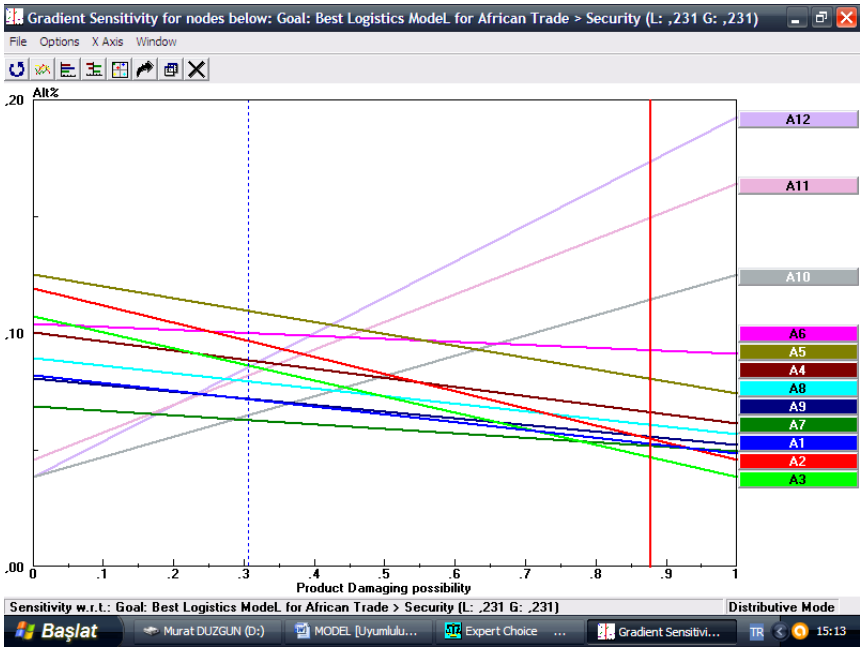


Figure 6.22: Gradient Sensitivity Graph on Alternatives basis

Sensitivity indicating interaction of two alternatives depending on the change in relative importance degree of the criterion Security is as shown in the Figure 6.22. Assuming that the weight of "Product Damaging Possibility", the highest degree sub-criterion of Security criterion in terms of weight, equal to 0,879 is reduced to 0,30, the "Intersection" that emerges at that point comes into being between alternatives A12 and A3 as is seen in the figure. At the level of weights lower than 0,30, although A12 is seen to be a lower degree "Product Damaging Possibility" , at the level of weights higher than 0,30, A12 is seen to be a higher degree "Product Damaging Possibility" (Incline Slope). The exact opposite applies for the alternative A3.

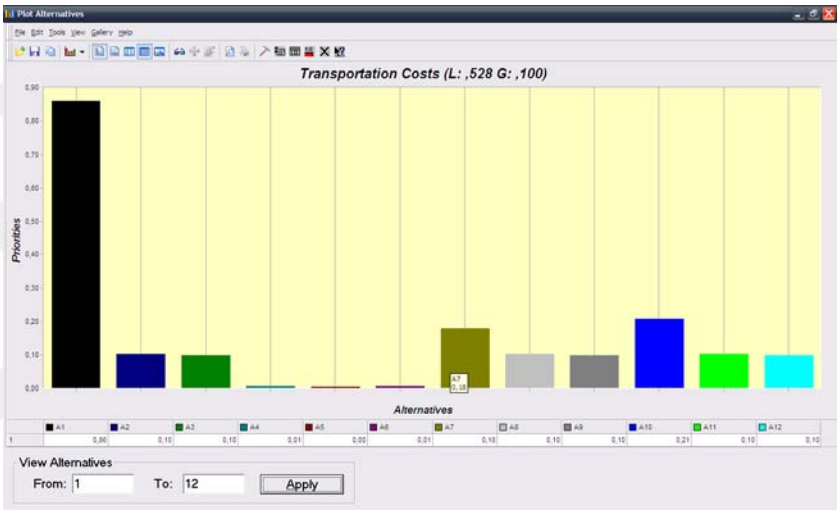


Figure 6.23: Alternative basis Inconsistencies on Transportation Costs

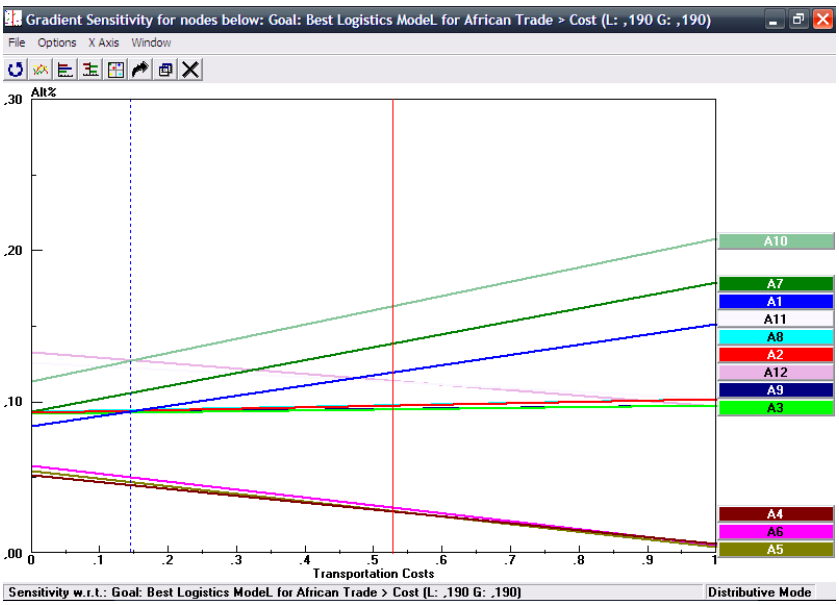


Figure 6.24: Gradient Sensitivity Graph on Transportation Costs basis

Sensitivity showing interaction of two alternatives depending on change in relative importance degree in the criterion Costs as is seen in Figure 6.23. Assuming that the weight of "Transportation Costs", the highest degree sub-criterion of the criterion Costs in terms of weight, equal to 0,528 is reduced to 0,15, the "Intersection" emerging at that point comes into being between alternatives A10 and A12 as can be seen in the figure 6.23. While, at the level of weight lower than 0,15, A12 is seen to be a lower degree "Transportation Costs", at the level of weights higher than 0,15, A12 is seen to be a higher degree "Transportation Costs" (Incline Slope). The exact opposite applies for the alternative A10.

Figure 6.25: Gradient Sensitivity Graph on Alternatives basis

6.4. AHP MODEL EVALUATION

The 1st phase consists of obtaining the assessments of the executives of those companies from 5 different sectors, which are specialized in the respective fields with an existence in the trade with Africa, and integrating these assessments to choose the best Logistics model from among 12 different Logistics models and to create AHP model in line with the purpose of the study. The company executives must be quite knowledgeable in terms of the respective field and have an analytical thinking frame of mind, which is the most important requirement for this process. Additionally information is provided about AHP assessments within the frame of the relevant details during the interviews held with the Experts, and the process flows are defined for them.

This is a complex problem far from being of such a quality that would allow for making a decision based upon the factors such as personal judgment, experiences or trial-

and-error. This model created and the criteria produced based upon scientific basis and the interrelations between them are solved with the analytical method. Thus the correct decision and a verifiable result can be achieved, and it is clearly understood that this result can make a considerable contribution to the process of developing the trade between Turkey and Africa and making it sustainable.

7 main criteria that would affect the model are identified at the 2nd phase and turn out to be as follows in the order of the level of importance after the model is solved: “Security”, “Cost”, “Traceability”, “Risks”, “Reliability”, “Product Features” and “Speed”. And the sub-criteria obtained at the 3rd phase are as follows in the order of the level of importance as illustrated in Figure 6.25.

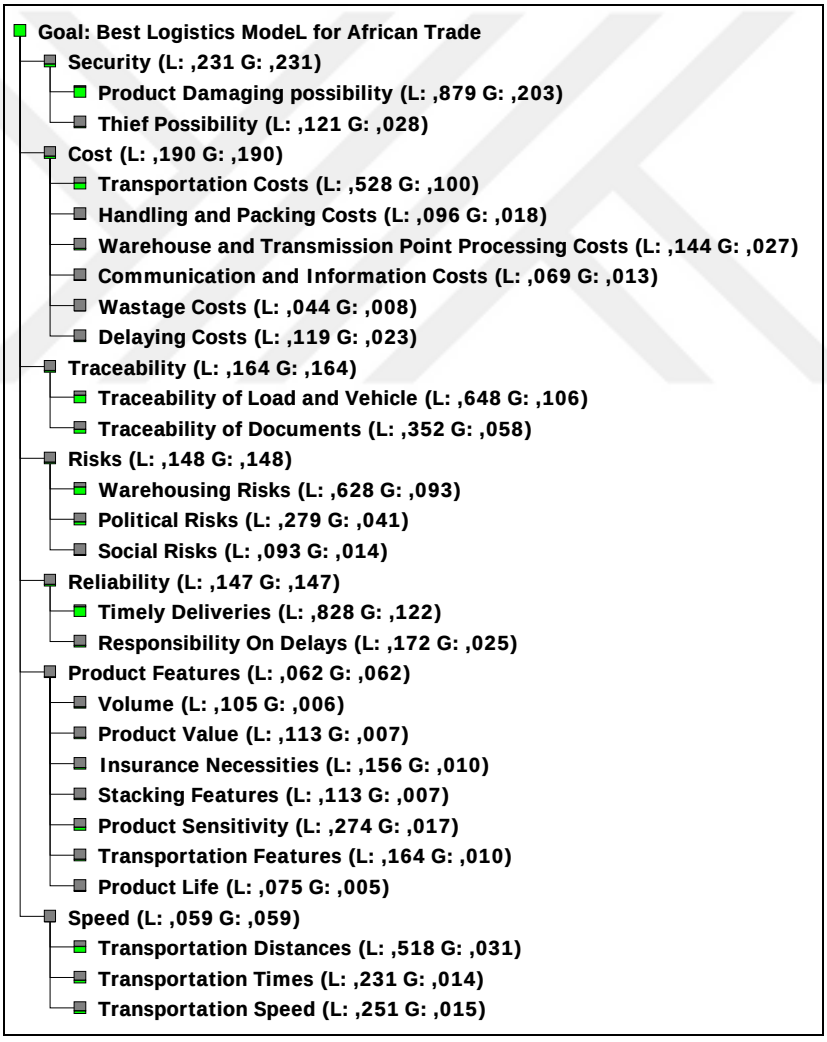


Figure 6.26: Level of Importance of Main and Sub Criteria

For instance, as for the level of importance for the sub-criteria in descending order “Product Damaging Possibility”, “Timely Deliveries” and “Traceability of Load and Vehicle” are the top three by 0,203, 0,122 and 0,106 respectively.

As the “Inconsistency Rate” of the system for choosing the best Logistics model established with AHP is 0,02 in general, it is clearly understood that the model identified is the best model in terms of meaningfulness and consistency. And the model is CONSISTENT at an acceptable level because the “Inconsistency Rate” for each comparison matrix created for the main and sub-criteria of the decision model is below 0,1 (See Appendix G).

The alternative A12 (Mersin Port – Kenya Mombasa Port) from among 12 Alternatives is chosen as the best MODEL with a “Relative Importance” of 0,106 after the model is solved. The alternatives A11 (Mersin Port – Ghana Tema Port) and A4 (Atatürk Airport – Algeria Algiers Airport) are ranked 2nd and 3rd with a weight of 0,097 and 0,093 respectively.

Finally a sensitivity analysis is conducred for the model, and the model is sensitive to the changes in the criteria “Speed”, “Traceability” and Product Features” where as it is not sensitive to the changes in the criteria “Security”, “Cost”, “Risks” and “Reliability” much accordingly.

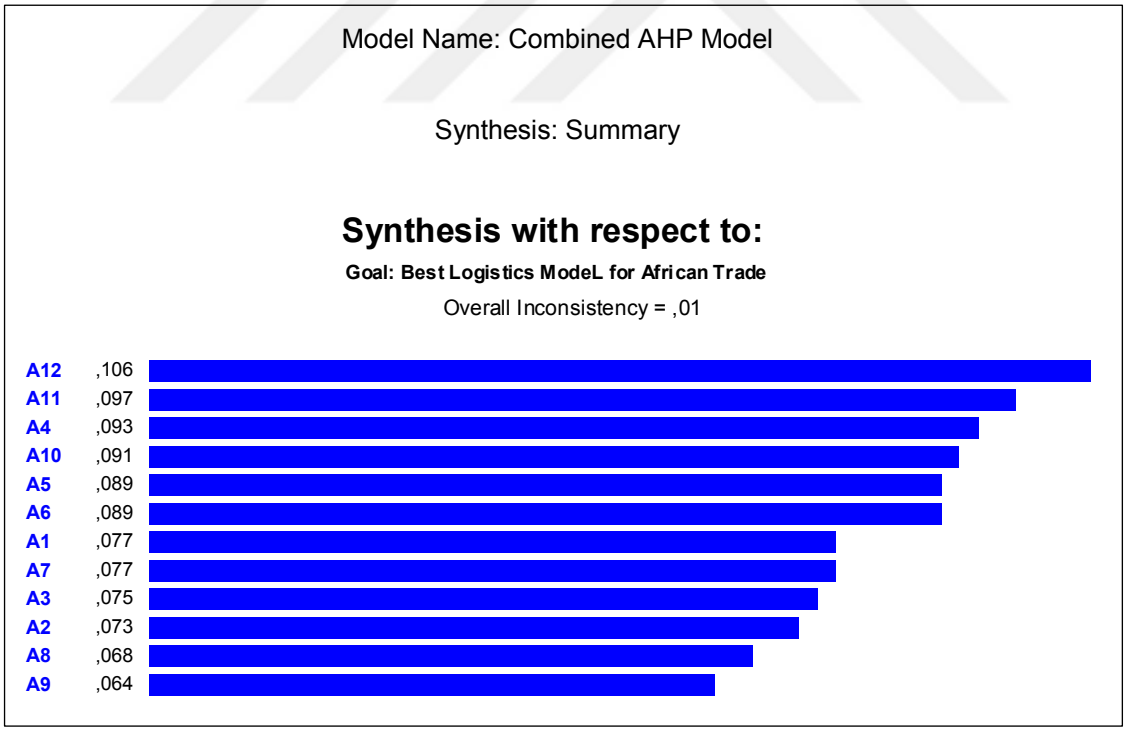


Figure 6.27: General Synthesis for “Best Logistics Model(s)”

7. DISCUSSION AND CONCLUSION

7.1. CONTRIBUTION AND LIMITATIONS OF THE STUDY

Turkey-Africa relations have been rapidly developing in the last two decades. Africa has become an important player in global economics and trade, and a crucial factor of international growth and development. In addition to that, it has grown to be an important partner for Turkey's international export and import activities.

Turkey-Africa economic and socio-political relations are still in their initial stage of development. However, recent developments and latest data signify that they are steadily and constantly growing and improving. In the literature there is equivocal evidence showing that the future of Turkey-Africa cooperation in various fields and spheres of life seems bright and prosperous.

This study focuses on the role of logistics in the development of Turkey-Africa economic and trade relations. First of all, statistical analyseses used for checking the data reliability and relation between mutually main criteria then to carry the results to AHP model that has been prepared for checking the relation mainly between "Cost" and "Time (Door to FOB Africa Port)" because of the most important two important parameters in logistics. The main goal of the thesis is to create a model that could assist Turkish firms participating in export-import activities in Africa to increase the quality of their processes, achieve more effective and efficient operations, optimize their performance and maximize their profit, while simultaneously ensuring economic stability, sustainable development and ultimately, international growth. To our knowledge, this thesis is the first of its kind AHP model aiming at achieving these objectives. In addition to that, it provides an in-depth analysis of the current situation of Turkey-Africa trade, a suggestion regarding the issues that could be addressed in the future in order to improve Turkey-Africa export and import, as well as a forecast regarding the future of Turkey-Africa cooperation.

There are four main hypotheses that are being formulated in this thesis:

1) The most important criteria in Turkey's trade with Africa are the ones related to costs.
2) Decreasing the lead time increases the Logistics Cost.
3) Ocean Freight in "Africa FOB Port" will reduce logistics costs.

4) Africa's hinterlands 1., 2., and 5 are crucial for the development of Turkey – Africa relations, and have to be improved in the future.

According to the author of this thesis, logistics currently remain on of the main problem areas in Turkey-Africa foreign trade. It is quite evident that effective and efficient logistics and trade practices will have significant positive effect on the business capacity of domestic and foreign trade companies, and eventually lead to economic growth in both, Turkey and Africa. Thus, this study attempts to create a detailed logistical model that will help Turkish firms and organisations to create and apply correct and efficient strategies and policies towards the African continent.

There are twelve main methods (models) which can be used for problem-solving in the Logistics problem at hand. After an in-depth literature survey and analysis of the existing models, the author of this thesis has selected AHP as the most appropriate method which can be used and applied for the creation of a logistical model which could enhance the Turkish firms' capacities and capabilities in their trade with Africa.

The AHP model suggested in this study aims to help Turkish firms involved in African trade to determine the attributes, factors and dimensions of the successful implementation of efficient transportation and logistics practices by offering an empirical analysis for the measurement and evaluation of the impact of logistical factors on organizational performance and by lining out the most important criteria and factors of economic and trade growth between Africa and Turkey in the coming decades.

The research process started with an in-depth literature review and analysis, which have helped us to determine the potential criteria that can be used for our model. We have determined seven main factors, affecting Turkey-Africa trade and logistics (namely product features, reliability, speed (time), traceability, cost and security). Those factors can help Turkish firms to increase and optimise their performance by ensuring the availability of the right product type, increasing reliability, speed and traceability, as well as by decreasing costs and ensuring maximum security levels The next step was the creation of a special questionnaire, which could help us to determine the main criteria of our AHP model. Before the survey was applied, 166 Turkish companies participating in Turkey-Africa trade have been selected for future study and analysis (Appendix B). After that, the survey was applied and important data was collected about the companies' structure and experience, as well as the characteristics of their trade with Africa.

The data we collected revealed that, as a whole, most of the firms have 4-7 years of African trade experience (34,9%), their main product group in African trade is machinery and automobiles (44,0%), the African country they export most is Algeria (33,7%), the hinterland in Turkey used most often for African trade is Istanbul (55,4%), and the ownership of the products exported to Africa belongs mostly to the companies themselves (65,7%).

We have discovered that most of the specialists working in Turkish firms and participating in Turkey-Africa trade are export marketing managers (28,9%), owners (18,1%) or export marketing supervisors (15,7%) in the African trading companies. The vast majority of the trade and logistics specialists have operating experience of 16 years and above (74,7%), while almost half of them (48,2%) have foreign trade experience of 16 years and above as well.

Overall, it was confirmed that although the analysed firms have a high level of skilled specialists and have a rich foreign trade experience and know-how, their African trade experience is pretty low and slowly increasing. This proves one more time that Africa is steadily getting more export and import attention from the trade and logistics sector in Turkey. Furthermore, companies in Turkey start to explore the trade opportunities in Africa.

In addition to that, we found out that more than 80% of the participating firms are using maritime transportation for their exports to Africa, while air transportation is used by 3,6% of the firms, and around 15% use intermodal transportation.

The most important ports for Turkey-Africa trade were shown to be the Istanbul Port (57,8%) and the Izmir port (10,8%). The buyer's firm (44,6%) or the seller's firm (41,6%) are mainly responsible for after sales logistics, while 11,4% of the firms outsource these operations.

The most popular after-sale logistics services were revealed to be custom clearance and international transportation (49,4%). In case of damaged products, the firms were revealed to most often change the product (38%) or pay the product amount back to the customer (34,9%). The most used delivery method is FOB (42,2%), the delivery points used the most are ports (82,5%).

Trade agreements were revealed to be mostly used for African trade (75,9%). African export constitutes 0%-15% in their overall revenue obtained from export (53,6%), and the

average annual revenue obtained from African trade is mostly around $0-1 million (46,4%) or $2-5 million (44,6%).

The data we collected has also helped us to determine the relationships between the characteristics of trading companies and their trade operations via Chi-Square tests. The Chi-Square tests were made for the purpose of analysing the patterns of dependency between the variables according to 3 separate “Variables Groups” targeted in the application.

The performed Chi-Square tests revealed seven types of main relationships between the different factors. Firstly, the relationship between the “Port Export” and “Container Type” categories was revealed. Furthermore, it was shown that “Port Export” and “Hinterlands” categories are related as well. Thirdly, a connection between the “Provider After Sale” and “Logistics Services” categories was shown. In addition to that, we have discovered that there is a connection between the “Provider After Sale” and “Delivery” categories. The “Provider After Sale” and “Delivery Point” categories, the “Product Group” and “Distance” categories, the “Distance” and “Ports Export” categories and the “Speed” and “Cost” categories were revealed to be interconnected as well.

The next step was the determination of criteria that could be used in AHP via an in-depth statistical analysis of the collected results. Firstly, the effective factors of explaining the Turkey-Africa trade were determined through regressions models. The main purpose of the logistic regression analysis was to model the relation between the independent variables and dependent variables.

It must be noted that the variable “Speed”, for example, was found to be much more effective in explaining the reliability compared to other variables. On the other hand, “Product Life” appeared to be the least effective one in explaining the reliability among question groups.

It was also observed that there is a high interrelation between “Provider After Sale” and “Logistics Services Categories” based upon our analysis. It appears that Buyer and Seller firms divide the services among those companies specialized in the respective field one by one for Logistics Services in 6 specified categories depending upon the type of delivery rather than a single "3PL" company. In addition to this, we have discovered that a pattern of dependency has emerged between Buyer and Seller firms in the form of “Delivery

Type". Accordingly the Delivery Type "FOB" is the primary reason for choice for both parties.

Finally, it is crucial to mention the dependency between "Product Group" and "Distance". The firms with high levels of export products in terms of "Weight" and "Volume" carry out their production or Logistics operations through locations close to ports. Thus, it comes as no surprise that there is an adequate level of dependency between "Cost" and "Speed".

The performed regression analyses clearly show that the two most important elements of the logistical problem are "Time" and "Cost". AHP is as a highly important solution method for improving the foreign trade between Turkey and Africa, as it allows decision-makers to consider all of the time and cost elements and come up with an optimal solution.

The importance and influence of the variables "Time" and "Cost", the main subject matter of the study, compared to the other variables is proved to a considerable extent in the detailed statistical analysis in Part 6. If the sampling size is increased in similar future studies, the confidence and the consistency of the results will considerably improve. In this context, if the amount of firms participating in the study (166) gets extended by 40 or 50 percent for a much higher reliability level (98,3%), the results will be more consistent.

Secondly, the effect companies' characteristics have on how much they value the criteria for African trade were determined via hypothesis tests. In other words, hypothesis tests was performed in order to find out the effect of the demographic characteristics, general African trade characteristics and selected logistics characteristics on the importance level of the main criteria and their sub-criteria that are given the highest level of importance on average.

The inferential statistics for main-criteria tests related to Tukey have shown that the most important criteria for the Turkish companies involved in Africa trade are costs, product features, and reliability, while the most important sub-criteria are product value, timely deliveries, transportation on time, traceability of documents, traceability of load and vehicle, transportation costs, product damaging possibility, and warehouse risks.

The next step was the performance of the AHP model and the determination of the best logistical model. It is important to mention that apart from the statistical analysis, Analytic Hierarchy Process (AHP) is also employed as a multi-criteria technique to find out

the best practice out of twelve existing models based on the judgments of five experts in the field.

The performed analysis showed that the "Mersin Port – Kenya Mombasa Port" alternative was the best from among the other 12 Alternatives and was chosen as the "*Best Logistics Model"* with a "Relative Importance" of 0,10 after the model was solved. Two other alternatives, namely "Mersin Port – Ghana Tema Port" and "Mersin Port – Algeria Annaba Port" were ranked as second best and third best option with a weight of 0,094 and 0,088 respectively.

The final step was the preparation of a sensitivity analysis. After it was conducted, it was revealed that the suggested model is sensitive to the changes in three criteria: "Speed", "Traceability" and Product Features", whereas it is not very sensitive to the changes in the criteria "Security", "Cost", "Risks" and "Reliability".

Overall, the structure of the suggested model has been able to generate a set of possible solutions that provide for improved logistics and trade relations between Turkey and Africa. The adoption of this model would help Turkish firms involved in export-import activities with Africa to optimise the effectiveness and efficiency of their processes, as well as to maximize their profit and overall performance. Managers should consider logistics and logistical processes development as one of the key factors towards the achievement of high performance levels in Africa trade.

The author of this thesis believes that one of the main contributions of the suggested model is that it is among the few studies that extend the theoretic debate regarding the economic and political development of Turkey-Africa relations to the context of the real-time business environment, thus benefitting both, the business sector and the academic community as well. Furthermore, it does not simply investigate the effect of logistics on the development of economic partnership and cooperation between Africa and Turkey, but offers a forecast of those for the next decades.

The ultimate goal behind the creation of this model is to help and support the Turkish firms operating in Africa to be more effective and efficient, to optimise their performance, reduce their logistical costs, improve the effectiveness and efficiency of their logistical processes, increase the quality and speed of response to customers, decrease the lead time of all the included processes and ensure economic growth for both Turkey and the African continent.

However, the suggested model has some limitations as well.

One of the limitations in this study is that the context of respondents is limited to Turkey-Africa trade and logistics, and focused on three main African countries: *Algeria, Ghana, and Kenya.* The study can be expanded to include other countries of the African Continent as well.

Another limitation is that the model is mainly focused on the importance of one sector. It can be extended to other sectors. For the particular case of the model proposed here, it can be concluded that considering only the importance of logistical processes, factors and sub-factors for the development of Turkey-Africa trade is limitation itself. However, including other factors of trade, such as the political and financial systems, technology development, buyer behaviour, etc, can make the model too complex and cumbersome. The rather small number of experts (five) whose individual and combined opinions were used for the determination of best practice can be a limitation as well.

Furthermore, the AHP methodology used can be a double-edged knife itself, because despite of its indisputable advantages, it has some drawbacks as well. Firstly, decision-makers should be extremely careful with rank reversal, otherwise they might not be able to come up with an optimal solution. Furthermore, the subjectivity of the AHP modelling process can be a constraint, as it cannot guarantee that the decisions are necessarily true and correct for the current problem. Last but not least, the enlargement of the current AHP model may take too much time and effort: when the number of factors and hierarchy levels increases, so does the number of pair comparisons. Thus, the complexity of the problem will continue to perpetually increase, and the solution procedure may become computationally intractable.

This is a complex problem far from being of such a quality that would allow for making a decision based upon the factors such as personal judgment, experiences or trial-and-error. This model created and the criteria produced based upon scientific basis and the interrelations between them are solved with the analytical method. Thus the correct decision and a verifiable result can be achieved, and it is clearly understood that this result can make a considerable contribution to the process of developing the trade between Turkey and Africa and making it sustainable.

7.2. SUGGESTIONS FOR FUTURE/FURTHER WORKS

To our knowledge, the suggested model is the first AHP used for the evaluation of Turkey-Africa trade and logistics. Study has been approved that "Time" and "Cost" are the most important criteria for this model that works perfectly. However this model can be applied on main and sub criteria list (Figure 6.9) for tailor-made application by changing the parameter up to circumstances. This research provides a "filling" of the gap in current literature regarding the topic of Turkey-Africa cooperation, as it goes beyond the mainly descriptive theoretical debate related to the economical, logistical and trade aspects of Turkey-Africa relations and extends it to the context of real-life business environment and the actual involvement of Turkish firms in Africa.

This thesis suggests a concrete model investigating the effect of logistics and trade on the economic development of Turkey-Africa economic relations, which can be used by Turkish firms that plan to make business with Africa, or are already involved in Turkey-Africa trade in a great variety of everyday real business situations. Currently there are no scientific models of Turkey-Africa trade or Turkey-Africa logistics that are applicable for the real-life business issues Turkish firms are dealing with, or could assist Turkish companies in the creation of correct strategies and the application of effective and efficient policies towards Africa.

The model focuses on Turkey's trade with three African countries, namely Algeria, Ghana, and Kenya. Future studies will be focused on other regions and countries in the African Continent as well. The study can be expanded to include other countries of the African Continent as well.

In this context, the model will be gradually enlarged: more detailed data will be collected and different mathematical and statistical models will be applied so that new and more precise results could be obtained. The survey will be expanded, more firms and Turkey-Africa trade specialists will be invited to participate in the future research, and eventually more factors and sub-factors affecting Africa trade will be included in the AHP hierarchy. Also enlarging the study, same data will be used for different kind of Decision making models like ANP, Promethee or Moora e.t.c.

8. REFERENCES

Afacan, I. (2013, April). The African Opening in Turkish Foreign Policy. *Ortadogu Analiz*, *5* (52), 46-54.

AFDB (2015). African Development Bank Group Statistics. Retrieved from http://www.afdb.org/en/knowledge/statistics/

African Economic Outlook (2015), Official Statistics. Retrieved from http://www.africaneconomicoutlook.org/en/statistics/

African Union (2011). *Africa's Strategic Partnerships*. Retrieved from http://www.au.int/en/sites/default/files/Partnerships.pdf

African Union (2013). *Turkey-Africa Partnership High Level Officials Meeting 2013. Talking Points.* Retrieved from http://www.au.int/ar/sites/default/files/Turkey-Africa%20Partnership%20High%20Level%20Officials%20Meeting.pdf

African Union Commission (2014). *Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024)*. Retrieved from http://hrst.au.int/en/sites/default/files/STISA-Published%20Book.pdf

African Union Commission (2015). *The Africa We Want. Africa's Agenda 2063.* Retrieved from http://archive.au.int/assets/images/agenda2063.pdf

Agility Emerging Markets Logistics Index (2015). Retrieved from http://www.agility.com/EN/about-us/Pages/Agility-Emerging-Markets-Logistics-Index-2015.aspx

Agresti A., 1990, Categorical Data Analysis, New York: John Wiley&Sons.

Aissaoui, N. et al. (2006). Supplier Selection and Order Lot Sizing Modelling: a Review. *Computers and Operations Research, 34*(12), 3516–3540

Akarte, M. et al. (2001). Web Based Casting Supplier Evaluation Using Analytical Hierarchy Process. *Journal of the Operational Research Society, 52*, 511-522.

Akel, A. (2014). *How has "Turkey's Africa Strategy" been Affecting Turkey's Exports to Africa? Evidence from Firm-Level Data for 2003-2012*. Retrieved from https://www.gtap.agecon.purdue.edu/resources/download/7160.pdf

Akgun, B., & Ozkan, M. (2010). Turkey's Opening to Africa. *Journal of Modern African Studies, 48* (4), 525–546.

Alberto, P. (2000). The Logistics of Industrial Location Decisions: an Application of the Analytic Hierarchy Process Methodology. *International Journal of Logistics: Research and Applications, 3*(3), 273–289.

Ameri, A. (2013). Application of the Analytic Hierarchy Process (AHP) for Prioritize of Concrete Pavement. *Global Journal of Human Social Science Interdisciplinary, 13*(3), 19-28.

AU–NEPAD (2010). *African Innovation Outlook 2010. African Union – New Partnership for Africa's Development.* Retrieved from http://www.nepad.org/system/files/June2011_NEPAD_AIO_2010_English.pdf

Babacan, A. (2008). *Speech to the Group of African Countries, New York.* Retrieved from http://africa.mfa.gov.tr/speech-by-h_e_-babaca-to-the-group-of-african-countries-at-the-un_-24-july-2008.en.mfa

Bektaş, S. (2009, Jan. 27). Africa as a Saviour for Turkish firms. *Hurriyet Daily Online.* Retrieved from http://www.hurriyet.com.tr/english/finance/10861936.asp

Beyazıt, M., Oğuz, B., Probability and Statistics for Engineers, Birsen Yayınevi, İstanbul, (1998).

Bilgic, A., & Nascimento, D. (2014). *Turkey's New Focus on Africa: Causes and Challenges. Policy Brief*. Norwegian Peacebuilding Resource Centre. Retrieved from http://www.peacebuilding.no/var/ezflow_site/storage/original/application/04208a7feeefed486e3be192c27f0f40.pdf

Boer L., et al. (2001). A Review of Methods Supporting Supplier Selection. *European Journal of Purchasing and Supply Management, 7*, 75-89.

Bontekoning, Y.M., and Priemus, H., 2004, "Breakthrough innovations in intermodal freight transport", Transportation Planning and Technology, 27(5):335-345

Boyacıoğlu, H., & Güneri, P. (2006). Sağlık Araştırmalarında Kullanılan Temel İstatistik Yöntemler. *Hacettepe Diş Hekimliği Fakülte Dergisi*, *30*(3), 33-39.

Bruno G., et al. (2011). AHP Based Methodologies for Suppliers Selection: A Critical Review. *International Symposium on the Analytic Hierarchy Process*, pp. 1-15.

BTI (2014). *Transformation Index: Country Reports: Algeria, Ghana, Kenya.* Retrieved from http://www.bti-project.org/reports/country-reports/

Büyüközkan, G. et al. (2008). Selection of the Strategic Alliance Partner in Logistics Value Chain. *International Journal of Production Economics, 113*(1), 148–158.

Chan, F., & Chan, H.K. (2004). Development of the Supplier Selection Model – a Case Study in the Advanced Technology Industry. *Journal of Engineering Manufacture, 218*, 1807-1824.

Civan, A. et al. (2013). The Effect of New Turkish Foreign Policy on International Trade. *Insight Turkey, 15*(3), 107-122.

Closs, D.J. (2004). Global Logistics:The Benefits and Challenges. *Logistics Quarterly,10* (2), 13-14.

Crainic, T.G., 2002, "A survey of optimization models for long-haul freight transportation", Handbook of Transportation Science, R.W. Hall (Ed.), 2nd Edition, Kluwer, Kanada.

Çağlayan, Z. (2011). Turkey's Vibrant Export Trends. *Turkish Policy Quarterly, 10* (3), 27-33.

Çakir, E. et al. (2009a). A Method For Selecting Third Party Logistic Service Provider Using Fuzzy AHP. *Journal of Naval Science and Engineering, 5*(3), 38-54 http://www.dho.edu.tr/sayfalar/02_akademik/egitim_programlari/deniz_bilimleri_enstitusu/dergi/04_hakantozan.pdf

Çakir, E. et al. (2009b). A Method For Selectıng Third Party Logistic Service Provider Using Fuzzy AHP. *Journal of Naval Science and Engineering, 5*(3), 38-54.

Çancı M. And Erdal M., 2013, UTIKAD Yayınları, Istanbul.

Çebi F., & Bayraktar, D. (2003). An Integrated Approach for Supplier Selection. *Logistics Information Management, 16*(6), 395-400.

Daily Sabah Business (2015). *No going back for Turkey-Africa Trade*. Retrieved from http://www.dailysabah.com/money/2015/01/21/no-going-back-for-turkeyafrica-trade

Davutoğlu, A. (2013). *Speech on Turkey's Africa Strategy.* Retrieved from http://www.mfa.gov.tr/disisleri-bakani-sayin-ahmet-davutoglu_nun-afrika-stratejileri-sektorel-degerlendirme-toplantisinin-acilisinda-yaptiklari-konusm.tr.mfa

Despodov Z. et al. (2011). Application of the AHP Method for Selection of a Transportation System in Mine Planning. *Underground Mining Engineering, 19*, 93-99

DHL & Technical University Darmstadt (2012). *Logistics Logbook.* Retrieved from https://www.dhl-discoverlogistics.com/cms/flash/#/en/

Divahar, S.R., & Sudhahar, C. (2012). Selection of Reverse Logistics Provider Using AHP. *Procedia Engineering, 38*, 2005–2008.

Doganis, R. (2002). *Flying Off Course - The Economics of International Airlines* (3rd ed.). London: Routledge. ISBN: 978-0-415-21324-0.

Doll A. et al. (2014, August). *Global Logistics Markets.* Roland Berger Strategy Consultants GmbH and Barclays Bank PLC Frankfurt. Retrieved from http://www.rolandberger.at/media/pdf/Roland_Berger_Studie_Global_Logistics_Markets_fin_20140820.pdf

Dong, Z. (2013). The Technical Conditions of Modern Logistics. *Open Journal of Social Sciences, 1*(5), 19-22.

Douma, F., & Kriz, A.K. (2003). Transportation Corridor Planning: a Model and Case Studies. *Humphrey School of Public Affairs, University of Minnesota.* Retrieved from https://goo.gl/TOFeth

DTM (2015). Official Website of the Undersecretary of Turkish Foreign Trade. http://www.dtm.gov.tr

Enwere, C., & Yilmaz, M. (2014, Dec.). Turkey's Strategic Economic Relations with Africa: Trends and Challenges. *Journal of Economics and Political Economy, 1*(2), 216-230

Erbıyık, S. et al. (2012). Retail Store Location Selection Problem with Multiple Analytical Hierarchy Process of Decision Making. An Application in Turkey. *Procedia - Social and Behavioral Sciences, 58*, 1405-1414.

Ernst & Young (2014). *Africa 2014 Attractiveness Survey. Executing Growth.* Retrieved from http://www.ey.com/Publication/vwLUAssets/EY-attractiveness-africa-2014/$FILE/EY-attractiveness-africa-2014.pdf

Ernst & Young, Oxford Economics (2011). *Trading Places. The Emergence of New Patterns of International Trade.* Retrieved from http://emergingmarkets.ey.com/wp-content/uploads/downloads/2011/11/TBF_212__International_trade_white_paper_v24_Low_Res2.pdf

Evotech Company (2014). *Overview and Outlook in Logistics Industry.* Retrieved from http://goldenvalleyco.com/wp-content/uploads/2014/05/GVDI-Logistics-Industry-Analysis-final-version.pdf

FAA (2015), Food and Agricultural Association Statistics. Retrieved from http://www.fao.org/statistics/en/

Forman, E.H., & Gass, S.I. (2001). The Analytic Hierarchy Process – an Exposition. *Journal of Operations Research, 49*(4), 469-487.

Freemantle, S. (2015, May 25). Trade Patterns Underline Africa's Shifting Role. *Business Day.* Retrieved from http://www.bdlive.co.za/opinion/2015/05/25/trade-patterns-underline-africas-shifting-role

García Márquez, F.P., & Lev, B. (2015). *Advanced Business Analytics.* Springer Verlag. ISBN: 978-3-319-11415-6.

Göl, H., & Çatay, B. (2007). Third-Party Logistics Provider Selection: Insights from a Turkish Automotive Company. *Supply Chain Management: An International Journal, 12*(6), 379-384.

Gudehus, T., Kotzab, H. (2009). *Comprehensive Logistics.* Springer-Verlag Berlin Heidelberg. ISBN: 978-3-540-68652-1

Habiyaremye, A., & Oguzlu, T. (2014). Engagement with Africa: Making Sense of Turkey's Approach in the Context of Growing East-West Rivalry. *Uluslararası İlişkiler-International Relations, 11*(44), 65-85.

Hair J., Anderson R., Tatham R., Black W., 1998; Multivariate Data Analysis, USA; Prentice-Hall, Inc.

Harrod, R. (1963). *International Economics* (pp. 5-8). The University of Chicago Press.

Hausmann, R. et al. (2007). What You Export Matters. *Journal of Economic Growth, 12,* 1-25.

Hazar, N. (2000). The Future of Turkish–African Relations. *Dis Politika, 25*(3), 109–110.

Hogg, R.V., and Craig, A.T., Introduction to Mathematical Statistics, MacMillan Publishing Co., Inc., USA, (1978).

Hosmer D., Lemeshov S., 2000, Applied Logistic Regression, New York: John Wiley&Sons.

Hurst, C. (2010). *China's Rare Earth Elements Industry: What Can the West Learn?* Institute for the Analysis of Global Security (IAGS). Retrieved from http://www.iags.org/rareearth0310hurst.pdf

ICC (2010). The Incoterms Rules. Retrieved from http://www.iccwbo.org/products-and-services/trade-facilitation/incoterms-2010/the-incoterms-rules/

IMF (2014). *World Economic Outlook 2014*. International Monetary Fund. Retrieved from http://www.imf.org/external/pubs/ft/weo/2014/02/

International Trade Centre (2012). *Africa's Trade Potential. Export Opportunities in Growth Markets. Technical Paper.* Retrieved from http://www.intracen.org/Africa-trade-potential-Export-opportunities-in-growth-markets/

Jakobczak, D.J. (ed.). (2015). *Analyzing Risk through Probabilistic Modelling in Operations Research.* Business Science Reference, USA: IGI Global. ISBN: 978-1-466-69458-3.

Jing, Z.., & Xue-Fang, X. (2009). The Application of AHP to Evaluate the Influencing Factors in the Logistics Network Distribution of Ningbo. *Second International Conference on Information and Computing Science, 3*, 390-393. ISBN: 978-0-769-53634-7

Kahraman et al. (2003). Multi-Criteria Supplier Selection Using Fuzzy AHP. *Logistics Information Management, 16*(6), 382-394.

Kalaycı, Ş. (2010). *SPSS Uygulamalı Çok Değişkenli İstatistik Teknikleri,5.*Basım, Ankara: Asil Yayın Dağıtım Ltd. Şti.

Karasar, N. (1999). *Bilimsel Araştırma Yöntemleri*, *9*. Basım, Ankara: Nobel Yayıncılık.

Kaya, K., & Warner, J. (2013), Turkey and Africa: a Rising Military Partnership? US Department of Defense, Harvard University, Retrieved from. http://scholar.harvard.edu/files/jasonwarner/files/kaya_and_warner_2013_turkey-africa.pdf

Kaya, K., Warner, J. (2013). *Turkey and Africa: a Rising Military Partnership?* US Department of Defense, Harvard University, Retrieved from. http://scholar.harvard.edu/files/jasonwarner/files/kaya_and_warner_2013_turkey-africa.pdf

Kim et al. (2014). Analysis of the Risks of Overseas Advancement by Logistics Companies Applying AHP. In Park, J. et al. (Eds.), *Future Information Technology* (pp 391-398). Springer Berlin Heidelberg. ISBN: 978-3-642-40860-1

Ko, H.J. (2014). A DSS Approach with Fuzzy AHP to Facilitate International Multimodal Transportation Network. *KMI International Journal of Maritime Affairs and Fisheries*, 51-70. Retrieved from https://goo.gl/RTEXen

Koç, E., Burhan, H.A. (2015). An Application of Analytic Hierarchy Process (AHP) in a Real World Problem of Store Location Selection. *Advances in Management and Applied Economics, 5*(1), 41-50.

KPMG (2011). *Logistics Insights.* KPMG International Cooperative. Retrieved from https://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/transport-logistics-insights.pdf

Kumar, R. (2008). *International Economics.* Excel Books. ISBN: 978-8-174-46648-8

Kuruüzüm, A. & Atsan, N. (2001). Analitik Hiyerarşi Yöntemi ve İşletmecilik Alanındaki Uygulamaları. *Akdeniz Üniversitesi, IIBF Dergisi, 1*, 83-105.

Lamparter, T. (2011). Incoterms 2010. Retrieved from http://goo.gl/sFFaLp

LPI (2011). *Logistics Performance Index*. Retrieved from http://data.worldbank.org/data-catalog/logistics-performance-index

Majumder, M. (2015). *Impact of Urbanisation on Water Storage in Face of Climatic Aberrations* (pp.38-39). Springer Verlag. ISBN: 978-981-4560-72-6.

Mankiw, G. (2003). *Macroeconomics*. Stuttgart: Schafer-Poeschel. ISBN: 978-0-170-10639-9

Masoom, M.A., Umbach, D., and Saleh, A.K.MD.E., Estimating Life Functions of Chi Distribution Using Selected Order Statistics, IIE Transactions, 24, 5, 88-98, 1992.

Mente, M. (2014). *Industrial Exports: Opportunities and Challenges*. Turkish Exporters Assembly.

MFA (2014), Republic of Turkey, Ministry of Foreign Affairs Official Website: http://www.mfa.gov.tr/turkiye-afrika-iliskileri.tr.mfa

MFA (2015), Republic of Turkey, Ministry of Foreign Affairs. *Turkey-Africa Relations.* Retrieved from http://www.mfa.gov.tr/turkey-africa-relations.en.mfa

Monette, D.R., et al. (1990). *Applied Social Research* (2nd ed.). New York: Harcourt School. ISBN: 978-0-030-26293-7.

MTMAC (2011). Republic of Turkey, Ministry of Transport, Maritime Affairs and Communication. Official Website http://www.ubak.gov.tr/

Murray R. Spiegel, Larry J. Stephens, Statistics, Schaum's Outline Series, 3r Edition, ISBN: 978-0070602816 Page: 261-265, 1998.

Nabben, H. (2014). 12 Trends that are Shaping the Future of Logistics. *Supply Chain Digital.* Retrieved from http://www.supplychaindigital.com/logistics/3610/12-Trends-that-are-Shaping-the-Future-of-Logistics#

Narasimhan R. (1983). An Analytical Approach to Supplier Selection. *Journal of Purchasing and Materials Management, 19,* 27-32.

New Vision (2012). *What is Turkey's Interest in Africa?* Retrieved from http://www.newvision.co.ug/news/131-blog-what-is-turkey-s-interest-in-africa.aspx

Neylan, D. (2008. Oct. 9). Turkey Focuses on Africa as it Looks to Diversify EU, Russian Trade. *Today's Zaman Online*, Retrieved from http://www.todayszaman.com/business_turkey-focuses-on-africa-as-it-looks-to-diversify-eu-russian-trade_156307.html

Norman, G. (2010). Likert Scales, Levels of Measurement and the Laws of Statistics. *Advances in Health Sciences Education, 15*(5), 625-632.

Nydick R., Hill R. (1992). Using the Analytic Hierarchy Process to Structure the Supplier Selection Procedure. *Journal of Purchasing and Materials Management, 25*, 1-6.

Nyilas, J. (1982). *World Economy and Its Main Development Tendencies.* Springer Science+Business Media Dordrecht. ISBN 978-94-017-3502-5

OECD & UNDP (2014). *African Economic Outlook 2014. Global Value Chains and Africa's Industrialisation.* African Development Bank Group. Retrieved from http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2014/PDF/E-Book_African_Economic_Outlook_2014.pdf

OECD, Organisation for Economic Cooperation and Development Statistics, Official Website: https://data.oecd.org/

Oyelaran-Oyeyinka, B., & Sampath, P.G. (2007). *Innovation in African Development. Case Studies of Uganda, Tanzania and Kenya.* World Bank Studies. Retrieved from http://info.worldbank.org/etools/docs/library/239730/InnovationInAfricaFinalPaper.pdf

Ozkan, M. (2008). Turkey Discovers Africa: Implications and Prospects. *SETA Foundation for Political, Economic and Social Research, Policy Brief, 22.* Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1434740

Ozkan, M. (2009). Turkiye'nin Afrika Politikasi 2009. In Duran, B., Inat, K., and Muhittin Ataman (eds), *Türk Dış Politikası Yıllığı* (pp. 571–601). SETA.

Ozkan, M. (2010a). What Drives Turkey's Involvement in Africa? *Review of African Political Economy, 37* (126), 533–540.

Ozkan, M. (2010b). Turkey´s Rising Role in Africa. *Turkish Policy Quarterly, 9*(4), 93-105

Ozkan, M. (2011). Turkey's 'New' Engagements in Africa and Asia: Scope, Content and Implications. *Perceptions, 16*(3), 115-137. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1981651

Ozkan, M. (2012). A New Actor or Passer-By? The Political Economy of Turkey's Engagement with Africa. *Journal of Balkan and Near Eastern Studies, 14*(1), 113-133.

Partovi F. et al. (1989). Application of Analytic Hierarchy Process in Operations Management. *International Journal of Operations and Production Management, 10,* 5-19.

Peng, J. (2012). Selection of Logistics Outsourcing Service Suppliers Based on AHP. *Energy Procedia, 17*, 595–601. Retrieved from http://goo.gl/UsNgsp

Perçin, S. (2009). Evaluation of Third-Party Logistics (3PL) Providers by Using a Two-phase AHP and TOPSIS Methodology. *Benchmarking: An International Journal 16*(5), 588-604

Pham, J. (2010). Turkey's Return to Africa. *World Defence Review*. Retrieved from http://worlddefensereview.com/pham052710.shtml

Piantanakulchai, M., & Saengkhao, N. (2003, Oct.). Evaluation of Alternatives in Transportation Planning Using Multi-Stakeholders Multi-Objectives AHP Modelling. *Proceedings of the Eastern Asia Society for Transportation Studies, 4.* Retrieved from https://goo.gl/d4e4EC

Pierre, D., & Stewart, R. (2010). *International Logistics - The Management of International Trade Operations* (3rd ed.). USA: Cengage Learning. ISBN: 978-0-989-49060-3

PMISPA, ISPAT (2013). *The Logistics Industry in Turkey.* Republic of Turkey Prime Ministry Investment Support and Promotion Agency. Retrieved from http://www.invest.gov.tr/en-US/infocenter/publications/Documents/TRANSPORTATION-LOGISTICS-INDUSTRY.pdf

Powers D., Xie Y., 2000; Statistical Methods For Categorical Data Analysis, London: Academic Press.

PwC (2012). *Transportation & Logistics 2030. Volume 5: Winning the Talent Race.* Retrieved from https://www.pwc.com/en_GX/gx/transportation-logistics/pdf/pwc-tl-2030-volume-5.pdf

PwC (2013). *Africa Gearing Up*. Retrieved from http://www.pwc.com/africagearingup

Racunica, I. Ve Wynter, L., 2005, "Optmial location of intermodal freight hubs", Transportation Research, 39:453-477.

Ramanathan, R. (2001, Sep.). A Note on the Use of the Analytic Hierarchy Process for Environmental Impact Assessment. *Journal of Environmental Management, 63*(1), 27-35.

Ramanathan, R., & Ganesh, L. (1995). Using AHP for Resource Allocation Problems. *European Journal of Operational Research, 80*(2), 410–417

Ramberg, J. (2011). *ICC Guide to Incoterms*. International Chamber of Commerce. ISBN 978-9-284-20082-5

Regmi, M., & Hanaoka, S. (2011, Jan.). Application of Analytic Hierarchy Process for Location Analysis of Logistics Centers in Laos. *91st Annual Transportation Research Board Meeting*. Retrieved from http://docs.trb.org/prp/12-0471.pdf

Ress, D.G., Foundations of Statistics, Chapman and Hall, NewYork, 1987.

Riad, N. et al. (2012). *Changing Patterns of Global Trade.* International Monetary Fund. Retrieved from https://www.imf.org/external/pubs/ft/dp/2012/dp1201.pdf

Rudincová, K. (2014). New Player on the Scene: Turkish Engagement in Africa. *Bulletin of Geography. Socio-economic Series, 24*, 197–213. Nicolaus Copernicus University Press.

Rush Sloan, Logistic Regression: The Standart Method of Analysis in Medical Research; http://trinity.edu/departments/mathematics/studpaper/s3.pdf

Saaty, R.W. (1987). The Analytic Hierarchy Process – What It Is and How It Is Used. *Mathematical Modelling, 9*(3-5), 161-176.

Saaty, T. L. **(**1990). *Multicriteria Decision Making: The Analytic Hierarchy Process* (2nd ed.). Pittsburgh: RWS Publications. ISBN: 978-0-962-03172-4.

Saaty, T.L. (1977). A Scaling Method for Priorities in Hierarchical Structures. *Journal of Mathematical Psychology, 15*(3), 234-281.

Saaty, T.L. (1980). *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*. McGraw-Hill, New York. ISBN: 978-0-070-54371-3.

Saaty, T.L. **(**1994**).** *Fundamentals of Decision Making and Priority Theory with the AHP*. Pittsburgh: RWS Publications. ISBN: 978-0-962-03176-2.

Saaty, T.L. (1999, Aug.12-14). *Fundamentals of the Analytic Network Process.* International Symposium on the Analytic Hierarchy Process (ISAHP), Kobe, Japan. Retrieved from http://goo.gl/VCaU7Q

Saaty, T.L. et al. (2012). *Models, Methods, Concepts & Applications of the Analytic Hierarchy Process.* Springer Science+Business Media New York. ISBN: 978-1-461-43597-6.

Saaty, T.L., (2008). Decision Making With the Analytic Hierarchy Process. *International Journal of Services Sciences, 1*(1), 83-98.

Samuelson, P., & Nordhaus, W. (1998). *Economics* (16th ed.). McGraw-Hill Companies. ISBN: 978-0070579477.

Saroha, R. (2014). Green Logistics & Its Significance in Modern Day Systems. *International Review of Applied Engineering Research, 4* (1), 89-92.

Schultz, M. et al. (2002). *International Business: Canada and Global Trade*. Nelson Thomson Learning. ISBN: 978-0-772-52932-9

Shahroodi. K. et al (2012). Application of Analytical Hierarchy Process (AHP) Technique to Evaluate and Select Suppliers in an Effective Supply Chain. *Kuwait Chapter of Arabian Journal of Business and Management Review, 1*(8), 119-132.

Sharma S., 1996: Applied Multivariate Technique, New York: John Wiley&Sons.

Soubbotina, T.P., & Sheram K. (2000). *Beyond Economic Growth: Meeting the Challenges of Global Development* (pp. 66-73). World Bank Publications. Retrieved from http://www.worldbank.org/depweb/beyond/beyond.htm

Subramanian, N., & Ramanathan, R. (2012). A Review of Applications of Analytic Hierarchy Process in Operations Management. *International Journal of Production Economics, 138*, 215–241.

Şeker, M. (2010). *Comparative Advantage of Turkey in International Trade*. Department of Economics, University of Minnesota. Retrieved from http://www.econ.umn.edu/~holmes/class/2007f1101/lec34_Muratslides.pdf

Şit, I. (2012, Dec. 17). *Export Strategy of Turkey*. Republic of Turkey, Ministry of Economy, General Directorate of Exports. Retrieved from http://www.yoikk.gov.tr/dosya/up/IDB/idb2012/ExportStrategy_IclalSIT.pdf

Tahriri, F. et al. (2008). AHP Approach for Supplier Evaluation and Selection in a Steel Manufacturing Company. *Journal of Industrial Engineering and Management, 1*(2), 54-76.

Tansakul, N. et al. (2013). An Analytic Hierarchy Process (AHP) Approach to Evaluate Factors that Influence Cross Border Trade Facilitation: A Case Study of East-West Economic Corridor Route. *10-th International Conference on Service Systems and Service Management*, 857 – 862. ISBN: 978-1-4673-4434-0

Tatlıdil H., 1996; Uygulamalı Çok Değişkenli İstatistik Analiz, Ankara: Cem Web Ofset Ltd. Şti.

Tavana, M. et al. (2016). An Integrated Intuitionistic Fuzzy AHP and SWOT Method for Outsourcing Reverse Logistics. *Applied Soft Computing, 40*, 544-557

Taylor, B.W. (2013). *Introduction to Management Science* (11th ed.). Pearson Education, Prentice Hall Publishing. ISBN: 978-0-13-275191-9

Tepecikliоğlu, E. (2015). *What is Turkey Doing in Africa? African Opening in Turkish Foreign Policy.* Centre for Policy and Research on Turkey. Retrieved from http://researchturkey.org/what-is-turkey-doing-in-africa-african-opening-in-turkish-foreign-policy/

Tepedelen, K. (2008). The Turkish Policy of Opening up to Africa. *Dış Politika, 34,* 100-114. Foreign Policy Institute.

TES (2009). *The Exports Strategy of Turkey for 2023.* Retrieved from http://www.economy.gov.tr/portal/content/conn/UCM/path/Contribution%20Folders/web_en/Home/strategy2023.pdf

The Times Atlas of the World (1999). UK: Times Books. ISBN: 978-0-812-93265-2.

Thirlwall, A.P. (2000). Trade, Trade Liberalisation and Economic Growth: Theory and Evidence. *African Development Bank, Economic Research Papers, 63.* Retrieved from http://213.154.74.164/invenio/record/16222/files/thirlwall.pdf

TIM (2009). *Turkey's 2023 Export Strategy and Sectoral Breakdown.* Turkish Exporters Assembly. Retrieved from http://www.tim.org.tr/files/downloads/2023/2023_english.pdf

TIM (2014). *Innovation Driven Export Growth towards 2023.* Retrieved from http://www.inovalig.com/Content/files/InovaLIG_and_Innovation_Strategy_EN.pdf

TMS (2015). Trade Map Statistics Official Website: http://www.trademap.org/Index.aspx

Today's Zaman Online (2015, Apr. 3). *Half of Turkish Exports Produced, Exported by 15K Foreign Companies.* Retrieved from http://www.todayszaman.com/business_half-of-turkish-exports-produced-exported-by-15k-foreign-companies_377093.html

Triantaphyllou, E., Mann, S.H. (1995). Using the Analytic Hierarchy Process for Decision Making in Engineering Applications: Some Challenges. *International Journal of Industrial Engineering: Applications and Practice, 2*(1), 35-44.

Turkish Review Online (2014, July 1). *Turkey's International Trade: Spotlight on Africa.* Retrieved from http://www.turkishreview.org/microscope/turkey-s-international-trade-spotlight-on-africa_540942

TurkStat (2014). *Turkish Statistical Institute Statistical Bulletin 2014*. Retrieved from http://www.turkstat.gov.tr/PreTabloArama.do?metod=search&araType=hb_x

TurkStat. *Foreign Trade Statistics*: http://www.turkstat.gov.tr/PreTablo.do?alt_id=1046

TurkStat. *Transportation Statistics*: http://www.turkstat.gov.tr/PreTablo.do?alt_id=1051

Tuzkaya, U. R.,& Önüt, S. (2008). A Fuzzy Analytic Network Process Based Approach to Transportation-Mode Selection between Turkey and Germany: A Case Study. *Information Sciences, 178, 3133-3146*

UKTI (2015a). *Doing business in Turkey: Turkey Trade and Export Guide*. UK Trade and Investment. Retrieved from https://www.gov.uk/government/publications/exporting-to-turkey/doing-business-in-turkey-turkey-trade-and-export-guide

UKTI (2015b). *Business Opportunities.* UK Trade and Investment. Retrieved from http://www.businessopportunities.ukti.gov.uk/home.html

UN (2010). *Africa's Cooperation with New and Emerging Development Partners: Options for Africa's Development*. UN Office of the Special Adviser on Africa. Retrieved from http://www.un.org/en/africa/osaa/pdf/pubs/2010emergingeconomies.pdf

UN (2011). *Main Economic Indicators. Africa Fact Sheet.* Retrieved from http://www.oecd.org/investment/investmentfordevelopment/47452483.pdf

UN (2015). Innovation for Development in Southern & Eastern Africa: Challenges for Promoting ST&I Policy. *United Nations University Policy Brief, 1* (1). Retrieved from http://www.merit.unu.edu/wp-content/uploads/2015/02/252608902-Innovation-for-Development-in-Southern-Eastern-Africa-Challenges-for-Promoting-ST-I-Policy.pdf

UN et al. (2013). *African Economic Outlook 2013. Structural Transformation and Natural Resources. Retrieved from* http://www.oecd-library.org/development/african-economic-outlook-2013_aeo-2013-en

UNCTAD (2010). *UNCTAD Handbook of Statistics.* Retrieved from http://unctad.org/en/pages/PublicationArchive.aspx?publicationid=2382

UNCTAD (2013). *World Investment Report 2013*. Retrieved from http://unctad.org/en/PublicationsLibrary/wir2013_en.pdf

UNCTAD (2014). *The Economic Development in Africa. Catalysing Investment for Transformative Growth in Africa.* Retrieved from http://unctad.org/en/PublicationsLibrary/aldcafrica2014_en.pdf

UNCTAD, United Nations Conference on Trade and Development Statistics Official Website: http://unctad.org/en/Pages/Statistics.aspx

UNDESA (2004). *World Population to 2300 Report*. United Nations Department of Economic and Social Affairs Population Division. Retrieved from http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf

UNDP (2014). *Human Development Reports*. United Nations Development Programme. Retrieved from http://hdr.undp.org/en

Vaidya, O., & Kumar, S. (2006). Analytic Hierarchy Process: An Overview of Applications. *European Journal of Operational Research, 169*, 1-29.

Verma, D., & Pateriya, A. (2013). Supplier Selection through Analytical Hierarchy Process: a Case Study in a Small Scale Manufacturing Organization. *International Journal of Engineering Trends and Technology, 4*(5), 1428-1433.

Vickers, B. (2011). *Africa and International Trade: Challenges and Opportunities.* International Trade and Economic Development (ITED) Division Department of Trade and Industry South Africa. Retrieved from http://www.unisa.ac.za/contents/colleges/docs/TMALI-Trade-Presentation-Vickers.pdf

Vicky, A. (2011, May 8). Turkey Moves into Africa. *Le Monde Diplomatique*. Retrieved from http://mondediplo.com/2011/05/08turkey

Vijayasri, G. V. (2013). The Importance of International Trade in the World. *International Journal of Marketing, Financial Services & Management Research, Vol.2* (9), 111-119.

Weber, C. et al. (1991). Vendor Selection Criteria and Methods. *European Journal of Operational Research, 50*, 2-18.

Wind, Y., & Saaty, T.L. (1980). Marketing Applications of the Analytic Hierarchy Process. *Management Science, 26*(7), 641-658.

World Bank & World Economic Forum (2013). *The Africa Competitiveness Report.* Retrieved from http://www.worldbank.org/content/dam/Worldbank/document/Africa/Report/africa-competitiveness-report-2013-main-report-web.pdf

World Bank (2007). *Global Economic Prospects – Managing the Next Wave of Globalization.* World Bank Publishing. Retrieved from http://goo.gl/tJzhSm

World Bank (2013). *World Development Indicators.* The World Bank. Retrieved from http://databank.worldbank.org/data/download/WDI-2013-ebook.pdf

World Bank (2014a). *Prosperity for All. Ending Extreme Poverty*. Retrieved from http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1327948020811/8401693-1397074077765/Prosperity_for_All_Final_2014.pdf

World Bank (2014b). *Trading up to High Income. Turkey Country Economic Memorandum, Report No. 82307-TR.* Retrieved from http://goo.gl/0ROc14

World Bank (2015). *Doing Business 2015. Going Beyond Efficiency*: *Comparing Business Regulations for domestic firms in 189 Economies. Flagship Report*. International Bank for Reconstruction and Development. Retrieved from http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Annual-Reports/English/DB15-Full-Report.pdf

WTO (2014). *World Trade Report 2014. Trade and Development: Recent Trends and the Role of the World Trade Organisation*. Retrieved from https://goo.gl/vkvhLy

Wu, W. et al. (2009). The Analytic Network Process for Partner Selection Criteria in Strategic Alliances. *Expert Systems with Applications, 36*(3), 4646–4653.

YASED, International Investors Association Official Website: http://www.yased.org.tr/webportal/English/Pages/MainPage.aspx

Ye, H., & Wu, J. (2014). Selection of a Logistics Service Provider Based on Analytic Hierarchy Process (AHP) Approach. Retrieved from http://goo.gl/xl9PDl

Ying, Y. (2012). The Study on Logistics Supplier Management based on Analytic Hierarchy Process and Information Entropy. *International Journal of Advancements in Computing Technology, 4*(21), 254-261.

Yurimoto, S., & Masui, T. (1995). Design of a Decision Support System for Overseas Plant Location in the EC. *International Journal of Production Economics, 41*(1-3), 411-418.

Zhang, Y., & Feng Y. (2007). A Selection Approach of Reverse Logistics Provider Based on Fuzzy AHP. *Fourth International Conference on Fuzzy Systems and Knowledge Discovery,* 479–482.

9. APPENDICES

Appendix A: Questionnaire for Data Collection

COMPANY:……
RELATED PERSON:..……..
CITY: ……. TEL: ……. WEB:…….
e-MAIL: …….……..... DATE: ….. /….. / ……..

Section-I: Company Information

1. Operating years of your company?
0-3 years ( ) 4-7 years ( ) 8-11 years ( ) 12-15 years ( ) 16 years and more ( )
2. Experience in foreign trade?
0-3 years ( ) 4-7 years ( ) 8-11 years ( ) 12-15 years ( ) 16 years and more ( )
3. Experience in foreign trade in Africa?
0-3 years ( ) 4-7 years ( ) 8-11 years ( ) 12-15 years ( ) 16 years and more ( )
4. Your position in company?
Owner ( ) Export Marketing Manager ( ) Export Marketing Supervisor ( )
Other ( ) (Please specify):……
5. Product group exported the most to African countries?
Machinery and automobile ( ) Textiles andapparel ( ) Iron and Steel ( )
Wooden products ( ) Other ( ) (Please Specify):……
6. Country you exported the most in Africa?
Algeria ( ) Morocco ( ) Nigeria ( ) Ghana ( )
Ivory Coast ( ) Kenya ( ) Other ( ) (Please Specify):…….
7. Percentage of your export to Africa, to total export?
0%-15% ( ) 16%-40% ( ) 41%-65% ( ) 66% and above ( )
8. Which transportation method do you use when you export to Africa most?
Maritime ( ) Air ( ) Mix ( ) Other ( ) (Please Specify):……
9. Which of the 6 hinterlands of Turkey do you use the most in your export to Africa?
İstanbul ( ) Bursa ( ) İzmir ( ) Konya ( ) Kayseri ( ) Gaziantep ( )
Other ( ) (Please Specify):…….
10.Which of the ports you use when you export to Africa?
İstanbul Port ( ) İzmir Port ( )
Mersin Port ( ) İstanbul Atatürk Air Port ( )
Other ( ) (Please Specify):…….
11. What kind of container do you use the most when you export to Africa via maritime?
20” DC ( ) 40” DC ( ) HC ( ) OpenTop ( )
Other ( ) (Please Specify):…….
No maritime ( )
12. Please specify the distance between the first exit point of product and the port?
100 km and less ( ) 101 km - 200 km ( ) 201 km - 300 km ( )
301 km - 400 km ( ) 401 km - 500 km ( ) 501 km and above ( )
13. Who is the provider of the after sale services when you export to Africa?
Seller Firm ( ) Buyer Firm ( ) Out Source (3PL, Forwarder)
Other ( ) (Please Specify):……
14. Which Logistics services are provided in after sales services when export to Africa?
Customs Clearance ( ) International Transportation( ) Warehousing ( )
Customs Clearance ve International Transportation ( )
Customs Clearanceand Warehousing ( )
Customs Clearance, international transportation and warehousing ( )
Other ( ) (Please Specify):…….

15. What is the annual revenue(in Million USD) you have from the country you exported the most in Africa.
0-1 ( ) 2-5 ( ) 6-10 ( ) 10+ ( )
16. Who owns the products you exported to Africa?
Own firm ( ) Other firms ( )
Own firm, and other firms as well ( )
Sometimes own firm, sometimes others ( )
17.What is the most common process you follow when the products you exported to Africa are damaged or wrong?
Back order ( ) Paying the product amount back ( ) Change of product ( )
Write-off the product ( ) Other ( ) (Please Specify):…….…….
18. Which of the delivery methods below do you use when you export to Africa?
Ex-works( ) FOB(AfricaPort) ( ) CIF(Door Delivery) ( )
Other ( ) (Please Specify): ……..
19. What is your delivery point when you export to African countries?
Free Trade Area ( ) Port ( ) Customs ( )
Other ( ) (Please Specify): …….
20. What is the most common agreement model you have in your trade to Africa?
Logistics Agreement ( ) Trade Agreement ( ) FinanceAgreement ( )
Other ( ) (Please Specify): ……

Section-II: Please specify the importance level of 7 criterias that can be effective when you export to Africa.
1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

	Level of Importance				
Criteria	**1**	**2**	**3**	**4**	**5**
Product features					
Reliability					
Speed					
Traceability					
Cost					
Security					
Risks					
Other(Please Specify:……..)					
Other(Please Specify:…..……)					

Section-III: Please specify the importance level of the sub features of Product features when you export to Africa.
1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

	Importance Level				
Product Sub-features	**1**	**2**	**3**	**4**	**5**
Volume					
Weight					

Product Value					
Packaging features					
Insurance necessities					
Stacking Features					
Product sensitivity					
Transportation features					
Product Life					
After sales services need					
Reverse logistics need					
Other(Please Specify:……..)					
Other(Please Specify:……..)					
Other(Please Specify:……..)					

Section-IV: Please specifythe importance level of sub-features of reliability when you export to Africa.

1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

Reliability sub-features	**Importance Levels**				
	1	**2**	**3**	**4**	**5**
Timely Deliveries					
Implementation of transportation tariffs					
Responsibility on delays					
Other(Please Specify:……..)					
Other(Please Specify:……..)					

Section-V: Please specifythe importance level of sub-features of Speed when you export to Africa.

1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

Speed Sub- Features	**Importance Levels**				
	1	**2**	**3**	**4**	**5**
Transportation distances					
Transportation Times					
Transportation Speed					
Time Spended on Transmission					
Other(Please Specify:……..)					
Other(Please Specify:……..)					

Section-VI: Please specify the importance level of sub-features of Traceability when you export to Africa.

1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

Sub-Features of Traceability	Importance Levels				
	1	2	3	4	5
Traceability of load and vehicle					
Traceability of transporting device					
Traceability of documents					
Other(Please Specify:……..)					

Section-VII: Please specify the importance level of sub-features of Cost when you export to Africa.

1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

Sub-Features of Cost	Importance Levels				
	1	2	3	4	5
Transportation Costs					
Handling and Packaging Costs					
Warehouse and Transmission point, processing costs					
Warehouse and Transmission point, investment costs					
Communication and information costs					
Wastage Costs					
Delaying Costs					
Other(Please Specify:……..)					

Section-VIII: Pls specify the importance level of sub-features of Security when you export to Africa.

1: Not important at all 2: Not important 3: Slightly important
4: Important 5: Very important

Security Sub-Features	Importance Levels				
	1	2	3	4	5
Product damaging possibility					
Thief possibility					
Diversity of Accident causes					
Lost Product Rate					
Other(Please Specify:……..)					
Other(Please Specify:……..)					

Appendix B: Participating Companies

TURKISH AFRICAN EXPORTER COMPANIES THAT PARTICIPATED TO PUBLIC SURVEY

NO	COMPANY NAME	LOCATION	RELATED PERSON	Area Code	TEL	E-MAIL	WEB
			1. İSTANBUL				
1	ARDA GROUP	ISTANBUL	Mr. Oğuz ŞEN	212	447 38 43	executiveassistant@ardagrup.com	www.ardagrup.com
2	ATMACA ELECTRONIC	ISTANBUL	Mr. Alper GÜLER	212	412 12 12	alpergurel@atmaca.com.tr	www.sunny.com.tr
3	BATA FURNITURE	ISTANBUL	Mr. Sina Sıtkı AKIN	212	220 42 20	sinaakin@b-t.com.tr	www.b-t.com.tr
4	KALE LOCK & MOULD	ISTANBUL	Mr. Cem KIZILTAN	212	705 80 00	ckiziltan@kaletrade.com	www.kalekilit.com.tr
5	KANAT STEEL	ISTANBUL	Mr. Kerem BOZDAŞ	212	671 38 38	info@kanatcelik.com	www.kanatcelik.com
6	METALICA OFFICE FURNITURE	ISTANBUL	Mr. Gökalim A. ORAL	212	615 31 17	gokalim@metalica.com.tr	www.metalica.com.tr
7	ÖZYAŞAR WIRE	ISTANBUL	Mr. Ismail E. AKBAŞ	212	735 25 78	ismailemre.akbas@ozyasar.com.tr	www.ozyasar.com.tr
8	POWER ELECTRONIC	ISTANBUL	Mrs. Neslihan KASAP	216	481 66 99	export@powerelektronik.com.tr	www.powerelektronik.com
9	TUNAYLAR SCALES	ISTANBUL	Mr. Ahmet ÖZHİNDİ	212	886 39 00	Ahmet@tunaylar.com	www.tunaylar.com
10	TURKKEN FOREIGN TRADE	ISTANBUL	Mr. Sait YAZICI	544	337 19 58	info@turkken.com	www.turkken.com
11	UNIPACK PACKINGS	ISTANBUL	Mr. Tolga TIRPANOĞLU	212	422 42 33	info@unipackambalaj.com	www.unipackambalaj.com
12	AKYUZ PLASTIC	ISTANBUL	Mr. Murat AKYÜZ	212	612 94 00	murat@akyuz.com.tr	www.akyuz.com.tr
13	POŞETSAN PACKINGS	TEKIRDAG	Mrs. Eda YAKAN	282	758 20 02	edayakan@posetsan.com	www.posetsan.com
14	PEYBA LTD.	KOCAELI	Mr. Murat MADEN	262	643 90 70	murat.maden@yoregroup.com	www.peyba.com.tr
15	FROW AUTOMOTIVE	ISTANBUL	Mr. Tamer ERKUŞ	216	621 00 50	t.erkus@frow.com.tr	www.frow.com.tr
16	ACP CONSULTANCY	ISTANBUL	Mr. Selim Serhat ÖZDİNÇ	216	355 05 61	info@acptrade.com	www.acptrade.com
17	ORTAKLAR CAMP EQUIPMENTS	ISTANBUL	Mr. Eflatun DEMIRCI	532	414 43 75	eflatun@orgaz.com.tr	www.orgaz.com.tr
18	SISTEM TECHNIC MACHINERY	ISTANBUL	Mr. Ali GÜRSES	212	222 23 45	info@electron.com.tr	www.electron.com.tr
19	KASPA FOREIGN TRADE	ISTANBUL	Mr. Mehmet CETINDERE	216	527 15 27	mcetindere@kas.com.tr	www.kas.com.tr
20	TEZPA AUTOMOTIVE	ISTANBUL	Mr. Zahit GÜLMEN	212	278 78 68	tezpa@tezpa.com	www.tezpa.com
21	SRP SPARE PARTS	ISTANBUL	Mrs. Zeynep AYDIN	212	671 07 77	info@srp.com.tr	www.srp.com.tr
22	ASEM AGRICULTURE	ISTANBUL	Mrs. Nefise LOCKYER	216	661 58 88	info@asemtarim.com	www.asemtarim.com
23	ARSAN CHEMISTRY	ISTANBUL	Mr. Mesut KÖMÜRCÜ	553	313 33 01	mesut@arsankimya.com	www.ultracompact.com.tr
24	ALDORA BATHROOM	ISTANBUL	Mr. Atılay YILMAZ	212	640 16 25	atilay@aldorabanyo.com	www.aldorabanyo.com
25	ÇELİK GRANÜL SAN. AS.	ISTANBUL	Mr. Nejat OKTAR	212	771 45 55	info@celikgranul.com	www.celikgranul.com
26	DORTEL AUTOMOTIVE	ISTANBUL	Mr. Ömer YAŞA	212	632 71 65	yakupyasa@hotmail.com	www.dorteloto.com.tr

27	KADA RADIATOR CORP.	ISTANBUL	Mr. Cem Nuri APAK	212	657 97 70	info@kadaradiator.com	www.kadaradiator.com
28	AJK FOREIGN TRADE	ISTANBUL	Mr. Şafak ŞAKACIOĞLU	212	715 02 06	info@ay-san.com	www.ay-san.com
29	VEFA HOLDING - CONTAINER	ISTANBUL	Mr. Yaşar CESUR	530	834 96 54	yasarcesur@vefa.com	www.vefa.com
30	EKU BRAKE	KOCAELI	Mr. Özgür TURAN	262	658 10 01	gagirbas@eku.com.tr	www.eku.com.tr
31	OTOKAM AUTOMOTIVE	ISTANBUL	Mr. Engin COŞGUN	212	671 67 77	engin.cosgun@otokam.com.tr	www.otokam.com.tr
32	RAN AUTOMOTIVE	ISTANBUL	Mr. Yunus ÇANKAYA	212	489 12 50	ersin.handere@rantota.com	www.enfekgroup.com
33	STAHL CHEMISTRY	ISTANBUL	Mr. Yusuf ÖZÇOMAK	216	394 88 86	stahl.kimya@stahl.com	www.stahlkimya.com
34	TEK AUTOMOTIVE	ISTANBUL	Mr. Aytaç YILMAZ	212	549 83 10	cihanoto@vekport.com.tr	www.vekport.com.tr
35	TORNADO MACHINERY	ISTANBUL	Mrs. Şengül OLGUNSOY	212	671 88 00	sengulolgunsoy@tornado.com	www.tornado.com
36	EMIKS AUTOMOTIVE	ISTANBUL	Mr. Saad ZAINVELDIN	216	466 75 96	info@imeksotomotiv.com.tr	www.imeksotomotiv.com.tr
37	FORMPART AUTOMOTIVE	ISTANBUL	Mr. Mehmet KÜÇÜKTURAN	216	499 24 04	export@formpart.com.tr	www.formpart.com.tr
38	ASIA KIMICA CHEMISTRY	ISTANBUL	Mr. İbrahim KIRT	216	504 18 98	info@asiakimica.com	www.asiakimica.com
39	İLKERLER AUTOMOTIVE	ISTANBUL	Mrs. Damla KAKIZ	212	576 80 80	info@ilkerler.com	www.ilkerler.com
40	ASIN AUTOM. COMPUTER SYS.	ISTANBUL	Mr. Akif PINAR	212	473 49 49	info@motorasin.com.tr	www.motorasin.com.tr
41	VHS WINDOW	ISTANBUL	Mr. Baki LOKUMCU	212	734 38 55	info@vhs.com.tr	www.vhs.com.tr
42	GUNDOGAN CONSTRUCTION	KOCAELI	Mr. Abdullah ALTINTAŞ	532	673 00 63	info@gundogancelik.com	www.gundogancelik.com
43	YUNISCO SPARE PARTS	ISTANBUL	Mrs. Arzu ÜNAL	212	248 58 58	younes@yunisco.com	www.yunisco.com
44	YÜCE PLASTIC	ISTANBUL	Mr. Merve ALTAY	212	544 71 36	yuce@yuceplastik.com	www.yuceplastik.com
45	AYDIN AUTOMOTIVE	ISTANBUL	Mr. Ümit DOĞAN	216	320 59 00	info@aydinotomobil.com	www.aydinotomobil.com
46	SARA FOREIGN TRADE	ISTANBUL	Mr. Mustafa KARAKILIÇ	212	522 80 73	saradisticaret@saradisticaret.com.tr	www.saradisticaret.com.tr
47	MTC METAL	ISTANBUL	Mrs. Öznur BULUT	216	410 31 40	oznurbulut@mtcmetal.com	www.mtcmetal.com
48	SAHAN FOREIGN TRADE	ISTANBUL	Mr. Yusuf OSMAN	212	632 46 91	sahanexport@sahanexport.com	www.sahanexport.com
49	CAGIN OFFICE FURNITURE	ISTANBUL	Mr. Murat SARI	216	675 12 62	cagin@caginburo.com	www.caginburo.com
50	KARMAK MACHINERY	ISTANBUL	Mr. Hüseyin BOZKURT	212	670 37 37	karmak@kar-mak.com	www.kar-mak.com
51	REPKON MACHINERY	ISTANBUL	Mr. Hakan ALBAYRAK	216	739 59 06	hakanalbayrak@repkon.com.tr	www.repkon.com.tr
52	SAES MACHINERY	KOCAELI	Mr. Ali GÜLKANAT	262	751 46 51	info@saesmakina.com	www.saesmakina.com
53	ELKON CONCRETE MACHINERY	ISTANBUL	Mr. Mustafa ALAPAGUT	212	288 96 33	info@elkon.com	www.elkon.com
54	PARTLAND AUTOMOTIVE	ISTANBUL	Mr. Engin COŞAR	212	530 04 37	info@partlandauto.com	www.partlandauto.com
55	KAPTAN IRON AND STEEL	TEKIRDAG	Mr. Fatih DEĞİRMENCİ	282	675 13 14	fd@kaptandemir.com.tr	www.kaptandemir.com.tr
56	ALARKO CARRIER	KOCAELI	Mrs. Gülnur TURANLI	262	648 63 47	gulnur.turanli@alarko-carrier.com.tr	www.alarko-carrier.com.tr
57	POLIFORM METAL	KOCAELI	Mrs. Gamze ÖZDEMİR	262	751 32 55	gamze@poliform.com	www.poliform.com
58	KORMAS ELECTRIC MACHINERY	KOCAELI	Mr. Bülent GÜVENAL	262	658 21 40	sales@kormas.com	www.kormas.com
59	KARMOD PREFABRİK YAPI	ISTANBUL	Mr. Ömer BIKMAZ	216	304 06 87	omer@karmod.com	www.karmod.com
60	TUTKUNLAR INDUSTRIAL	ISTANBUL	Mr. Muhammed ESSADET	507	824 87 21	essadet@tutkunlar.com.tr	www.tutkunlar.com.tr
61	BATI AUTOMOTIVE	ISTANBUL	Mr. Tolga KARDEŞ	212	671 75 53	tolga@batiotomotiv.com	www.batiotomotiv.com

62	LIDER COZMETIC	KOCAELI	Mr. Hakan ALIŞKAN	262	754 78 54	info@liderkozmetik.com	www.liderkozmetik.com
63	MATSAN FOREIGN TRADE	KOCAELI	Mr. Hakan KOÇEL	262	751 33 83	matsan@matsanas.com	www.matsanas.com
64	MOTUS AUTOMOTIVE	ISTANBUL	Mr. Salim ERGEN	530	405 61 20	info@motusdokum.com	www.motusdokum.com
65	HALAS CONSTRUCTION	ISTANBUL	Mr. Şükrü TOPRAK	216	451 21 27	info@halasiskele.com	www.halasiskele.com
66	TUERK MACHINERY	ISTANBUL	Mrs. Emine GEDIMAN	216	517 10 86	tuerk@tuerkgrup.com	www.tuerkgrup.com
67	NORM MACHINERY SPARE PAR.	ISTANBUL	Mr. Celal TAŞKIRAN	216	481 88 64	norm@norm.com.tr	www.norm.com.tr
68	EMSA GLASS MACHINERY	ISTANBUL	Mr. Yaşar SABANCI	216	377 49 29	info@emsacammakina.com	www.emsacammakina.com
69	CVS MACHINERY	KOCAELI	Mr. Vedat ÇALIŞ	262	759 15 05	info@cvs.com.tr	www.cvs.com.tr
70	SIGNAL CABLO LTD.	TEKIRDAG	Mr. Mustafa YILDIZ	282	652 62 30	export@signalcable.com.tr	www.signalcable.com.tr
71	VATAN MACHINERY	ISTANBUL	Mr. Nail UMAR	216	364 34 19	info@vatanmakina.com.tr	www.vatanmakina.com.tr
72	MUTLU ACUMULATOR	ISTANBUL	Mrs. Eser BERBER	216	304 15 90	export@mutlu.com.tr	www.mutlu.com.tr
73	GOODYEAR TYRE	ISTANBUL	Mr. Aydın YALÇINKAYA	212	329 50 00	aydin.yalcinkaya@goodyear.com	www.goodyear.com
74	BRIDGESTONE	ISTANBUL	Mr. Fırat ÜSTÜN	216	544 35 00	f.ustun@bridgestone.com.tr	www.bridgestone.com.tr
75	INCI DENTAL	ISTANBUL	Mr. Mustafa DEMİR	212	632 63 45	info@incidental.com.tr	www.armadis.com.tr
76	ISTANBUL LOCK SYSTEMS	ISTANBUL	Mr. Mustafa ÇELİKLER	216	444 01 47	info@korkmaz.com.tr	www.korkmaz.com.tr
77	ÖZTREYLER STEEL	KOCAELI	Mr. Burak ŞAHİN	262	751 50 30	bsahin@oztreyler.com.tr	www.oztreyler.com.tr
78	KALEKIM CHEMISTRY	ISTANBUL	Mr. Ali KIRAN	212	423 00 18	info@kalekim.com.tr	www.kalekim.com.tr
79	MERLUX AUTOMOTIVE	ISTANBUL	Mrs. Gülten ARSLAN	212	674 83 46	export@cmsmachine.com	www.cmsmachine.com
80	GEDIK WELDING	ISTANBUL	Mr. Üstün YILMAZER	216	378 50 00	gedik@gedik.com.tr	www.gedik.com.tr
81	SAHRA CABLE	ISTANBUL	Mr. İbrahim GÜLENYÜZ	216	634 10 23	ibrahim@sahrakablo.com	www.sahrakablo.com
82	BIRAY WATER PURIFICATION	KOCAELI	Mrs. Nidan Nur ZALOĞLU	262	641 65 59	nidazaloglu@biraygroup.com	www.biraygroup.com
83	PAPATYA FURNITURE	ISTANBUL	Mr. Ismail KILIÇ	212	698 90 50	ismailkiliç@papatya.com.tr	www.papatya.com.tr
84	AVAR ALIMINIUM	ISTANBUL	Mr. Emre AVAR	212	601 00 71	info@avaryapi.com	www.avaryapi.com
85	BEKAP METAL	ISTANBUL	Mrs. Yeşim ÖZAY	216	623 11 48	info@bekap.com	www.bekap.com
86	OZGUR TRACTOR	ISTANBUL	Mr. Cemal YILDIZ	216	661 36 36	info@ozgur.com	www.ozgur.com
87	TEZGULLER MACHINERY	ISTANBUL	Mr. Yusuf YİĞİTER	216	364 21 03	info@tezguller.com.tr	www.tezguller.com.tr

2. BURSA

88	ÇİLEK FURNITURE	BURSA	Mr. Metin GÜLER	224	721 28 66	metin.guler@cilek.com	www.cilek.com
89	IBRAHIM KOSE AUTOMOTIVE	BILECIK	Mr. Ibrahim KÖSE	228	314 14 00	info@kiogrup.com	www.kiogrup.com
90	KOMURHAN TEXTILE	BURSA	Mr. Yavuz TIRYAKI	224	342 65 26	yavuztiryaki@komurhantekstil.com	www.komurhantekstil.com
91	ATS AUTOMOTIVE	BURSA	Mr. Atilla ALBAĞ	224	215 65 19	info@atskilit.com	www.atskilit.com
92	SEVIM GLASS LTD.	BURSA	Mr. Coskun SEVİM	224	215 84 85	coskun.sevim@sevimcam.com	www.sevimcam.com
93	MEHMET EREN AUTOMOTIVE	BURSA	Mr. Mustafa SÜLOĞLU	224	367 17 38	info@mksparts.com	www.mksparts.com

94	ORJIN AUTOMOTIVE	BURSA	Mrs. Nurdan KAYGISIZ	224	483 49 49	info@orjinautomotive.com	www.orjinautomotive.com
95	FKK AUTOMOTIVE	BURSA	Mr. Hikmet SEVENER	224	441 27 19	info@fkk.com.tr	www.fkk.com.tr
96	ICF ISI CİHAZLARI	ESKISEHIR	Mr. Özgün SEYMEN	222	236 01 70	ozgun@icf.com.tr	www.ozgun.com.tr
97	AKYAPAK METAL PROCESSING	BURSA	Mr. Erdinç DİNÇ	224	280 75 60	erdinç@akyapak.com.tr	www.akyapak.com.tr
98	OMTEC AUTOMOTIVE	BURSA	Mr. Erman CİCE	224	261 13 63	e.cice@omtec.com.tr	www.omtec.com.tr
99	CIG AUTOMOTIVE	BURSA	Mr. Mustafa KARAATLI	224	351 18 36	m.karaatli@ethel.com.tr	www.ethel.com.tr
100	OZ OTOSAN MIRROR	BURSA	Mrs. Gözde VİDİN	224	493 24 51	gozde@ozotosan.com.tr	www.ozotosan.com.tr
101	DOSEMENLER AGRICULTURE	BALIKESIR	Mr. Ahmet BOSUT	266	626 10 50	info@dosemenler.com	www.dosemenler.com
102	TINAZ AGRICULTURE	BALIKESIR	Mr. Cumhur HUNUMA	266	241 21 39	info@tinaztarim.com	www.tinaztarim.com
103	HISARLAR AGRI. MACHINERY	ESKISEHIR	Mr. Mustafa ERKAR	222	411 24 30	mustafaerkara@hisarlar.com.tr	www.hisarlar.com.tr
104	JMS WHEEL	ESKISEHIR	Mr. Çınar Özhan ÖZCAN	222	236 00 36	ozcan@jamak.com.tr	www.jamak.com.tr
105	BILGIC MOULD CORP.	BURSA	Mr. Yaşar KÖKLÜ	224	410 00 35	info@bilgickalip.com.tr	www.bilgickalip.com.tr
106	BUROSIT OFFICE FURNITURE	BURSA	Mr. Vahit TÜRKÖZ	224	280 20 00	vahit.turkoz@burosit.com	www.burosit.com
107	SEGER ELECTRIC - ELECTRONIC	BURSA	Mrs. Ayşe Nida FİDAN	224	261 03 11	seger@sim.net.tr	www.seger.com
108	KRB AUTOMOTIVE LTD.	BURSA	Mr. Tarık YAPARLI	224	482 26 75	export@boduroglu.com	www.boduroglu.com
109	GRAMMER SEATS CORP.	BURSA	Mr. Haydar ÜÇÜNCÜOĞLU	224	219 30 00	haydar.ucuncuoglu@grammer.com	www.grammer.com
			3. İZMİR				
110	AKAL EXPORT IMPORT	IZMIR	Mr. Akın ÇIĞIRGİL	232	471 15 13	info@akaltrade.com	www.akaltrade.com
111	AKUAKARE WATER EQUIPMENT	MUGLA	Mr. Hüseyin EK	252	513 64 37	info@akuakare.com	www.akuakare.com
112	FDR AUTOMOTIVE	IZMIR	Mr. Fatih ALICIOĞLU	232	479 11 15	fatih@fdrfuelpump.com	www.fdrfuelpump.com
113	GEMAS ENGINEERING	IZMIR	Mr. Deniz USTUNES	232	799 03 33	info@gemas.com.tr	www.gemas.com.tr
114	EGE PROFILE CORP.	IZMIR	Mr. Ulas MOLLAOSMAN	232	398 98 98	ulas.mollaosmanoglu@deceuninck.com	www.deceuninck.com
115	ÖZTEKNİK CORP.	IZMIR	Mr. Murat FİDAN	533	035 17 47	murat@ozteknikoto.com	www.ozteknikoto.com
116	CANDAN FOREIGN TRADE	DENIZLI	Mr. Yusuf CANDAN	258	371 15 50	cdscandan20@hotmail.com	N/A
117	ISIGUN MEDICAL CORP.	IZMIR	Mr. Onur KEBUDE	232	458 78 58	info@promekmedical.com	www.promekmedical.com
118	ARISCO INDUSTRIAL KITCHEN	IZMIR	Mr. Can GÖZEGİR	232	328 35 19	izmirsts@cozummutfak.com	www.cozummutfak.com
119	YILDIZPEN PLASTIC	IZMIR	Mr. Anıl KILINÇ	232	328 03 40	export@yildizpen.com	www.yildizpen.com
120	EFE INDUSTRY	IZMIR	Mrs. Müge ÖNDER	232	877 01 82	export@efe.com.tr	www.efe.com.tr
121	IZMIR IRON AND STEEL	IZMIR	Mr. Tanju AVCI	232	441 50 50	tavci@izdemir.com.tr	www.izdemir.com.tr
122	BWF ENVIROTEC	IZMIR	Mrs. Gönül ÇIRAK	232	853 73 40	gonul.cirak@bwf-envirotech.com.tr	www.bwf-envirotech.com
123	ATP AUTOMOTIVE	IZMIR	Mrs. Burcu SAYGILI	232	375 46 21	info@atpdiesel.com	www.atpdiesel.com
124	ISONEM CONSTRUCTION	IZMIR	Mr. Merih KEMAH	232	799 04 95	export@isonem.com	www.isonem.com
125	NOYA VERA FOREIGN TRADE	IZMIR	Mrs. Cansel ERDOĞAN	232	446 74 54	cansel.erdogan@noyavera.com	www.noyavera.com

126	TEZKAR FURNITURE	IZMIR	Mr. Hasan TEZEL	232	237 55 98	hasantezel@vespero.com	www.vespero.com
127	OZKAN IRON & STEEL	IZMIR	Mr. Halit KARABAL	232	625 15 15	info@ozkansteel.com	www.ozkansteel.com
			4. KONYA				
128	HIDROMAS	KONYA	Mr. M. Yaşar GÜL	332	239 08 52	hidromas@hidromas.com	www.hidromas.com
129	ÖZGÜL TRAILER	KONYA	Mr. Mehmet ÖZGÜL	332	444 13 60	info@ozgul.com.tr	www.ozgul.com.tr
130	UTEST TEST EQUIPMENTS	ANKARA	Mrs. Canan AKSU	312	394 38 75	info@utest.com.tr	www.utest.com.tr
131	KONPAR FOREIGN TRADE	KONYA	Mr. Arif KILIÇ	332	342 73 94	iletisim@n-part.com	www.n-part.com
132	KAHVECI AUTOMOTIVE	KONYA	Mrs. Kadriye SARIBAS	332	239 14 00	kahveci@kahveci.com.tr	www.kahveci.com.tr
133	DAFE FOREIGN TRADE	KONYA	Mr. Ramazan BILDIRIR	332	444 13 60	ozgul@ozgul.com.tr	www.ozgul.com.tr
134	KAMSA AUTOMOTIVE	KONYA	Mr. Yusuf EKER	332	239 04 37	info@kamsa.com.tr	www.kamsa.com.tr
135	ALP AUTOMOTIVE	ANKARA	Mr. Nevzat MAZMANOĞLU	312	385 18 56	sales@alpautomotive.com	www.alpautomotive.com
136	OZKAPTAN SPARE PARTS	KONYA	Mr. Sinan ÖZER	332	249 58 58	yeniozkaptan@ozkaptan.com	www.ozkaptan.com
137	AZIMKAR AUTOMOTIVE	KONYA	Mr. Ahmet DİKİCİ	332	236 96 60	info@aeks-azimkar.com	www.aeks-azimkar.com
138	TEVFIK OZEL AUTOMOTIVE	KONYA	Mr. Esat ÖZEL	332	249 20 24	info@sampa.com.tr	www.sampa.com.tr
139	DELTA WINDMILL	KONYA	Mr. Bilgen DÜNDAR	332	238 04 01	bilgen@deltamilling.com	www.deltamilling.com
140	ARCEK CONSTRUCTION	KONYA	Mrs. Nurdan IŞIK	332	238 99 91	arcek@arcek.com.tr	www.arcek.com.tr
			5. KAYSERİ				
141	KUMTEL ELECTRIC EQUIPMENTS	KAYSERI	Mr. Murat SARI	352	321 14 00	msari@kumtel.com	www.kumtel.com
142	YATAŞ BED	KAYSERI	Mr. Serkan ŞEN	352	321 24 00	Serkan.sen@yatas.com.tr	www.yatas.com.tr
143	AKUSAN ACUMULATOR	KAYSERI	Mr. Ömer LEKESİZ	352	241 07 71	akusan@akusan.com	omer@akusan.com
144	DOLPHIN BATHROOM	KAYSERI	Mr. Yunus Sami AYGÜN	352	311 53 13	sales@aygun-bathroom.com	www.aygun-bathroom.com
145	KLASS FOREIGN TRADE	KAYSERI	Mrs. Nihal YİĞİT	352	321 13 76	nihal@klass.com.tr	www.klass.com.tr
146	ATAK STEEL DOOR	KAYSERI	Mr. Hamza GÜRCAN	352	321 15 58	export@atakcelikkapi.com	www.atakcelikkapi.com
147	SERHAT FURNITURE	KAYSERI	Mr. Mehmet ÖZEN	352	322 25 25	serhat@serhat.com.tr	www.serhat.com.tr
148	EZINC METAL	KAYSERI	Mr. Mustafa TEKEŞEN	352	321 13 21	info@ezincmetal.com	www.ezincmetal.com
149	LALE WOOD PRODUCTS	KAYSERI	Mr. Aytaç ÖRTMEZ	352	321 32 00	sarprofil@sarprofil.com.tr	www.sarprofil.com.tr
150	ARKOPA WOOD PANEL	KAYSERI	Mr. Cihangir BİRKARDEŞ	352	321 26 10	arkopa@arkopa.com.tr	www.arkopa.com.tr
151	BOYTEKS TEXTILE	KAYSERI	Mr. Ali Ihsan PULLU	352	322 05 47	info@boyteks.com	www.boyteks.com
152	YUKSEL STEEL DOOR	KAYSERI	Mr. Mehmet YAŞAR	352	321 20 15	info@tepesafe.com.tr	www.tepesafe.com.tr

			6. GAZİANTEP				
153	TRANSFORMATOR ELECTRIC	ADANA	Mr. Gürsu BAŞDOĞAN	322	394 42 53	gursu@betatransformer.com	www.betatransformer.com
154	SUPERFILM PACKAGING	GAZIANTEP	Mr. Gürkan TURAL	342	211 61 47	superfilm@superfilm.com.tr	www.superfilm.com.tr
155	KARACA TEXTILE INDUSTRY	GAZIANTEP	Mr. Kemal ERDOGAN	342	337 90 61	info@karacanhali.com	www.karacanhali.com
156	ISIK WOOD PROFILE INDUSTRY	GAZIANTEP	Mr. Mehmet YASAR	342	337 47 05	info@isikahsap.com.tr	www.isikahsap.com.tr
157	ASAS FILTER	HATAY	Mrs. Esra DEMEN	326	618 82 74	esra@asasfilter.com	www.asasfilter.com
158	NAKSAN PLASTIC CORP.	GAZIANTEP	Mr. Cahit NAKIBOGLU	342	211 21 00	info@naksan.com.tr	www.naksan.com
159	NECCAR FURNITURE	MALATYA	Mr. İhsan ÖZKAN	532	294 40 39	ihsan@neccarmobilya.com	www.neccarmobilya.com
160	KAPLANSER CARPET	GAZIANTEP	Mr. Selahattin KAPLAN	342	357 05 60	info@kaplansercarpet.com	www.kaplansercarpet.com
161	KOKSAN PLASTIC	GAZIANTEP	Mr. M. Emin TÜMER	342	357 03 30	info@koksan.com	www.koksan.com
162	DEHA TEXTILE	GAZIANTEP	Mr. Davut DÜNDAR	342	337 14 57	davut.dundar@dehatextile.com	www.dehatextile.com
163	GULSAN DOKUMA	GAZIANTEP	Mr. M. Ali TOPÇUOĞLU	342	337 11 80	info@gulsan-group.com	www.gulsan-group.com
164	OZTURKLER TEXTILE	GAZIANTEP	Mr. İbrahim DEMİRCİ	342	227 58 24	info@ozturkler.com.tr	www.ozturkler.com.tr
165	AKANLAR FOREIGN TRADE	GAZIANTEP	Mr. Hasan GÜLEN	342	323 02 55	info@akanlar.com	www.akanlar.com
166	GOYMEN AGRICULTURE	GAZIANTEP	Mr. Arif ELBİRLER	342	337 24 33	arif.elbirler@goymen.com.tr	www.goymen.com.tr

Appendix F: Experties Companies that Participated to AHP Modelling Survey

NO	COMPANY NAME	LOCATION	RELATED PERSON	Area Code	TEL	E-MAIL 1	E-MAIL 2	WEB
1	AYMED HEALTH PRODUCTS	ISTANBUL	Mr. Hasan UĞURLU	216	305 03 33	hasan.ugurlu@aymed.com	aymed@aymed.com	www.aymed.com
2	KENYA TURKISH TRADE CONSU.	NAIROBI	Mr. Ziya CAMUR	++ 254	302 218 180	nairobi@ekonomi.gov.tr	embassy.nairobi@mfa.gov.tr	www.be.mfa.gov.tr
3	IPEK AIR CARGO AGENCY	ISTANBUL	Mrs. Zarife SEVİNÇ	216	358 06 06	zarife@ipeklogistics.com	ipek@ipeklogistics.com	www.ipeklogistics.com
4	MAERSK SEA LINES TURKEY	ISTANBUL	Ms. Deniz KATIRCIOĞLU	216	666 50 31	deniz.katircioglu@maersk.com	tr.expert@safmarine.com	www.safmarine.com
5	KGM MACHINERY	ISTANBUL	Mr. Talat EREN	212	537 71 13	t.eren@kgmas.com.tr	h.ugurlu@kgmas.com.tr	www.kgmas.com.tr

Appendix C: Normality Test Results for Sub Criteria of each Main Criterion

Main Criteria		Stat.	df	Sig.	Main Criteria		Stat.	df	Sig.
Product Features	Volume	,234	166	,000*	Traceability	Traceability of load and vehicle	,245	166	,000*
	Weight	,214	166	,000*		Traceability of transporting device	,242	166	,000*
	Product Value	,277	166	,000*		Traceability of documents	,283	166	,000*
	Packaging Features	,203	498	,000*	Cost	Transportation Costs	,360	166	,000*
	Insurance Necessities	,253	166	,000*		Handling and Packaging Costs	,231	166	,000*
	Stacking Features	,225	166	,000*		Warehouse and Transmission point Processing costs	,202	166	,000*
	Product Sensitivity	,225	166	,000*		Warehouse and Transmission point, Investment costs	,193	166	,000*
	Transportation Features	,215	166	,000*		Communication and information costs	,283	166	,000*
	Product Life	,247	166	,000*		Wastage Costs	,283	166	,000*
	After Sales Services Need	,206	166	,000*		Delaying Costs	,283	166	,000*
	Reverse Logistics Need	,178	166	,000*	Security	Product damaging possibility	,283	166	,000*
Reliability	Timely Deliveries	,388	166	,000*		Thief possibility	,249	166	,000*
	Implementation of Transportation Tariffs	,251	166	,000*		Diversity of Accident causes	,211	166	,000*
	Responsibility on delays	,235	166	,000*		Lost Product Rate	,208	166	,000*
Speed	Transportation distances	,221	166	,000*	Risks	Warehousing Risks	,233	166	,000*
	Transportation Times	,237	166	,000*		Political Risks	,234	166	,000*
	Transportation Speeds	,230	166	,000*		Social Risks	,239	166	,000*
	Time Spended on Transmission	,203	166	,000*		Environmental Risks	,187	166	,000*

** $p<0.05$, not normally distributed*

Appendix D: 95% Turkey Pairwise Comparison Results for each Main Criterion

Turkey Pairwise comparisons of sub-criteria of Product Features

Grouping Information Using the Tukey Method and 95% Confidence

Product Features	N	Mean	Grouping
Product Value	166	4,2470	A
Insurance Necessities	166	4,0602	A B
Product Sensitivity	166	3,9699	A B
Transportation Features	166	3,9578	A B
Product Life	166	3,9578	A B
Volume	166	3,9398	A B
Stacking Features	166	3,9217	A B
Packing Features	166	3,8313	B
Weight	166	3,7831	B
After Sales Services Need	166	3,7169	B C
Reverse Logistics Need	166	3,3675	C

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Reliability

Grouping Information Using the Tukey Method and 95% Confidence

Reliability	N	Mean	Grouping
Timely Deliveries	166	4,5060	A
Responsibility On Delay	166	4,0843	B
Implementation Of Transportation	166	3,9398	B

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Speed

Grouping Information Using the Tukey Method and 95% Confidence

Speed	N	Mean	Grouping
Transportatin On Times	166	4,1265	A
Transportation Speeds	166	4,0241	A B
TransportationDistances	166	3,9398	A B
Time Spended On Transmission	166	3,8313	B

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Traceability

Grouping Information Using the Tukey Method and 95% Confidence

Traceability	N	Mean	Grouping
Traceability of Documents	166	4,2892	A
Traceability of Load and Vehicle	166	4,0964	A
Traceability of Transporting Device	166	3,6627	B

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Cost

Grouping Information Using the Tukey Method and 95% Confidence

Cost	N	Mean	Grouping
Transportation Costs	166	4,4819	A
Delaying Costs	166	4,0964	B
Handling and Packing Costs	332	3,9277	B C
Warehouse and Transmission Processing Costs	166	3,9036	B C
Warehouse and Transmission Point Processing Costs	166	3,9036	B C
Wastage Costs	166	3,8494	B C
Communication and Information Costs	166	3,8193	B C
Warehouse and Transmission Point Investment Costs	332	3,7771	C

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Security

Grouping Information Using the Tukey Method and 95% Confidence

Security	N	Mean	Grouping
Product Damaging Possibility	166	4,3675	A
Thief Possibility	166	4,1506	A B
Diversity of Accident Causes	166	4,0120	B
LostProductRate	166	3,9699	B

Means that do not share a letter are significantly different.

Turkey Pairwise comparisons of sub-criteria of Risks

Grouping Information Using the Tukey Method and 95% Confidence

Risks	N	Mean	Grouping
Warehousing Risks	166	4,0723	A
Political Risks	166	4,0060	A B
Social Risks	166	3,8012	A B
Environment Risks	166	3,7590	B

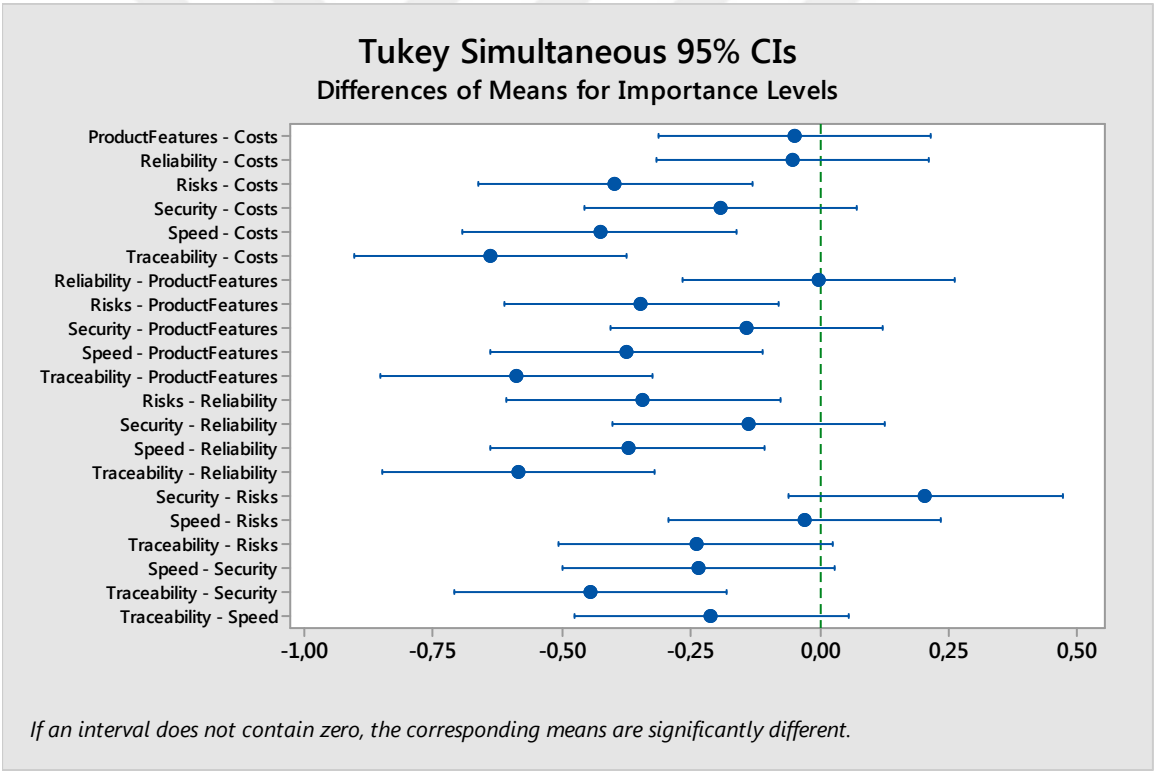
Means that do not share a letter are significantly different.

Appendix E: 95% Tukey Pairwise Comparison Results for Main Criteria

Grouping Information Using the Tukey Method and 95% Confidence

Main Criteria	N	Mean	Grouping
Cost	166	4,4398	A
Product Features	167	4,3892	A
Reliability	166	4,3855	A
Security	166	4,2470	A B
Risks	165	4,0424	B C
Speed	166	4,0120	B C
Traceability	166	3,8012	C

Means that do not share a letter are significantly different.



Appendix G: Comparison Matrices Provided By Experts

(1- AYMED HEALTH PRODUCTS)

COMPARISON MATRIX for MAIN CRITERIA

	C1	C2	C3	C4	C5	C6	C7
C1	1	5	5	3	3	2	2
C2		1	1/3	1/3	1/5	1/5	1/3
C3			1	3	1	3	5
C4				1	1/3	1	1
C5					1	3	5
C6						1	3
C7							1

C.R = 0,09

COMPARISON MATRICIES for SUB CRITERIA

COMPARISON MATRIX for PRODUCT FEATURES

	C11	C12	C13	C14	C15	C16	C17
C11	1	3	3	1/5	1/7	1/5	9
C12		1	3	1/3	1/5	1/5	9
C13			1	1/5	1/5	1/5	5
C14				1	1	1	9
C15					1	1	9
C16						1	9
C17							1

C.R. = 0,09

COMPARISON MATRIX for TRACEABILITY

	C41	C42
C41	1	1/5
C42		1

C.R. = 0,00

COMPARISON MATRIX for SECURITY

	C61	C62
C61	1	9
C62		1

C.R. = 0,00

COMPARISON MATRIX for RISKS

	C71	C72	C73
C71	1	7	9
C72		1	1
C73			1

C.R. = 0,01

COMPARISON MATRIX for RELIABILITY

	C21	C22
C21	1	5
C22		1

C.R. = 0,00

COMPARISON MATRIX for SPEED

	C31	C32	C33
C31	1	1/3	1/3
C32		1	1
C33			1

C.R. = 0,00

COMPARISON MATRIX for COSTS

	C51	C52	C53	C54	C55	C56
C51	1	9	5	5	9	9
C52		1	1/3	1/3	1	1
C53			1	1	7	2
C54				1	9	9
C55					1	1
C56						1

C.R. = 0,07

COMPARISON MATRICIES for ALTERNATIVES

COMPARISON MATRIX for PRODUCT VOLUME

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	9	9	9	9	5
A5					1	1	7	9	7	7	7	9
A6						1	9	9	9	7	7	5
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for PRODUCT VALUE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/7	1/7	1/7	1	1	1	1	1	1
A2		1	1	1/9	1/7	1/7	1	1	1	1	1	1
A3			1	1/9	1/9	1/7	1	1	1	1	1	1
A4				1	1	1	9	9	9	9	9	9
A5					1	1	9	9	9	9	9	9
A6						1	9	9	9	9	9	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for INSURANCE NECESSITIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/7	1/7	1/7	1	1	1	1	1	1
A2		1	1	1/7	1/7	1/7	1	1	1	1	1	1
A3			1	1/7	1/7	1/7	1	1	1	1	1	1
A4				1	1	1	7	7	7	9	9	9
A5					1	1	7	7	7	9	7	9
A6						1	9	9	9	9	9	7
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for STACKING FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	7	7	7	7	9
A5					1	1	9	7	7	7	7	9
A6						1	9	9	9	9	9	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for PRODUCT SENSITIVITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1	1	1
A2		1	1	1/5	1/5	1/5	1	1	1	1	1	1
A3			1	1/5	1/5	1/5	1	1	1	1	1	1
A4				1	1	1	5	5	5	5	9	9
A5					1	1	7	7	5	5	5	7
A6						1	7	7	7	9	9	7
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,01

COMPARISON MATRIX for TRANSPORTATION FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	5	5	5	5	9
A5					1	1	9	5	5	5	5	9
A6						1	9	5	5	5	5	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,01

COMPARISON MATRIX for PRODUCT LIFE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/7	1/7	1/7	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	9	9	9	9	9
A5					1	1	9	9	9	9	9	9
A6						1	9	9	9	9	9	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for TIMELY DELIVERIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1	1	1
A2		1	1	1/5	1/5	1/5	1	1	1	1	1	1
A3			1	1/5	1/5	1/5	1	1	1	1	1	1
A4				1	1	1	7	7	7	7	7	9
A5					1	1	7	7	7	7	7	9
A6						1	5	5	5	5	5	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for RESPONSIBILITY ON DELAYS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/8	1/8	1/8	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	7	5	7	9	7
A5					1	1	9	7	5	7	9	7
A6						1	9	7	5	7	9	7
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for TRACEABILITY OF LOAD AND VEHICLE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	7	9	7	9	5
A5					1	1	9	7	9	7	9	5
A6						1	9	7	9	7	9	5
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for TRACEABILITY OF DOCUMENTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	9	9	9	9	9
A5					1	1	9	9	9	9	9	9
A6						1	9	9	9	9	9	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for DELAYING COSTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/7	1/7	1/7	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/5	1/5	1/5	1	1	1	1	1	1
A4				1	1	1	7	7	7	7	7	7
A5					1	1	7	7	7	7	7	7
A6						1	7	7	7	7	7	7
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for PRODUCT DAMAGE POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	9	9	9	9	9	9
A5					1	1	9	9	9	9	9	9
A6						1	9	9	9	9	9	9
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for THIEF POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1	1	1
A2		1	1	1/5	1/5	1/5	1	1	1	1	1	1
A3			1	1/5	1/5	1/5	1	1	1	1	1	1
A4				1	1	1	7	7	7	7	7	7
A5					1	1	7	7	7	7	7	7
A6						1	7	7	7	7	7	7
A7							1	1	1	3	3	1
A8								1	1	3	3	1
A9									1	3	3	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,02

COMPARISON MATRIX for WAREHOUSING RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/7	1/7	1/7	1	1	1	1	1	1
A2		1	1	1/7	1/7	1/7	1	1	1	1	1	1
A3			1	1/7	1/7	1/7	1	1	1	1	1	1
A4				1	1	1	7	7	7	7	7	7
A5					1	1	7	7	7	7	7	7
A6						1	7	7	7	7	7	7
A7							1	1	3	3	3	1
A8								1	3	3	3	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,02

COMPARISON MATRIX for POLITICAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	5	5	5	5	5	5
A5					1	1	5	5	5	5	5	5
A6						1	5	5	5	5	5	5
A7							1	1	1	1	1	1
A8								1	1	1	3	3
A9									1	1	3	3
A10										1	3	3
A11											1	1
A12												1

C.R. = 0,03

COMPARISON MATRIX for SOCIAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/9	1/9	1/9	1	1	1	1	1	1
A2		1	1	1/9	1/9	1/9	1	1	1	1	1	1
A3			1	1/9	1/9	1/9	1	1	1	1	1	1
A4				1	1	1	5	5	5	7	7	7
A5					1	1	5	5	5	7	7	7
A6						1	5	5	5	7	7	7
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	3	3
A10										1	3	3
A11											1	1
A12												1

C.R. = 0,08

COMPARISON MATRICES PROVIDED BY EXPERT 2: (KENYA TURKISH TRADE CONSULAR)

COMPARISON MATRIX for MAIN CRITERIA

	C1	C2	C3	C4	C5	C6	C7
C1	1	1/9	3	1/5	1/5	1/7	1/3
C2		1	5	1	1/3	1	2
C3			1	1/7	1/7	1/8	1/7
C4				1	1	1	1
C5					1	1	1
C6						1	3
C7							1

C.R = 0,06

COMPARISON MATRICIES for SUB CRITERIA

COMPARISON MATRIX for PRODUCT FEATURES

	C1	C12	C13	C14	C15	C16	C17
C11	1	1	1/5	1/2	1	1	1
C12		1	1/5	1/2	1	1	1
C13			1	3	1	3	3
C14				1	1/3	1	1
C15					1	5	1
C16						1	1
C17							1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY

	C41	C42
C41	1	1
C42		1

C.R. = 0,00

COMPARISON MATRIX for SECURITY

	C61	C62
C61	1	9
C62		1

C.R. = 0,00

COMPARISON MATRIX for RISKS

	C71	C72	C73
C71	1	2	6
C72		1	7
C73			1

C.R. = 0,08

COMPARISON MATRIX for RELIABILITY

	C21	C22
C21	1	5
C22		1

C.R. = 0,00

COMPARISON MATRIX for SPEED

	C31	C32	C33
C31	1	5	1
C32		1	1/3
C33			1

C.R. = 0,03

COMPARISON MATRIX for COSTS

	C51	C52	C53	C54	C56	C57
C51	1	5	5	9	7	7
C52		1	1	7	7	5
C53			1	6	7	3
C54				1	3	1/3
C56					1	1/3
C57						1

C.R. = 0,09

COMPARISON MATRICIES for ALTERNATIVES

COMPARISON MATRIX for PRODUCT VOLUME

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	5	7	7	7
A4				1	3	3	5	7	7	9	9	9
A5					1	1	2	3	1	3	3	3
A6						1	1/3	1/2	1/2	3	5	5
A7							1	5	5	6	6	6
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT VALUE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	5	7	7	7
A4				1	3	3	5	7	7	9	9	9
A5					1	1	2	3	1	3	3	3
A6						1	1/3	2	1/2	3	5	5
A7							1	5	5	6	6	6
A8								1	1	1	1	1
A9									1	3	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,08

COMPARISON MATRIX for INSURANCE NECESSITIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/3	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	5	7	7	7
A4				1	3	3	5	7	7	9	5	9
A5					1	1	2	3	1	3	3	3
A6						1	1/3	1/2	1/2	3	5	5
A7							1	5	1	6	6	6
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for STACKING FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for PRODUCT SENSITIVITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for TRANSPORTATION FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	5	5	5	3	3	3	5	7	8	7	7
A2		1	1/3	1/5	1	3	1/5	3	3	3	5	3
A3			1	1/3	3	3	5	5	5	5	7	3
A4				1	3	3	3	7	5	9	9	9
A5					1	1	2	3	3	3	3	5
A6						1	1/2	1/2	3	3	5	5
A7							1	5	5	6	6	6
A8								1	1/2	1	2	1
A9									1	1	1	1/2
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT LIFE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for TIMELY DELIVERIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A4				1	1/3	1/3	1	1	1	1/5	1/5	1/5
A5					1	1/3	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,08

COMPARISON MATRIX for RESPONSIBILITY ON DELAYS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A4				1	1/3	1/3	1	1	1	1/5	1/5	1/5
A5					1	1/3	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY OF LOAD AND VEHICLE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	1	1	1	1	1	1	1	1	1
A3			1	1	1	1	1	1	1	1	1	1
A4				1	1	1	1	1	1	1	1	1
A5					1	1	1	1	1	1	1	1
A6						1	1	1	1	1	1	1
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for TRACEABILITY OF DOCUMENTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	3	3	3	1	7	7	8	9	9
A2		1	1/3	1/2	1	3	1/3	3	1	5	5	5
A3			1	3	3	3	5	5	5	7	5	7
A4				1	5	5	5	5	7	9	7	9
A5					1	1	2	3	1	3	5	3
A6						1	1/2	2	2	3	5	5
A7							1	5	5	5	5	5
A8								1	1	1	1/2	1
A9									1	1	1/2	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for DELAYING COSTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1/5	1/7	1/7
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/7	1/7
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/5	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/7	1/7
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT DAMAGE POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1/5	1/7	1/7
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/7	1/7
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/5	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/7	1/7
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,09

COMPARISON MATRIX for THIEF POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	3	3	1	1	1	3	3	3
A3			1	3	3	3	1	1	1	3	3	3
A4				1	3	3	1	1	1	3	3	3
A5					1	3	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	3	3	3
A9									1	3	3	3
A10										1	3	3
A11											1	3
A12												1

C.R. = 0,06

COMPARISON MATRIX for WAREHOUSING RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	5	5	5
A2		1	1	3	3	3	1	1	1	5	5	5
A3			1	3	3	3	1	1	1	5	5	5
A4				1	3	3	1	1	1	5	5	5
A5					1	5	1	1	1	5	5	5
A6						1	1	1	1	5	5	5
A7							1	1	1	5	5	5
A8								1	1	5	5	5
A9									1	5	5	5
A10										1	5	5
A11											1	5
A12												1

C.R. = 0,08

COMPARISON MATRIX for POLITICAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	1	1	1	1	1	1	1	1	1
A3			1	1	1	1	1	1	1	1	1	1
A4				1	1	1	1	1	1	1	1	1
A5					1	1	1	1	1	1	1	1
A6						1	1	1	1	1	1	1
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for SOCIAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	3	3	1	1	1	3	3	3
A3			1	3	3	3	1	1	1	3	3	3
A4				1	3	3	1	1	1	3	3	3
A5					1	3	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	3	3	3
A9									1	3	3	3
A10										1	3	3
A11											1	3
A12												1

C.R. = 0,06

COMPARISON MATRICES PROVIDED BY EXPERT 3:
(IPEK AIR CARGO AGENCY)

COMPARISON MATRIX for MAIN CRITERIA

	C1	C2	C3	C4	C5	C6	C7
C1	1	1/9	3	1/5	1/5	1/7	1/3
C2		1	5	3	3	1	2
C3			1	1/7	1/7	1/8	1/7
C4				1	1	1	3
C5					1	3	1
C6						1	3
C7							1

C.R = 0,09

COMPARISON MATRICIES for SUB CRITERIA

COMPARISON MATRIX for PRODUCT FEATURES

	C11	C12	C13	C14	C15	C16	C17
C11	1	3	4	5	1/2	1/2	3
C12		1	1/3	4	1/8	1/8	1/2
C13			1	4	1/8	1/8	1/2
C14				1	1/8	1/8	1/2
C15					1	5	5
C16						1	5
C17							1

C.R. = 0,09

COMPARISON MATRIX for TRACEABILITY

	C41	C51
C41	1	7
C51		1

C.R. = 0,00

COMPARISON MATRIX for SECURITY

	C61	C62
C61	1	7
C62		1

C.R. = 0,00

COMPARISON MATRIX for RISKS

	C71	C72	C73
C71	1	4	9
C72		1	5
C73			1

C.R. = 0,07

COMPARISON MATRIX for RELIABILITY

	C21	C22
C21	1	7
C22		1

C.R. = 0,00

COMPARISON MATRIX for SPEED

	C31	C32	C33
C31	1	4	9
C32		1	5
C33			1

C.R. = 0,07

COMPARISON MATRIX for COSTS

	C51	C52	C53	C54	C55	C56
C51	1	9	7	7	9	5
C52		1	1/4	2	2	1/5
C53			1	3	4	1/4
C54				1	3	1/4
C55					1	1/5
C56						1

C.R. = 0,09

COMPARISON MATRICIES for ALTERNATIVES

COMPARISON MATRIX for PRODUCT VOLUME

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	3	2	2	2	4	1	6	7	7	9	9
A2		1	1/3	1/3	1/3	5	1/5	3	1	5	5	5
A3			1	1/5	1/3	5	1/5	5	5	7	7	7
A4				1	9	7	3	7	7	9	9	7
A5					1	3	1/2	3	2	4	4	4
A6						1	1/3	4	4	4	4	7
A7							1	7	4	4	7	7
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT VALUE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1/3	1/4	1	1	1/3	3	1	3	5	5
A3			1	3	5	3	5	5	5	5	5	5
A4				1	3	3	5	7	7	7	9	7
A5					1	3	2	3	1/2	3	3	3
A6						1	1/3	1/2	1/2	3	3	5
A7							1	3	3	6	6	6
A8								1	3	1	3	3
A9									1	3	2	2
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for INSURANCE NECESSITIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	5	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	7	7	7	5	7
A4				1	3	3	5	7	7	9	5	5
A5					1	1	2	3	1	3	3	3
A6						1	1/3	1/2	1/2	3	5	5
A7							1	5	5	5	3	5
A8								1	1	1	1	1
A9									1	3	1	1
A10										1	2	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for STACKING FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/5	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/5	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/5	1	1	1	1/5	1/5	1/3
A5					1	1/3	1	1	1	1/5	1/5	1/3
A6						1	1	1	1	1/3	1/5	1/3
A7							1	1	1	1/3	1/5	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,08

COMPARISON MATRIX for PRODUCT SENSITIVITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	3	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	3	3	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	3	3	1/3	1/3	1/3
A5					1	1/3	1	3	3	1/3	1/3	1/3
A6						1	1	3	3	1/3	1/3	1/3
A7							1	1	3	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for TRANSPORTATION FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	5	2	4	3	3	3	5	7	8	7	7
A2		1	1/2	1/3	1	3	1/3	3	3	3	5	3
A3			1	3	3	3	5	5	5	5	7	3
A4				1	3	3	3	7	5	9	9	9
A5					1	1	2	3	3	3	3	5
A6						1	1/2	1/2	1/2	3	5	5
A7							1	5	5	6	6	6
A8								1	1/2	1	1/2	1
A9									1	1	1	1/2
A10										1	3	1
A11											1	1/2
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT LIFE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	3	5	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	3	5	5	1/3	1/3	1/3
A4				1	1/3	1/3	3	5	3	1/3	1/5	1/3
A5					1	1/3	1	5	5	1/3	1/3	1/3
A6						1	1	5	4	1/3	1/3	1/3
A7							1	1	1	1/3	1/5	1/5
A8								1	1	1/3	1/5	1/5
A9									1	1/3	1/3	1/5
A10										1	1/3	1/3
A11											1	1/2
A12												1

C.R. = 0,09

COMPARISON MATRIX for TIMELY DELIVERIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	3	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A3			1	1/3	1/3	1/3	3	1	1	1/3	1/5	1/5
A4				1	1/3	1/3	3	1	1	1/3	1/5	1/5
A5					1	1/3	1	1	1	1/3	1/3	1/5
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/5	1/3	1/5
A8								1	1	1/5	1/3	1/3
A9									1	1/5	1/5	1/3
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,09

COMPARISON MATRIX for RESPONSIBILITY ON DELAYS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	3	1/3	1/3	1/5	1	1	1	1/5	1/3	1/5
A3			1	1/3	1/3	1/5	3	1	1	1/5	1/3	1/5
A4				1	1/3	1/3	3	3	1	1/3	1/3	1/5
A5					1	1/3	3	3	1	1/3	1/3	1/5
A6						1	1	3	1	1/3	1/5	1/3
A7							1	1	1	1/3	1/5	1/5
A8								1	1	1/5	1/5	1/3
A9									1	1/5	1/5	1/5
A10										1	1/5	1/3
A11											1	1/5
A12												1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY OF LOAD AND VEHICLE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	3	3	1	1	1	3	1	1	1
A3			1	1	3	3	1	1	3	1	1	5
A4				1	1	1	1	1	3	3	3	5
A5					1	1	1	1	3	3	3	5
A6						1	1	1	3	3	3	5
A7							1	1	3	3	3	3
A8								1	1	3	3	3
A9									1	1	1	3
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY OF DOCUMENTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	3	3	3	1	7	7	8	9	9
A2		1	1/2	1/5	1	3	1/3	3	1	5	5	5
A3			1	3	3	3	5	5	5	7	5	7
A4				1	5	5	4	5	7	9	7	9
A5					1	1	2	3	1	3	5	3
A6						1	1/3	1	1	3	5	5
A7							1	5	5	5	5	5
A8								1	1	1	1/2	1
A9									1	1	1/2	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for DELAYING COSTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/4	1	1	1	1/7	1/7	1/7
A2		1	1	1/3	1/3	1/4	1	1	1	1/7	1/7	1/7
A3			1	1/3	1/4	1/4	1	1	1	1/7	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/7	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/7	1/7
A6						1	1	1	1	1/5	1/6	1/7
A7							1	1	1	1/6	1/6	1/7
A8								1	1	1/6	1/6	1/7
A9									1	1/6	1/6	1/7
A10										1	1/5	1/7
A11											1	1/6
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT DAMAGE POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/4	1	1	1	1/7	1/7	1/7
A2		1	1	1/3	1/3	1/4	1	1	1	1/7	1/7	1/7
A3			1	1/3	1/4	1/4	1	1	1	1/7	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/7	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/7	1/7
A6						1	1	1	1	1/5	1/6	1/7
A7							1	1	1	1/6	1/6	1/7
A8								1	1	1/6	1/6	1/7
A9									1	1/6	1/6	1/7
A10										1	1/5	1/7
A11											1	1/6
A12												1

C.R. = 0,09

COMPARISON MATRIX for THIEF POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	3	3	1	1	1	3	3	3
A3			1	3	3	3	1	1	1	3	3	3
A4				1	3	3	1	1	1	3	3	3
A5					1	3	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	3	3	3
A9									1	3	3	3
A10										1	3	3
A11											1	3
A12												1

C.R. = 0,06

COMPARISON MATRIX for WAREHOUSING RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	3	2	2	4	1	1	1	5	5	5
A2		1	3	3	3	5	1	1	1	5	5	5
A3			1	5	3	5	1	1	1	3	3	5
A4				1	5	5	1	1	1	3	3	5
A5					1	5	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	4	5	5
A9									1	4	5	5
A10										1	3	3
A11											1	5
A12												1

C.R. = 0,09

COMPARISON MATRIX for POLITICAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	1	1	1	1	1	1	1	1	1
A3			1	1	1	1	1	1	1	1	1	1
A4				1	1	1	1	1	1	1	1	1
A5					1	1	1	1	1	1	1	1
A6						1	1	1	1	1	1	1
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for SOCIAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	5	5	1	1	1	3	3	3
A3			1	3	5	5	1	3	3	3	3	3
A4				1	3	3	1	2	3	3	5	3
A5					1	3	1	2	2	3	5	5
A6						1	1	2	2	2	4	4
A7							1	1	1	3	5	5
A8								1	1	2	4	4
A9									1	2	3	4
A10										1	2	4
A11											1	2
A12												1

C.R. = 0,09

COMPARISON MATRICES PROVIDED BY EXPERT 4: (MAERSK SEA LINES TURKEY)

COMPARISON MATRIX for MAIN CRITERIA

	C1	C2	C3	C4	C5	C6	C7
C1	1	1/7	3	1/3	1/5	1/8	1/3
C2		1	5	1	1/2	1	2
C3			1	1/7	1/7	1/8	1/7
C4				1	1	1	1
C5					1	1	1/3
C6						1	3
C7							1

C.R = 0,08

COMPARISON MATRICIES for SUB CRITERIA

COMPARISON MATRIX for PRODUCT FEATURES

	C11	C12	C13	C14	C15	C16	C17
C11	1	1	1/5	1/2	1	1	2
C12		1	1/4	1/2	2	1	1
C13			1	3	1	3	3
C14				1	1/2	1	1
C15					1	5	3
C16						1	1
C17							1

C.R. = 0,09

COMPARISON MATRIX for TRACEABILITY

	C41	C42
C41	1	3
C42		1

C.R. = 0,00

COMPARISON MATRIX for SECURITY

	C61	C62
C61	1	7
C62		1

C.R. = 0,00

COMPARISON MATRIX for RISKS

	C71	C72	C73
C71	1	3	5
C72		1	4
C73			1

C.R. = 0,08

COMPARISON MATRIX for RELIABILITY

	C21	C22
C21	1	3
C22		1

C.R. = 0,00

COMPARISON MATRIX for SPEED

	C31	C32	C33
C31	1	7	1
C32		1	1/3
C33			1

C.R. = 0,08

COMPARISON MATRIX for COSTS

	C51	C52	C53	C54	C55	C56
C51	1	3	4	9	7	5
C52		1	1	7	7	3
C53			1	7	7	3
C54				1	3	1/5
C56					1	1/7
C57						1

C.R. = 0,09

COMPARISON MATRICIES for ALTERNATIVES

COMPARISON MATRIX for PRODUCT VOLUME

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	5	7	7	7
A4				1	3	3	5	7	7	9	9	7
A5					1	1	2	3	1	3	3	3
A6						1	1/3	3	1/2	3	5	5
A7							1	5	5	6	6	6
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,08

COMPARISON MATRIX for PRODUCT VALUE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	9
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	5	7	7	7
A4				1	3	3	5	7	7	7	9	9
A5					1	1	2	3	1	3	3	3
A6						1	1/3	1/2	1/2	3	5	5
A7							1	5	5	8	6	6
A8								1	2	1	1	1
A9									1	3	1	1
A10										1	2	1
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for INSURANCE NECESSITIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	7	3	1	3	3	1	7	7	8	9	8
A2		1	1	1/5	1	1	1/3	3	1	3	5	5
A3			1	3	3	3	5	5	7	7	7	7
A4				1	3	3	5	7	5	9	9	8
A5					1	1	2	3	1	3	5	3
A6						1	1/3	1/2	1/2	3	5	3
A7							1	5	5	6	8	8
A8								1	1	1	3	3
A9									1	5	1	3
A10										1	2	1
A11											1	2
A12												1

C.R. = 0,09

COMPARISON MATRIX for STACKING FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for PRODUCT SENSITIVITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for TRANSPORTATION FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	3	3	2	3	3	3	5	7	8	7	8
A2		1	2	1/5	1	3	1/3	3	3	5	5	3
A3			1	3	3	3	3	5	5	5	7	3
A4				1	3	3	3	7	5	9	5	9
A5					1	1	2	3	3	3	3	5
A6						1	1/3	1	1/2	3	5	5
A7							1	5	5	6	6	6
A8								1	1/2	1	1/2	1
A9									1	3	1	1/2
A10										1	2	1
A11											1	2
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT LIFE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A2		1	1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A3			1	1/3	1/3	1/3	1	1	1	1/3	1/3	1/3
A4				1	1/3	1/3	1	1	1	1/3	1/3	1/3
A5					1	1/3	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1/3	1/3	1/3
A8								1	1	1/3	1/3	1/3
A9									1	1/3	1/3	1/3
A10										1	1/3	1/3
A11											1	1/3
A12												1

C.R. = 0,06

COMPARISON MATRIX for TIMELY DELIVERIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A4				1	1/3	1/3	1	1	1	1/5	1/5	1/5
A5					1	1/3	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,08

COMPARISON MATRIX for RESPONSIBILITY ON DELAYS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A2		1	1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A3			1	1/3	1/3	1/3	1	1	1	1/5	1/5	1/5
A4				1	1/3	1/3	1	1	1	1/5	1/5	1/5
A5					1	1/3	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/5
A12												1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY OF LOAD AND VEHICLE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	1	1	1	1	1	1	1	1	1
A3			1	1	1	1	1	1	1	1	1	1
A4				1	1	1	1	1	1	1	1	1
A5					1	1	1	1	1	1	1	1
A6						1	1	1	1	1	1	1
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for TRACEABILITY OF DOCUMENTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	5	3	3	3	3	2	7	7	8	9	9
A2		1	1	1/5	1	3	1/3	3	1	5	5	3
A3			1	2	3	3	4	5	5	7	7	7
A4				1	4	5	3	5	7	9	7	9
A5					1	1	2	5	1	3	5	3
A6						1	1/3	1/2	3	3	5	5
A7							1	5	5	3	5	5
A8								1	2	1	1/2	1
A9									1	1	1/2	1
A10										1	2	1
A11											1	3
A12												1

C.R. = 0,09

COMPARISON MATRIX for DELAYING COSTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A2		1	1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A3			1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/7	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/5	1/5	1/5
A7							1	1	1	1/5	1/5	1/5
A8								1	1	1/5	1/5	1/5
A9									1	1/5	1/5	1/5
A10										1	1/5	1/5
A11											1	1/4
A12												1

C.R. = 0,09

COMPARISON MATRIX for PRODUCT DAMAGE POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A2		1	1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A3			1	1/4	1/4	1/4	1	1	1	1/7	1/7	1/7
A4				1	1/4	1/4	1	1	1	1/7	1/7	1/7
A5					1	1/4	1	1	1	1/5	1/5	1/5
A6						1	1	1	1	1/4	1/4	1/4
A7							1	1	1	1/4	1/4	1/4
A8								1	1	1/4	1/4	1/4
A9									1	1/4	1/4	1/4
A10										1	1/4	1/4
A11											1	1/4
A12												1

C.R. = 0,09

COMPARISON MATRIX for THIEF POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	3	3	1	1	1	3	3	3
A3			1	3	3	3	1	1	1	3	3	3
A4				1	3	3	1	1	1	3	3	3
A5					1	3	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	3	3	3
A9									1	3	3	3
A10										1	3	3
A11											1	3
A12												1

C.R. = 0,06

COMPARISON MATRIX for WAREHOUSING RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	4	4	4	1	1	1	5	5	5
A2		1	1	4	4	4	1	1	1	5	5	5
A3			1	4	4	4	1	1	1	5	5	5
A4				1	4	4	1	1	1	5	5	5
A5					1	4	1	1	1	5	5	5
A6						1	1	1	1	4	4	4
A7							1	1	1	4	4	4
A8								1	1	4	4	4
A9									1	4	4	4
A10										1	4	4
A11											1	4
A12												1

C.R. = 0,09

COMPARISON MATRIX for POLITICAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2		1	1	1	1	1	1	1	1	1	1	1
A3			1	1	1	1	1	1	1	1	1	1
A4				1	1	1	1	1	1	1	1	1
A5					1	1	1	1	1	1	1	1
A6						1	1	1	1	1	1	1
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for SOCIAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	3	3	3
A2		1	1	3	3	3	1	1	1	3	3	3
A3			1	3	3	3	1	1	1	3	3	3
A4				1	3	3	1	1	1	3	3	3
A5					1	3	1	1	1	3	3	3
A6						1	1	1	1	3	3	3
A7							1	1	1	3	3	3
A8								1	1	3	3	3
A9									1	3	3	3
A10										1	3	3
A11											1	3
A12												1

C.R. = 0,06

COMPARISON MATRICES PROVIDED BY EXPERT 5: (KGM MACHINERY)

COMPARISON MATRIX for MAIN CRITERIA

	C1	C2	C3	C4	C5	C6	C7
C1	1	1/5	1/5	1/4	1/3	1/7	1/5
C2		1	1	1/2	1	1/2	1/2
C3			1	3	1	1/3	1/5
C4				1	1	1	1
C5					1	1/3	1/3
C6						1	1
C7							1

C.R = 0,08

COMPARISON MATRICIES for SUB CRITERIA

COMPARISON MATRIX for PRODUCT FEATURES

	C11	C12	C13	C14	C15	C16	C17
C11	1	1/7	1/5	1/5	1/3	1/5	1
C12		1	1	3	2	3	1
C13			1	2	3	2	2
C14				1	1/3	1	1
C15					1	3	1
C16						1	1
C17							1

C.R. = 0,08

COMPARISON MATRIX for TRACEABILITY

	C41	C42
C41	1	5
C42		1

C.R. = 0,00

COMPARISON MATRIX for SECURITY

	C61	C62
C61	1	5
C62		1

C.R. = 0,00

COMPARISON MATRIX for RISKS

	C71	C72	C73
C71	1	1	2
C72		1	5
C73			1

C.R. = 0,09

COMPARISON MATRIX for RELIABILITY

	C21	C22
C21	1	5
C22		1

C.R. = 0,00

COMPARISON MATRIX for SPEED

	C31	C32	C33
C31	1	3	5
C32		1	3
C33			1

C.R. = 0,04

COMPARISON MATRIX for COSTS

	C51	C52	C53	C54	C55	C56
C51	1	5	5	7	3	4
C52		1	1	1/2	1/2	1/5
C53			1	3	1/3	1/5
C54				1	1	1/5
C55					1	1/3
C56						1

C.R. = 0,09

COMPARISON MATRICIES for ALTERNATIVES

COMPARISON MATRIX for PRODUCT VOLUME

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	3	2	6	7	7	3	7	5	3	7	5
A2		1	1/2	5	9	7	1/3	2	3	1/3	2	3
A3			1	7	5	5	1	4	3	1	4	3
A4				1	2	2	1/6	1/5	1/5	1/6	1/5	1/5
A5					1	1	1/7	1/6	1/6	1/7	1/6	1/6
A6						1	1/7	1/6	1/6	1/7	1/6	1/6
A7							1	4	4	1	4	4
A8								1	1/2	1	1	1
A9									1	1	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,06

COMPARISON MATRIX for PRODUCT VALUE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	3	2	4	5	5	3	7	5	3	7	5
A2		1	1/2	5	9	7	1/3	2	3	1/3	2	3
A3			1	5	3	3	1	4	3	1	4	3
A4				1	1/2	1/2	1/6	1/3	1/3	1/4	1/3	1/3
A5					1	1/3	1/5	1/4	1/4	1/5	1/4	1/4
A6						1	1/5	1/4	1/4	1/5	1/4	1/4
A7							1	4	4	1	4	4
A8								1	1/2	1	1	1
A9									1	1	1	1
A10										1	3	1
A11											1	1
A12												1

C.R. = 0,07

COMPARISON MATRIX for INSURANCE NECESSITIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	4	3	5	5	5	1	4	3	1	4	3
A2		1	2	6	8	7	3	1	2	3	1	2
A3			1	6	5	5	1	1/3	1/2	1	1/3	1/2
A4				1	1/2	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A5					1	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A6						1	1/5	1/6	1/6	1/5	1/6	1/6
A7							1	1/3	1/2	1	1/3	1/2
A8								1	2	1	2	2
A9									1	1/2	1	1
A10										1	1/3	1/2
A11											1	1
A12												1

C.R. = 0,07

COMPARISON MATRIX for STACKING FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/3	1/3	3	2	2	1	1/3	1/3	1	1/3	1/3
A2		1	1	9	4	4	1	1	1	3	1	1
A3			1	8	3	3	3	1	1	3	1	1
A4				1	1	1/2	1/5	1/7	1/7	1/5	1/7	1/7
A5					1	1	1/5	1/7	1/7	1/5	1/7	1/7
A6						1	1/5	1/7	1/7	1/5	1/7	1/7
A7							1	1/3	1/3	1	1/3	1/3
A8								1	1	3	1	1
A9									1	3	1	1
A10										1	1/3	1/3
A11											1	1
A12												1

C.R. = 0,02

COMPARISON MATRIX for PRODUCT SENSITIVITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	4	3	5	5	5	1	4	3	1	4	3
A2		1	2	6	8	7	3	1	2	3	1	2
A3			1	6	5	5	1	1/3	1/2	1	1/3	1/2
A4				1	1/2	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A5					1	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A6						1	1/5	1/6	1/6	1/5	1/6	1/6
A7							1	1/3	1/2	1	1/3	1/2
A8								1	2	1	2	2
A9									1	1/2	1	1
A10										1	1/3	1/2
A11											1	1
A12												1

C.R. = 0,07

COMPARISON MATRIX for TRANSPORTATION FEATURES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/3	1/3	3	2	2	1	1/3	1/3	1	1/3	1/3
A2		1	1	9	4	4	1	1	1	3	1	1
A3			1	8	3	3	3	1	1	3	1	1
A4				1	1	1/2	1/5	1/7	1/7	1/5	1/7	1/7
A5					1	1	1/5	1/7	1/7	1/5	1/7	1/7
A6						1	1/5	1/7	1/7	1/5	1/7	1/7
A7							1	1/3	1/3	1	1/3	1/3
A8								1	1	3	1	1
A9									1	3	1	1
A10										1	1/3	1/3
A11											1	1
A12												1

C.R. = 0,02

COMPARISON MATRIX for PRODUCT LIFE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	3	3	3	1	1	1	1	1	1
A2		1	1	3	3	3	1	1	1	1	1	1
A3			1	3	3	3	1	1	1	1	1	1
A4				1	1	1	1	1	1	1/3	1/3	1/3
A5					1	1	1	1	1	1/3	1/3	1/3
A6						1	1	1	1	1/3	1/3	1/3
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,03

COMPARISON MATRIX for TIMELY DELIVERIES

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1/5	1/5	1/5	1	1	1	1	1	1
A2		1	1	1/5	1/5	1/5	1	1	1	1	1	1
A3			1	1/5	1/5	1/5	1	1	1	1	1	1
A4				1	1	1	5	5	5	5	5	5
A5					1	1	5	5	5	5	5	5
A6						1	5	5	5	5	5	5
A7							1	1	1	1	1	1
A8								1	1	1	1	1
A9									1	1	1	1
A10										1	1	1
A11											1	1
A12												1

C.R. = 0,00

COMPARISON MATRIX for RESPONSIBILITY ON DELAYS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/3	1/2	5	5	5	1	1/3	1/2	1	1/3	1/2
A2		1	1	5	5	5	3	1	2	3	1	2
A3			1	5	5	5	2	1/2	1	2	1/2	1
A4				1	1	1	1/5	1/5	1/5	1/5	1/5	1/5
A5					1	1	1/5	1/5	1/5	1/5	1/5	1/5
A6						1	1/5	1/5	1/5	1/5	1/5	1/5
A7							1	1/3	1/2	1	1/3	1/2
A8								1	1	3	1	2
A9									1	2	1/2	1
A10										1	1/3	1/2
A11											1	1
A12												1

C.R. = 0,03

COMPARISON MATRIX for TRACEABILITY OF LOAD AND VEHICLE

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/3	1/3	3	2	2	1	1/3	1/3	1	1/3	1/3
A2		1	1	9	4	4	1	1	1	3	1	1
A3			1	8	3	3	3	1	1	3	1	1
A4				1	1	1/2	1/5	1/7	1/7	1/5	1/7	1/7
A5					1	1	1/5	1/7	1/7	1/5	1/7	1/7
A6						1	1/5	1/7	1/7	1/5	1/7	1/7
A7							1	1/3	1/3	1	1/3	1/3
A8								1	1	3	1	1
A9									1	3	1	1
A10										1	1/3	1/3
A11											1	1
A12												1

C.R. = 0,02

COMPARISON MATRIX for TRACEABILITY OF DOCUMENTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/2	1/2	2	1	1	1	1/2	1/2	1	1/2	1/2
A2		1	1	7	3	3	1	1	1	2	1	1
A3			1	6	2	2	2	1	1	3	1	1
A4				1	1	1	1/4	1/6	1/6	1/4	1/6	1/6
A5					1	1	1/4	1/6	1/6	1/4	1/6	1/6
A6						1	1/4	1/6	1/6	1/4	1/6	1/6
A7							1	1/2	1/2	1	1/2	1/2
A8								1	1	2	1	1
A9									1	2	1	1
A10										1	1/3	1/3
A11											1	1
A12												1

C.R. = 0,03

COMPARISON MATRIX for DELAYING COSTS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/3	1/2	5	5	5	1	1/3	1/2	1	1/3	1/2
A2		1	1	5	5	5	3	1	2	3	1	2
A3			1	5	5	5	2	1/2	1	2	1/2	1
A4				1	1	1	1/5	1/5	1/5	1/5	1/5	1/5
A5					1	1	1/5	1/5	1/5	1/5	1/5	1/5
A6						1	1/5	1/5	1/5	1/5	1/5	1/5
A7							1	1/3	1/2	1	1/3	1/2
A8								1	1	3	1	2
A9									1	2	1/2	1
A10										1	1/3	1/2
A11											1	1
A12												1

C.R. = 0,03

COMPARISON MATRIX for PRODUCT DAMAGE POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	4	3	5	5	5	1	4	3	1	4	3
A2		1	2	6	8	7	3	1	2	3	1	2
A3			1	6	5	5	1	1/3	1/2	1	1/3	1/2
A4				1	1/2	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A5					1	1/2	1/5	1/6	1/6	1/5	1/6	1/6
A6						1	1/5	1/6	1/6	1/5	1/6	1/6
A7							1	1/3	1/2	1	1/3	1/2
A8								1	2	1	2	2
A9									1	1/2	1	1
A10										1	1/3	1/2
A11											1	1
A12												1

C.R. = 0,07

COMPARISON MATRIX for THIEF POSSIBILITY

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/7	1/5	1	1/2	1/3	1	1/7	1/5	1	1/7	1/5
A2		1	3	5	1	2	7	1	3	7	1	3
A3			1	4	1	1	3	1	3	5	1/3	1
A4				1	1/2	1/2	1	1/5	1/3	1	1/5	1/2
A5					1	1	5	3	5	8	3	6
A6						1	5	1	3	7	1	3
A7							1	1/5	1/3	1	1/5	1/3
A8								1	1	1	1	1
A9									1	1/3	1	1
A10										1	1/5	1/3
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for WAREHOUSING RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/7	1/5	2	2	2	1	1/7	1/5	1	1/7	1/5
A2		1	3	5	1	2	7	1	3	7	1	3
A3			1	4	1	1	3	1	3	5	1/3	1
A4				1	1	1	1	1/5	1/3	1	1/5	3
A5					1	1	5	3	5	8	3	6
A6						1	5	1	3	7	1	3
A7							1	1/5	1/3	1	1/5	1/3
A8								1	1	1	1	1
A9									1	1/3	1	1
A10										1	1/5	1/3
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for POLITICAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/7	1/5	2	2	2	1	1/7	1/5	1	1/7	1/5
A2		1	3	5	1	2	7	1	3	7	1	3
A3			1	4	1	1	3	1	3	5	1/3	1
A4				1	1	1	1	1/5	1/3	1	1/5	1/3
A5					1	1	5	1	3	7	1	3
A6						1	5	1/3	1	5	1/3	1
A7							1	1/5	1/3	1	1/5	1/3
A8								1	1	1	1	1
A9									1	1/3	1	1
A10										1	1/5	1/3
A11											1	1
A12												1

C.R. = 0,09

COMPARISON MATRIX for SOCIAL RISKS

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1/7	1/5	2	2	2	1	1/7	1/5	1	1/7	1/5
A2		1	3	5	1	2	7	1	3	7	1	3
A3			1	4	1	1	3	1	3	5	1/3	1
A4				1	1	1	1	1/5	1/3	1	1/5	1/3
A5					1	1	5	1	3	7	1	3
A6						1	5	1/3	1	5	1/3	1
A7							1	1/5	1/3	1	1/5	1/3
A8								1	1	1	1	1
A9									1	1/3	1	1
A10										1	1/5	1/3
A11											1	1
A12												1

C.R. = 0,09

Appendix H: Numeric Data Of Alternatives for AHP Model

DISTANCE

			1649,0000
A1	**2123**	0,878474	0,1649
A2	**8656**	0,215457	0,0405
A3	**6964**	0,267806	0,0503
A4	**2258**	0,825952	0,1551
A5	**4472**	0,417039	0,0783
A6	**4571**	0,408007	0,0766
A7	**1865**	1	0,1878
A8	**8390**	0,222288	0,0417
A9	**6643**	0,280747	0,0527
A10	**6193**	0,301146	0,0565
A11	**8982**	0,207637	0,0390
A12	**6193**	0,301146	0,0565
		5,325701	1,0000
Minimum	1865		

TIME

A1	**284**	0,010563	0,00488	0,0049
A2	**840**	0,003571	0,00165	0,0017
A3	**704**	0,004261	0,00197	0,0020
A4	**3**	1	0,46230	0,4623
A5	**5**	0,6	0,27738	0,2774
A6	**6**	0,5	0,23115	0,2311
A7	**262**	0,01145	0,00529	0,0053
A8	**795**	0,003774	0,00174	0,0017
A9	**611**	0,00491	0,00227	0,0023
A10	**192**	0,015625	0,00722	0,0072
A11	**819**	0,003663	0,00169	0,0017
A12	**566**	0,0053	0,00245	0,0025
		2,163118	1,00000	1,0000
Minimum	3			

SPEED

A1	**28**	0,01099	0,0110
A2	**28**	0,01099	0,0110
A3	**28**	0,01099	0,0110
A4	**765**	0,30035	0,3004
A5	**765**	0,30035	0,3004
A6	**765**	0,30035	0,3004
A7	**28**	0,01099	0,0110
A8	**28**	0,01099	0,0110
A9	**28**	0,01099	0,0110
A10	**28**	0,01099	0,0110
A11	**28**	0,01099	0,0110
A12	**28**	0,01099	0,0110
Total	2547	1,00000	1,0000

TRANSPORTATION COSTS

A1	**1580**	0,860759	0,1516
A2	**2770**	0,490975	0,0865
A3	**2895**	0,469775	0,0827
A4	**45760**	0,02972	0,0052
A5	**74880**	0,018162	0,0032
A6	**49920**	0,027244	0,0048
A7	**1580**	0,860759	0,1516
A8	**2770**	0,490975	0,0865
A9	**2895**	0,469775	0,0827
A10	**1360**	1	0,1761
A11	**2770**	0,490975	0,0865
A12	**2895**	0,469775	0,0827
		5,678896	1,0000
Minimum	1360		

HANDLING AND PACKAGING COSTS

A1	**1004**	1	0,0976
A2	**1104**	0,90942	0,0888
A3	**1104**	0,90942	0,0888
A4	**1684**	0,5962	0,0582
A5	**1684**	0,5962	0,0582
A6	**1684**	0,5962	0,0582
A7	**1004**	1	0,0976
A8	**1104**	0,90942	0,0888
A9	**1104**	0,90942	0,0888
A10	**1004**	1	0,0976
A11	**1104**	0,90942	0,0888
A12	**1104**	0,90942	0,0888
		10,24512	1,0000
Minimum	1004		

WAREHOUSE COSTS

A1	265	1	0,1051
A2	265	1	0,1051
A3	265	1	0,1051
A4	**1202**	0,220466	0,0232
A5	**1302**	0,203533	0,0214
A6	**1302**	0,203533	0,0214
A7	**275**	0,963636	0,1012
A8	**275**	0,963636	0,1012
A9	**275**	0,963636	0,1012
A10	**265**	1	0,1051
A11	**265**	1	0,1051
A12	265	1	0,1051
		9,518441	1,0000
Minimum	265		

COMMUNICATION COSTS

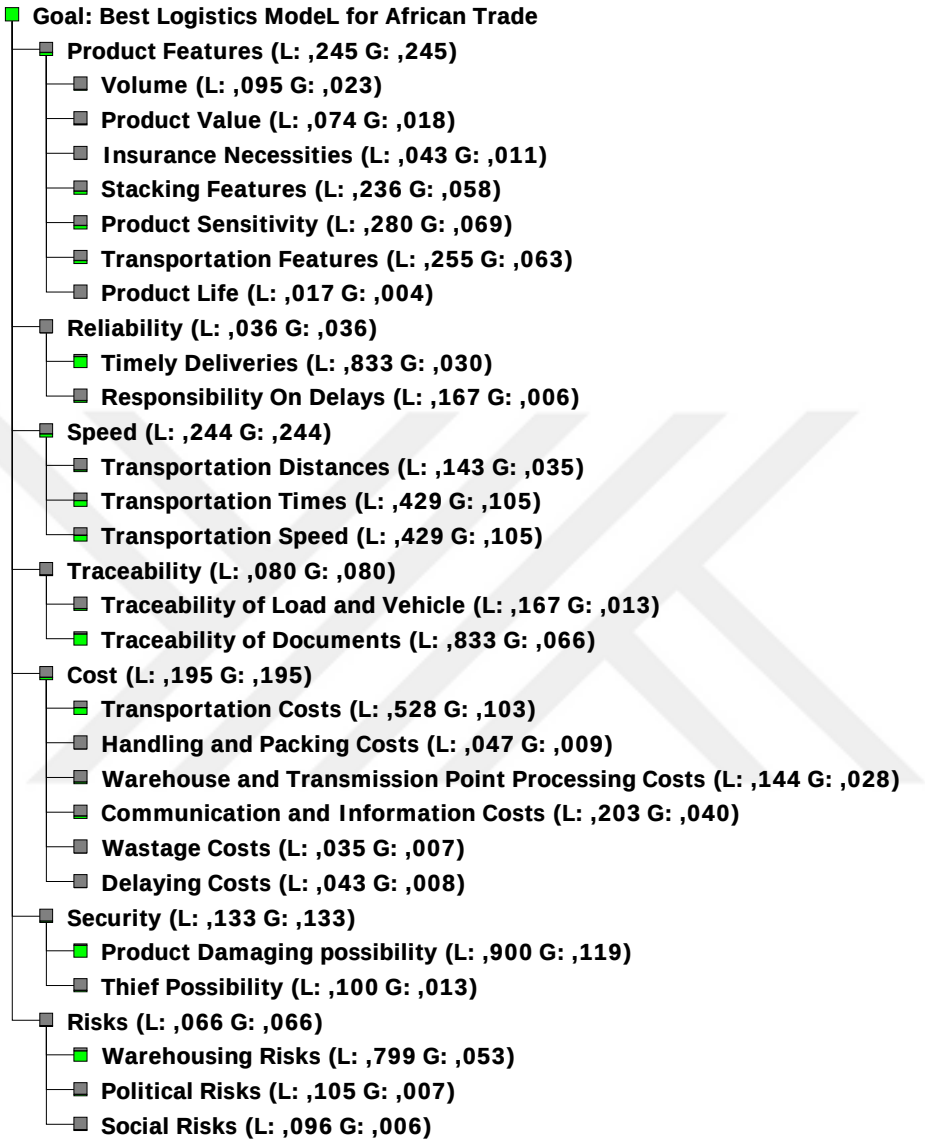
A1	**1300**	1	0,0891
A2	**1300**	1	0,0891
A3	**1300**	1	0,0891
A4	1750	0,742857	0,0662
A5	**1750**	0,742857	0,0662
A6	**1750**	0,742857	0,0662
A7	**1300**	1	0,0891
A8	1300	1	0,0891
A9	**1300**	1	0,0891
A10	**1300**	1	0,0891
A11	**1300**	1	0,0891
A12	1300	1	0,0891
		11,22857	1,0000
Minimum	1300		

WASTAGE COSTS

A1	85	1	0,1018
A2	85	1	0,1018
A3	85	1	0,1018
A4	175	0,485714	0,0494
A5	175	0,485714	0,0494
A6	175	0,485714	0,0494
A7	95	0,894737	0,0911
A8	95	0,894737	0,0911
A9	95	0,894737	0,0911
A10	95	0,894737	0,0911
A11	95	0,894737	0,0911
A12	95	0,894737	0,0911
		9,825564	1,0000
Minimum	85		

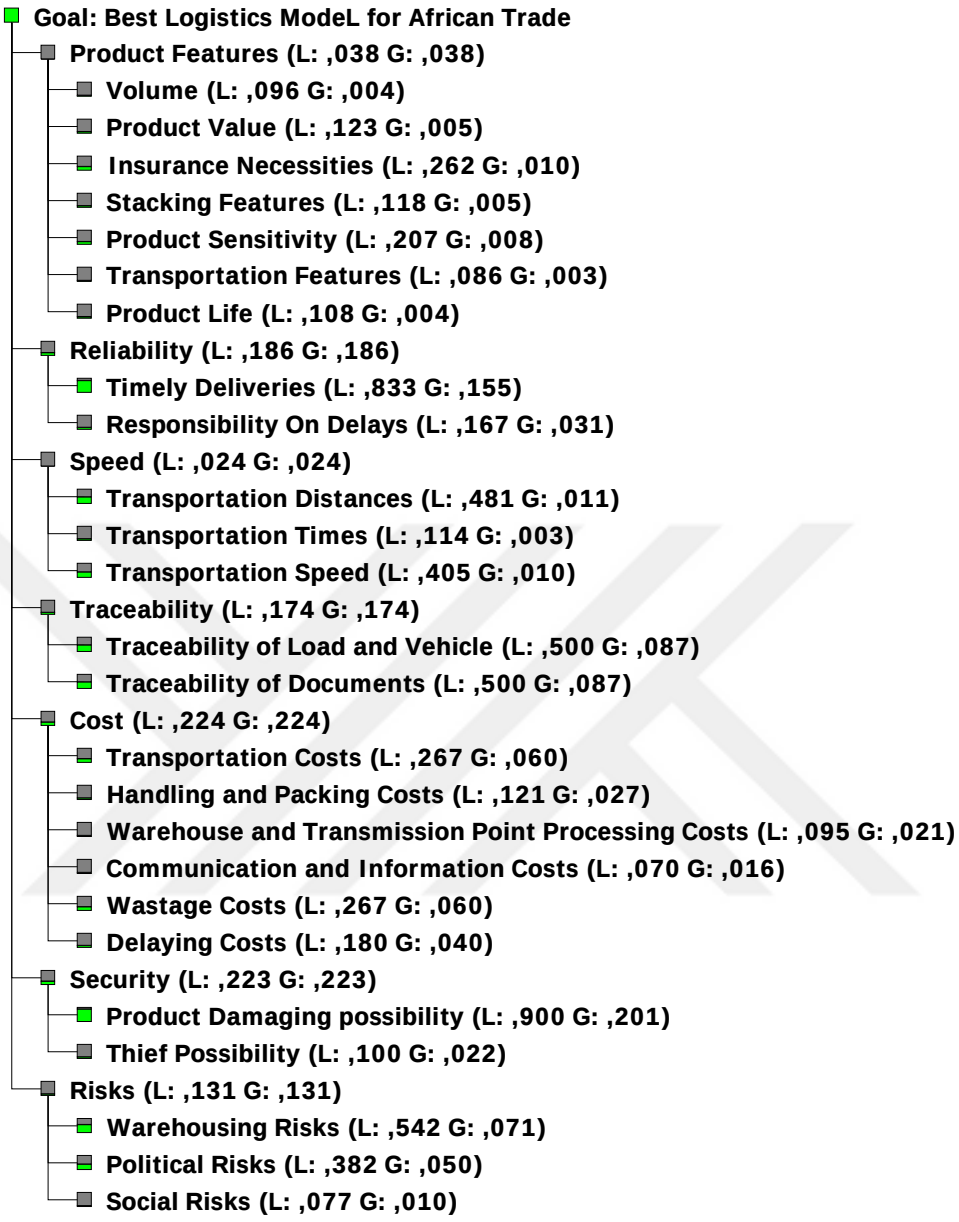
Appendix I: Participant Tables on Expert Choice Program

P2 – AYMED HEALTH PRODUCTS



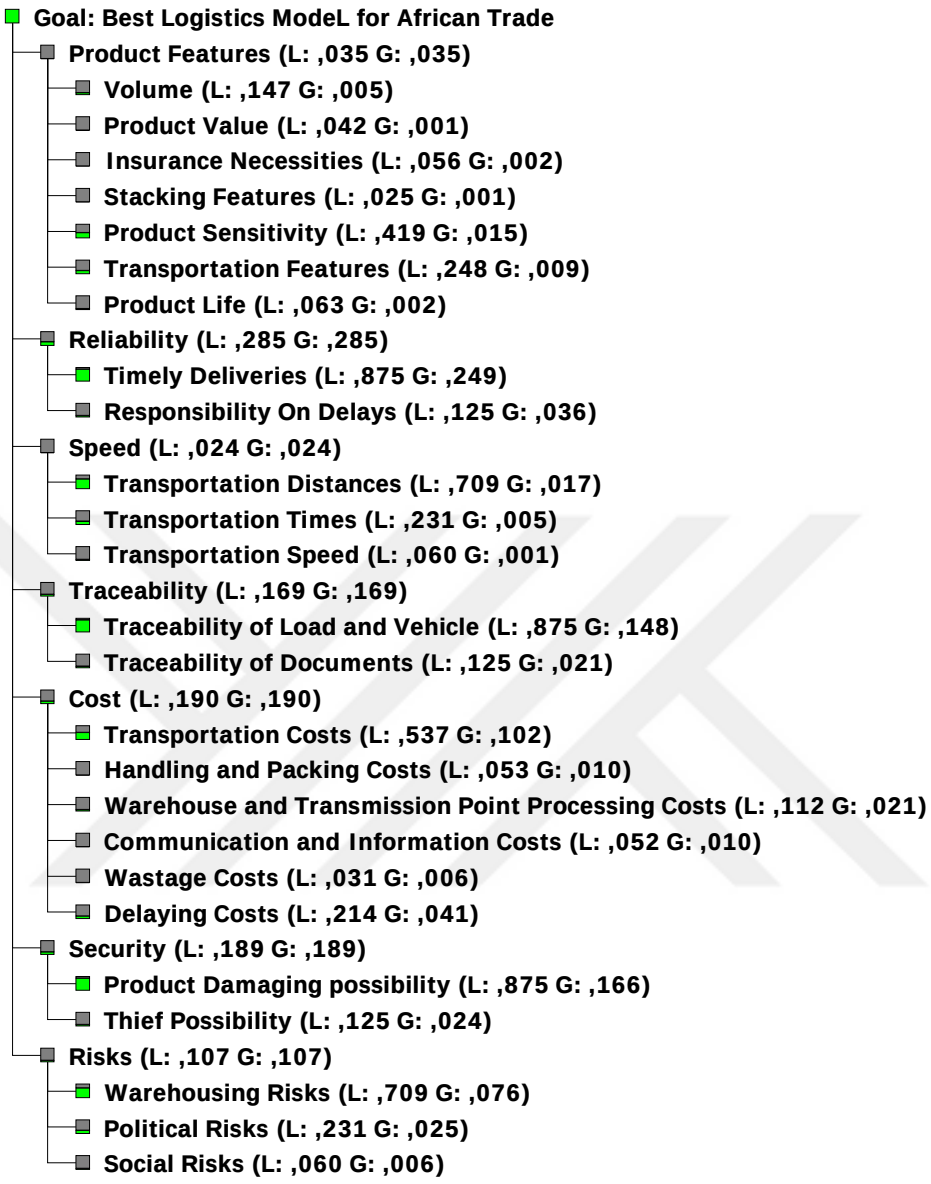
A1	,062
A2	,048
A3	,048
A4	,185
A5	,171
A6	,171
A7	,063
A8	,049
A9	,048
A10	,060
A11	,047
A12	,048

P3 – KENYA TURKISH TRADE CONSULAR



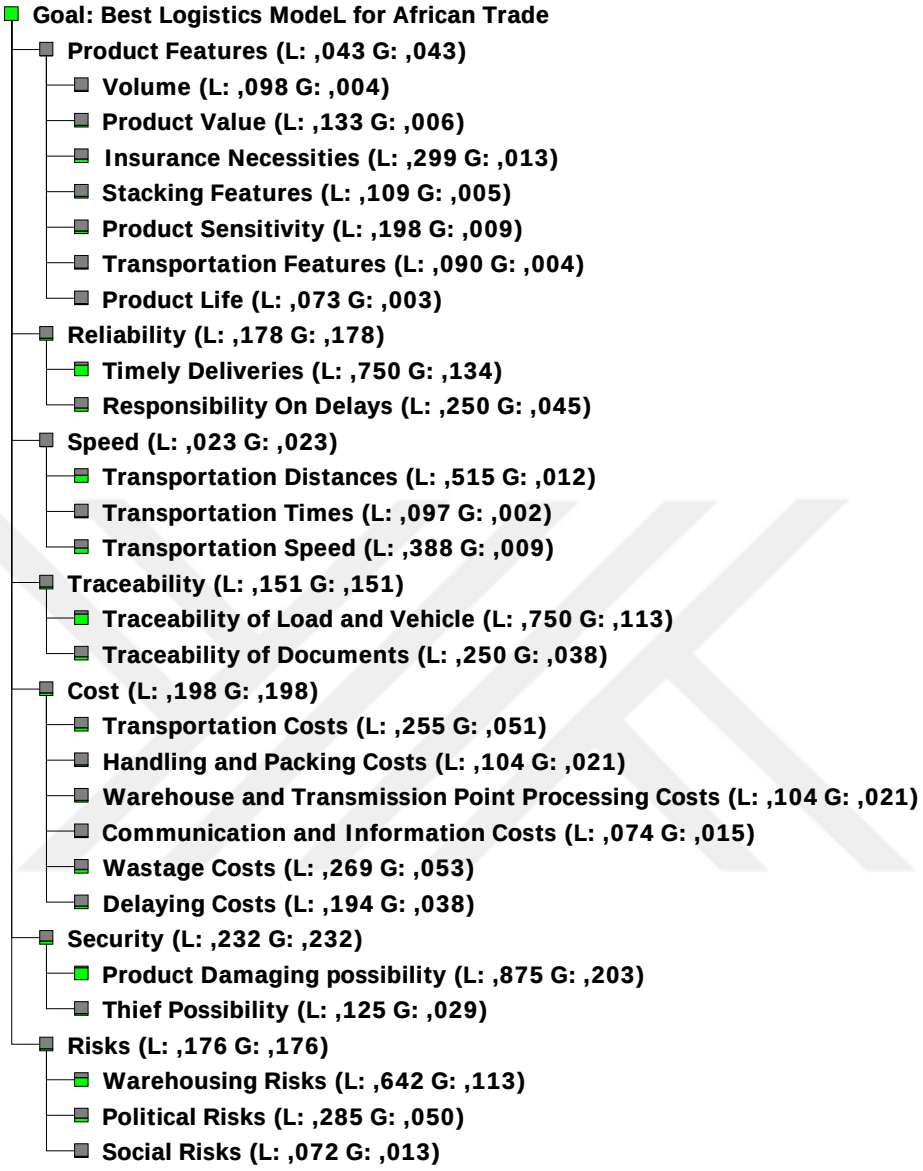
A1	,094
A2	,076
A3	,085
A4	,073
A5	,065
A6	,065
A7	,081
A8	,069
A9	,070
A10	,094
A11	,104
A12	,123

P4 – IPEK AIR CARGO AGENCY



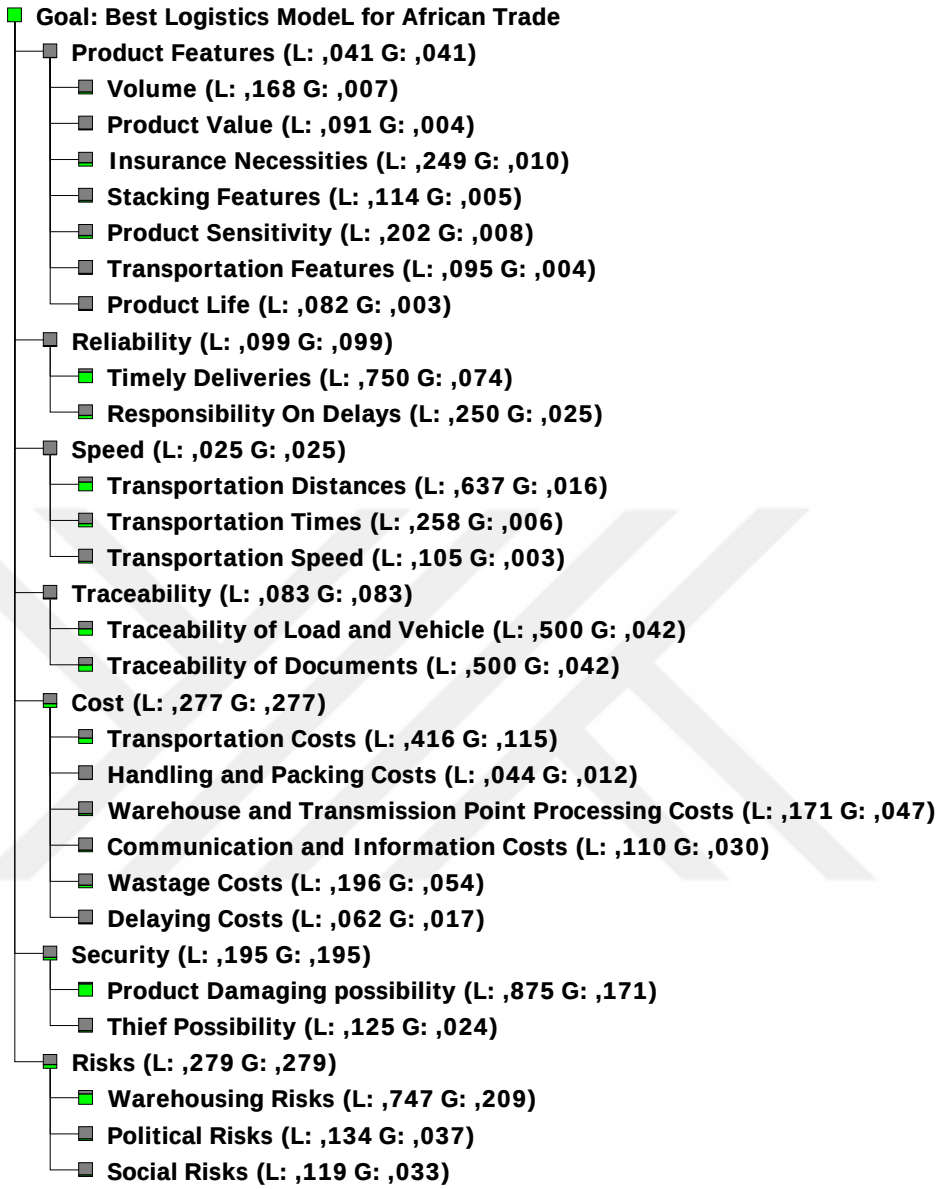
A1	,085
A2	,080
A3	,084
A4	,072
A5	,064
A6	,068
A7	,083
A8	,071
A9	,060
A10	,097
A11	,104
A12	,132

P5 – MAERSK SEA LINES TURKEY



A1	,092
A2	,081
A3	,086
A4	,073
A5	,067
A6	,068
A7	,079
A8	,071
A9	,071
A10	,091
A11	,100
A12	,120

P6 – KGM MACHINERY



A1	,107
A2	,061
A3	,062
A4	,055
A5	,057
A6	,060
A7	,119
A8	,085
A9	,081
A10	,116
A11	,096
A12	,102

Appendix J: Africa Hinterlands & Distances

					DISTANCE (km.)		FLYING TIME TO DESTINATION (mn.)
AFR 1	***4 CONT. PORTS***	***13 INT. AIRPORTS***	**CAPITAL**	**LOCATION**	**ROAD**	**RAIL**	**TURKISH AIRLINES ISTANBUL FLIGHTS**
1	**ALGERIA**		**ALGIERS**	**PORT**	**25**		**215**
2	**MOROCCO**		**RABAT**	**SEASHORE / PORT**	**1.040**	**1.170**	**290**
3	**TUNUSIA**		**TUNIS**	**SEASHORE / PORT**	**810**	**980**	**165**
4	**MAURITANIA**		**NOUAKCHOTT**	**SEASHORE / PORT**	**3.230**	**3.390**	**415**
5	**WESTERN SAHARA**		**LAAYOUNE**	**SEASHORE / PORT**	**2.630**	**2.790**	**310**
AFR 2	***1 CONT. PORT***	***1 INT. AIRPORT***					
1	**GHANA**		**ACCRA**	**PORT**	**20**		**435**
2	**NIGERIA**		**ABUJA**	**SEASHORE / PORT**	**1.225**	**1.260**	**395**
3	**BENIN**		**PORTO-NOVO**	**SEASHORE / PORT**	**385**	**415**	**405**
4	**GUINEA**		**CONAKRY**	**SEASHORE / PORT**	**2.150**	**2.290**	**620**
5	**SENEGAL**		**DAKAR**	**SEASHORE / PORT**	**2.930**	**3.130**	**475**

6	IVORY COAST		YAMOUSSOUKRO	SEASHORE / PORT	770	830	485
7	TOGO		LOME	SEASHORE / PORT	205	240	460
8	LIBERIA		MONROVIA	SEASHORE / PORT	1.575	1.645	635
9	SIERRA LEONE		FREETOWN	SEASHORE / PORT	1.980	2.060	645
10	GUINEA BISSAU		BISSAU	SEASHORE / PORT	2.590	2.630	670
11	NIGER		NIAMEY	INLAND	1.250	1.370	370
12	BURKINA FASO		OUAGADOUGOU	INLAND	980	1.060	395
13	MALI		BAMAKO	INLAND	1.540	1.680	445
AFR 5	*1 CONT. PORT*	*4 INT. AIRPORT*					
1	KENYA		NAIROBI	MOMBASA	490		395
2	TANZANIA		DAR ES SALAAM	SEASHORE / PORT	840	915	445
3	UGANDA		KAMPALA	INLAND	640	710	385
4	RWANDA		KIGALI	INLAND	1.135	1.260	410
5	BURUNDI		BUJUMBURA	INLAND	1.240	1.390	445

Appendix K: Distances In Turkey & Hinterlands

Distances in Turkey (KM)

	CITIES	ROAD (km.)	RAIL (km.)	EXP./IMP. SEAPORT(S)			EXP./IMP. AIRPORT(S)		
	Total 40 cities								
TRK1	*2 SEAPORTS*	*2 INT. AIRPORTS*		AMBARLI PORT	HAYDARPASA PORT		*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		ISTANBUL		25	20		ATATURK	15	SABIHA GOKCEN INT.
1	KOCAELI (Highway)	120	125	145	95		ATATURK	120	SABIHA GOKCEN INT.
2	SAKARYA (Highway)	160	175	200	150		ATATURK	170	SABIHA GOKCEN INT.
3	TEKIRDAG (Highway)	150	125	155	175		ATATURK	175	CORLU AIRPORT
4	DUZCE (Highway)	225	N/A	255	205		ATATURK	230	ESENBOGA INT.
5	BOLU (Highway)	270	N/A	300	250		ATATURK	280	ESENBOGA INT.

TRK2	*1 SEAPORT*	*1 INT. AIRPORT*		GEMLIK PORT	HAYDARPASA PORT		*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		BURSA		25	230		BURSA	60	SABIHA GOKCEN INT.
1	BALIKESIR	160	N/A	180	335 (Rail)		ADNAN MENDERES	195	KUTAHYA INT.
2	BILECIK	100	N/A	95	265 (Rail)		KUTAHYA (Rail)	160	BURSA INT.
3	KUTAHYA	185	N/A	215	340 (Rail)		KUTAHYA	50	BURSA INT.
4	ESKISEHIR	145	N/A	185	320 (Rail)		ESENBOGA (Rail)	275	KUTAHYA INT.
5	YALOVA (Highway)	75	N/A	40	105		SABIHA GOKCEN	105	BURSA INT.
TRK3	*1 SEAPORT*	*1 INT. AIRPORT*		ALSANCAK PORT			*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		IZMIR		5			ADNAN MENDERES	30	-
1	MANISA	40	45	45			ADNAN MENDERES	60	-
2	DENIZLI	250	265	255			ADNAN MENDERES	230	DENİZLİ AIRPORT
3	AFYON	330	350	335			KUTAHYA (Rail)	65	KONYA (Rail)
4	AYDIN (Highway)	115	140	120			ADNAN MENDERES	100	DENİZLİ AIRPORT
5	USAK	220	255	225			ADNAN MENDERES (Rail)	235	USAK AIRPORT

6	BURDUR	400	485	410			ANTALYA	135	SULEYMAN DEMIREL
7	ISPARTA	410	470	420			ANTALYA	130	SULEYMAN DEMIREL
TRK4	*N/A SEAPORT*	*1 INT. AIRPORT*		MERSIN PORT	HAYDARPASA PORT	ALSANCAK PORT	*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		ANKARA		505 (Rail)	440 (Rail)	605 (Rail)	ESENBOGA	30	KONYA (Rail)
1	KONYA	265	280	360 (Rail)	540 (Rail)	570 (Rail)	KONYA	25	ESENBOGA
2	KIRIKKALE	75	80	475 (Rail)	515 (Rail)	680 (Rail)	ESENBOGA (Rail)	90	KAYSERI INT. (Rail)
3	KARAMAN	380	405	260 (Rail)	-	695 (Rail)	KONYA (Rail)	135	ADANA INT.
4	AKSARAY	230	N/A	280	-	-	KONYA	160	KAYSERI
TRK5	*N/A SEAPORT*	*1 INT. AIRPORT*		MERSIN PORT			*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		KAYSERI		325 (Rail)			KAYSERI	10	ESENBOGA INT. (Rail)
1	ADANA	310	360	95 (Rail)			ADANA	10	GAZIANTEP (Rail)
2	MERSIN (SEAPORT)	320	385	10 (Rail)			ADANA (Rail)	90	GAZIANTEP (Rail)
3	SIVAS	205	220	535 (Rail)			KAYSERI (Rail)	205	SİVAS AIRPORT
4	KIRSEHIR	140	N/A	380			KAYSERI	150	ESENBOGA INT.
5	NEVSEHIR	80	N/A	275			KAYSERI	80	NEVSEHIR AIRPORT
6	NIGDE	130	145	160 (Rail)			KAYSERI (Rail)	125	ADANA INT.
TRK6	*N/A SEAPORT*	*1 INT. AIRPORT*		MERSIN PORT			*INTERNATIONAL AIRPORT*	*DISTANCE*	*ALTERNATIVE AIRPORT*
		GAZIANTEP		305 (Highway)			GAZIANTEP	25	SANLIURFA INT. (Rail)
1	SANLIURFA (Highway)	155	175	450 (Highway)			SANLIURFA	35	GAZIANTEP INT. (Rail)
2	DIYARBAKIR	310	560	620			DIYARBAKIR (Under Construction)	10	ELAZIG AIRPORT
3	ELAZIG	345	370	575			DIYARBAKIR (Under Construction)	160	ELAZIG AIRPORT
4	MALATYA	240	275	465			MALATYA	25	ELAZIG AIRPORT
5	KILIS	65	70	370 (Highway)			GAZIANTEP	25	SANLIURFA INT. (Rail)
6	ADIYAMAN	155	N/A	415			GAZIANTEP	155	SANLIURFA INT.
7	KAHRAMANMARAS	85	N/A	275 (Highway)			GAZIANTEP	90	KAHRAMANMARAS

Appendix L: Turkey Hinterlands' Export Details

TURKEY HINTERLANDS (Million USD)						
	REGIONS	CITIES	Export	Africa Export	Total Export	Total Africa Export
					145.443.260	13.960.883
TRK1	ISTANBUL		63.800.027	5.826.536	43,87%	41,73%
		KOCAELI	12.725.183	1.838.629	8,75%	13,17%
		SAKARYA	2.240.493	124.714	1,54%	0,89%
		TEKIRDAG	702.299	63.161	0,48%	0,45%
		DUZCE	115.812	13.232	0,08%	0,09%
		BOLU	147.086	6.873	0,10%	0,05%
		Total	79.730.900	7.873.145	54,82%	56,39%
TRK2	BURSA		12.855.962	994.441	8,84%	7,12%
		BALIKESIR	621.282	35.415	0,43%	0,25%
		BILECIK	78.118	3.883	0,05%	0,03%
		KUTAHYA	180.020	13.248	0,12%	0,09%
		ESKISEHIR	812.209	25.973	0,56%	0,19%
		YALOVA	305.383	1.439	0,21%	0,01%
		Total	14.852.974	1.074.399	10,21%	7,70%

TRK3	IZMIR		8.916.983	561.673	6,13%	4,02%
		MANISA	4.033.295	200.063	2,77%	1,43%
		DENIZLI	3.083.294	249.876	2,12%	1,79%
		AFYON	364.428	12.946	0,25%	0,09%
		AYDIN	575.924	25.990	0,40%	0,19%
		USAK	258.878	17.683	0,18%	0,13%
		BURDUR	157.630	9.586	0,11%	0,07%
		ISPARTA	187.868	28.466	0,13%	0,20%
		Total	17.578.300	1.106.283	12,09%	7,92%
TRK4	ANKARA		7.270.973	656.463	5,00%	4,70%
		KONYA	1.386.523	203.360	0,95%	1,46%
		KIRIKKALE	13.655	4.869	0,01%	0,03%
		KARAMAN	322.075	73.186	0,22%	0,52%
		AKSARAY	73.050	10.814	0,05%	0,08%
		Total	9.066.276	948.692	6,23%	6,80%
TRK5	KAYSERI		1.773.422	298.650	1,22%	2,14%
		ADANA	1.895.829	144.881	1,30%	1,04%
		MERSIN	1.498.574	124.136	1,03%	0,89%
		SIVAS	77.271	2.746	0,05%	0,02%

		KIRSEHIR	207.678	39.070	0,14%	0,28%
		NEVSEHIR	52.679	4.835	0,04%	0,03%
		NIGDE	67.178	4.236	0,05%	0,03%
		Total	5.572.631	618.554	3,83%	4,43%
TRK6	GAZIANTEP		6.472.870	805.721	4,45%	5,77%
		SANLIURFA	226.120	5.007	0,16%	0,04%
		DIYARBAKIR	231.336	7.159	0,16%	0,05%
		ELAZIG	255.941	1.523	0,18%	0,01%
		MALATYA	401.781	13.999	0,28%	0,10%
		KILIS	29.991	659	0,02%	0,00%
		ADIYAMAN	79.621	79	0,05%	0,00%
		KAHRAMANMARAS	810.500	79.800	0,56%	0,57%
		Total	8.508.160	913.947	5,85%	6,55%
		Total 40 cities				
		G.T	135.309.241	12.535.020	93,03%	89,79%
		TOTAL OF TURKIYE CITIES	81			
		REST OF THE CITIES	41			
			Export	Africa Export	Total Export	Total Africa Export
		EXPORT DIFFERENCE 41 CITIES	10.134.019	1.425.863	6,97%	10,21%

	Appendix M: Seven African Hinterlands & All Turkey Trade			
			TURKEY (1.000.000 USD)	
	HINTERLANDS	COUNTRIES	EXPORT	IMPORT
AFR1	1. H	ALGERIA	2.037.533	714
		MOROCCO	1.160.809	572
		TUNUS	894.087	289
		MORITANIA	101.393	4
		WESTERN SAHARA	0	0
		TOTAL	4.193.822	1.579
AFR2	2. H	NIGERIA	410.482	149
		GHANA	181.727	202
		BENIN	132.749	2
		GUINEE	126.827	13
		SENEGAL	117.267	6
		IVORY COAST	85.812	132
		TOGO	81.571	46
		LIBERIA	55.283	11
		SIERRA LEONE	45.409	24
		NIGER	41.161	0
		BURKINA FASO	20.891	37
		MALI	20.807	0
		GUINEE BISSAU	5.239	0
		TOTAL	1.325.225	622
AFR3	3. H	EGYPT	3.230.430	1.629
		LIBYA	2.723.868	304
		ETHIOPIA	359.971	57
		SUDAN	269.392	26
		DJIBUTI	70.033	0
		SOMALI	38.582	1
		ERITRE	1.326	0
		TOTAL	6.693.602	2.017

AFR4	4. H	CAMERUN	103.788	45
		CONGO REPUBLIC	94.819	8
		GABON	94.543	3
		ECUATOR GUINEE	71.308	0
		DEM. CONGO REP.	37.894	63
		CHAD	12.448	11
		MID AFRICA REP.	1.295	3
		TOTAL	416.095	133
AFR5	5. H	TANZANIA	140.572	43
		KENYA	131.301	15
		UGANDA	22.335	10
		RWANDA	9.717	0
		BURUNDI	1.560	0
		TOTAL	305.485	68
AFR6	6. H	ANGOLA	263.095	8
		NAMIBIA	3.033	4
		TOTAL	266.128	12
AFR7	7. H	SOUTH AFRICA	620.486	1.479
		MADAGASCAR	59.506	4
		MOZAMBIQUE	41.601	59
		ZAMBIA	21.503	1
		ZIMBABWE	7.706	17
		MALAWI	4.828	18
		BOTSWANA	2.857	0
		SWAZILAND	1.582	0
		LESOTHO	456	0
		TOTAL	760.525	1.578
		TOTAL 51 Countries		
			13.960.883	6.009.000

Appendix N: Africa Regions

1. REGION

ALGERIA	Algiers
MOROCCO	Rabat
TUNUSIA	Tunis
MAURITANIA	Nouakchott
WEST. SAHARA	Laayoune

2. REGION

GHANA	Accra
NIGERIA	Lagos
BENIN	Porto Novo
GUINEA	Conakry
SENEGAL	Dakar
IVORY COAST	Yamoussoukro
TOGO	Lome
LIBERIA	Monrovia
SIERRA LEONE	Freetown
NIGER	Niamey
BURKINA FASO	Ouagadougou
MALI	Bamako
GUINEA BISSAU	Bissau

5. REGION

KENYA	Nairobi
TANZANIA	Dodoma
UGANDA	Kampala
RWANDA	Kigali
BURUNDI	Bujumbura

Appendix O: Turkey Regions and Cities

1. REGION IN TURKEY

(7 CITIES)

ISTANBUL

IZMIT (KOCAELI)

SAKARYA

DUZCE

BOLU

TEKIRDAG

CANAKKALE

2. REGION IN TURKEY

(6 CITIES)

BURSA

ESKISEHIR

BILECIK

KUTAHYA

BALIKESIR

YALOVA

3. REGION IN TURKEY

(8 CITIES)

IZMIR

MANISA

DENIZLI

AYDIN

AFYON

ISPARTA

BURDUR

USAK

4. REGION IN TURKEY

(5 CITIES)

KONYA

ANKARA

KIRIKKALE

AKSARAY

KARAMAN

5. REGION IN TURKEY

(7 CITIES)

KAYSERI

ADANA

MERSIN

NEVSEHIR

NIGDE

SIVAS

KIRSEHIR

6. REGION IN TURKEY

(8 CITIES)

GAZIANTEP

MALATYA

ELAZIG

URFA

K. MARAS

ADIYAMAN

DIYARBAKIR

KILIS

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- "The Importance of Istanbul Grand Airport (IGA) for Turkey and Its Influence on Widely Regional Air Traffic Around", (with Ana D. Georgieva and Prof. Dr. Mehmet Tanyaş), Research in Logistics & Production (RLP), pp. 239-245, 30 June 2015, Number 3/2015 Special Issue, ISSN (Print): 2083-4942, Internet Pub.: http://research.logistyka-produkcja.pl/en/number-3-2015-special-issue.html

7.2 International Conference Presentations & Proceedings:

- "Integration of Stock Keeping Areas and Inventory Planning", (with Prof. Dr. Mehmet Tanyaş), 9th International Logistics and Supply Chain Congress 2011, October 27-29, İzmir, Turkey, (Proceedings, Vol. I, p.314-321).

- "Integration of Stock Keeping Areas and Inventory Planning", (with Prof. Dr. Mehmet Tanyaş), 10th International Logistics and Supply Chain Congress 2012, November 8-9, İstanbul, Turkey.
- "The importance of Istanbul Grand Airport (IGA) for Turkey and its influence on widely regional air traffic around" (with Ana D. Georgieva and Prof. Dr. Mehmet Tanyaş), 12th International Logistics and Supply Chain Congress 2014, October 30-31, İstanbul, Turkey.

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- "The Image of Turkish Industrial Products for Export", Lap Lambert Academic Publishing. ISBN 978-3-8443-8509-0, 2012

7.4 National Conference Presentations & Proceedings:

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- "İstanbul Üçüncü Havalimanı (IGA)'nın Türkiye için önemi ve Geniş çaplı Bölgesel Hava Trafiği üzerinde etkisi ", (with Prof. Dr. Mehmet Tanyaş), IV. Ulusal Lojistik ve Tedarik Zinciri Kongresi, 21-23 Mayıs 2015, Gümüşhane

8- OTHER PUBLICATIONS:

8.1 National Books written:

- "Uluslararası Lojistik: Küresel Tedarik Zinciri Yönetimi", (with Prof. Dr. Mehmet Tanyaş), Tanslation, Nobel Publication, Ankara 2012, ISBN: 978-605-133-210-9.
- "Depo Yönetimi", (with Prof. Dr. Mehmet Tanyaş), Translation, Nobel Publication, Ankara 2014, ISBN: 978-605-133-879-8.
- "Uluslararası Ticaret ve Finans El kitabı", (with Ass. Prof. Dr. Tülay Yazar Öztürk), Translation, Nobel Yayınları, Ankara 2014, ISBN: 978-605-133-899-6.
- "Tedarik Zinciri: En İyi Uygulamalar", (with Prof. Dr. Mehmet Tanyaş), Translation, Nobel Publication, Ankara 2015, ISBN: 978-605-133-913-9.