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The Provision of Efficient Transport Services in the Iranian Maritime and Land Transport Interface

By
Farhad Razkhaneh
206525761

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School of Accounting, Economics and Finance
College of Law & Management Studies

Supervisor: Professor Trevor Jones

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DECLARATION

I, Farhad Razkhanch, declare that

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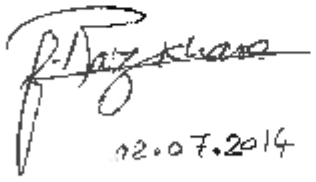
Signature: 

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I am also learning that the comparative advantage in the economy is supported to be a general concept, applicable to countries in every stage of economic development with a central message that every country rich or poor, gains from specialising in those fields it has a comparative advantage such as transport for Iranian economy and hence, the gain from trade and transport is shared with other countries. Consequently, I am also learning that: “to gain righteousness you have to sacrifice that which you love (in terms of the world).” Al Quran 3:92.

Love is the means to perfection: “but he will prosper who purifies himself (both inwardly and outwardly) and remembers the name of his Guardian Lord, and prays.” Al Quran 87:14. And also 91:9

Abstract

This research investigates the efficiency of Iran's transport system with reference to the sea-borne trade and sustainable development of ports, shipping services, logistics centres and transit corridors as the overall objectives. The reason this study is relevant, is it introduces Iran through its potentially cost-effective transport advantages to create an alternative source of revenue for a country that is heavily dependent on oil income. To successfully analyse the provision of effective transport services in the Iranian maritime and land transport interface, the emerging Iranian transport corridors have been under close observation, and a scenario planning approach mixed with a descriptive exploratory comparative cost analysis has been applied. This methodology comprises two stages. The first stage involves the identification of the main features, limitations and challenges of the chosen transport corridors through which the different infrastructure and the development of main ports, routes and corridors are described according to the available data and information. The second and more analytical stage utilises this base to estimate and compare the comparative costs of these through-transport routes, with a view to establishing their cost effectiveness. As research recommendations, the optimisation of efficiency of some alternative land haulage routes, and the International North-South Transport Corridor (INSTC) as a sea cum-land route-rail are elaborated.

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List of Abbreviations and Explanations

ADB	Asian Development Bank
AH	Asian Highway
ALTID	Asian Land Transport Infrastructure Development
ASYCUDA	Automated System for Customs Data
BOT	Build-Operate-Transfer (Scheme)
BRICS	Brazil, Russia, India, China and South Africa
CAREC	Central Asian Regional Economic Cooperation
CARs	Central Asian Republics
CAO	Civil Aviation Organisation
CBT	Commercial Benefit Tax
CDTIC	Construction and Development of Transportation Infrastructure Company
CFZ	Chabahar Free Zone
CIS	Commonwealth of Independent States
CMR	Convention de Merchandises par Route
COC	Carrier Owned Containers
DC	Dry Container
DEEPLIST	Demographic, Environment, Economic, Politics, Legal, Information, Social and Technology
DWT	Dead Weight Tonnage
dwt	deadweight tonnage
EATL	Euro-Asian Transport Links
ECE	Economic Commission for Europe
ECMT	European Conference of Ministers of Transport
ECO	Economic Cooperation Organisation
EDI	Electronic Data Interchange
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
EUCAM	EU-Central Asia Monitoring (analysts)
EurAsEC	Eurasian Economic Community
FAL	Facilitation of International Maritime Traffic (Convention)
FEU	Forty-foot Equivalent Unit (Container)
FTZ	Free Trade Zone
FYDP	Five-Year Development Plan
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GLS	General Logistics Services
ha	hectare
HC	High Cube (Container)
ICD	Inland Clearance Depot
IDRO	Industrial Development and Renovation Organisation
IMF	International Monetary Fund
IMO	International Maritime Organisation
INSTC	International North-South Transport Corridor
IOTC	Iranian Oil Terminal Company

IRI	Islamic Republic of Iran
IRICA	Islamic Republic of Iran Customs Administration
IRISL	Islamic Republic of Iran Shipping Lines
IRU	International Road Transport Union
ISL	Institute of Shipping Economics and Logistics
ISLB	Iranian sea-landbridge
ISO	International Standard Organisation (standard unit of container)
ISOICO	Iran Shipbuilding & Offshore Industries Complex Co
LNG	Liquefied Natural Gas
km	kilometre
MIDAS	Maritime Industrial and Distribution Activities
MENA	Middle East-North Africa (region)
NELTI	New Eurasian Land Transport Initiative
NIOC	National Iranian Oil Company
NTBs	Non-Tariff Barriers
OECD	Organisation for Economic Cooperation and Development
OIC	Organisation of the Islamic Conference
OSJD	Organisation for Cooperation of Railways
PESTLE	Political, Economic Social, Technical Legal and Environmental
PMO	Ports and Maritime Organisation
PPP	Public Private Partnership
PPP	Purchasing Power Parity
PSEEZ	Pars Special Energy Economic Zone
RAI	Iranian Railway Company (Rah Ahan e Iran)
RDC	Regional Distribution Centre
RMTO	Road Maintenance & Transportation Organisation
RORO	Roll-On/Roll-Off (ferry ships)
RTA	Regional Trade Agreement
RTG	Rubber-tyrd Gantry (cranes)
SAR	Search and Rescue (boat)
SEZ	Special Economic Zone
TAR	Trans-Asian Railway
TEU	Twenty-foot Equivalent Unit (Container)
TRACECA	Transport Corridor Europe-Caucuses-Asia
TIR	Transports Internationaux Routiers
TSS	Traffic Separation Scheme
TTFSC	Trade and Transportation Facilitation in the South Caucuses
TTO	Transportation and Terminals Organisation
UIC	International Union of Railways
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UN/LOCODE	United Nations Code for Trade and Transportation Locations
VAL	Value-added Logistic activities
VTS	Vessel Traffic Services
WB	World Bank

WCO	World Customs Organisation
WTO	World Trade Organisation

CHAPTER ONE

INTRODUCTION

1.1 Introduction and objectives

It is the quality of the transport and communication infrastructure of a country which allows even isolated communities of that country to participate in trade. Developments in domestic trade are usually discussed with regards to the effects and role of transport. An efficient transport system is always needed to connect domestic producers with new markets. Appropriate transport costs, on-time delivery and service quality are essential elements to calculate and to assess the competitiveness of products for the global market. Therefore, cost effectiveness of transport remains as a priority. In the context of multilateral trade, transport is examined either as a service to trade or a service that is tradable.

The focus of discussion in this thesis will be on transport-related issues in the Persian Gulf region and how Iran as a developing economy can integrate more fully into a multilateral trade system by overcoming these issues on a just and fair basis. The Iranian ports are good candidates as "hub" container ports within the Persian Gulf region and present themselves as transport gateways in potentially least-cost through-transport corridors (both sea corridors involving transshipment and feeder services purely by sea, and multi-modally with landside transport) for the landlocked CIS countries, for a resurgent Iraq, for Afghanistan, and, of course for inland destinations in Iran herself.

The case for Iranian ports, port systems and maritime transport services as least-cost through-transport options is addressed while the role of transport in integrating developing economies into the multilateral trading system is also analyzed. The overall objective of this research is to investigate the ways of building the efficiency of Iran's transport system, with reference to sea-borne trade and sustainable development of ports, shipping services, logistics centres and transit corridors. The purpose of this research is to highlight and engage with the factors determining the provision of efficient transport services in the Iranian maritime and land transport interface in the Persian Gulf and hinterland region.

The specific aims of this research are to evaluate, using a cost effectiveness framework:

1- Alternative ways to improve facilities and infrastructure in the transport sector;
2- The removal of non-physical barriers along multimodal sea/landside routes, including simplification of border crossing procedures;
3- Alternative ways of developing multimodal transport by improving logistics capabilities; and
4- Alternative reforms in order to set the stage for trade liberalization in the transport sector.

This introductory chapter has set out very briefly (in section 1, above) the overall objectives and landscape of the research; it introduces the methodology to be used in the research (section 2); it presents discussions relating to the current status and current and future challenges of the international and Iranian transport sector (section 3); and section 4 outlines the sequence of chapters (and their principal areas of focus) that will follow in the thesis.

1.2 Methodology

The principal research method used in this study is scenario planning. The basis for this method is on creating a series of 'different futures' generated from a combination of known factors. These factors are like demographics with plausible alternative political, economic social, technical legal and environmental (PESTLE) trends which are key driving forces. The goal is to craft diverging worlds by extrapolating these pivotal driving forces. The scenario planning or scenario thinking was developed after World War II and was adopted as a more general business tool by Kahn in the 1960s (Jisc infoNet, 2008).

The appropriate methodology used is comparative cost analysis. This methodology comprises two stages. The first stage involves the identification of the main features, limitations and challenges of the chosen transport corridors through which the different infrastructures and development of the main ports, routes and corridors are described according to the available data and information. The second and more analytical stage utilises this base to estimate and compare the comparative cost of these through-transport routes, with a view to establishing their cost effectiveness.

The data used consist of mostly secondary data, including electronic bulletins, books, articles published in newspapers and magazines as well as reliable economic websites and official statistics of the related organizations. Concepts, definitions and methods in this present study were widely taken from authentic academic books and scientific articles published in valid electronic library resources. Much of the relevant data pertaining to the transport sector and its related road and rail infrastructure and corridors and ports and maritime activities have been provided through official statistical information derived from the Port and Maritime Organization (PMO), Ministry of Road & Transportation, the Transportation and Terminals Organization (TTO), the Islamic Republic of Iran Shipping Lines (IRISL), the Central Bank of the Islamic Republic of Iran, and non-governmental companies in sea, rail & road transportation plus a range of international maritime transport publications.

1.3 Results and discussions

The maritime sector of the world economy has so far been the main facilitator of the process of globalization. There has been a massive increase in the size of different types of ships and building tankers of over 500,000 tons Dead Weight (DWT) and dry bulk carriers of over 370,000 tons DWT has reduced the unit cost of shipments and closed the gaps between suppliers and processors of materials. In liner markets, the introduction of standard freight containers ushered in the so-called "container revolution" from the late-1960s. With containerization, global market manufacturers and consumers have been brought together, hence this event has further aided the process of globalization. Containerization and reduced maritime transport costs provided new global sourcing internationally and created possibilities for regional and national economies to explore their comparative advantages for further economic integration and development. Therefore, removal of bottlenecks and creation of cost effective links in maritime and land transport, which gives wider access to domestic hinterlands, is necessary for wide-spread and sound economic development on an ever-wider geographic base.

1.3.1 Transportation and trade interaction

The Islamic Republic of Iran (IRI) transport sector has already achieved goals domestically and in the region through the port developments in the south of the country, which includes the

Persian Gulf region, with some of the busiest container ports, and in the North on the Caspian Sea. The country owns and operates the largest merchant marine fleet in the Middle East.

The Islamic Republic of Iran operates a fleet that is made up of 108 national flag vessels, plus a further 121 vessels sailing under foreign or international flags, totalling 229 ships. This fleet comprises a total of 15.31 million deadweight tons (dwt), of which 1.74 million dwt operates under the national flag, while 13.56 million dwt is foreign flagged (UNCTAD Review, 2013). This accounts for 0.95% of the global fleet and on this basis Iran stands 23rd in the world, and 22nd in the rank of major container operators (BRS Alphaliner, 2013). Considerable tonnage is also currently on order, which will add to fleet capacity.

A valuable commitment of transitional countries like Iran for opening transport routes can result in facilitating intra-regional trade and provision of access to massive hinterlands of Central Asia, and this is consequently of great significance in the region. The additional transport corridors that are planned between Iran and her neighbouring countries will bring links and broad-based integration for Iran and the Middle East with the markets of Europe and other parts of the world through integrated land-cum-sea routes.

1.3.2 Developments in maritime transport

In the developing world, the population explosion and fast industrial growth has created large centres of production and consumption. As a result, there is an overall increase in demand for transportation and in particular demand for sea borne trade. Out of the four modes of transport namely, rail, highway, air, and water, it is ocean transport which is by far the dominant form of transportation that unites all areas of the trading world. As states' interdependence deepens, the advantages gained by shipping in the world economy increases. To understand economic and political forces shaping sea borne trade, one must be aware of the reciprocal demand for interaction between developments in the shipping field and the world economy. The maritime industry is an extremely complex one, with sea transport responsible for the carriage of over 80 per cent of international commodity trade by volume. The backbone supporting international trade and globalisation therefore remains maritime transport. The volume of international seaborne trade reached about 9.2 billion tons of cargo of all types in 2012, representing an

increase of some 4.3 per cent from 2011. The broad tanker trades (crude oil, petroleum products and gas) comprised 2.836 billion tons, accounting for less than one third of the total. The major dry bulks accounted for some 2.665 billion tons and other dry cargo (including containerized general cargo) amounted to 3.664 billion tons, being responsible for the remaining share handled in ports worldwide (UNCTAD Review, 2013: pp.6-7).

In terms of gross registered tonnage (GT) the year 2012 saw the turn of the largest shipbuilding cycle in recorded history. New-building deliveries reached new historical highs between 2001 and 2011, year after year. The dead-weight tonnage delivered annually continued to increase even after the economic downturn of 2008 for three more years, due to the orders that had largely been placed prior to the crisis. It was only for the first time in 2012 that the fleet entered into service during the year was less than that delivered during the previous 12 months. The world tonnage continued to grow in 2012, in spite of slowing down of new deliveries, and year-on-year growth at a slower pace amounted to six per cent as compared to ten per cent increase in the previous year. The world fleet more than doubled since 2001, reaching about 1.63 billion dwt in January 2013 (UNCTAD Review, 2013: 35).

The world merchant fleet expanded by 6 per cent during 2012 to about 1.63 (1.628, 783,000) billion deadweight tons (DWT). The world fleet in January 2013 consisted of 42 per cent dry-bulk tonnage with 684.673 million dwt, stood at a historical record for this vessel type. General-cargo tonnage with 80.345 million dwt on the other hand, continued its decline; its share of the world total is now less than 5 per cent, down from a 15 per cent share 20 years ago. Oil tankers with 490.743 million dwt too, saw their share decline, from almost half of the world tonnage in 1980, to 30 per cent in January 2013. Container ships with 206.577 million dwt, carry an estimated 52 per cent of global seaborne trade in terms of value (World Shipping Council, 2013). Containership deliveries in 2012 consisted of 201 ships with a total capacity of 1,251,171 TEUs (UNCTAD Review, 2013). By the beginning of 2013, the global container fleet stood at 5109 vessels of an aggregated 40,77 million GT, and with a total carrying capacity of about 16 million twenty-foot equivalent units, (TEUs) (BRS, Annual Review, 2013).

Expansion of world merchant fleets and the strategies that shipping lines followed in building container ships with a remarkable increase in size and capacity, ultimately led to downward market pressure on liner freight rates globally. According to present data, liner shipping carries about 25 per cent of the world's seaborne trade, but its influence on the global market is far greater than bulk shipping, as it is associated with the carriage of higher-valued commodities with great influence on manufacturing industries. In the era of containerization, which originated in the late-1960s, initially vessels of 1000 TEU capacity came into use; at a later stage and by 1985 carrying vessels of 2500 TEU and more were built and commonly used; and at present 11,000 and 14,000 TEU and recently 18,000 TEU capacity containerships such as the new Maersk "Triple Es" are being deployed on high-density sea routes (shown in Table1). In this process, they confer substantial benefits on shippers, since economies of scale have the effect of lowering unit transport costs and ultimately freight rates (Cariou, 2008 & Haralambides, et al., 2002).

So far as the port sector is concerned huge fresh investment in infrastructure and equipment has resulted in considerable efficiency increases in shipping services and has contributed to a decline in tariff rates.

The Port and Shipping Organization of Iran, which recently changed its name to Port and Maritime Organization (PMO), was established to facilitate the development of the Iranian ports and maritime services. According to the national economic development policy, the PMO is promoting a strong private sector driven economy in which government acts as an enabler. By adopting liberal and market-oriented economic policies and with the elimination of bureaucratic obstacles, the ground has been opened up in the economy for participation and investment by local and foreign capital. This promotes private sector investment and the operation of profitable business operations within shipping services in Iran over the long term (Port and Maritime Organization of Iran, 2008).

Table 1.1: Stages of container ship development

Source:	First generation	Second generation	Third generation	Fourth generation	Fifth generation	Sixth generation	Seventh generation	E-Class generation	Triple-Es generation
Length (m)	190	210	210~290	270~300	290~320	305~310	355~360	397	400
Speed (knots)	16	23	23	24~24.8	25	25	-	25.5	25.5
Width (m)	27	27	32	37~41	39.6~47.2	38~40	38~40	56	59
Draft (m)	9	10	11.5	13~14	13~14	13.5~14	15	15.5	16
Loading capacity (TEU)	1,000	2,000	3,000	Above 4,000	Above 4,900	Above 6,000	Above 8,000	14,770	18,340
Deck capacity	1~2 stacks	2/8 2/10	3/12 3/13	3/14 4/16	6/16	6/16	-	22 rows	23 rows
Underdeck capacity (high/low)	5~6 stacks	6/7 6/8	7/9 9/10	9/10 9/12	-	10/13	-	+600 TEU reefers	+1000 TEU reefers
Period	1960s	1970s	1980s	1984s	1992s	Since1996	Since 2000	Since 2006	Since 2011
Ship type	Modified ship	Full container	Panamax	Post-Panamax	Post-Panamax	Ultra large ship	Ultra large ship	Ultra large ship	Ultra large ship

Source: Compiled based on Korea Maritime Institute, 2007 and Maersk.com, 2011

As the total seaborne trade of the region includes a considerable portion of the world trade, an extensive network of shipping services is already in place in the Iranian ports sector, but there is room for further substantial increase, given that it is located in a developing region of the world, and at a unique crossroads of global trade.

1.3.3 Challenges facing the transport sector, with particular reference to Iran

In order for the Iranian transport sector to fulfill its role of cost effectiveness and supporting integration of the Iranian economy multilaterally into regional and international systems, several urgent issues need to be addressed.

1.3.3.1 Alternative ways to improve facilities and infrastructure in transport sector

To alleviate inadequate infrastructure capacity and mitigate its constraints on the flow of goods, two ways of addressing this issue are usually suggested: firstly; more efficient use of existing assets; and secondly; promoting strong private sector involvement (ESCAP, 2011).

Experience shows that successful financing, developing, managing, and operating of transport infrastructure can be gained with private sector involvement. However, in order for developing countries to be successful in promoting private sector partnership, there needs to be considerable ground work undertaken prior to processing the privatization. Amongst the measures to be taken, there needs to be clear identification of objectives and institutional changes that are required, whereas capacity increase through efficiency gains remains the aim. The Islamic Republic of Iran, by implementation of measures mentioned above, thus far has addressed some of these issues successfully in the port sector.

Adequate infrastructure and capital investment is made by the government to introduce an efficient service for handling containers. To allow larger ships to call, apart from purchased dredgers, the PMO also has dredging contracts with some foreign dredging companies. Gantry cranes have been installed, road surfaces strengthened and a considerable quantity of onshore equipment made available. Iran could have been expected to be a leader among developing countries in the move towards modernization of port facilities. In developing countries, as is the case elsewhere, unions of port workers are strong and they are likely to resist the introduction of

capital-intensive technology at the expense of their members' jobs, unless some guarantees with respect to employment and income are provided by the relevant authorities. This is also the case in Iran, where Government is unwilling to introduce methods which will reduce the level of employment (Adibi-Harris Consultants, 1967).

Economic decision-makers realized that the country's central geographical location in the Middle East, so close to shipping routes to and from the Persian Gulf, provides the potential for attracting cargo which could later be transshipped. Consequently, they have provided berths with sufficient depth alongside, adequate quaywall length and sufficient back-up space to enable port authorities to develop special economic zones for warehousing and repacking to attract more cargo. All this opens opportunities to reduce transportation costs. The effect of developments on the finances of the port and shipping organization is salutary. The revenues from container terminals and special economic zones enable the port authority to reduce its dependence on harbour fees and wharfage. This demonstrates a growing realization that all aspects of the port must be managed and operated with maximum efficiency. Delays of whatever origin and for whatever reason cost money and in the highly competitive transport business, time is money. Importance of concepts such as the turn-around times of ships, the number boxes moved per hour, productivity per man and so on must be understood. As a port moves from labour-intensive to more capital-intensive techniques, executives and managers must learn new methods to deal with the different types of problems which arise. Extensive training in the operation and maintenance of the machines is received by many of the workers (UNCTAD, 2006).

1.3.3.2 Removal of non-physical barriers (including simplification of border crossing procedures) along intermodal sea-landside routes

To support economies in multilateral trade, integration by way of adopting measures that can increase the efficiency of available infrastructure and equipment is of a great significance. Measures like improving border crossing facilities, reducing formalities and provision of transport facilitation has already been supporting trade. As such, the utilization of facilities in a way to meet the market demands of price-conscious and time-sensitive shippers becomes equally important. Transit agreements, especially in the case of landlocked countries, play an important role in facilitating the movement of goods across boundaries to or from loading/discharge ports.

To facilitate efficient land transport and movement of vehicles, goods and passengers between countries, several conventions have been ratified within the framework of the United Nations.

Transport facilitation and transit agreements have so far made a great contribution to the process of removal of non-physical barriers. As long as bottlenecks at border crossings exist and add to the cost of through transport, the competitiveness of the delivered goods in the international market is reduced and the possibility of seamless transport movement remains a vision. The seamless transport movements provided in the shadow of transit agreements and land transport conventions enables countries to quantify the cost attributed to the various elements of the transport chain and determines the losses that may result due to unnecessary delays on the corridors.

The most cost-effective action for smooth flow of transport of goods could be achieved by adopting such measures. Amongst measures which could be taken (and which would also be regarded as essential steps) are appropriate corridor studies for identification of physical and non-physical barriers and recommendation of remedies at domestic and international levels. In relation to facilitation measures and in order to accede to the International Maritime Organization (IMO) Maritime Facilitation Convention the (FAL Convention), the provisions of the seven land transport conventions identified in ESCAP resolution 48/11 on road and rail modes of transport must be considered.

Iran is situated on an arid high plateau, ringed by a barrier of mountain ranges, with vast deserts at its centre (Dasht e Lout, Dasht e Kavir). It today has a population of nearly 70 million, making it number 16 in the world. Its population is expected to reach 97 million in 2025. The country is still among developing nations. Iran is situated at the crossroads of Europe (border with Turkey), the Caucasus, Central Asia, the Indian sub-continent, the Persian Gulf and the Near East. It has the world's second largest gas reserves and the third largest oil reserves. It has fifteen neighbours in total. Along its land borders these are Iraq, Turkey, Armenia, Azerbaijan, Turkmenistan, Afghanistan and Pakistan. Iran also has two coasts – on the Caspian Sea and on the Persian Gulf. On the Caspian Sea there is direct access to Azerbaijan, Russia, Kazakhstan and Turkmenistan and in the Persian Gulf, Iraq, Kuwait, Saudi Arabia, Bahrain, the United Arab

Emirates, Qatar and Oman are situated. The land borders have the following lengths: with Afghanistan 936 km; with Armenia 35 km; with Azerbaijan as a whole 432 km; with the Azerbaijan province known as the Naxcivan enclave 179 km; with Iraq 1458 km; with Pakistan 909 km with Turkey 499 km; and with Turkmenistan 992 km (EGIS, 2007).The Persian Gulf coastline comprises 2440 km and the Caspian Sea offers a coastline of 740 km. The lengths of these land and sea borders entail a certain number of constraints, if nothing else with regard to surveillance and organization of crossing points.

Iran thus is a country of transit, historically situated on the "Silk Route" from China to Europe, and giving the countries of Central Asia access to warm-water ports (Persian Gulf, Sea of Oman and Indian Ocean). Very early on, the country became convinced of the principles of free transit and on 29 January 1931, it ratified the Convention and Statute on Freedom of Transit, adopted in Barcelona on 20 April 1921 under the aegis of the League of Nations. The preamble to this text states that "recognizing that it is well to proclaim the right of free transit and make regulation thereon as being one of the best means of developing co-operation between states without prejudice to their rights of sovereignty over routes available for transit" (League of Nations, 1921).

By virtue of this definition, which above all emphasizes cross-border transit, the national authorities must not disadvantage the transport of foreign goods passing through the national territory, in relation to domestic transport of locally produced goods.

The customs arrangements described by the Kyoto Convention (revised) on the harmonization and simplification of customs procedures, managed by the World Customs Organization, envisage broader solutions, making transit more frequent and making this procedure a tool of economic policy (ESCAP development policy 20-24).

The Islamic Republic of Iran (IRI), enjoying the benefit of its geographical position in the region, is one of the best-situated countries in the way of international and regional transit corridors, and nowadays "North-South" and "East-West" corridors both pass through Iran. The country's geopolitical situations require it to act as a transit bridge between the Central Asian

countries, Europe and the Middle East. In this respect, one should bear in mind many important factors such as safety, low cost and shorter transit times for goods transportation. Due to the collapse of the Soviet Union and the appearance of newly independent countries on the northern border of Iran, a need arose to find least-cost import-export routes. This, together with intra-Eurasian trade worth some $3000 billion, triggered a huge explosion in the market and calls for the creation of new corridors as new trading partners put forth new transport demands in the region. Iran's role and vantage point as a suitable medium or axis enables the country to regain its former status. By virtue of its location, Iran controls within her territorial waters, the entire northern Persian Gulf, Sea of Oman and Strait of Hormuz, through which over 800 million tons or 33% of the world's total seaborne crude oil flows annually, making this twenty one mile wide channel an area of immense strategic influence (Lloyd's MIU, 2007). Well-situated in a regional area which accounts for a large share of world trade and with a rapidly expanding economy, Iran is one of the important and efficient countries in the region. Iran is often described as transitional country acting like a gateway between the great Eurasian-Central Asian land mass and the open and warm high seas.

1.3.3.3 Alternative ways of developing multimodal transport by improving logistics capabilities

One of the most important and essential factors in the multilateral trading system is the availability of cost effective door-to-door transport services for which a comprehensive and integrated global approach is required. Containerization is a technological advancement which needs to be incorporated into the logistics of international production and distribution. As transport infrastructure and services are subject to rapid technological changes, the management of the transport sector is confronting demands for improved and integrated services too. In order to reduce costs, the market has forced manufacturers to focus on integrated transport and logistics strategies. The reliability, competitiveness and time sensitivity of door-to-door freight forwarding can foster trade opportunities. There is consequently a general need to control transport costs to keep down production/distribution costs. Developments in container-based transport logistics give advantages to freight forwarding and multimodal transport, which in turn has provided cost-effective services to the clients. The new sea-rail-road multimodal transport which has become alternative to unimodal sea options and the efficiency level of services

rendered by conventional and block-trains have resulted in a better utilization of fleet capacity by the ocean carriers. The local traders and transport service providers can create unexpected trading opportunities by managing these potential improvements to the benefit of their national economies.

An integrated transport approach, apart from the short-term benefits it confers on local traders and transport operators, can lead to structural changes in the pattern of international trade of the country. The effective participation in the provision of global transport and logistics services is a challenge for the developing economies which necessitates urgent need for updating their legislation to ensure recognition of freight forwarders, and multimodal transport operators in their transport sector. The role of e-commerce in the transport process and the efficiency of freight forwarders and multimodal transport operators to provide the necessary platform for partnership with international players require that governments provide the facilitating legislation to enable the fulfillment of their functions and to enable them to exploit the benefits of e-commerce.

Iran has a relatively diversified industrial base, which is constantly growing. This industry obviously needs sources of energy (oil, natural gas, and coal) and raw materials: (bauxite, iron, lead, zinc, copper, etc.) to be used in manufacturing processes. Iran's industrial region is primarily situated within the Tabriz, Abadan, Shiraz, Yazd and Tehran rectangle. Energy (produced in the south of the country) and raw materials (mined in the centre and east of the country) therefore have to be transported to the industrial sites in the northwest. To avoid excessive transportation of oil and gas products (to north of the country where more than half of the population lives), the authorities have set up swap agreements with foreign suppliers (Azerbaijan, Kazakhstan and Turkmenistan), whereby supplies are received from these countries. However, despite its substantial wealth, Iran is obliged to import heavily. The factories have to buy equipment (machine-tools, compressors, and pipes), components (such as CKDs for the automobile industry), spare parts and IT equipment from the industrialized nations. Continuous supply routes therefore have to be created from Europe, Russia and the industrialized Asian nations. The industrial zones, located near the major urban centres, are mainly in the northeast and centre of the country (Transport Coordination Studies of Iran BCEOM). The imported

goods and machines must therefore be taken to these zones, which are relatively far from the Persian Gulf and Caspian Sea coast. It is therefore essential for the Iranian agricultural, industrial and commercial supply routes to function correctly, both from Europe (Turkish border) or Russia (Caspian Sea) and from Asia (ports of Bandar Abbas and to a lesser extent, Bandar Bushehr and Bandar Imam Khomeini).

In this respect, the policy of lean manufacturing and cost reductions requires that the transit times for the goods, from the country of shipment to the place of processing, manufacture and distribution are not only very short, but also guaranteed, because any lengthening of the transit time may lead to an interruption of supplies and force industry to constitute precautionary stocks, which could constitute an additional expense and inevitably affect prices (reducing the competitiveness of Iranian products and consumer's spending power).

1.3.3.4 Alternative reforms to set the stage for trade liberalisation in transport services

The prior liberalization of the maritime sector has resulted in competitive pressures for similar, knock-on liberalization of road, rail, and postal services associated with the provision of international transport services. This exposed developing countries to more competition from rival trading nations, and in some cases provoked responses in the form of protectionist measures that have been adopted by developing countries to protect their transport services from foreign competition. A long history of protectionism in the maritime sector in the past culminated in drafting of the United Nations Conference on Trade and Development (UNCTAD) Liner Code of 1974 which encouraged developing countries to resort to interventionist policies. In 1983, when the UNCTAD code of conduct for liner conferences came into force, the maritime climate changed towards protectionism. The Code finally came into force when Western European countries ratified it, but with the proviso that it should not be applied to all the liner cargo but only liner conferences. Ultimately diplomatic pressure and several domestic forces led developing countries to greater liberalization of their shipping industries. Although the Code is now a dead letter, with no practical impact, it was really killed by globalisation, the rise of the Consortium structure in liner shipping, in place of Conferences, and the rise to dominance of cross-trading container majors.

As witnessed, liberalization of transport services has resulted in unprecedentedly low freight costs to users for much of the past decade. However, these market forces alone cannot ensure the long term stability of freight rates, which are closely linked to international trade, and exporters seeking new markets, deriving their growth from it. But, trends towards concentration of market power in transport especially in the maritime transport sector and upward trend of freight rates on some routes before the 2008/9 recession have affected the trade and transport industry, at times adversely. So far as a context of competition is concerned two schools of thought have emerged. According to one, competition should be considered within the domain of domestic policy, and therefore be the responsibility of national governments rather than multilateral organizations. The second view is that for optimization of the opportunities derived from liberalization a multilateral agreement on minimum competition should be negotiated. Developing countries will need to be adequately prepared for the challenges and negotiations on trade liberalization in transport (OECD, ECMT. 2007).

The Iranian national merchant fleet (Aria) was established in 1967. It started maritime activities in the Persian Gulf waterways in 1968 with small coastal vessels later extended to cover Mediterranean ports. The liner services to the Far East were inaugurated 1971 and to the east coast of the United States in 1972. At the end of the Iranian year 1356 (1977), one year prior to the victory of the Islamic revolution, the country's fleet stood at 42 vessels of 525,000 dwt. After the Iranian Islamic revolution, under the auspices of the Islamic government, the fleet expanded its activities to acquire more ocean-going vessels to equip the fleet with modern bulk and container carriers, resulting in diversification of commercial activities. This made the Islamic Republic of Iran Shipping Lines (IRISL), one of the largest and the most capable general cargo and container fleet in the Middle East. Presently the IRISL Group includes a variety of 115 ocean going vessels with a total capacity of 5.7 million dwt out of which 3.3 million dwt is under flags of convenience and the rest under the national flag. By delivering the new vessels currently on order, company's carrying capacity will exceed 6.2 million tons dwt. Besides the very large fleet of vessels owned by IRISL it also owns a sizable stock of twenty and forty foot ISO containers (about 165,000 box units – IRISL COC Database).

With its regular world-wide services and vast background in international maritime transportation, and with its substantial resources of fleet, equipment and skilled manpower, IRISL has been one of the most successful national merchant marines which have been owned by a developing country in the region. Until very recently it was under government protectionist shelter, but due to privatization schemes which led to more open doors for the private sector investment in the shipping field of the country, now it is subject to more intense competition from privately-owned ships and other major international carrying lines for domestic and cross-trade international cargoes (IRISL company profile). Although under the severe sanctions imposed on the country and consequently on the IRISL Group, first by United States unilaterally on September 2008 and then by the United Nation from March 2010 and later on as a result of the European Union restrictions on July 2011, the services rendered by the company became limited and almost ceased to Europe.

The economies of scale which are encouraging use of larger vessels, and on the other hand the ability of global shipping to offer multiple string services on key routes, are the two forces moulding the evolving structure of container shipping. The globalization of production has led to the demand for the creation of comprehensive shipping services around the world. A quality service ensuring the right product in the right place at the time at the right price is required by the shippers. An operator assuring responsibility for the door-to-door delivery of the goods and a carrier who is able to provide transport networks to achieve this at the global level are required. All of the above-mentioned requirements have forced major carriers to develop operational capabilities that enable them to cope with the challenging needs of the more competitive and demanding market through an expanded network of services. The number of containers needed to fill larger containerships, together with service required by shippers, has led shipping lines to further mergers and acquisitions, and has increased concentration and control in the container sector. Three acquisitions of container shipping companies were notified to the European Commission, in 2005. With bid of Danish A.P. Møller Maersk for the Dutch British shipping company Royal P&O Nedlloyd (PONL) the consolidation wave started. Some months later Hapag-Lloyd, a subsidiary of the German tourism and logistics company TUI, presented a public offer for the Canadian shipping company CP Ships and it went through and in terms of capacity resulted in creation of the fifth largest player in the world. Finally, the French shipping company

CMA CGM acquired the French company Delmas in terms of which CMA CGM became the third largest global player. The cooperation of liner shipping companies in consortia and alliances has to be taken into account when analysing the competitive constraints on each trade (Merger control, spring 2006).

So far and until recently the article 44 of the constitution law of Iran has been greatly supportive of maritime shipping in the government sector, which resulted in sustained growth of the national merchant marine fleet of the country as the largest national merchant fleet in the Middle East, by resorting to protectionist measures. But despite the monopoly position that IRISL enjoyed for quite a long period of time, due to proper adaptation and flow of planned programs it has become one of the most successful national fleets in the region and perhaps in the world. With proper attention and resort to economies of scale, large vessels of 6500 TEU have been ordered and put in service from 2008 and after delivery of all the newly-built containerships a pendulum service has been conducted in the loops covering major Far East as east bound voyage and major European ports of North continent and Mediterranean Sea for the west bound voyages.

Currently, Iran handles more than 7500 vessel calls (on the part of vessels over 1,000 dwt) annually in all her seaports. This includes container carriers, crude and petroleum tankers, liquefied gas carriers as well as break-bulk and bulk vessels. Some of the leading European and international shipping companies operate liner services, while vessels from Far East and Indian Ocean also operate liner services to Iran. There are many tramp vessels sailing to the country annually while there are a lot of opportunities for shipping services in the coastal areas as a main support to various Iranian oil installations, rigs etc. both onshore and offshore. Cargo import and export to and from Iran accounts for more than 50% of the total volume of cargo throughput generated by entire Middle East. This is so since Iran, with a population of over 70 million, is the most populous country in the Middle East. The country itself occupies a strategic location within the Persian Gulf and Middle East. This enables her easy access to the neighboring countries; hence goods meant for land-locked neighbours and a number of Commonwealth of Independent States (C.I.S) transit Iranian territory.

As there is an increasing demand for transportation to inland points in Iran as well as transit to Azerbaijan, Turkmenistan, Uzbekistan, Kazakhstan, Tajikistan, Armenia and Nakhichivan, considerable potential traffic is created for ports such as the Iranian port of Bandar Abbas with strategic location as a potential "Hub" for maritime activities in the region and for other major ports such as Khorramshahr, Bandar Imam Khomeini, Bushehr and Chabahar in the South and Caspian ports of Anzali and Nowshahr and Amirabad in the north of the country. Hence efforts have been intensified to acquire more equipment and also to introduce competitive charges in all Iranian ports by revision of port dues to accommodate more vessel calls to Iranian harbours.

Aggregate (non-oil) port activity in the principal Iranian ports is presented in Table 1.2. This reflects the transportation of bulk and other dry cargoes, including transit cargoes, as well as container volumes, numbers of passengers handled, and the number of vessels passing through the ports system. In each case, port activity from March 21, 2012 to March 20, 2013 is compared with the port operations from March 21, 2013 to March 20, 2014. (The year in Iran begins on March 21).

Table 1.3 addresses the performance of the principal 11 seaports in Iran (the facilities and landside connections of which will be set out far more fully in Chapter Five of this thesis). For each major port, and for a consolidated grouping of more minor ports, volumes of cargo landed and cargo shipped are enumerated within the broad categories of bulk cargoes other than oil and petroleum cargoes, and other dry cargoes, including containers, for the 2012/2013 and 2013/14 periods. Moreover, Table 1.3 reveals both the overall dominance of the ports on the southern shoreline of Iran (on the Persian Gulf and the Sea of Oman) over the northern Caspian ports, and also within the range of southern ports, the powerful position of the Bandar Abbas Shahid Rajaee port complex and the Port of Imam Khomeini as by some margin the two major national non-oil ports.

Table 1.2: Non-oil port activity in the major Iranian ports: 2012/2013 and 2013/2014

Operations/Activity		From March 21, 2012 to March 20, 2013	From March 21, 2013 to March 20, 2014	Difference (tons)	(%) Change
Total Cargo	Loading and unloading	127,367,764 tons	126,325,363 tons	-1,042,401	-0.82%
Dry	Loading and unloading	89,487,560 tons	85,857,455 tons	-3,630,105	-4.06%
	Unloading	47,996,998 tons	38,984,599 tons	-9,012,399	-18.78%
	Loading	41,490,562 tons	46,872,856 tons	5,382,294	12.97%
	Import	41,849,890 tons	32,174,712 tons	-9,675,178	-23.12%
	Export	32,873,258 tons	39,699,529 tons	6,826,271	20.77%
	Transit	1,188,902 tons	2,279,614 tons	1,090,712	91.74%
Bulk	Loading and unloading	37,880,204 tons	40,467,909 tons	2,587,705	6.83%
	Unloading	20,253,363 tons	21,725,098 tons	1,471,735	7.27%
	Loading	17,626,841 tons	18,742,811 tons	1,115,970	6.33%
	Import	925,192 tons	1,376,540 tons	451,348	48.78%
	Export	6,866,549 tons	8,107,679 tons	1,241,130	18.08%
	Transit	3,881,101tons	4,511,275 tons	630,174	16.24%
Containers (TEU)	Total	2,430,886	2,039,472	-391,415	-16.10
	Full	1,620,198	1,394,945	-225,254	-13.90
	Empty	810,688	644,527	-166,161	
Number of vessel callers	Total	13,668	21,107	7,439	
	Over 1,000 dwt	8,106	7,678	-428	-5.28
	Less than 1,000 dwt	5,562	13,429	7,867	141,44
Passengers	Total	10,240,737	14,343,497	4,102,760	40.06
	Entry	5,169,111	7,177,034	2,007,923	38.34
	Departure	5,071,626	7,166,463	2,094,837	41.31

Source: Port and Maritime Organization of Iran, April 02, 2014 compiled by author

Table 1.3: Non-oil port activity in individual ports of Iran (tons) 2012/2013 and 2013/2014

Ports	Unloading				Loading				% change
	Bulk		Dry		Bulk		Dry		
	2012-2013	2013-2014	2012-2013	2013-2014	2012-2013	2013-2014	2012-2014	2013-2014	
Khorramshahr	2,489	42	397,224	407,039	47,843	0	1,089,44	1,008,291	-8
Imam Khomeini	636,829	1,010,156	16,743,189	13,122,832	12,678,618	13,013,134	6,872,062	6,824,998	-8
Bushehr	1,263,139	1,495,998	1,540,648	1,987,845	361,501	408,836	1,006,353	733,133	11
Shahid Rajaee	16,642,739	17,674,358	18,968,266	15,865,055	4,244,466	4,957,963	24,763,790	29,400,006	5
Shahid Bahonar	50,594	1,264	238,212	405,543	281,763	351,441	1,218,608	1,127,263	5
Qeshm	113,706	122,791	4,070,443	3,697,424	12,585	8,007	3,947,880	3,618,267	-9
Chabahar	964,624	1,107,151	432,239	218,919	45	1,961	36,518	82,303	-2
Anzali	303,635	121,595	2,949,160	1,385,536	20	174	294,747	532,319	-43
Noshahr	18,641	41,446	747,878	474,294	0	0	22,274	22,397	-32
Amirabad	43,281	47,787	1,423,748	964,911	0	0	1,790,949	2,163,498	-3
Neka	213,556	102,266	292	788	0	1,200	0	0	-51
Other Ports	129	244	485,699	453,783	20	4,583	1,323,660	481,757	3
Total	20,253,363	21,725,098	47,996,998	38,984,599	17,626,841	18,742,811	41,490,562	46,872,856	-1

Source: Ports and Maritime Organization of Iran, April 02, 2014 compiled by author

In more aggregate terms, as illustrated in Table 1.4, Iranian exports and imports have increased substantially if unevenly in both value and volume terms from 2005 to 2013. Growth continued particularly in the year after 2008, when the global economy was affected adversely by the international economic slow-down, but in more recent years trade performance has been severely impacted by the imposition of trade sanctions on the country. Despite these sanctions, Iran's trade in non-oil exports and imports to and from selected economic blocks, such as the Persian Gulf Cooperation Council (PGCC), the Economic Cooperation Organization (ECO), European Union (EU), Commonwealth of Independent States (CIS) and Association of Southeast Asian Nations (ASEAN), has continued.

Table 1.4: Iran's export and import trend (million $ and thousand tons) 2005 to 2013

Year	Export		Import	
	Value $m	Volume 1000 tons	Value $m	Volume 1000 tons
2005	9328	23435	38671	34405
2006	12973	27933	40401	40153
2007	14506	31137	45104	42300
2008	18047	31805	45104	42300
2008	18047	31805	57991	44414
2009	19199	42553	49804	47260
2010	25821	59311	57804	47397
2011	31301	62788	58207	36581
2012	33522	69613	53201	38817
2013	30665	76796	45276	31093

Source: Based on Iran's Customs Administration (IRICA) Statistics, 2013

Further, as shown in Table 1.5, in 2013 the two blocks of the PGCC and the ECO were the largest importer suppliers to Iran and the most significant export buyers of non-oil commodities from Iran, respectively. This underscores the importance of Iran as a regional trading *entrepôt* and potential through-transport hub for the Persian Gulf Region, the Caucuses and more generally for Eurasia.

Table 1.5: Iran Non-oil export to/from selected economic blocks (million $ & thousand tons)

Economic blocks	Non-oil import 2013		Non-oil export 2013	
	value	volume	value	O
PGCC	9371	4978	3837	7651
ECO	3941	3243	6781	10416
EU	7728	5225	980	448
CIS	1434	2199	2642	6354
ASEAN	1402	1248	560	786

Source: Based on Iran's Customs Administration (IRICA) Statistics, 2013

Table 1.6 provides an overview of the principal foreign markets into which Iran's exports flow. As shown, 83 percent of non-oil exports of Iran by value is exported to ten countries, all located in Asia Minor, the Persian Gulf region and its hinterland, and Asia, while other countries of the world account for the remaining 17 percent.

Table 1.6: Iran's main export destinations in 2013

No	Countries	Value Million $	Volume 1000 (t)	Value Share %	% Change	
					value	Volume
1	China	6778	32202	22	19	24
2	Iraq	5979	16248	20	20	-6
3	United Arab Emirates	3436	5436	11	30	-9
4	Afghanistan	2529	3302	8	-9	-13
5	India	2519	5063	8	-3	-8
6	Turkey	1673	1527	5	28	10
7	Turkmenistan	851	1315	3	-27	21
8	Pakistan	653	808	2	-5	-13
9	Egypt	534	763	2	156	84
10	Azerbaijan	474	2454	2	17	-8
Total	Top ten	25427	69117	83	16	1
	Rest of the world	7679	7679	17	0	0

Source: Based on Iran's Customs Administration (IRICA) Statistics, 2013

1.4 Overall direction and unfolding structure of this thesis

The research concentrates on the broad potential of intermodal transport complexes in Iran. As the transport industry is dynamic, and structural changes are rapidly taking place in the international logistics and distribution field, therefore the Islamic Republic of Iran (IRI) as a developing economy must monitor these changes in the transport sector in a proactive manner, and must respond appropriately to these changes. In facing ever-intensifying competition from other trading nations, Iran must take effective measures to ensure the competitiveness and cost effectiveness of its maritime sector, logistics services and transit corridors to satisfy the need of its potential users. Although Iran has enjoyed a degree of success in the growth of its maritime sector as well as logistics and transit stewardship through the concentrated efforts by the government, stiff challenges still lie ahead in many areas. For a nation dependent on its trade, the importance of its maritime sector as a facilitator of its trading success cannot be overemphasized. The Iranian economy domestically and internationally relies heavily on facilitative support of this sector to gain competitive advantages. Therefore, to remain a competitive trading nation Iran has to develop a dynamic and efficient maritime transportation sector to support its maritime industry and economy as a whole. So far as development in areas like liberalization and globalization is concerned, the transport sector has to be given strategic priority in order for Iran to maintain its competitiveness with reliable logistics services and safe and attractive transit corridors.

Given the above, and to further develop and strengthen the transport chain in Iran, what is essential is the creation of flexible policies that are poised to meet future challenges and developments.

This thesis will seek to develop some detailed understanding of the transport potential of Iran to exploit what might be termed an “Iran Route” to transport domestic, regional and international transit cargoes, through a better utilisation of Iran’s transport infrastructure. The thesis is organized around five chapters. The broad direction, scope, size and shape of the remaining four chapters is set out below.

Chapter Two reviews the literature on ports and the sea transport industry. It presents an overview of broad developments in the sea transport industry; it addresses the economic role of ports in the context of the idea of minimizing the cost of transport to users; it reviews different port authority arrangements; it raises questions related to differing models of port "doctrine"; it seeks to set out the role of ports and port corridors in a global and regional trade/transport perspective; and it considers the views of those who have already contributed to the literature on an "Iran route" or "Land Bridge". The chapter concludes with a short presentation of some of the central received literature that has been directed specifically at the transport sector in and transport performance of the Iranian economy.

Chapter Three addresses the research approach and methodology that underpin this thesis, by discussing the broad method of scenario planning that serves as a conceptual foundation, and the operational methodology of comparative cost analysis, which is utilized to identify least-cost through-transport routes.

Chapter Four presents a brief but coherent overview of the size and shape of the Iranian economy, together with a more detailed description of the national transport sector including major rail and road routes and the major port corridors. The geopolitical situations of the country and its significance, as well as the geo-strategic position of Iran, are highlighted. The current status, and present and future challenges in the transport sector of the country are discussed and non-trade barriers and efforts for accession to the World Trade Organization (WTO) in the context of Iranian economy are elaborated. The country's intermodal opportunities, limitations, carrying capacity, and traffic base with regards to the hinterland destinations are described.

Chapter Five presents an overview of the port infrastructure of Iran, together with a commentary on the current administration of the major Iranian ports, which are located on two shorelines of the country. The southern shoreline is dominated by the Persian Gulf ports system and is associated with the foreign-going seaborne commerce of the country and the region. The northern shoreline comprises ports on the south coast of the Caspian Sea basin, and is primarily associated with regional sea trade.

Chapter Six establishes the comparative costs of through transport on competing port corridors in the region and beyond (including the viability of longer-haul east-west and north-south multimodal routes) with a view to highlighting the potential cost advantages and concomitant potentially enhanced trade/transport opportunities that could be open to selected Iranian ports and Iran routes as least-cost alternatives for cargo owners.

Finally, Chapter Seven draws together the principal threads of argument and analysis presented in this research in relation to the potential cost effectiveness of an "Iran Route" or a cluster of transport routes utilizing Iran's ports, landside transport modes and territory. This chapter also identifies areas of potential fruitful future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 The purpose, intent and direction of the overall study

Iran is potentially counted as a logistics country, largely on the strength of its exceptional geopolitical position in the area and the world. Thus, due to its unique locational advantage, enhancing and developing the ports and related corridors of the country with the aim of processing the value added servicing in the ports and corridors can be advantageous for national production and income. The strategic situation of the country provides the basic platform for success in the broad domain of the maritime industry and port logistics, and can therefore be viewed as the most basic vehicle that can boost employment, eliminate deprivation, stimulate economic growth and upgrade technology. The role of the ports in taking the economic lead towards creation and support of value-adding supplementary activities has been quite obvious in these recent decades, and this is what recognizing the train of value added policy across the full spectrum of port activities entails. This study investigates the potential transformation of Iran's ports and their related landside corridors from their traditional shape into a modern integrated system. This is a situation that offers a potentially golden opportunity for creation of economic growth by utilizing the geographical position of country in such a way that implementation and usage of value added activities and proper management in the ports, can lead to greater national self-reliance, without as much dependency on oil resources.

As UNESCAP (2002) suggested in its study on Commercial Development of Regional Ports as Logistics Centres, for this purpose ports should transform their orientation from the old form to one that provides integrated logistics centres of transportation that align with modern international transportation structures.

Over the decades, sea ports have grown larger as world trade has increased, and on many mainstream sea trade routes many ports have now become space constrained and congested (Drewry, 2007). While access from the sea to ports with use of radar guided systems and other

sophisticated tracking systems is highly regulated and efficient for the ships, quayside facilities for loading and unloading as well as the land routes out of the port can be slow (Divandari, 2011). This thesis analyses the growth of the Iranian maritime transport with a focus mainly on the establishment of major ports and the operational and navigational activities of container terminals in order to assess the outcome of better port operational management. Improvement of maritime transport in a way can also be achieved by establishing dry ports. Reduction in the time vessels spend in the ports for loading and/or discharging containers could be achieved by use of advanced equipment for cargo handling operations at the terminals. To achieve a competitive advantage of container handling at Iranian ports, proper performance of an integrated scheduling of various types of handling equipment in automated container terminals is needed. Besides, as it is the economic functions and merits of ports that ensure the sustainability of the customers and at the same time maintain a situation of rivalry with other ports, logistics centres are important for development of the port. There are steps to be taken to evolve from traditional cargo handling functions to a value-added, service-enhancing condition which is ideal for rivalry and competition especially for those ports that are still in transition from a more limited traditional role to one where they serve as genuine processing and distribution centres. The port can profit not only from the logistics centres, but also increased flow of cargoes will benefit the port. Thus, a diverse range of services that are highly integrated should be provided by a port for it to be regarded as an ideal port. Therefore, the increasing importance of the role ports can play out in logistics management is a need which should be seriously considered (UNESCAP, 2002). Hence, because of the position that Iran holds in the sense of having proper access to free waters and having competent commercial ports on its northern and southern coasts, the country can serve as a powerful provider of logistical services to the region and beyond. Creation and development of logistics centres in ports is one of the imperatives of the commercial ports and transportation sector of the country.

This thesis has aimed to analyze the potential of Iranian ports for handling cargoes, especially containerized cargoes, but not excluding break-bulk, bulk and other types of cargo coming from the Far East to the Europe via an “Iran route”. At present these cargoes are carried through a traditional ocean route via the Suez Canal. The underlying conception and backbone for this study is the comparative advantage of least-cost through transport routes through Iranian ports

and territory as compared to the traditional oceanic route. The Iran route, which offers multimodal transport opportunities, may potentially be associated with shorter transit times and lower through-transport costs, in comparison with the traditional route and may thereby enhance Asia's connectivity to Europe. With this view in mind the thesis presents an idea for a functional and competitive freight route. To understand the nuances of such a new freight route is not a simple process, hence to attempt to understand and unravel some of the central, if at times uncertain driving forces that will impact on it, a scenario method has been used. What this scenario approach does is to reflect a way for acceleration of the integration of the Commonwealth of Independent States (CIS) and Eastern European countries into the globalization process and a way to extend the global supply chain by utilizing Iranian routes.

In this context this research studies ways which can mitigate underutilization and even possibly boost utilization of some of Iranian ports by focused interventions and actions that will facilitate transshipment and generate increased road and rail traffic and transit of goods and passengers on corridors associated with the principal Iranian ports.

With this view in mind, like many other developing countries, Iran has followed the lead of the developed nations and has begun to develop its ports, roads, railway lines and corridors and above all the merchant marine fleet using in the first instance measures that involve a sustainable degree of state ownership and control. Despite the traditional objections, it is believed that the potential economic and social benefits would outweigh the economic cost of these courses of action; therefore, government intervention in all the transportation fields and mode sectors should be continued until the playing fields have been levelled and thereafter it could resort to private intervention and other means like outsourcing.

The benefits are defined as foreign and local revenue gained from increased transportation activities, as well as overarching economic growth and development. The overall objective of this thesis has been to investigate the ways of building the efficiency of Iran's transport system, with reference to sea-borne trade and sustainable development of ports, shipping services, logistics centres and transit corridors. Thus, this research analyses the ports and related landside infrastructure of Iran, and it identifies weaknesses which need to be overcome. It examines the

corridors as land bridges between ports and their hinterlands. It also identifies some of the ways of attracting traffic to the corridors, while viewing the corridors as multi-modal corridors. It also envisages the potential viability of the ports of Iran as technically and economically efficient container-handling centres. It became apparent through this research that Iranian corridors are able to function as coherent transcontinental corridors centred on the Tehran area with a western leg to Bandar Imam Khomeini port and an eastern leg to Chabahar port.

2.2 The broader international trade and transport landscape

More challenging demands on port infrastructure and services have arisen, as a result of major technology changes which are taking place in the ocean shipping sector. A trend that is most obvious and widely expected to continue into the future is the increasing containerisation of global trade. Although seaborne trade containerisation is some 50 years old and deep-sea containerisation some 40 years, yet it has dramatically changed requirements for cargo handling and port facilities. Besides, it has raised the financial stakes of investing in these facilities also by creating serious labour redundancy issues and retraining needs, it has radically affected manpower and labour skill required to handle cargo in many ports.

On the other hand, more than 60 percent of the world general cargo trade moved by sea is carried in containers, due to containerisation of world trade. The percentage approaches more than 90 percent (of the containerisable cargo) on trades between highly industrialised countries. For a technology that dates only from the mid-1950s, when the first converted ship made its initial voyage between New York and Houston carrying 58 containers, this is a remarkable penetration. Since then there has been a continual increase in both number and size of containerships (Ecorys, 2005 in World Bank, 2007).

One of the most important dimensions of economic development in the last decade of the 20th century has been the globalization of markets and consequently the increase of international exchange of products between assembly plants and/or between manufacturers and consumers (United Nations, 1999). At this period the business model named “globalized” financial market came to be seen as an entity that could have a wider impact on the world and it became a process itself (Jeffery, 2002). Globalization of trade and international economies is generating a

continuous increase in the transport of goods between countries of different continents that are, at the moment, mostly carried through maritime routes.

As Barrios et al., (2010: 2) have indicated, "the decoupling of output from trade has at the same time led to a remarkable growth in seaborne transportation, which is expected to grow even more in the future". The reliability, safety, time and cost of ocean transportation, together with the morphology of our planet, have made this transport mode the principal means of international trade. Furthermore, technological advances in ship construction and automation, and the highly competitive nature of the shipping industry have resulted in lower transport costs; shrinking 'economic' distances, and stimulating more trade.

Ports have been playing an increasingly important role in our trading system. Trade liberalization and development of land infrastructure have abolished national (economic) borders and captive hinterlands, obliging ports to compete fiercely for custom, particularly for transshipment cargo transported in containers through marine terminals. Greater carrier choice in routing cargo and parallel advances in logistics and supply chain management have thus changed competition from one between ports to one between supply chains. Efficiency at the enterprise level is assuming greater dimensions, due to the globalization of production, transport and distribution, and the consequent intensification of international competition (Haralambides, 2002a).

The new expectations from ports are today clearly felt by port administrations who realize, often painfully, that the benefits of fine-tuning supply chains can be easily withered away by bottlenecks in inefficient ports (Haralambides, 2002b). This realization has led to a global restructuring of the port industry. Ports are thus adopting new organizational forms, including privatisation; acquiring modern cargo handling equipment; investing in infrastructure necessary for hosting the largest of ships; and assuming a more recognizable coordinating role in their respective hinterlands. Obviously, port productivity has become a major issue in such a competitive environment.

2.2.1 The economic function of seaports

A seaport may generally be regarded as acting as a gateway through which goods and passengers are transferred between ships and the shore. Some may have other primary objectives such as those which are the terminals of major canals, or whose main activity is the supply of fuel. The significance of a port depends on availability of demand for its services and therefore, supply alone is not sufficient for its economic significance. It could be exemplified in a number of good natural harbours which are largely unused by commerce because few people live nearby and there is no accessible hinterland, and there is no trade wishing to pass through them (Goss, 1990).

The entire transport system and distribution industry has been reshaped as a result of developments in production and trading systems. This has called for different actors in the transport and logistics chain to further indulge in market consolidation, greater integration and closer collaborative management. The emergence of global production systems has required a profound restructuring of the transportation industry with shipping and port services standing at the forefront of these changes. The need to optimize transport chains, manage and integrate them within the seamless production, distribution and trading systems became the new imperative at the heart of these changes (UNCTAD, 2004).

Today the port role exceeds the simple traditional sea/land interface function of rendered services to ship and cargo. Ports are now also obvious locations for value-added logistics and related services including industrial, trade, financial, and even leisure and property development activities. As such, the port system today, apart from serving as an integral part of transport systems, is a major sub-system of the production, trade and logistics system as well. What precisely constitutes the core business of ports, and exactly where the demarcation line between port and non-port activities may be located are issues that are not easily understood in simple terms. Further, the extent to which port business should be limited to, or associated only with, ship/shore goods transfer or cargo-flow management, or whether port activities should expand into landside developments, is a key question, (*Ibid*,. p.4). In the last two decades, changes and shifts in the production process and a wider and more comprehensive distributive reach of the

trading support system show that value-added enhancements in ports are not only based on the growth of the trade and cargo handling issues but also present themselves as important and unique trading supports in the international trading, transport services business (UNESCAP, 2009).

So far as the impact of globalisation on ports is concerned, it should be stated that globalisation of production has sharpened the need for ports to be value adders, not value subtractors, in the supply chain. Globalisation of production has given ports a unique opportunity to become value-adding entities, while ports have always been important nodes in the logistics system. A port is the interface between a place in the hinterland being considered for production, assembly, or final distribution and the intercontinental transport. The decision for locating a plant or distribution centre is greatly influenced by port capability and efficiency that often determine whether a local producer can compete globally or regionally with other producers. Providing low-cost, efficient port services is a challenge for ports in order to relate to the needs of their customers and assist them in improving their competitive positions (World Bank, 2007).

Creating and developing the logistics activities implantation will not only benefit the ports' economic functions and the enhancement of their merits but will attract and ensure the stability of the existing customers and future transport users; in other words, it also will improve and maintain the competitiveness situation in the ports (Slack, 1999). The necessity of the implementation of the suitable strategies for improving the logistics centres in the ports is therefore clear (Medidute, 2005).

Strategies of vertical integration include ocean carriers and other multimodal providers such as rail operators and sometimes shippers as port owners engaging in terminal leasing and ownership of dedicated oil or car terminals. Horizontal strategies were less common in the past such as through port cooperation and mergers and more particularly the expansion of certain ports beyond their spatial bases. Shipping lines, private terminal operators and land-based hinterland transporters have integrated their operations and services both horizontally and vertically through strategic alignments, corporate takeovers and application of new technologies (Jacobs, & Hall, 2007).

The broad realm of inter-port competition has shifted to cross-border, cross-industry levels by impacts of globalisation, deregulation and privatisation. Modern ports, wherever they are or could be located, can now compete for far-reaching cargoes with far-distant counterparts, due to the instigation of new logistics patterns of maritime and multimodal transportation, such as in terms of hub, transshipment and network models. At the same time, ports (or port operators) seeking to integrate either horizontally (through mergers with or management takeovers of terminals beyond the homeport) and/or vertically (by offering a wider range of logistics services along the transport value chain) should be aware of possible channel conflicts as they can also be the subject of footloose arrangements, market and spatial losses (UNCTAD, 2004: 5).

The way ports will operate in the 21st century is subject to major changes due to the driving impact of changing dynamics on ports and the way developments taking place in international logistics, shipping technology, industry consolidation, and environmental regulations. Ports are being increasingly cast as partners in assisting customers to compete for business share in the global market, as the world's economies become more intertwined. Shipping sector technology is changing at a rapid rate, creating the need for major financial commitments to stay ahead of the technology wave, particularly relating to containerisation and information exchange. A small number of powerful players along with the growth of a relatively small number of global terminal operators that can change the way port services are bought and sold are being created as a result of mergers and acquisitions in the shipping sector. Besides, winners and losers among ports that achieve hub status are created, while distribution patterns are increasingly evolving into hub and spoke networks. Throughout this is the increasing concern about the environment and safety, which affects the way ports deal with their customer bases (World Bank, 2007: 37).

The strategic location of the hub, relative to the primary origins and final destinations of container traffic is the most important attribute carriers look for it. The ability to safely accept large ships, extent of terminal facilities, efficiency of container handling operations, availability of frequent feeder services with an appropriate geographical coverage, and attractive cargo handling charges, are the other attributes beyond location that carriers consider. To accept the largest containerships in service, most carriers believe a 15 metre depth is adequate in the

foreseeable future, although some carriers have recently specified 16 metres depth for entrance channels. Draft of containership has not been increasing in proportion to the growth of TEU capacity, with most of the capacity growth in Post-Panamax ships the result of increasing the beam of the ship. A depth of 15 metres should accommodate all but the largest containerships now in service. It is nevertheless possible that potential hub ports will need depths in excess of 16 metres in the likely event that container vessels in excess of 10,000 TEU are calling at such ports (Drewry, 2005).

The need for substantial investment in new and larger vessels came with globalisation, competition and the creation of new carriers which have pressured the global coverage of shipping operations (Brooks cited in Slack et al, 2003: 66). Pressures for economies of scale and the large investments necessary for expansion are likely to contribute to further concentration of economic power, including the focus of traffic on a smaller number of hub ports (OECD, 2002: 15). Ports are engaged in a vigorous struggle to build larger berths. The growth in larger ships will result in shipping lines visiting fewer ports (Freight Logistics Industry, 2002: 26).

As such, effective factors and approaches in port industry and shipping lines have been proposed and divided in two categories: internal factors like service levels, availability of facilities with appropriate capacity, status of facilities and port operation policy; and external factors like international politics, change of social environment, trade market, economic factors, features of competitive ports, functional changes of transportation and material handling (Peters, 1990). As defined by UNCTAD (1992), other external factors like geographical location, hinterland networks, availability and efficiency of transportation, port tariffs, port stability, and port information systems, are also major factors of note.

There are some important factors which impact on port importance, such as having confidence in port schedules, frequency of calling vessels, variety of shipping routes, accessibility of ports (Pearson, 1980), navigation distance, hinterland nearness, connectivity to ports, port facilities, availability of port, and port tariffs (Willingale, 1981) average waiting time in port, port service capacity (Collison, 1984), calling frequency, tariffs, accessibility in port schedules, port

congestion, liner-linked transportation network (Slack, 1985), port cost, frequency of calling vessels, port reputation and/or loyalty, ship direct calling, experience of cargo damage (Brooks, 1984, 1985).

The globalization of the world economy has led to an increasingly important role for transportation. In particular, container transportation plays a key role in the process, largely because of numerous technical and economic advantages it possesses over traditional methods of transportation (De Langen, 2004). Standing at the crucial interface of sea and inland transportation, the significance of the container port and its production capacities cannot be ignored (Robinson, 2002). Compared with traditional port operations, containerization has greatly improved port production performance for two reasons (Robinson, 2004). Firstly, liner shipping companies and container ports are, respectively, willing to deploy dedicated container ships and efficient handling systems, in order to reap economies of scale and of scope. In so doing, port productivity has been greatly enhanced (Baird, 2002). On the other hand, the freedom yielded by a monopoly over the handling of cargoes from within their hinterland is no longer enjoyed by many container ports. They are not only concerned with whether they can physically handle cargo but also whether they can compete for cargo (Baird & Valentine, 2006). Under the orthodox microeconomic framework, this inter-port competition is believed to be providing an incentive to improve port performance. Productive efficiency, therefore, is a survival condition in a competitive environment (Banomyang, 2005). Under such a competitive environment, port logistical performance measurement is not only a powerful management tool for port managers, but also constitutes a most important input for informing regional and national port planning and operations (Robinson, 2002). Increasing globalisation and a growing degree of product customisation have resulted in more complex supply chains that demand a more rapid response to order delivery and more effective movement of goods across the world, which makes logistics a new service sector crossing departments, industries and regions. How to make goods move more efficiently to satisfy international trading has become a key factor to drive the regional economy and its development, which cannot be separated from port logistical performance (Baird & Valentine, 2006).

Traditionally, ports are considered as interfaces between ships and shore. As such, they are involved in the operation and movement of cargo within ports premises, by preparing shelter and berthing space, interim storage and supplying superstructure and infrastructure. That is why the role of seaports and their function in the first instance have been seen independently as a standalone without any attention to other elements in the supply chain. One of the main dimensions of this research is to address the efficiency and performance of seaport and container terminals. In the era of globalization, the role of ports has changed towards the development of global supply chains for efficient distribution of products across supply chains, from a previous customary focus only on the loading, unloading of ships and on berth availability (Cullinane, 2002; Heng, 2005; Tongzon 2005). In these new circumstances and in bringing value to the final customers ports are now considered as a part of clusters of organizations involving different logistics and transport operators. In order to be successful, these channels require gaining a higher degree of coordination and cooperation (De Souza, 2003; Panayides, 2007).

Janelle and Beuthe (1997: 203) stated that "the increasing transport distances that accompany economic globalisation often requires use of complex chains of modes and means of transportation. The loading, unloading, transshipping and setting up of cargoes are expensive and time-consuming operations, particularly if they depend on transport systems that were not designed for multimodal operations. Concerns for compatibility of equipment and logistical practices, for efficiency, security and safety, underlie the encouragement and adoption of international standards of transportation; the internationalisation of transport beyond previous levels lends significance to logistical requirements for intermodality of passenger and freight movement".

2.2.2 Sectoral dialogue and commercialization: the changing role of modern-day ports

Suykens, (1985) indicated that "as containerisation and other forms of mechanisation developed during the late 1960s and1970s, making ever greater inroads into more conventional methods of cargo handling, international shipping lines and private operating companies displayed a greater willingness to invest in dedicated berths and specialist equipment".

Turnbull, (2006: 8) stated that "the growth of private sector investment signalled a more commercial approach to port administration, management and operations. At most of the world's major ports, public port authorities now work closely with private operators to develop port facilities and integrate the various transport modes that converge at the port – sea, road and rail – as well as promoting more broadly based maritime, industrial and distribution activities (MIDAS) in around the port area, the so-called "golden touch" that ports can have in terms of local and even national economic growth."

Turnbull, (*Ibid,* p.12) indicated that "it is now widely acknowledged that modern ports must fulfill a multitude of different roles. They are vital to national economic interests, especially for developing countries where port costs can make the difference between goods being competitive or uncompetitive on world markets; they are centres for maritime, industrial and distribution activities and as such act as "growth poles" for the local, regional and even national economy". Robinson, (2002) stated that "it is the latter role that is perhaps the main driver of current developments, with transnational companies seeking to integrate a variety of different transport modes and offer "door-to-door" services to major customers." Turnbull, (*op. cit*., p.12) indicated that "these companies might be international shipping lines or their subsidiaries (e.g. Maersk-Sealand-APM Terminals), forwarding and trucking companies (e.g. Kuhne Nagel and Transplace), rail operators (e.g. Stinnes-Railion and ABX) or "integrators" such as UPS and FedEx. These companies demand lower port costs, higher productivity, and more reliable services from the world's major ports, where they are often willing to make significant investments, as well as a reliable network of "feeder" ports that make up their global network of routes and services."

Baird, (2002) and Inoue, (2005) stated that "to accommodate these changes, ports are moving towards a "landlord" model of port organisation and administration". UNCTAD, (2003a: 17) indicated that "this model is advocated by the World Bank, (2001) and UNCTAD, (1995) and port management group such as the Southern African Development Community and Port Management Association of Eastern and Southern Africa."

Turnbull, (*op. cit*., p.13) elaborated that "while there is a clear trend towards the landlord model, change is not a discrete or linear process and there is likely to be considerable differentiation within the same port or port system over time. For example, a private concession for the port's container terminal under a landlord model might co-exist with a tool port model for general user, break-bulk cargoes. This can raise questions about equal access to available work opportunities". UNCTAD, (2001) indicated that "as port authorities become landlords, new forms of public-private sector dialogue will be required to ensure the representation of different interest groups. There are examples of good practice from outside and inside the port industry. Many ports already have institutions that provide opportunities for dialogue between the public port authority and private sector operators and user groups. Other ports have been reformed to give users more say in how the port functions".

Insofar as standard global port management and operational experience is concerned, at least five main port management models may be presented, representing different public/private sector interfaces. Rodrigue, in World Bank, (2007) stated that "these are the public service port, the tool port, the landlord port, the corporatized port and the private service port. These models relate to the ports' characteristics regarding the ownership of infrastructure, equipment, terminal operation and provision of services such as pilotage and towage. Service and tool ports often exist to promote public interest; landlord ports attempt to balance public and private interests; and at the end of the spectrum, private service ports are maximizing their shareholders' interest".

Public service ports are best understood in a context in which the authority performs the whole range of related services, in addition to owning all the infrastructures. The port authority is commonly a branch of a government ministry and most of their employees are civil servants. Some ancillary services can be left to private companies. The number of such public service ports has declined, mainly because in the course of time they had exhibited various deficiencies.

Tool ports, like public service ports, operate in a context where a wide range of services are rendered by the port authority, with the exception of cargo operations which are handled by the

private sector. In many occasions the tool port acts like a transitional form between a public service port and a landlord port.

Landlord ports are associated with a situation where infrastructure, and in particular terminals, are leased to private companies and the port authority only retains ownership of the land. Concession is the most common form of a lease where a private company is granted a long-term lease in exchange for a rent that is commonly a function of the size of the facility as well as the investment required to build, renovate or expand the terminal. The private operator is also responsible to provide terminal equipment so that operating standards are maintained.

Corporatized ports are broadly similar, with the exception that ownership remains public and often assumed as a majority shareholder, while virtually all other functions have been privatized. The port authority essentially behaves as a private enterprise. This management model is unique since it is the only one where ownership and control are separated, which lessens "public good" pressures confronting the landlord port authority and "shareholder value" pressures facing private ports.

Private Service ports refer to a complete privatization of the port facility with a mandate that the facilities retain their maritime role. The port authority is entirely privatized with almost all the port functions under private control with the public sector retaining a standard regulatory oversight. Still, public entities can be shareholders and thus gear the port towards strategies that are deemed to be of public interest (Rodrigue, in World Bank, 2007: 1).

2.2.3 Transformation of port terminal operations – local to global

There are important regional differences between Europe and North America on the bases for the internationalisation of the port terminal industry. While the port industry is being transformed by the penetration of transnational companies, in North America, most of the new actors are shipping lines, whereas in Europe, the lead actors are companies that have arisen out of the industry itself. Since they represent fundamentally different types of organization, the

consequences of this differentiation are substantial. One being an outcome of vertical integration and oriented towards dedicated berth use, and the other being a product of horizontal integration based on multi-user berth operations. Therefore, "the dissimilarities are explained in terms of governance, competition and capacity, and Intra-regional differences are also examined through the case of France, where an unwillingness to open French ports to global operators has affected the performance of those ports" (Slack, & Fremont, 2005: 117).

Despite this, and as Adams, (1973); Goss, (1990); and Stevens, (1999) have stated "a variety of institutional arrangements has governed ports in the past 50 years, with two models typified container terminal management up to the very end of the 20th century. Some port authorities provided cargo-handling services themselves, investing in and operating terminal equipment, and directly employing dock labour. A second model involved contracting terminal and stevedoring operations to third parties". In ports across the spectrum from state-owned facilities to those under different forms of control, examples of each model could be found. Martin and Thomas, (2001) indicated that "whether there was direct or leased management of container terminals, operations tended to have a local character, since in the leased model the firms tended to be locally based, and in the direct port ownership model operations were inevitably local". For much of the 20th century up to the last decade, this pattern held sway. Thus, as Doe and Schoenmakers, (1998) stated "in the case of Europe's leading port of Rotterdam in the Netherlands, a number of firms operated the terminals on lease from the municipally owned port authority", "while in London, it was the port authority itself that ran the container terminals" (Adams, 1973). Similarly, as Marcus, (1976) indicated "in the USA, the Virginia Ports Authority operated the facilities at Norfolk", "while in the port of New York-New Jersey, facilities were leased to local stevedoring firms" (Warf, 1988). As there were examples where the two systems operated in parallel in the same port, this simple distinction did not apply in every case. Thus use of terminals for multiple shipping line clients was an important feature of both models and container-handling services were provided on a contractual basis, since each terminal had its own collection of shipping line customers.

To meet changing circumstances the role of government in port management has been developed gradually. This is pertinent in the case of Japan, where due to the containerisation of cargo it was at a competitive disadvantage, in 1966. Public wharf authorities in Tokyo and Osaka Bay were created by the government, in 1970s. Container terminals were built, using a combination of interest-free loans, low interest finance and private investment, which were made available to private enterprises. Delegating authority to port terminal corporations, the public authorities were abolished, in the 1980s. Then after, as indicated "the local port authorities continued to provide additional facilities that could be used by private companies" (Ports and Harbour Bureau, 2006 pp.14-15).

Container hub port development has been considered not only as the point of convergence between intermodal transportation and both gateway and transhipment cargoes, but it also serves as a vital dimension in an important integrated logistics system in the context of a hub-and-spoke system with the accelerated globalization of production and consumption (Perez-Labajos and Blanco, 2004; Lee and Cullinane, 2005). Between 1970 and 2010 there has been a big change in the number of top ports in Asia which stand amongst the top global 25 ports of the world in terms of container cargo handling throughput. In 1970 there were only two Asian ports amongst top 25 which number is dramatically increased to 15 in 2010, whereas in North America and Europe the incidence decreased respectively from seven to three and from 14 to five over the same period. As stated by Paul Tae-Woo Lee & Matthew Flynn (2011), a pivotal dimension of the port doctrine used by Asian countries to dominate container hub development over the last four decades has been the central role played out by the state. The Asian doctrine illustrates the central role of public ownership with the later supportive investment of private capital and how Asian governments are more extensive in their investment in waterside and landside infrastructure. Two broad developmental approaches to port development have previously been identified – these have been termed the Anglo-Saxon Doctrine and the Continental (European) Doctrine, respectively (Bennathan & Walters, 1979).

The Anglo-Saxon view is that "the port should stand on its own bottom. At least it should not incur a loss and best should earn a reasonable profit. So the main rationale for investment proposals and tariff policy is that they make money" (Bennathan & Walters, 1979).

In contrast to the Anglo-Saxon case, the (Continental) European Doctrine views the port as a part of the social infrastructure for the national economy. Therefore, a port is constructed under the auspices of public funds on the grounds that it contributes to the development of the regional and national economy in terms of cheaper transportation costs, job creation in the course of port construction and also multiplier impacts of social welfare. Therefore, port investment decisions are not made only on the basis of profitability (or cost recovery) at the enterprise level. As a consequence, port charges can be set relatively lower compared with those under the Anglo-Saxon Doctrine, which leads to improved port competiveness against other ports.

The Asian Doctrine proposes an addition to these two doctrines using the example of major Asian container hub ports and focusing on specific economic ideology, strategy and execution practices by describing structures of infrastructure development and patterns of policy levers, such as pricing for port development, that exhibit a strong pattern of state architecture that is named the Asian Doctrine or Asian Port Doctrine (Lee, & Flynn, 2011).

A research report of the Port Economics study by Hong Kong: Flynn Consulting Ltd. (Lee et al., 2008) confirmed key features behind the rise of Asian hub ports over the last three decades. Asian port developments have been driven by a multi-dimensional role of central governments as port designer, developer, and operator, port pricing maker, mediator and investor. Moreover, the function of the Asian container ports and larger industrial ports dealing with liquefied natural gas and crude oil is very closely interrelated to national economic development in the context of a series of measures in the government strategic economic development plan. Such strategic ports have been regarded not only as fundamental infrastructure for their national economy but also as a lifeline for international trade. The overhead capital, such as port and industrial parks and electric utilities, requires a substantial level of investment, which cannot be afforded by individual private enterprises, especially in the early stage of economic development (Lau, 1996). Therefore, infrastructure projects have been undertaken by central governments in the above countries rather than by private investors because of factors such as lack of sufficient capital, long gestation or inability to bear the risk given the capital position. These propositions

have been presented, because this thesis argues that they strike many resonances with the trajectory of port development that has emerged in Iran.

2.2.4 Spatial and functional dynamics of ports as logistics centres

In the text of international shipping and logistics, when ports provide logistics services at the seashore and shore-land interfaces, seaports can be treated as 'maritime logistics centres'. Hence, not all ports can claim a logistics centre status, even though many ports in the world have an established body of knowledge and experience in providing value-added logistics activities for ship-cargo consignments. Activities like; cargo handling and transfer operations, storage and warehousing, break/bulk and consolidation, value added activities, information management, and other related services are regarded as typical logistics functions of ports. A distinction between value added services (or general logistics services – GLS), and value-added logistics activities (VAL) determines port status because as mentioned earlier, "the later elements could constitute a good benchmark for ports claiming to operate as maritime logistics centres" (UNCTAD, 2004).

When ports act as nodal interfaces intersecting the different segments of the inland transport system such as for road/rail, road/road, rail/rail, and even rail/road and air combinations, they may also be seen as 'inland logistics centres'. With some emphasis on the role of inland logistics centres in recent years, there are locations where all logistical operations can take place there and not necessarily requiring to be carried out in the seaport area. Opportunities for developing port facilities at some distance away from traditional seaport locations that can provide logistics-like services arose from several experiences around the world. Consequently, some new concepts such as regional distribution centres (RDCs), inland terminals, and destriparks have been resulted from these developments. In addition, other generic terms including dry ports and inland clearance depots (ICDs), which are both bounded by customs presence and common-user service arrangements, have been emerged recently. Nevertheless, in terms of spatial dimension, functional, or organisational status, there is no clear-cut separation between all such facilities (*Ibid.*, p.22).

Seaports have focused on nautical constraints, seashore infrastructure, ship/cargo handling equipment, and other related superstructure facilities as seaside links in their development strategies, design and planning schemes, traditionally. Therefore, much of their developments were around these seashore interfaces such as port operational and management concepts and practices, and were not around the landside connections and related value-added logistics activities. As a result, with little or no emphasis on inland transport services, and much less on landside logistics operations, services, and facilities, rest of port performances such as port operations and planning, marketing and competition, performance measurement and monitoring systems, were almost entirely directed towards sea transport and shipping services.

The land logistics interface integration to ports may prove beneficial, firstly by reducing dependence of port income on shipping services by diversification of the portfolio of port services; and secondly by directing part of port investment and financial capabilities towards improving landside networks. A third dimension is that a prevailing competitive advantage over neighbouring ports and other competitors could be achieved by ports which adopt landside-oriented strategies. Last, but not least, such strategies by providing an effectual and central role in international logistics and distribution systems will enable ports to fully integrate the logistics and transport chain. Finally, as UNCTAD, (2004: 7) pointed out "the optimum solution is to integrate ports in the wider logistics and supply chain system, with equal emphasis on landside networks as on seaside links".

2.2.5 The multi-modal through-transport perspective in the context of global and regional trade

The world economy has become more integrated after World War II. Burfisher, et al, (2003) stated that "the first 20-30 years after World War II can be seen as a period characterised by shallow integration both globally and regionally ("old regionalism"), with the Uruguay round of GATT negotiations, there were strong elements of deep integration or ("new regionalism"). As the World Trade Organization (WTO) pointed out, over 250 Regional Trade Agreements (RTAs) are currently in force. Estevadeordal et al, (2008) indicated that "most of the agreements have been concluded in the past 15 years and many new agreements are under negotiation". Besides, Asian Development Bank, (2009) highlighted that "direction of trade data also show that Asia, as

the third hub of world trade after Europe and North America, has become increasingly integrated".

There is an underlying assumption that more opportunities for trade would be provided with integration into the world economy. The evidence shows that for this international economic integration a prior integration at the regional levels can help developing countries. As a consequence, to develop a better understanding of prospects for future arrangements, it will be important to outline and analyse past efforts at regional integration or regionalism. Therefore, this study assesses the impact of Iran's membership and participation in several regional as well as international transport-related agreements. This aligns with one of Iran's overarching development and transport objectives, which is expansion of intra-regional trade and transport with the rest of the world. It is important to gain a better perspective on how economic integration affects the economic structure and especially the commodity transit and trade of the region's members. It would reveal the strong and weak points of regional operations and provide inputs for developing a joint trade strategy. Such an overall perspective may be achieved by studying the situation of member countries before and after regional agreement formation in the region compared with the rest of the world. Transport is an important sector for all the member states involved in a regional trade agreement and it acts as a catalyst for trade and transit among them. One of the objectives of this study is to access the impacts of Iran's membership in the Economic Cooperation Organisation (ECO) by analyzing the economic impacts of a regional trade agreement using a least-cost through-transport option.

The economic disadvantages of being a landlocked country are evidenced by the fact that the economic growth of landlocked countries in the period 1992-2002 was 25 per cent lower than that of their transit neighbouring countries (Snow, et al., 2003). In 2003, in the Almaty program of action, a genuine partnership between landlocked and transit developing countries at the bilateral, sub-regional, regional and international levels, based on establishing efficient transport systems between landlocked and transit developing countries, was emphasised. UNCTAD, as a key stakeholder in the Almaty Program of Action, has been working for many years on the problems faced by landlocked and transit developing countries, producing tangible solutions to the problems faced by them (UNCTAD, 2007). United Nations resolution 61/212, called for a

midterm review in 2008 of progress on implementation of the Almaty Program of Action. Against this background, and to support landlocked and transit developing countries in their common endeavours to improve transit transport operations in practical ways, several meetings on regional cooperation in transit transport and solutions for landlocked developing countries were held. This research takes a look at selected international legal instruments and institutional solutions and provides an overview of the current situation, but from the clear perspective that Iran as a transit developing country has to be a central transport partner for at least eight landlocked countries out of 12 such states located in Asia.

Transportation is one of the least visible, but critical components of the global economy by supporting a wide array of movements of passengers and freight between nations. Freight transportation is particularly unnoticed even if globalisation depends on the trade of raw materials, parts and finished products. The substantial diversity, availability and affordability of goods in the global economy thus depend to a great extent on the capacity to transport them. The circulation of goods and people within the global economy thus must be supported by transportation (Rodrigue, 2007). As UNESCAP, (2000) indicates "the world has become more interconnected due to global communications and transportation and more interdependent due to the growth of international trade, investment and finance."

Stiglitz (2002: 9) defines globalisation as "the closer integration of the countries and the people of the world which has been brought about by the enormous reduction of costs of transportation and communication, and the breaking down of artificial barriers to the flow of goods, services, capital, knowledge, and (to lesser extent) people across borders." Banister and Berechman (2001: 212) state that "it is clear that all countries need a well-developed transport infrastructure to compete internationally in new global markets; as trade barriers are reduced and as new markets are opened up, it is essential to have high levels of accessibility. However, it is not only the quantity of the physical infrastructure that is important, but also the quality of the infrastructure in a much wider context."

The ultimate role of an international multimodal transport corridor is to connect one or more adjoining countries to deliver cargoes with maximum assurance of delivery reliability and while

minimizing transit time and costs in international transport corridors. Due to variation in standards in individual countries within international corridor routes, the overall performance of these routes in delivering cargoes can be affected because of lack of interconnections, interoperability and articulated legal frameworks. Facilitation of an optimal multimodal transport route by decision makers and commercial players depends largely on economic principles. Therefore, it is necessary for the policy makers who are associated with an international route to know the needs of commercial players and the type of barriers they are facing. An international multimodal transport corridor is expected to serve and expand foreign trade between adjoining and multiple countries through national and domestic routes. Hence, economic development of countries involved is secured by the efficient, reliable and cost-effective services of international multimodal transport which facilitate an efficient movement and flow of cargoes for the targeted area via its logistics systems. In addition to knowing the needs of commercial players, it is highly justified to utilize analysis tools to investigate systematically the international routes in terms of interconnections, interoperability, legal frame-work, etc. (Ko, 2009). The international multimodal transport network can typically arise in a practical situation where either importers or exporters are located. Another situation that represents a more common transportation scenario is the (internal or external) transshipment of imported or exported goods via transfer points to reach sources of supply or customer bases located in cities that are not directly accessible from major seaways (Banomyong & Beresford, 2001).

Multimodal transport is a combination of two or more modes of transport to move passengers or goods from one source to a destination. The Multimodal Transport Problem has been addressed by many authors proposing different abstractions and algorithms (Modesti and Sciomachen 1998; Lozano and Storchi 2001; Kamoun et al., 2005; Hedi et al., 2009). Previous research studies undertaken by these and other authors have found that in the past selection of multimodal transportation routes have been predicated on their ability to miminise cost or time or both (Min 1991; Bookbinder 1998; Southworth and Peterson 2000; Banomyong and Beresford 2001; Lazano and Storchi 2001; Ham et al., 2005; Chang 2008; Ko 2009).

Branch, (2006) states that "The North-South Transport Corridor is a term used to describe the ship, rail, and road route for moving freight from South Asia to Europe through Central Asia, the Caucasus, and Russia." As a result of the rapidly expanding trade between Europe and India, the multi-modal North-South transport corridor that links northwest Europe and Scandinavia with Central Asia and Persian Gulf has become a much more important corridor. The corridor running from the Port of Bombay to St. Petersburg is 7,200 km long and its routes rely on the extensive transport networks of Russia, Iran, Kazakhstan and other countries. Several routes in the Caspian region use waterways to connect with a number of railways and motorways: the trans-Caspian sea route, the inland Caspian-Volga-Baltic waterways which extend to the Volga-Don Canal and the Black Sea are amongst them. "An overwhelming majority of the goods traded between the EU and the Asian Pacific region are being shipped by sea in practice" (Vinokurov et al., 2009). Year 2007, witnessed shipment of 17.7 million containers (of 20-foot equivalent units – or TEUs) from Asia to Europe, and 10 million TEUs from Europe to Asia. The difference of 7.7 million TEUs accounts for repositioning of empty containers to their point of origin. According to the Economic and Social Commission for Asia and the Pacific (UNESCAP) "containerised transportation from Asia to Europe and from Europe to Asia may reach 26.1 million TEUs and 17.7 million TEUs by 2015, respectively" (UNESCAP, 2007). Thus, the potentials of Iran from transit and transport point of view within the trans-Eurasian land routes has been described in this research from the standpoint that "the Suez Canal is expected soon to reach its maximum capacity for container vessels, so the opportunities for land routes to gain more traffic may grow" (*Ibid.,* p5).

Therefore, the objective of this research is to assess the potential functionality and efficiency of optimal full swing multimodal transportation routes between Iran and its neighbours and the region as a whole for achieving a multimodal transportation system in which the quantitative and qualitative criteria covering cost, time, risk and environmental issues should be included and users can make their decisions according to their needs for transport.

2.3 The focus of attention to the region specifically, and of course to Iran itself

The special geographical situation of Iran and its location on international trade routes half way between the East and the West, and the North and the South, offers a unique crossroads and

marketplace for the provision of transport services in international trade. Hence, the potentials of transportation in Iran's railway, road, ports and shipping, airways, and compound transportation sector are important as a strategic bridge. The Islamic Republic of Iran, with its immense economic potential, is one of the most important hubs of global economic and political relations for Central Asia, the Caucasus and also for its other neighbours. This role of a linking hub has its roots in Iran's geographical location, as well as its pragmatic foreign policy. Almost all the Central Asian Republics are land locked, and therefore to a greater or lesser extent depend on passage through Iran for direct and indirect economic connections with the rest of the world. The geopolitical advantages of the Islamic Republic of Iran, and its position as a regional and continental linking bridge between the Central Asia, the Caucuses and other landlocked neighbouring countries and the open sea, have made the importance of its linkages a reality. Thus, Iran enjoys an advantageous position and an international study on Iran's connection routes and corridors to the neighbouring countries would be constructive.

Infrastructure development and consequently demand for commodities in the countries such as Brazil, Russia, India and China (BRIC) have been fuelled and is rising markedly by growth of newly emerging countries. Wilson and Purushothaman (2003) have identified "Three common characteristics of the BRIC namely, plentiful natural resources, relatively young populations, and large areas." The analysts have been prompted by these features to classify them as markets that can alter the global landscape significantly. Kao et al., (2008) indicate that "in fact, a working definition to this effect, despite scholarly attempts to measure a country's productivity or efficiency remains quite elusive." The "economic development potential of another set of developing countries may also be pertinent" (O'Neill et al., 2005). These countries, which are referred to as "The Next Eleven (N-11)", have the potential to rival or surpass the BRIC nations, and amongst them Iran in the Middle East is mentioned. O'Neill et al., (2005) estimate that "in 2050 the gross domestic product (GDP) of these N-11 will equal that of the United States" or exceed Japan's GDP by a factor of four. The acronym BRIC changed to BRICS after the Republic of South Africa joined the four previous members. In fact, according to former Goldman Sachs chairman and the man who first identified the BRIC, Jim O'Neil, the "Next 11" (N-11), is the next countries in line to become economic powerhouses are: Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, the Philippines, Turkey, South Korea and Vietnam.

In order to gain decisive competitive advantages, many multinational corporations have made these emerging markets their primary investment choice. In turn, their investments have clearly fuelled the development of these economies since they affect productivity and hence competitiveness, interest rates, distribution efficiency, energy costs and energy availability. (Wu, & Goh, 2010) state that "With the rise of countries like China, these new emerging economies will also realise the importance of an emphasis on trade and logistics, and therefore the volume of their import and export cargoes is inevitably expanding."

Indeed, some scholars such as Tangzon, (1989); Chin and Tangzon, (1998) assert that "Port efficiency is an important criterion for a country in international competitiveness." Thus far "container port operations have attracted significant attention from academics and practitioners alike" (Kim et al., 2007; Li et al., 2009; Parola and Sciomachen, 2005; Rodriguez-Alvarez et al., 2007). As UNCTAD, (2007: 23) indicated "the global containership fleet increased by 17 million dead weight tons or 15.5% year-on-year, with the high growth rate reflecting greater international trade in manufactured goods and increasing containerisation." During the years 2007-2011, 1,570 containerships with 656 million TEU and 80.1 million dwt were added to the fleet. Between the beginning of 2008 and 2012, the container fleet expanded on average by 9.2 per cent per year in terms of TEU and the number of containerships by 4.1 percent (Shipping Statistics and Market Review, 2012: 5). UNCTAD, (2011: 36) indicated "As manufactured goods are increasingly containerized, the containership fleet has increased its share from 1.6 per cent of the world fleet in 1980 to over 13 per cent in 2011. This has happened mostly at the expense of general cargo vessels, whose share has dropped from 17 to 7.8 per cent during the same period." According to UNCTAD (2011) the containership fleet reached 184 million dwt in January 2011 (8.7% over 2010). Rosana, & Martinez (2013: 71) cited Turner et al., (2004) stating that "For this reason, improving port efficiency or productivity has become a critical yet challenging task in the development of many countries." The level of port efficiency affects to a large extent a country's productivity and competitiveness, because ports are an important link in the logistics chain. Gonzalez, & Trujillo, (2008) indicate that "Countries need to focus on the factors that affect the efficiency of their ports and benchmark on the degree of efficiency, both between ports within a region and with the ports of other regions." So far as, port industry in emerging markets is concerned either due to lack of data or interest, few international studies

have been conducted. However despite the dearth of literature, based on the recent economic growth of emerging markets such as those of India and China, exploring issues relevant to the port sector of developing countries markets has become of considerable importance. This research thus seeks to evaluate the efficiency of container ports in Iran as a country of interest, by reviewing and discussing the container-handling efficiency of the various ports of Iran located on the southern and northern coasts of the country.

Port services are regarded as public goods in character, which thus provide a strong argument in favour of subsidizing port infrastructure, taking into account the public interest in facilitating trade at the lowest economic cost (Goss, 1968, 1990, 1999). Therefore, it is natural that government influence on port policy, either directly or indirectly, is fairly large in all countries.

Ports and therefore ports infrastructure in Iran are under the jurisdiction of the Ports and Maritime Organisation (PMO), which is a semi-autonomous organization under the Iranian Ministry of Road and Transportation. The original characteristics of the system of port management in the I.R Iran were akin to those found in the Public Service Port Management model in which the public sector PMO receives its funds for development of the port sector from the Central Government. All port infrastructures, and originally all port superstructure, were owned and maintained by PMO. In the past even most of the cargo-handling labour force was employed by PMO and sources of income were port dues, cargo handling fees and all types of service fees. However, this port management system changed a few years ago and the PMO developed a strategy to reduce its total labour force and simultaneously invited the private sector to enter into the port domain by contracting out some of its functions. Following that process, the management structure slowly evolved into that of a Tool Port. This implies that the public sector provides the basic infra- and superstructure in the ports but, leaves the handling of cargo to the private sector through contracts. Such contracts practically exist in all the Iranian ports. At present the majority of companies that have been contracted in the national ports are engaged in cargo handling and warehousing activities and several of these private companies have invested in stevedoring equipment and superstructure. The largest private company involved in ports and transport is Middle East Tidewater, which is the principal operator in Bandar Shahid Rajaee and is a private company, of which 49% of the shares are owned by PMO and the

remaining 51% by private individuals, some 41% of whom are PMO employees. As recently as 2011, about 42.5% of government share were sold to private entities. The company is also engaged in activities such as dredging and towage through a contract with PMO. Recently the PMO has expressed its intention to limit its role even further, to move into the direction of a Landlord Port Management Model, as is the world trend. Ways to do that have included signing of concession agreements as lease or Build-Operate-Transfer (BOT) contracts, as is being discussed for the major extension of the container handling facilities in Bandar Abbas Shahid Rajaee Port Complex (World Bank, 2006).

The transport links between Iran and neighbouring countries and major Europe and Asian routes mirror the growing trend in Euro-Asia trade and consequently transport activities have also shown evidence of growth. The growth in trade can be equally seen in the observed demand for the energy products (gas and oil), which are playing a vital role in the exports; also raw materials and intermediate products (cement, steel, petrochemicals), which have diversified transportation options open to them in terms of transport modes and routes. For instance, consideration of land haulage is based on the fact that distance may be shorter than distance by sea, especially when both origins and destinations are located inland. At present, maritime transport is the mode most commonly used, and transport functions as a path connecting to main ports. Even though sea is the most commonly used mode of transport in Iran, land transport, apart from functioning as a connection to ports, plays a significant role in the economies of landlocked and other neighbouring countries. Trains and trucks can carry loaded containers and break bulk cargoes to inland and regional destinations and vice versa (OECD, 2006).

The vision of Iran's logistics development strategy is to establish a world class logistics system to support Iran in acting as a Eurasian trade and investment centre in the Middle East; therefore, transportation is an important component of the national economy. International multimodal transportation is a highly time-sensitive activity to respond to the market demand and obviously plays a key role in this region (Kengpol et al., 2009).

Limao and Venables, (2001) showed that "the shipping costs of a median land-locked country are more than 50% higher than those of a median coastal country." As Redding and Venables

mention, “these sources narrowly define transportation cost as pure costs of freight and insurance; this may result in possible understatement of the real scale of trade barriers as the cost of distance could possibly be higher due to the costs of transit time or information gathering” (Redding & Venables, 2004).

A potential future scenario for Iran in the form of the prospects for regional integration is within the Economic Cooperation Organisation (ECO). Since its inception in 1992, “in view of establishing a preferential trading regime within the ECO, and in the light of the relatively poor prospects for substantial intra-ECO trade, the most promising track is for the ECO members to continue their unilateral liberalisation, reinforced by improved transport links and trade facilitation” (Pomfret, 1997). World Bank, (1995) pointed out that “the enlarged body of ECO contains 325 million people spread over almost eight million square kilometers and ECO has a cultural cohesion incorporating all of the non-Arab Islamic countries of western and central Asia.” The members of ECO are; Iran, Turkey, Pakistan, Afghanistan, Turkmenistan, Azerbaijan, Kazakhstan, Uzbekistan, Tajikistan and Kirghizstan.

For a region as large as ECO the transport network as well as improving the network is essential and because it provides feasible alternative routes for the land-locked members to export overseas would be a major step towards closer integration. The secretariat’s (Iran’s) current approach to regional integration which is based upon unilateral trade liberalisation on a multilateral basis consistent with GATT/WTO principles is an evolutionary one. As it has shown, the evolutionary approach of unilateral non-preferential trade liberalisation fits in with the current development strategy of all ECO members; therefore, in an ECO context unilateral trade liberalisation has major practical advantages over negotiated preferential tariff reduction. Within the evolutionary approach and in line with the WTO framework, top priority needs to be given to trade facilitation, trade liberalization and transport projects. However, for the landlocked ECO members there are alternative positive scenarios such as cooperation over routes to the sea. Iran’s bilateral developments in ECO in the past three decades have centred on legitimate concerns about coordinating trade and transport infrastructure developments. Consequently, increased interaction across Eurasia in all directions promises to deliver a range of benefits to the landlocked countries of the region to find new markets within and beyond this trade network. It

is also tempting to explain the ambitions of Iran and its interest to establish its own seaports as Central Asia's and other landlocked neighbouring countries' major outlets to the sea following the regionalisation path. This is because under globalisation, ports are going beyond their own facilities to help accommodate additional traffic and to facilitate more complex patterns of freight distribution, namely by improving hinterland transport. Hinterland access regimes are developing as important port competition factors, particularly in light of the footloose transshipment functions (De Langen, 2008).

It is difficult to estimate through transport costs of goods from origin to destination due to the variability of land transport costs. However, the cost contribution of various modes of transport to the international movement of goods between a place to another place demonstrates the comparative disadvantage faced by shippers in a landlocked country and the obstacles they face with respect to price and time competitiveness in the international market. The identification of the contributing costs of the various modes of transport and other contributing factors could be applied by countries to identify critical areas to be addressed in the transport process (UNESCAP, 2000).

The mere fact that the Port and Maritime Organisation of Iran has some 11 major commercial ports, as well as 60 smaller, multi-purpose ports on its agenda for development and expansion and where port investment decisions are not made basis on profitability or even at the enterprise level for cost recovery, shows the level of government involvement in the port and maritime affairs of the country. Its hub-port development especially at Bandar Abbas and Bandar Imam Khomeini could be well regarded as resorting to the Asian Doctrine in port development planning policy. On the other hand according to the objectives speculated in the Fifth National Development Plan, a capacity of some 50 million tons was projected to be realized for the transit of cargoes in the country, which again is crucial to focus the national efforts in achieving revenues from the field of transit that would be able to compete with the revenues resulting from oil production and petrochemical products. All of this demonstrates the level of intervention of the government into the transport affairs of the country. The fact that the Iranian maritime administration had been extensively active in the development and distribution of port and maritime know-how and activities, clarifies that if a country could expand and develop coasts

and ports and achieve a combination of various modes of transportation, such as railway, road and sea, the transit of cargoes would also improve resulting in job creation, income generation and reducing level of unemployment, poverty and above all maintain sustainable development in the country (Port & Maritime Magazine, 2013).

The establishment and operation of an efficient multi-modal transport chain requires the synthesis of many elements: near ideal practices for the transport modes involved (low transport cost, high frequency, high connectivity, quality of service), adequate terminal infrastructure (sufficient capacity, fast handling, limited dwell time), efficient interfaces (existence of interoperable sea/rail/road networks, prompt information flow, effective documentation processing and customs clearance) etc.

Multimodal/intermodal transport capability and flexibility are improved; a number of countries, amongst them Iran, have already ratified the United Nations Convention on International Multi-modal Transport of Goods (Geneva 24 May 1980). Even for countries that have not ratified the above convention, relevant liability terms are usually included in the transport contracts (nevertheless, the existence of contract terms, national legislation and international conversions for the same case, introduces fuzziness that allows for various legal interpretations).

A defined area within which various operators carry out all activities relating to transport, logistics and the distribution of goods, both for national and international transit, is a freight village. For buildings and facilities such as (warehouses, break-bulk centres, storage areas, offices, car parks, etc.) which have been built there, these operators can either be owners or tenants. Nevertheless, a freight village must allow access to all companies involved in the activities set out above, in order to comply with free competition rules.

In Iran, there are multimodal freight centres and logistics centres. There are also many truck stations serving the needs of domestic or international road operators. These are managed and supervised by Road Maintenance & Transportation Organisation (RMTO). The closest facility to

a multimodal freight centre is Bandar Abbas, and in particular the cotton storage terminals where the benefits of a free zone rather than of multimodal freight centre are exploited. Additionally, there are companies operating or planning logistics warehouse facilities like ARAMEX International and MESC, which is constructing a logistics warehouse in the Port of Imam Khomeini in the Persian Gulf (International Union of Railways, 2008).

2.4 Literature specific to the Iranian transport sector

Earlier research by Parviz Bavarsad Ahmadi (1997), whose thesis on "Iran's potential as a landbridge for former USSR Republics: A Scenario Approach" was submitted in June 1997 to the University of Plymouth, seems to be the first detailed work on the potential of Iranian transportation. Prior treatment of the concept of a landbridge had been limited to either the Trans-Siberian Railway or east coast/west coast overland routes in the United States of America. No comprehensive general academic study of landbridges was found nor was Iran's potential as landbridge explored. The main features of Bavarsad's research included a comprehensive review of literature related to landbridge arrangements; an investigation and analysis of Iranian transport supply and demand including both domestic and foreign trade; an investigation and analysis of the demand of Central Asian and Caucasus countries for transport; the development of a demand and supply model related to an Iranian sea-landbridge (ISLB) for eight Central Asian and Caucasus countries and Iran; an evaluation of the impacts of demand on landbridge supply; and a comprehensive review of the scenario approach and its application to the Iranian sea landbridge study using a regression technique.

He develops three scenarios being: optimistic, most probable and pessimistic. The main result of his scenario modelling suggests that the transport system of Iran requires considerable improvement to compete effectively with other landbridges, given an increase in trade from Iran and the Central Asian and Caucasus countries. From his work, it is quite clear that insufficient attention was paid to the routes as well as the potential of Iranian sea-landbridges to a landlocked country such as Afghanistan and also to the bilateral transport exchange with Turkey and even Iraq as a country which has the largest border with Iran and perhaps at times could also have the highest volume of trade. Bavarsad also did not expand on Iranian sea-landbridges to

international routes as the shortest connecting link particularly for East Europe to Persian Gulf as a half way route to the Far East, nor does he indicate much about the role of an Iranian landbridge as a link in the wider Euro-Asian transportation arena.

Different bridge concepts are identified by him and most important examples assessed and compared under the four broad headings of geographical, political, technical and organisational aspects.

The other prior research of some note in this field is the work of Derakhshan (principal author), Pasukeviciute and Rose in 2005 on "Diversion of containerized trade: Case analysis of the role of Iranian ports in global maritime supply chain". This research "aims to analyse the potential of Iranian ports for carrying some containerised cargo from the Far East to the European Union, which was usually transported via traditional shipping routes. The act of diverting cargo via an "Iran route" emerged from an examination of economic, trade and maritime transportation trends and events." Their study introduces "an idea for a freight route, designed in four segments for the benefit of the carrier" (Derakshan, Pasukeviciute, & Roe, 2005). To make assumptions about the future, a scenario method has been employed by them which were followed by a plausible future plan for a new terminal dealing with container transit market through this route. This assumption was based on the fact that after 1985 an increasing amount of containerised cargo has been transported between South East Asia and Western Europe. The authors in their study employed scenario analysis as a research tool and generated a "route via Iran" which took into account micro and macroeconomic events and port, shipping and hinterland trends. Costs of diversion of a share of transit cargo via this route were also assessed. The theoretical basis in their study was the potential comparative advantage of an Iranian route as opposed to the traditional ocean shipping route to show that the cost of transit through Iran is lower, leading to a possible situation where the Far East-European transit business could become one of the major commercial services in the country.

This thesis – "The provision of effective transport services in the Iranian maritime and land transport interface" – builds substantially on these previous studies. A broader transport context

is considered by highlighting the through transport potential of Iran as a whole, acting as a “full swing expanded Route”. The focus of research attention is the entire spectrum of seaports and land border links that are open to the local, national, regional and international markets, covering a full flow of containerised and other cargoes in both directions; that is, incoming commodities of all types on all routes, or cargoes originating in the region and passing through the country to their related destinations or export markets.

CHAPTER THREE

RESEARCH METHODOLOGY

The principal research method used in this study is scenario planning. The basis for this method is on creating a series of 'different futures' generated from a combination of known factors. These factors are like demographics with plausible alternative political, economic social, technical legal and environmental (PESTLE) trends which are key driving forces. The goal is to craft diverging worlds by extrapolating these pivotal driving forces (JiscinfoNet, 2008). The scenario planning or scenario thinking approach was developed after World War II and was adopted as a more general business tool by Kahn (1960). Indeed scenarios as strategic planning tools stretched further than military matters by Kahn's insights into the benefits of using futures, and in this way, Scenario Thinking began to emerge everywhere from politics and economics to public policy. As Fahey & Randall, (1998: 17) pointed out "these techniques were also gaining credence in the corporate world and in the 1970s both Royal Dutch Shell and the Consulting Firm SRI International contributed to the creation of a more formalised approach to Scenario Thinking that could be more readily linked with strategic planning."

Van der Werff (1998), while describing scenario planning as a method, stated that "Scenario planning answers 'What if…?' questions that involve important issues and large external influences. Unlike strategic planning, which postulates a single anticipated future, scenario planning looks at alternative versions of the future." He indicated that "The goal of scenario planning is to enrich management's thinking, perceptions of reality, and modes of decision making when addressing important issues in the face of uncertainties" (Van der Werff, 1998: 1).

Khan (1989: 129) defined scenario planning as a "hypothetical sequence of events constructed for the purpose of focusing attention on causal process and decision points." Kleiner (1995) adds that "contrary to what many people believe about scenario exercises, their purpose is not

prediction as you don't predict what will happen: you posit several potential futures." He further added "(a) scenario planning exercise is a bit like a storytelling workshop, set up to bring forth distinction and phenomena that the conventional wisdom ignores" (Kleiner, 1995: 275).

Integrated movement of consignments from origin to destination is discussed in this thesis around an "Iran route" which is the theme of a landbridge concept with its combinations of sea-land, consisting of sea-cum-rail or sea-cum-road or sea-cum-land-sea that is the focal point and central core of this research. Although some research has previously been conducted on this theme, this has not elaborated on an all-round Iran route, which constitutes the base for an Iranian sea-land bridge in such a way as to illustrate the supporting corridors for each of the ports in the south and north of the country with their multimodal transport opportunities, and their potential and the costs of routes connecting to international sea routes and land corridors. This thesis looks at the Iranian economy and its transport infrastructure, the physical and vehicular network and the characteristics of modes and interfaces operationally.

Therefore, a scenario is created by its variables that have three main steps – scenario generation, scenario development and scenario contraction. As such in the case of Iran, the main development of economy, trade, shipping, ports and their hinterland have been considered as variables in the first phase and long-term operational environments of the story are generated in the second phase. The themes which are driving forces "are usually derived using Finlay's DEEPLIST (Demographic, Environment, Economic, Politics, Legal, Information, Social and Technology) method, which requires developing each theme through analysing the present taken on into the future" (Finlay, 2000). In the field of transport, the scenario planning method has so far been used by many researchers, including Banister (1998), Bavarsad (1997) and Darzentas (1996), who modelled a transportation system by applying scenario planning.

This thesis will apply this methodological approach to the specific context of Iran's port corridors and associated multi-modal transport routes, in the process extending significantly the work of Bavarsad and others. It designs a methodological approach, which is followed by a comprehensive literature review. It explores the conventional hinterland transport of Iran which

is based upon many links by road and by rail. Finally, It uses the UNESCAP 'Time/Cost Distance' Methodology which is a practical and simple way to illustrate the time and cost involved in transportation process, that considers multiple objective aspects of the multimodal transportation.

It is under uncertain conditions that a scenario can emerge through rational trends and events or can be created by its variables and their outcomes. Scenario creation thus generally comprises three main steps namely: scenario generation, scenario development and scenario contraction. Hence, here for scenario creation of an Iran route, in the first phase Iran's economy, trade, shipping, ports and hinterland would be considered and these are identified as scenario variables. The scenario also notes a range of futures and a sphere of changes. In the scenario creation which would be the second phase, some themes are deliberately exaggerated based on the environments of a "story" and in a context of long-term realities and opportunities for the region.

All transport systems are usually affected by internal as well as external factors: some of the most obvious internal factors are developments in transport technology, engineering advancement, control systems, deregulation, containerization etc. On the other hand, there are external variables which can significantly influence technological, social and integration concepts within the transportation system. These important matters are most commonly associated with the global economy. Because a seaport serves as a link between the shipping industry and the port's hinterland, therefore both internal and external factors are equally important in the maritime supply chain. Here, the forces in the national and also global economy affect shipping and the hinterland, which are both potential port customers.

The appropriate methodology used is comparative cost analysis and where possible, the necessary cost and details are discussed and considered. This methodology comprises two stages. The first stage involves the identification of the main features, limitations and challenges of the chosen transport corridors through which the different infrastructures and development paths of the main ports, routes and corridors are described, according to the available data and information. The second and more analytical stage utilises this base to estimate and compare the

comparative cost of these through-transport routes, with a view to establishing their cost effectiveness.

In order to successfully analyze the provision of effective transport services in the Iranian maritime and land transport interface, the emerging transport corridors between Europe and Asia are interrogated in some detail, and a scenario planning approach mixed with a descriptive exploratory comparative cost analysis has been applied. Development of a methodology for analysis of international transport routes seeks to identify physical and non-physical barriers. A strategy for the Iranian Transport System Development is also recommended for the facilitation of transport at the border-crossing, ports etc., to be based on international conventions and to establish the national transport/trade facilitation committees comprising representatives of all Economic Cooperation Organization (ECO) member states and parties involved where necessary. For successful development of a linkage to the ECO region and connection to the Euro-Asian Transport Links (EATL), it is necessary to address technical and operational issues as well as non-physical obstacles to efficient transport and border clearance. These depend on intergovernmental cooperation and hence member states, including Iran, need to strengthen their national capacities for developing interregional land and land-cum-sea transport linkages. It is clear that these transport linkages influence Iran's economic growth and also impact on regional economic development as well. At the same time, this also strengthens the capacities of Iranian national Officials in identifying major impediments to the smooth international movement of goods, including inefficient border crossing practices and poor implementation of international conventions; physical infrastructure provision and quantity; and non-physical obstacles to inter- and intra-regional trade.

The identified challenges and constraints are discussed and selected for further analyses. The development of the analytical framework was supported by the review of the existing literature and the gathering of available information from a broad scale of sources. The features, constraints and main challenges faced by the Iranian ports, routes and corridors are then compared and analysed within and beyond the region. The results can become an operational support for a modelling approach as soon as the basic assumptions and their relations become more tested and validated in further research.

It should be stated that this thesis is not building a formal econometric model of transport routes in the region. Rather, it assesses routes in terms of basic determinants such as route distance, transit times (including waiting time), necessary transhipment points, border crossings and the like. In each case, and for each integrated route, these determinants are expressed in cost terms to determine the cost effectiveness of the respective routes, and to identify least-cost multimodal choices. In many instances, impediments such as additional transhipment points, changes of rail gauge, border crossings, or the need to involve intermediate ferry crossings, raise overall route costs.

Within this analytical framework, there are a number of practical obstacles which could be identified for each scenario. These could be considered under geographical, technical and economic categories. Geographical obstacles are specific to particular routes and corridors within the broad region. These are discussed in substantial detail in Chapter Four. Technical obstacles include weaknesses associated with Iranian port terminal performance in terms of capacity and productivity, as well as the technical productivity of land-based transport. Economic obstacles include uncertainties within the Iranian financial system and vulnerability of the overall economy, given its economic dependency on natural resources in general and oil in particular.

Within these principal approaches of scenario and cost analysis, this study employs a descriptive approach, by interrogating cost and performance data on a range of regional transport routes. This study attempts to provide a comprehensive analysis of the performance of a range of regional transport routes, not only within Iran, but also serving its land-locked neighbours in respect of their broader connectivity to European and Asian markets, in the process seeking to fill some of the gaps associated with earlier regional transport literature and research. It reviews and raises some standard solutions for surmounting natural transport barriers, and removing bottlenecks, filling missing links in the identified routes, especially Iran routes in conjunction with other international transportation corridors passing through Iranian territory. Similarly, this study's approach seeks to analyse the strengths, weaknesses, opportunities and threats on the land transport links wherever possible and provides useful information on their respective attributes, potentials for further development as well as their related risks.

The study also argues that the smooth functioning of Iranian routes, efficient Customs transit regimes, the implementation of international trade and transport conventions, the elimination of rent-seeking and the overall improvement of transport and logistics can reduce time and costs to transport operators and traders and, ultimately, to end-consumers. The study sets out a number of recommendations in the area of facilitation and seeks to identify sectoral policies that lay the groundwork for the continued sustainability of these broad regional transport routes through Iranian territory.

The data used consist primarily of secondary data, including electronic bulletins, books, articles published in newspapers and magazines as well as reliable economic websites and official statistics of the relevant organizations. Concepts, definitions and methods in this present study are drawn widely taken from authentic academic books and scientific articles published in valid and acknowledged electronic library resources. Much of the relevant data pertaining to the transport sector and its related road and rail infrastructure and corridors and ports and maritime activities have been provided through official statistical information derived from the Port and Maritime Organization (PMO), Ministry of Road & Transportation, the Transportation and Terminals Organization (TTO), the Islamic Republic of Iran Shipping Lines (IRISL), the Central Bank of the Islamic Republic of Iran, and from non-governmental companies in sea, rail & road transportation as well as from a range of international maritime transport publications.

CHAPTER FOUR

REGIONAL AND INTERNATIONAL TRENDS FOR IRAN'S SEA AND LAND TRANSPORT LINKS

This chapter presents an overview of the size and shape of the Iranian economy, together with a description of the national transport sector including major rail and road routes and the major port corridors. The geopolitical situation of the country and its significance, as well as the geo-strategic position of Iran, are highlighted. The current status, and present and future challenges in the transport sector of the country are discussed and non-trade barriers and efforts for accession to WTO in the context of the Iranian economy are discussed. The country's intermodal opportunities, limitations, carrying capacity, and traffic base with regards to the hinterland destinations are described. Sections 4.1 to 4.8, in reviewing Iran's politico-economic realities and regional priorities, which have impacted on trade patterns and destinations/sources in Asia and Europe, address Iran's transport links in a descriptive manner.

Iran's contribution in the revival of regional land routes such as the historic Silk Road, the Transport Corridor Europe-Caucuses-Asia or TRACECA program, the Trans-Asian Railway (TAR), the International North-South Transport Corridor (INSTC) and the Asian Highway are discussed with a view to spelling out their significance to the Iranian transport sector and to the broader national economy. The prospects of different corridor agreements in facilitation of transit transport and trade amongst the regional states insofar as the transit time and transit cost is concerned, are analysed. The rationale behind swaps of oil between Iran and certain neighbouring states and impacts of these operations on the trade and transit activities in the Caspian Sea basin are investigated, with a particular focus on the implications for the regional sea transport economy. Sections 4.9 to 4.14 present an analysis of expansion and enhancement endeavours that are underway in several key domestic railway connections, and highlight the role that these projects play out in strengthening the country as a key transport and transit corridor.

The Chapter concludes (in section 4.15) with an analysis of the overall transport sector infrastructure, its recent consolidated performance and achievements and it presents some recommendations for the more effective performance of the Iranian transport sector.

4.1 Iran's transport sector: Current status and present and future challenges

Although Iran possesses middle-income standing, its process of growth is strongly tied to the petroleum product global price. In recent years, within the Middle East-North Africa region, Iran has gained one of the highest growth rates. This was made possible as a result of sustained high oil prices and reforms, investment and increased openness to international trade. In spite of global recession the overall economic situation in the country is favourable, with rising international reserves, low external debt, a decline in the unemployment rate and a high and broad-based GDP growth. In the aftermath of the 2008 global financial crisis, Iran is one of the economies to have maintained positive growth despite sanctions imposed on the country as a result of its nuclear program. The economy is the seventeenth largest in the world by purchasing power parity (PPP) and is ranked twenty-sixth by market value as shown in Table 4.1 (World Economic Outlook Database, International Monetary Fund, 2012; CIA World Fact-book, Retrieved, 2012).

Table 4.1: Principal features and macroeconomic indicators of the economy of Iran

Rank	17th (PPP) / 26th (nominal 2011 est.) 18th (PPP) / 25th (nominal 2012 est.)
Currency	1 Toman (super unit) = 10 Iranian Rial (IRR)
Fiscal year	21 March – 20 March
Trade organizations	ECO, OPEC, GECF, WTO (observer) and other
GDP	PPP: $990.219 billion (2011 est.)PPP: $997.430 billion (2012 est.) Nominal: $482.445 billion (2011 est.) Nominal: $483.780 billion (2012 est.)
GDP growth	1.97% (2011 est.) 0.36% (IMF 2012 est.)
GDP per capita	$6,359 (nominal), $13,053 (PPP). (2011 est.) (nominal: 79th, PPP: 69th) $6,356 (nominal), $13,104 (PPP). (2012 est.) (nominal: 80th, PPP: 70th)
GDP by sector	Agriculture (10%), oil (25%), industry (20%), services (45%) (2011 est.)

Source: International Monetary Fund (IMF) and Central Bank of Iran (CBI)

The economy of Iran is a mixed and transitional economy with a large public sector and with some 50% of the economy centrally planned (Central Bank of Iran, 2009; The Islamic Republic of Iran - Ministry of Economic Affairs and Finance 2009). With over 40 industries directly involved in the Tehran Stock Exchange, Iran's economy is also regarded as a diversified economy (Organization for Investment Economic and Technical Assistance of Iran, 2009). Yet, the majority of government revenue in 2010 was still earned through export of oil and gas (Central Bank of Iran, 2011; Bloomberg, 2010).

Progress in several economic areas as a result of reforms, including the establishment of private banks, the amendment of tax laws, revised foreign direct investment approval, trade liberalization, and relaxation of restrictions have been achieved to a good extent. Introduction of broad-based value-added tax has been contemplated and Iran at least in the past decade has achieved a smooth transition to a unified exchange rate system which worked well up until recently and improved the neutrality and buoyancy of indirect taxation. The government's decisions to allocate increased oil revenue to pay down external debt, build international reserves, and accumulate savings in a stabilization fund, facilitated the recent economic performance.

In September 2012 the Iranian currency – the Rial – fell to a record low of 23900 to the US Dollar; the recent instability of the exchange rate and higher import levels have, however, created inflationary pressure in the tradable goods sector (Associated Press, 2012). Needless to state that with a subsequent more stable exchange rate foreign exchange risk should be reduced for both exporters and importers. Hence, because of lack of access to the financial means to hedge the exchange rate, this is an important factor for those engaged in international trade in Iran. The recent tendency for the exchange rate to depreciate may attract a disproportionate share of investment to non-tradable sectors (like gold and property markets), which could challenge the export competitiveness of the non-oil export sector. In order for Iran to achieve optimal management of oil resources it is needed to provide savings and achieve an optimal balance between consumption and savings by lower consumption spending and a much greater proportion of GDP to be allocated to savings. Also an adjustment to achieve substantial savings

could be derived from a pricing reform of Iran's energy subsidy system. As Heydarian (2011) stated this is evident by the fact that "Iran has been among the world's top consumers of fuel, even though Iran's economy is only among top the 25 or top 17 (depending on whether you use nominal or purchasing power parity as the measure) countries and its population is hardly among the top ten nations, consequently this means that average fuel consumption levels in Iran are several times the global average." Simply because prices do not reflect the true value, residential areas and industrial sectors have a problematic energy record, engaged in 'leisure drives' which it means, artificial low fuel and food costs have also led to inefficiency in many sectors. Inefficient consumption has led to a huge pressure on the national budget in the absence of clear price signals. Thus, the government has had to allocate a large portion of its national budget disproportionately to subsidies, instead of investing revenues in wealth-generating, which favour the more affluent sectors that could afford more subsidized commodities. "Subsidies have encouraged wasteful consumption; higher reliance on imported refined-fuel; and deprived the country of more surplus energy commodities for exports and that is what should be adjusted and the government has to take some major actions in this regards" (Guillaume, D. et al., 2011: 12).

Even though countries in the region import from Iran, relative to buyers elsewhere in world their market size and hence the scope for significant merchandise trade between Iran and the countries in the region appears modest. A more promising activity, however, could be transit trade, but in order to realize this potential, several challenges need to be addressed. Indeed, for the landlocked countries in Central Asia, the Port of Bandar Abbas presents one alternative to land routes through Russia and insofar as rising road transportation is concerned, the adaptation of common regional trucking standards is an issue which needs to be sorted out by eliminating local monopolies that raise costs of road transportation for the landlocked countries in Central Asia. For Central Asian countries, the new rail link from Bafqh to Mashhad (near Iran's border with Turkmenistan and Afghanistan) has made Bandar Abbas a more attractive seaport which could lower freight costs within Iran, making Bandar Abbas their number one access choice. This has been substantiated by various authors such as Chong & Lindstrom (2001), Pomfret (1997) and Ziyadov (2011).

The bulk of Iran's earnings are from export of oil therefore the country is still heavily dependent on oil exports. As shown in Table 4.2, in the recent years over 80 percent of exports comprised oil and broad petroleum products destined for markets in East Asia and Western Europe (UN COMTRADE database, 2012).

Table 4.2: Trade and international indicators of the economy of Iran

Exports	$66.37 billion (2012 est.) fob
Export goods	petroleum (80%), chemical and petrochemical products (4%), fruits and nuts (2%), cars (2%), carpets (1%), technical services
Main export partners	China 21.4%, Japan 9.1%, Turkey 8.8%, India 8.1%, South Korea 8.0%, Italy 5.3% (2011 est.)
Imports	$66.97 billion (2012 est.)
Import goods	industrial raw materials and intermediate goods (46%), capital goods (35%), foodstuffs and other consumer goods (19%), technical services
Main import partners	United Arab Emirates 30.9%, China 17.4%, South Korea 7.1%, Germany 4.8%, Turkey 4.2% (2011 est.)
FDI stock	Home: 16.82 billion (72nd; 2010) Abroad: $2.075 billion (68th; 2010)
Gross external debt	$14.34 billion (31 December 2010 est.)

Source of Data: Trade promotion organization of Iran

Iran has pursued policies to liberalize its trade regime, despite the lack of accession to the WTO, in recent years. Iran has recently begun rationalizing its tariff schedule and it has been steadily making progress in ratification of its non-tariff barriers. A uniform, four percent customs duty and a variable commercial benefit tax (CBT) which has some 24 rates – reflecting the ratifications on NTBs – are levied on all imported goods. "The resulting simple average tariff rate (combining the customs duty and the CBT) is 31.4 percent" (World Bank, 2003).

Since as per foreign exchange surrender rules, non-oil exports are bound by mandatory certification procedures, minimum export prices, as well as some export bans and licensing requirements, therefore oil remains Iran's main export. Restrictions on importation have been liberalized, and Importers are no longer required to have a special licence, and most exemptions

of preferential tariff have also been eliminated. “Tax collection is about 6 percent of the value of imports, of which the commercial benefit tax is 5 percent” (Iran Customs Authority in World Bank, 2001). Note also that sales and corporate income taxes are not neutral with respect to international trade.

Towards increasing the transparency of economic policies, including Iran’s trade regime, significant progress has been made. The WTO accession process, would likely result in further progress in that direction, if carried forward. Current outward-looking policies would ultimately be a formidable anchor for Iran towards membership of the WTO, which would also benefit neighbouring countries. In the meantime, “further reforms aiming at developing private-sector activity and enhancing efficiency should be considered by the authorities” (World Bank, 2001).

4.2 Geo-strategic position of Iran

In the oil-rich region of Western Asia, Iran stands out prominently as the largest and most populous nation. The country, by virtue of its geographical land mass and human resources, is positioned such that it can act like a transport bridge in Western Asia. It has fairly large revenues from oil and gas exports. The country is endowed with seven percent of the global mineral resources including 11 percent of proven global oil reserves and 16 percent of the world’s natural gas reserves. This translates into 133 billion barrels of oil (17 billion tons) and 27 trillion cubic metres of gas totalling to $4000 billion at current oil and gas prices, (British Petroleum website), despite the fact that Iran has only one percent of the world’s population (75 million). Significant attention of all major powers is drawn towards Iran’s geo-strategic location. It dominates the entire eastern side of the Persian Gulf and it has a long coastline on the north of the Indian Ocean and the Arabian Sea. As shown in Figure 4.1, its borders with Iraq, Turkey, Afghanistan and Pakistan are quite long and it has also borders with the residual republics of the former Soviet Union. In the north, Iran shares borders with the republics in the Central Asian region and also has a coastline on the Caspian Sea. Consequently, Iran could rightly be termed as the obvious “entry port” for the Central Asian Republics (Maleki, 2009).

Iran’s potential as a regional entry port and transportation bridge, which is driven from its geo-strategic location, and forms the basis for the actual infrastructural development and multilateral

regional relations, has been well received by neighbouring states. In order for Iran to link its infrastructure with that of the countries of Central Asia and the Caucuses it has few difficulties in finding partners for the construction of roads, railways, pipelines and power grids. Iran also does not have a problem with processing further programs to remove trade barriers in all directions, and for environmental protection in the Caspian Sea basin.

Figure 4.1: Iran's international and province boundaries, rail and road routes

Source: Maps of world - University of Texas libraries, October 2001

4.3 Iran's politico-economic realities

Iran is oriented toward consistent integration into the world economic system while retaining its national specifics, marked by independence and predictability, both in the medium and long term. Apart from its dependency on the export of oil, in the light of recent developments, Iran also greatly depends on the export of manufactured goods and technology. "As the country implements large-scale industrial modernization programs and develops transportation infrastructure, and combining planned economy elements, it is visibly picking up pace with market mechanisms and coordinating the operation of state-owned and private enterprises, which ensures steady growth of GDP (on average, 5 percent a year)" (Cristiani, 2010).

Iran had a population of 70.49 million, according to the 2006 census and based on the 2011 national population and housing census, 75.14 million (Statistical Centre of Iran, 2011). With a high level of education and a growing proportion of young people in its population, its human resource potential differs from many other developing countries. "As per OECD/World Bank statistics, population growth in Iran from 1990 to 2008 was 17.6 million (a 32% increase over this time period), and the literacy rate was 80% in 2007" (IEA/OECD, 2012: 89). At the same time the proportion of students in the age group of 15-34 is high: in other words, these points to the positive dynamics of the state's social development.

The national transport development strategy is geared to develop a modern network of railways and highways that will serve to link the Persian Gulf coast with ports in southern coast of the Caspian Sea; the country's western border areas with Iraq and Turkey; its eastern border with Pakistan and Afghanistan; and its northern border with the Central Asian Republics. Also, a lot of effort is being deployed to expand the present pipeline transport system and to modernize the sea ports and oil refineries in the north of the country. By providing the Central Asian independent states with one of the shortest outlets to world markets, transit-wise Iran remains a main gateway for the newly independent states of Central Asia. Considering the aforementioned, Iran can well be put on a par with Russia and China, in the extent of its political and influence on Central Asia (Auelbaev, 2004 pp.82-87).

4.4 Regionalism as a priority in Iran's transportation

Throughout the modern period, a unique combination of geo-strategic location and large resources of energy has made Iran a focus point for the great powers and has created a kind of competition amongst them for acquiring influence in the region and attempting to impose their influences and their interests in the country. This has also profoundly affected the way Iran's and Iranians' perceptions of historical processes and international relations have developed, and the way Iran views the major powers (Graham, 1990 pp.17-23). Iran is situated at the focal point and heart of the most important petroleum hub of the world. Iranians are sitting on a huge land mass, which controls a number of water gates, corridors and transportation lines that are passing through Iran and providing access for landlocked neighbouring countries to the high seas (Acemuglu, 1999).

The geographic diversity, skilled and semi-skilled workforce, and communication routes all contribute to this country's standing. The potential to play a leading or pivotal role in a number of regional configurations – the Persian Gulf, Greater Central Asia and the Caspian basin, among others – derives from Iran's geographical position, size and economic structure. It was the collapse of the Soviet Union that gave rise to a new awareness in Iran for understanding the opportunities and possibilities presented by the combination of the country's strength as compared to other regional states with regards to its geographical location at the heart of the Eurasian continent. Iran's conversion and functions towards regionalism, in this respect can be perhaps best understood and that is why all the Iranian governments so far have strongly prioritised regional relations (Nasri Meshkini, 2000 pp.73-101).

Iran is the main link to international markets for the Central Asian countries and that is why the Central Asian states and Afghanistan have all asked the Iranian government to connect the country's railways to rail in Turkmenistan, to provide access and link the other countries in the region to the Central Asia, Russia and to the Persian Gulf. The 700 km railroad connecting the Iranian city of Bafg to the Persian Gulf port of Bandar Abbas, which opened in March 1995 (by the president of Iran in the presence of heads of state of all the Central Asian Countries), was a major milestone in moving towards regional conversion and in fact construction of this link completed the rail link between the Iranian city of Mashhad and the Persian Gulf. The

complementary line that connects Iran with Turkmenistan (the Tejan-Sarakhs-Mashhad line) was completed and came in use in March 1996. This line is 40 km long and provides a short and time saving route, which enables Central Asia and Russia to access Europe via Turkey and to reach to the Persian Gulf, Pakistan and India conveniently (international.rai.ir, 2012). With the inauguration of this important transport link, the Central Asian countries now have access to the Persian Gulf, Caucasus and Turkey; it actually serves as an alternative rail link for these countries to the Russian railway system (Abulverdi, 2006 p:25.8.). The major project underway is the Trans-Asian Railway (TAR), which is planned to connect Singapore with Istanbul. The TAR was initiated by the United Nations Economic and Social Commission for Asia and Pacific (ESCAP). The length of the main direct route will be 14000 km, out of which the current missing part is 1550 km between Bangladesh and Thailand.

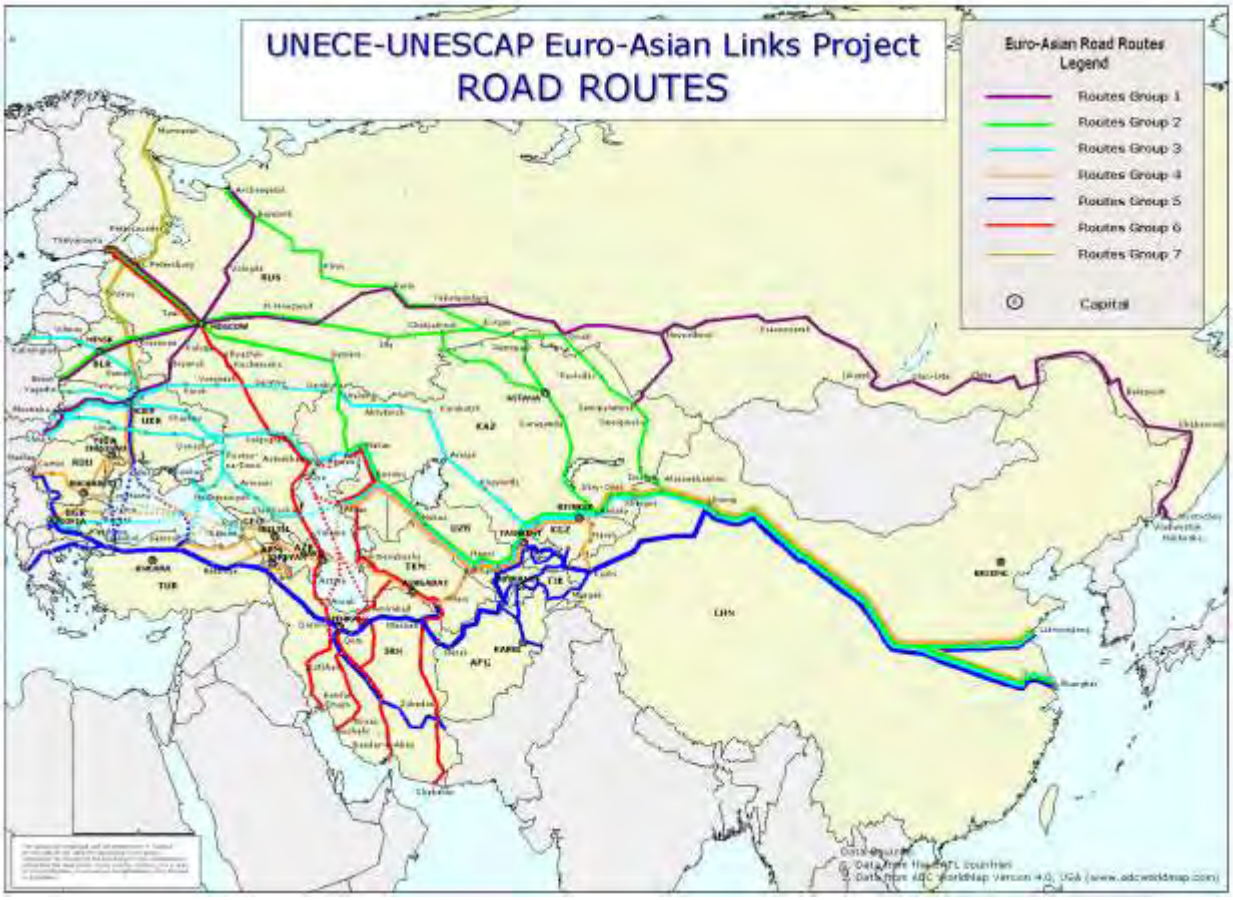
4.5 Bilateral, Regional or Corridor Agreements

In order to simplify transit procedures including transport infrastructure, visa, and permit and vehicle regulations, bilateral or regional transit agreements are signed between two or more countries. A bilateral or regional transit agreement is one of the ways to mitigate the difficulties of landlocked countries in transit operations. A variety of issues including transport infrastructure, visa, permits and vehicle regulations could be dealt with through the bilateral agreements. The regional agreements tend to have a broader coverage and focus on policy directions but have not been fully implemented so far. These agreements are necessary for transit in the absence of a fully functional Transports Internationaux Routiers (TIR) system and are key building blocks of customs harmonisation initiatives. “In the case of landlocked countries, bilateral agreements are particularly important when access to a seaport depends on a transit country” (gfptt.org, 2013).

The TIR convention or the Convention on “International Road Transport for Transportation of Goods Under Cover of TIR Carnets”, has worked well in Western and Central Europe. Iran and some of the Central Asian Republics (CAR) are members, but so far as road transportation is concerned, TIR is not fully respected within the region and national formalities have been added. Regional transit may be desirable under TIR in the long-term, but in the early stages of formation of ECO with the exception of Iran which met with the requirements of TIR, other regional

trucking fleets, could not meet the TIR standards without substantial and costly modification. A regional approach based on prevailing regional standards offered a more immediate and practical approach to facilitating transit without TIR, as road freight dominates international transport in the region. In this way, for international road transit successful, regional corridor agreements that apply regional standards to regional needs could be agreed, by which the transit formalities and documentation, levels of transit fees and the limits on gross vehicle weights and axle-loads could be determined. With regard to road transportation (shown in Figure 4.2), Iran has different vehicle standards from the other countries.

Figure 4.2: Main Euro-Asian road and inland water transport routes, transhipment points and ports



Data Source: 1- EATL countries 2-ADC world map version 4, 0. 6th November 2007

From the early stages of formation of the TIR convention in 1975, Iran became a member and therefore has kept up with this standard and has a fleet of 28000 standard trucks with over 500

operators licensed by this organization (Iran Transit Directory, 2002). On the other hand quality of road and route arrangements like TIR special parking and the establishments for fulfilment of formalities by the drivers within the customs of border crossing and ports are in line with the TIR Carnet requirements.

A set of multi-year growth estimate for transit and intra-regional trade by weight and route has been prepared by the Asian Development Bank (ADB) which elaborated the economic impact of these routes from a Central-South Asian road corridor by 2010 and indicated their importance (World Bank, 2004: 42). These routes connect Central Asia with ports in Iran and also Pakistan through Afghanistan by road. A total of twelve routes were considered, out of which six would pass through Iran, providing connection to Iranian ports, and six to Pakistan. The total distance to connect to Iranian ports, taking out the segments is 7,964 kilometres linking Dushanbe-Chabahar, Dushanbe-Bandar Abbas, Heart and Zaranj, Tashkent-Chabahar, Tashkent-Bandar Abbas, Ashgabat-Chabahar, and Ashgabat-Bandar Abbas. The combined lengths of corridors in Iran are 1941 km. Hence specific corridors rather than regional agreements may have more immediate relevance.

Although the CARs have signed several regional agreements, perhaps because they are too general in nature, they have had little impact, but ADB's two corridor agreements seemed to be more contemplated for the Central-South Asia region, covering the most probable transit flows:

- The Iran Corridor Agreement including Iran, Afghanistan, Uzbekistan and possibly Tajikistan covering routes to both Bandar Abbas Shahid Rajaee port and Chahbahar port.

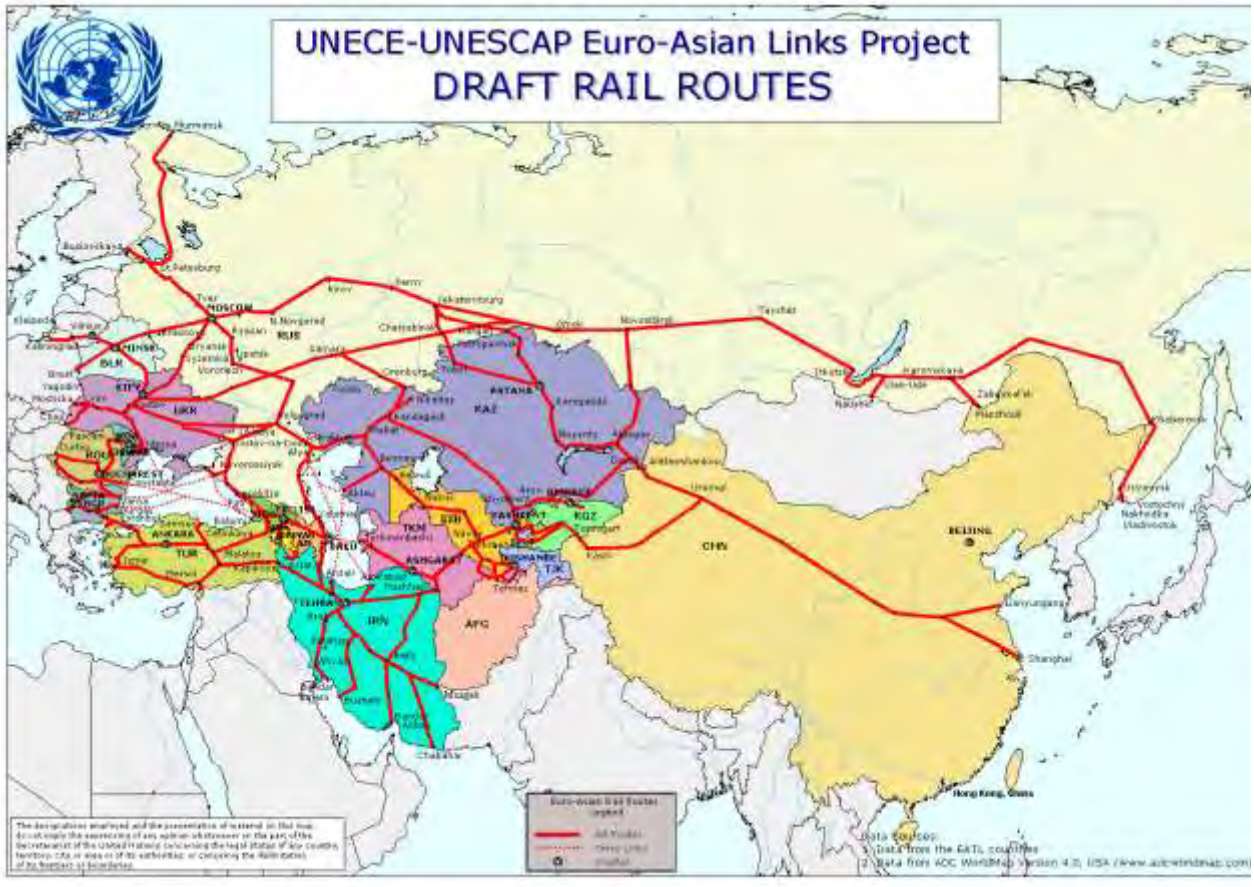
- The Pakistan Corridor Agreement including Pakistan, Afghanistan, Tajikistan and possibly Uzbekistan to cover the routes to Karachi, port Qusim and eventually Gwadar port.

In order to facilitate trade, Turkmenistan is interested in a corridor agreement with Iran. From amongst the CARs, Uzbekistan is also interested to facilitate bilateral trade and develop routes to Iran, while the other countries of Central Asia would gain from routes to the south; however,

Kazakhstan, Tajikistan and Kyrgyzstan might wish to participate in one or both of the corridor agreements (World Bank, *op. Cit*., p.43).

By virtue of Iranian investments in 1990s in the Iranian rail network and in its expansion to the border of Central Asia, Iran's attractiveness as a route into Central Asia has also been enhanced. The inauguration of a 703 kilometre railroad connecting Bafgh in central Iran to the port city of Bandar Abbas on the Persian Gulf in 1995 was a major step (see Figure 4.3). The beginning of a weekly train service from Almaty in Kazakhstan to Tehran in March 2002, within the framework of the Economic Cooperation Organization (ECO), as part of an agreement to revive the Silk Road, marked another important step in this direction.

Figure 4.3: Main Euro-Asian rails and inland water transport routes, transshipment points and ports



Data Source: 1- EATL countries 2-ADC world map version 4, 0. 6th November 2007

To date, and as a result of changes that have taken place, the TIR contracting parties in Central Asia have increased to include Afghanistan, Azerbaijan, Kazakhstan, Tajikistan and Turkmenistan. In fact, the TIR convention at present has 68 contracting parties (2011) across the globe including the European Communities, and countries in Eastern Europe, and Middle East bordering with Iran including the CARS, Turkey and Armenia. Pakistan and China are currently in the accession process to the TIR convention (The world road transport organization – International Road Transport Union IRU, 2011).

4.6 North-South International Transport Corridor

Another area is **the North-South Transportation Corridor**. The North-South corridor project, is intended to link Mumbai via Bandar Abbas in Iran with St. Petersburg and the Indian Ocean with the Baltic Sea and Europe. This is the result of an agreement among Iran, Russia and India in 2000 (with Belarus and Kazakhstan joining later). The aim is to use this corridor, which has the potential to be quite economical and efficient if workable roads and railroads are built, and to develop the required ports along the way in conjunction with streamlined customs and other procedures. In comparison with the Suez Canal route, for the cargo on transit from the Indian Ocean and Persian Gulf regions to Northern and Eastern Europe, this route, which will form part of the larger Asian Highway System of land and sea connections, will shorten the cargo transit distance by two thirds. Apart from substantially increased trade among the participating nations, in the light of development of this corridor, the level of interaction between Asia and Europe would increase. When a Russian freighter discharged its load at Iran's Caspian Sea port of Anzali in early 2003, the sea/land route began its official operation. "A completed Transportation Corridor, however, will require the investment of large sums and years of sustained effort and cooperation amongst the participating nations" (Berlin, 2004).

This corridor project will pass across Iranian territory to Caspian Sea ports and then along the Russian inland water, rail, and road network to countries of east and Central Europe and Scandinavia, it envisions the creation and development of a joint transportation infrastructure of Iran, Russia and India, and some of other states who are wishing to participate (see Figures 4.4, 4.5 & 4.6).

Figure 4.4: North-South corridor presentation

Source: Railway Pro Magazine, May 17, 2011

Additional opportunities have been created for the Islamic Republic of Iran in international trade and transit by the emergence of the North-South transportation corridor project. At the same time, it provides grounds for formation of a national transport network with diversified infrastructure as a whole and the industrial development of Iran's western regions. In this respect, on the one hand, the evolution of the Caspian Sea basin as an international transport node orients a part of freight and passenger flows to the country, which creates additional opportunities for a balanced development of its economy on the regional level and on the other hand, by offering and making available its transit services, Iran gets an opportunity of becoming an intermediary in the international flow of goods. Planning for shipment of a larger share of the non-oil sector of industry, along with modernisation of ports in the Iranian side of the Caspian Sea, could be considered as important aspects of this project. Transportation of a wide range of goods with the development of the fuel and energy sphere will result in the stimulation of industrial and agricultural growth of the country (Iran International Magazine, 2003).

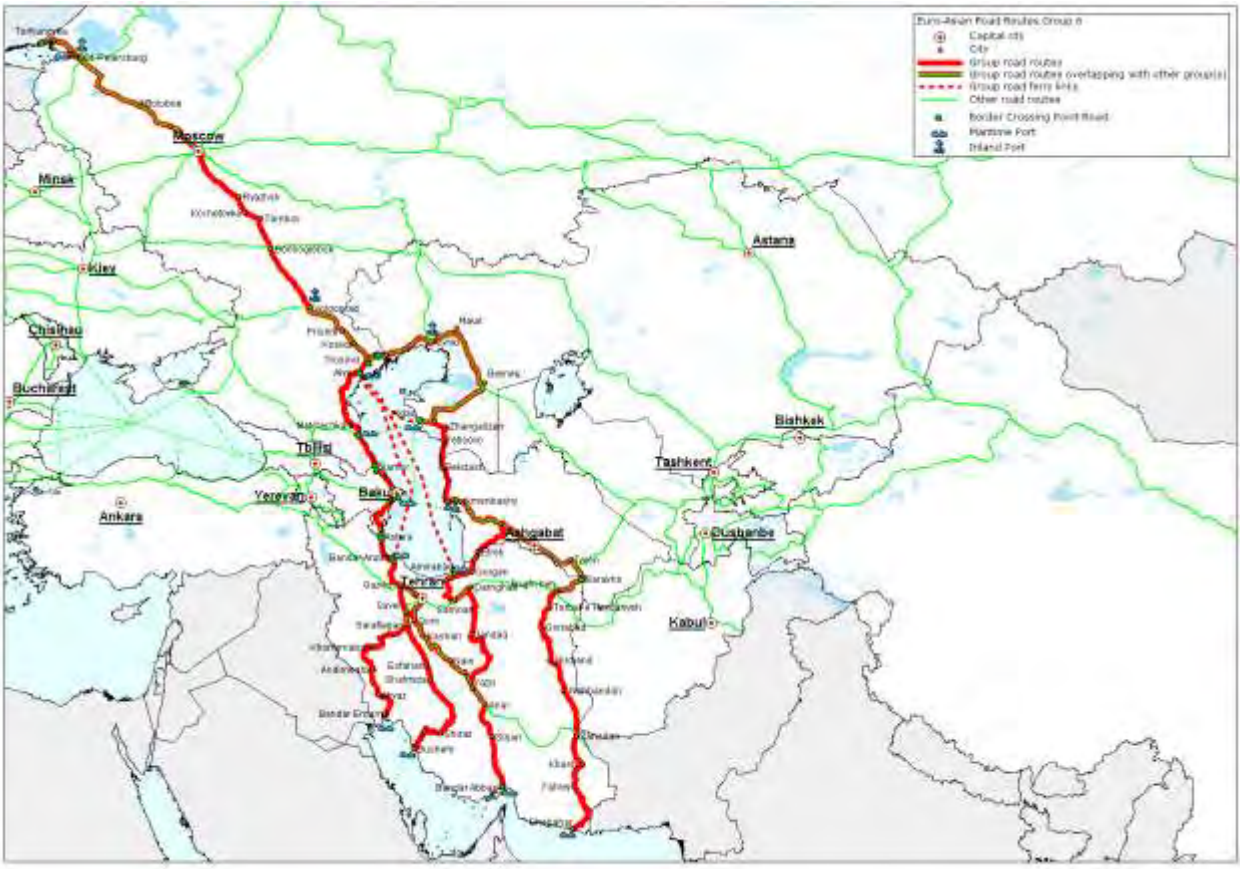
Considering the fact that the emerging transportation infrastructure plays an important role and is of key importance for the development of economic contacts in Iran and other Caspian countries, Iran is now restructuring all of its transport and communication systems, especially railways, as the most cost effective sector. For restructuring of the transport system, while considering transit to neighbouring states is global market oriented, two important interconnected trends are also to be considered – on the one hand the modernization of the network, and on the other hand to work on the autonomy of transportation system of the country. It must be noted that to a large extent the modern transport system of Iran is influenced by the European standard.

At the same time, towards materialization of the proper performance of the corridor, States in the region, while interacting within the framework of the north-south corridor program, are working to carry out integration projects too. In particular, as per plan there are plans to build a rail road along the east coast of the Caspian Sea, linking Russia, Kazakhstan, Turkmenistan, and Iran, known as the Eastern Path which is due to be completed in 2014, as well as along its Western coast – that is to say, across the territory of Azerbaijan.

With Iran's maximum use of its geographical position, which gears the country's strategy towards neighbouring states, the Iranian transport network is changing considerably, while it does not have to bear the cost that the CIS republics or others are facing. Hence, the Islamic Republic of Iran should get more actively involved in the regional transport structure so as to be able to withstand better political pressure affecting its economic process, and also in order to cope with pressure from America and the Western world in the region which aims at formation of transport and communication structure there without Iranian participation.

At present Iran's railway lines are linked with those in Turkey, Armenia via Nakhchivan Azerbaijan, Pakistan, and Turkmenistan, as well as with the port of Bandar Turk-man and Bandar Amirabad on Iran's Caspian coast and with the ports of Khorramshahr, Bandar Imam Khomeini, and Bandar Abbas in the Persian Gulf. There is also a rail link to the new Port of Amirabad that is being built to the north of Bandar Turk-man.

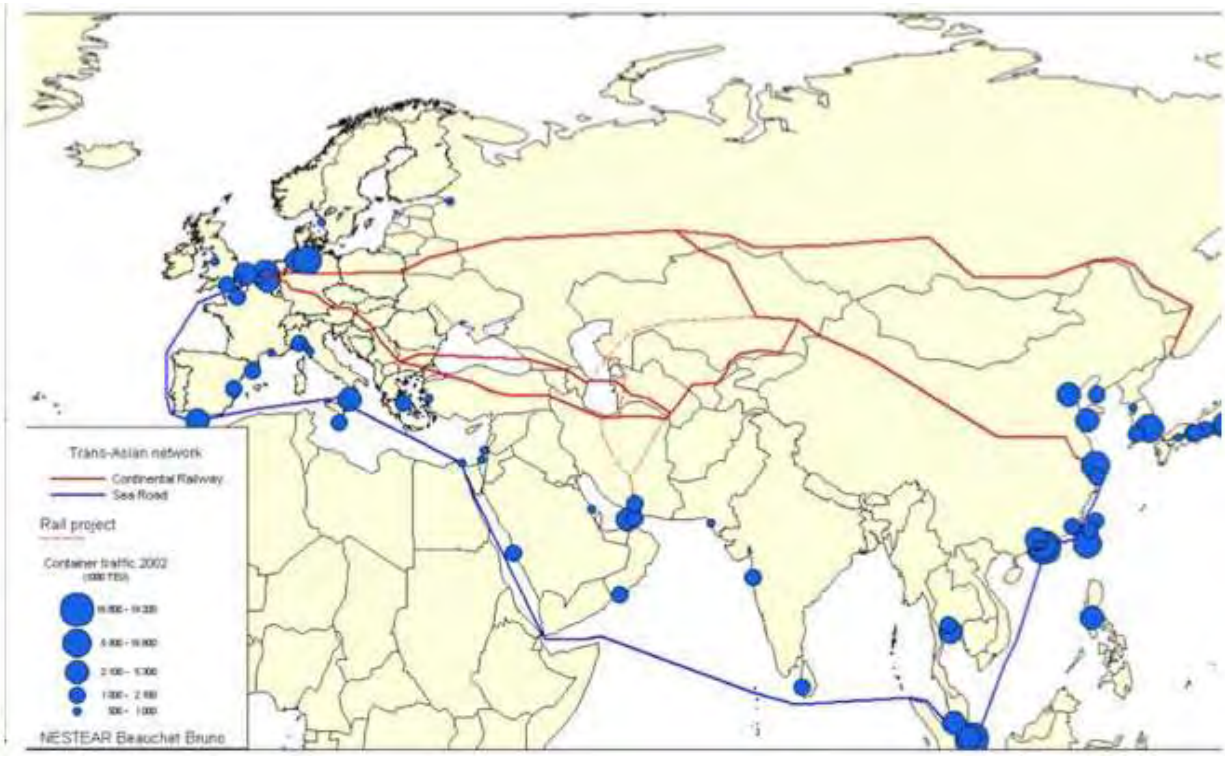
Figure 4.5: North South Route: from the Finnish border through Russia, Azerbaijan to Iran/Persian Gulf



Source: UNECE Transport division, 2008

Therefore, there is good reason for optimism that cooperation between Iran and her Caspian Sea neighbours in the transport and communication sphere is developing quite successfully with the North-South International Transportation Corridor (United Nations Economic and Social Council, 2004).

Figure 4.6: Trans-Asian Railway versus sea routes to Europe



Source: Transport Division of UNECE, 2002

4.7 The Trans-Asian Railway as a Section of the Modern Silk Road

As shown in Figure 4.7 and according to definition and in the classification of the Economic and Social Commission for Asia and the Pacific, or ESCAP, the **Southern Corridor** links such capitals and large cities as Beijing, Taiyuan, Xian, Lanzhou, Urumchi (China); Almaty, Taraz, Shymkent (Kazakhstan); Tashkent, Dzhizak, Novai, Bukhara (Uzbekistan); Chardzhou, Mary (Turkmenistan); Mashhad, Tehran, Tabriz (Iran); and Van, Ankara and Istanbul (Turkey). It has a total length of 12,000 kilometres. This railway route length in Iran as a selected country is 6221 kilometres of 1.435-metre standard gauge track. Essentially, this road follows the **Silk Road** (United Nations – ESCAP, 2001b).

Upon completion of construction of two railway branch lines on the border of the region in the first half of the 1990s, the corridor went into operation. The Kazakh and Chinese railway lines

were linked in a place near Dzhungar Gate in September 1990; while subsequently, the construction of the Tedzen-Serakhs-Mashhad railway line was completed on the border of Turkmenistan and Iran in May 1996.

Figure 4.7: Trans-Asian Railway Network – major routes

Source: United Nations April 2006

This line is 292 kilometres in length out of which 130 kilometres pass across Turkmenistan and the rest through Iran. The period of construction was four years and the most difficult section to build was in Iran, where 29 kilometres of rail were laid across the Mahura highland terrain and another 42 kilometers along mountainous terrain. The Iranian section includes eight stations, a

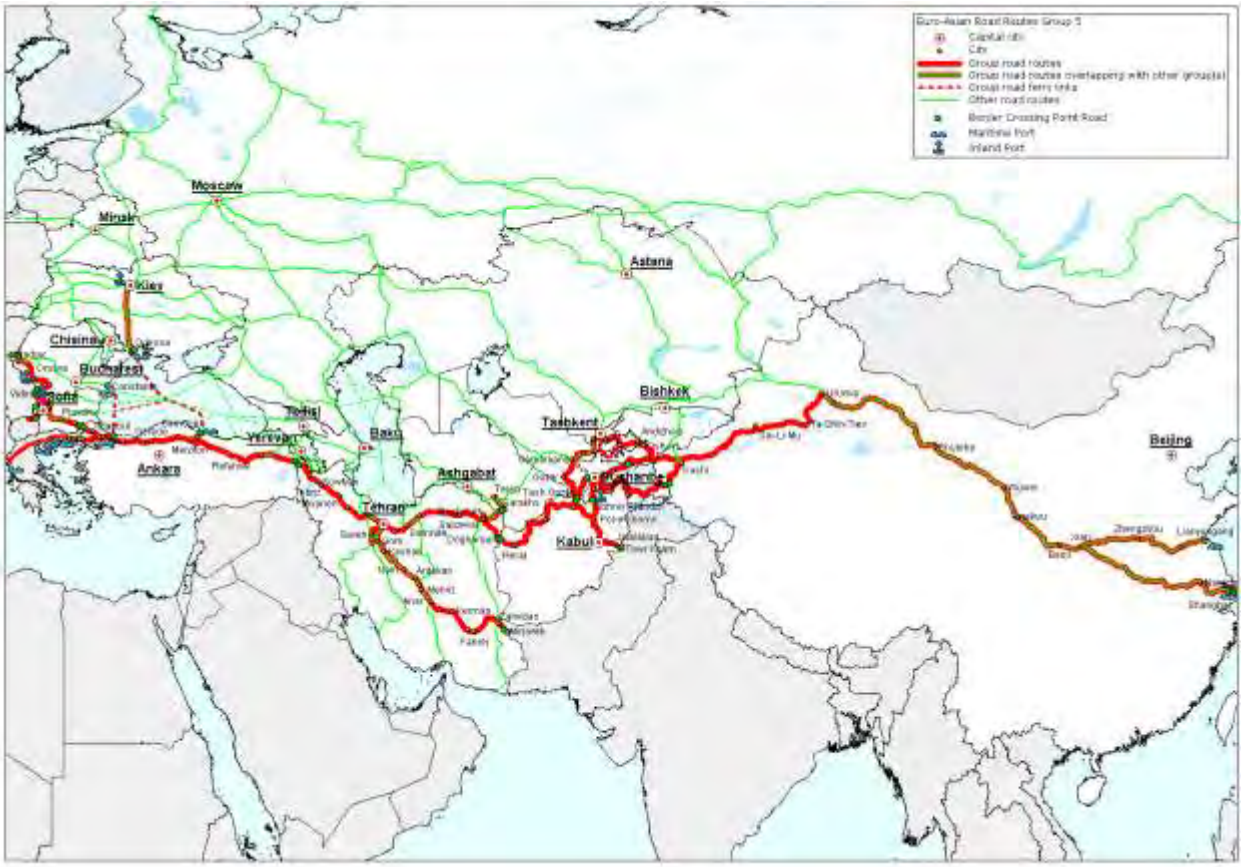
2,700-metre bridge, and three tunnels with a total length of 4,998 metres (UNESCAP, 2001b). As for Turkmenistan, in addition to the Tedzhen-Sarakhs section and in order to link the city of Kazandzhik to the Iranian port of Bandar Turk-man, the Karakumv-Dashovous access line was also built.

There is no doubt that as a result of development of the transportation infrastructure of these neighbouring countries, the transit capacity of the Central Asian Republics, Russia, and China for freight shipments to states in the Near and Middle East and South Asia via Iran would be considerably expanded, while the last mentioned acquires better access to the large markets of Central Asia, Russia, and China. Thus, in the context of regional economic integration the **Southern Corridor** with the Tedzhen-Sarakhs-Mashhad transport branch line as its "golden link" is unlikely to lose its strategic importance. Yet in order to revive the **Silk Road**, a number of difficult tasks will need to be fulfilled. Amongst these politico-economic stability, security of the international transport line and success of economic reforms are worth mentioning, while along with the trade and economic ties, tourism also needs to be developed (Auelbaev, 2004).

4.8 TRACECA

By virtue of its strategic location Iran is a key transport corridor between Europe and Central Asia. Hence, Iran formally joined the Transport Corridor Europe-Caucasus-Asia (TRACECA) programme in September 2009. TRACECA was founded in 1998, with the aim of promoting relations, trade and transport communications between Europe, the Caucasus and Asia (see Figure 4.8). This program consists of the EU and 14 member states from Europe and the Caucasus including Iran. Iran's strategic location means that it is a key transport corridor between Europe and Central Asia (traceca-org.org, 2009).

Figure 4.8: Euro-Asian road routes covering TRACECA



Source: Traceca.org, 2008

4.9 Co-operation in the Oil and Gas Sector

Following a summit meeting in Tehran in 1996, an agreement regarding supplies on a swap basis was signed between Iran and Kazakhstan. However, it was only in December 2001, that this contract could actually be finalized and thereafter, in February 2002, the first tanker of the national shipping company KazMorTransFlot with Kazakh oil set out from the port of Aktau to the Iranian port of Neka. The oil cargo was destined for Tehran and North Iranian oil refineries. It was followed by the supply of an equivalent volume of Iranian oil, shipped on a Kazakh importers tanker vessel at Kharg Island (south Iranian Port Island in the Persian Gulf). The volume rose and in 2003, Kazakhstan exported approximately 1 million tons of oil on a swap basis through Iran. In fact, the intention to develop cooperation in the transport sphere between the two countries under the Swap Project was to a certain extent achieved and fulfilled. Considering the fact that for Iran and Kazakhstan oil is the main source of revenue, it is also

extremely important not only for the country's development point of view, but also for Iran's integration into the world economy. These oil swap operations have contributed significantly to this process (Oil & Gas Eurasia, 2012).

Under the oil swap arrangements the catchment area of which is shown in Figure 4.9, Kazakhstan, Azerbaijan, and Turkmenistan each provide Iran with some crude oil that is refined in refineries in northern Iran. Iran then sells on the accounts of those countries an equal amount of its own crude in the Persian Gulf. In this way Iran's benefits is in the fact that it does not have to build more pipelines to bring crude from the southern oilfields to northern Iran. "An average of 90,000 barrels per day was swapped through Iran so far and the capacity will rise to 300,000 barrels per day within five years" (Payvand news, 2011).

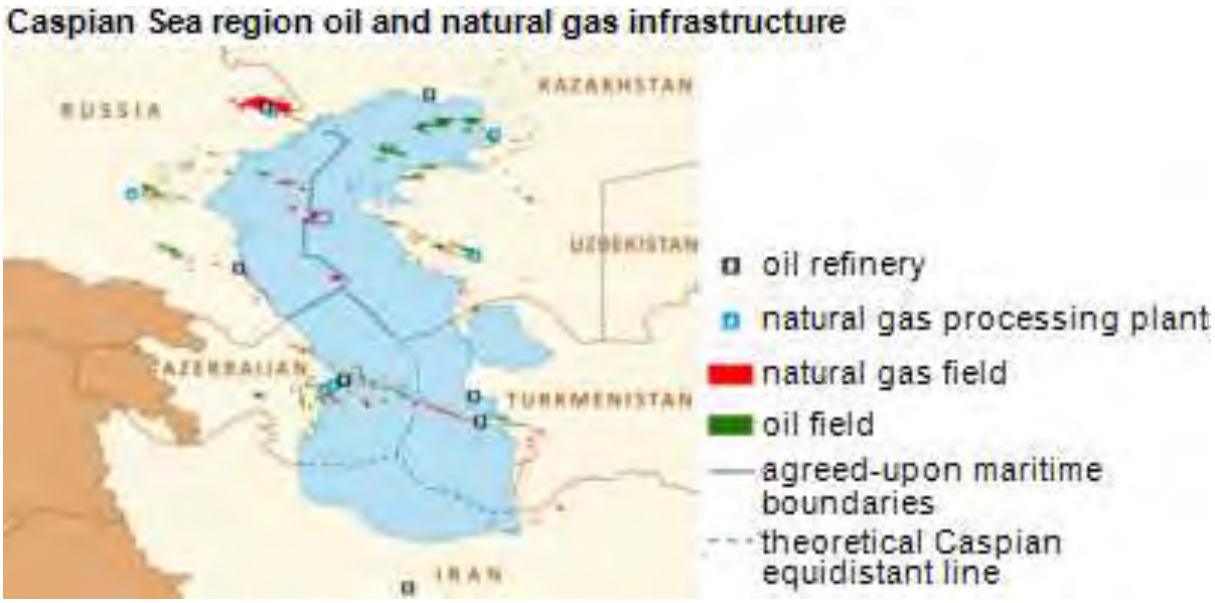
To increase its contribution and for its part, Iran is also building up infrastructure, such as the development of Amirabad port on the Caspian coast, which plays an important role in the oil and non-oil sector as well. From Kazakhstan's perspective the development of relations with Iran stimulated modernization of the Port of Aktau that can today handle up to eight million tons of oil products a year. A Tengiz-Uzen-Belek-Tehran-Qom-Isfahan-Kharg pipeline project which has a length of 1,440 kilometres is also under consideration by both the parties, of which about 500 kilometres runs across Iranian territory. The other project, which envisages the use of the existing Omsk-Pavlodar-Shymkent-Chardzhou oil pipeline with an extension to the north of Iran, is being developed by Transneft-KazTransOil companies. This development, if it materializes, will link with the Iranian section of the pipeline and make it accessible by Turkmenistan, Uzbekistan, Kazakhstan and Russia. Therefore, it is understandable that an interdependent oil exchange system serves not only as a base to benefit Iran, but also it helps the other countries in the Central Asia and Caspian Sea basin to get involved in the process (Auelbaev, 2004: 84).

Iran is strengthening its position in international structures, in particular, the Organization of the Islamic Conference (OIC), by developing political relations with republics in Central Asia. At times, almost all the companies operating in the Kazakh sector of the Caspian Sea have perceived the advantages of the Iranian oil transport route as by far the most profitable route. Amongst them worth mentioning was Canadian Petrokazakhstan inc. that shipped under a swap

contract its share of oil, produced at the Kumkol oil field, to the Tehran refinery along the Tedzhen-Sarakhs-Mashhad railway line. An oil swap agreement also was signed with Iran in 1998, whereby Turkmen exporters were represented by the Drayun Oil Company.

Oil swap operations are profitable for Iran, resulting from the difference in the price of oil bought in the north and that provided in the south, as well as from transit charges, while for the Central Asian Countries (CARs) as compared to the existing Russian or Prospective Chinese route, the Iranian route is the shortest and is therefore more profitable (Gidadhubli, 2004).

Figure 4.9: Caspian oil & gas infrastructure



Source: EIA, U.S. Geological Survey, IHS EDIN, September 11, 2013

More than 90 percent of the Iranian import and export, particularly in the fisheries and oil sectors, are undertaken through the sea. In 2008, 84% of the transited goods through Iran were transported through roads while the rest was transported via railroad; in 2009, 81% through road and 19% through rail. In 2009, transited goods amounted to 6.42 million tons which shows 18.9% increase as compared to a year before. In 2009, some 24 border crossings except Kileh in Sardasht (West Azerbaijan) and Yazdan in Southern Khorasan were active nationwide. Bandar Abbas, contributing 40.8% of transit operations, was considered the most dynamic in terms of transit cargo. It was followed by Bazargan (16.6 percent), Sarakhs (14.1 percent), Bandar Anzali

(9.2 percent) and Pileh-Savar (3.9 percent). Over 5 million passengers have also been transported via border points mainly Mehran, and Bazargan. "Every ton of transit cargo earns $150 for the country and creates 40 jobs" (Trade Promotion Organization of Iran, 2010).

4.10 Development and Construction of the Transit and Transport infrastructure

In January 2003 and in connection with strengthening transit and transport ties, Iran, Afghanistan and India, held a meeting in Tehran, in which they signed a memorandum with the intent of improving the route from Chabahar, Iran to the Afghan cities of Zaranj and Delaram. With regards to Pakistan and India, energy of course will remain the key commodity in their economic relationship with Iran. In May 2003, Iran and India reached an agreement based on which Tehran will supply India with five million tons of liquefied gas annually for twenty-five years and with 100,000 oil barrels per day for a trial period of a year (Berlin, 2004: 1). This was followed by the New Delhi Declaration that, "Iran with its abundant energy resources and India with its growing energy needs as a rapidly developing economy are natural partners" (satp.org, 2003). In addition to the foregoing, Tehran and New Delhi are continuing to discuss construction of a natural gas pipeline from Iran via Pakistan (or via the Persian Gulf and Arabian Sea) to India. New Delhi, however, retains its emphasis on ship-borne liquid natural gas (LNG) imports, mainly because from an Indian point of view the land pipeline faces a variety of obstacles. However, if Indo-Pakistan relations improve, it remains to be seen whether such a positive trend would create any interest in this project.

By virtue of its geographical position, Iran has a great potential to play the role as a strategic partner of the Central Asian Republics, as Iran provides their gateway to the Middle and Near East and South Asia. Hence, for developing mutually beneficial politico-economic relations, there are a number of factors of special interest between Iran and the CARs (The World Bank, 2005).

4.11 Streamlining Transit through Iran

Use of its ports for both Afghanistan and the CARs has been promoted by the Iranian government. In this regard the construction of the Bafgh-Mashhad rail link substantially reduces rail distances and has made rail a competitive mode for their traffic to Bandar Abbas. The port

of Chabahar has a permissible draft of 29 foot (roughly nine metres) at present which suffices to meet the calls of ocean-going Handymax vessels and therefore promotes Chabahar as an alternative for Bandar Abbas. Iran is strategically located for linking Central Asia and Afghanistan to the Iranian ports on the Persian Gulf and Sea of Oman coasts.

Because of war risk and lack of security and non-compliance with standard trucking rules required by the TIR Convention, most of incoming transit goods destined to Afghanistan by road, after being carried to the border crossing points such as Dogharoon and Islam Ghalleh, are transhipped truck-to-truck at the Afghan border. Local shippers have to accept such transhipment, but at the end of the day it would be highly detrimental for the development of through-transit as truck-to-truck transshipment, other than simply switching trailers, is almost perverse and uneconomical. Hence both the countries must look into ways to secure direct transit and container shipment, which are crucial for the development of the routes.

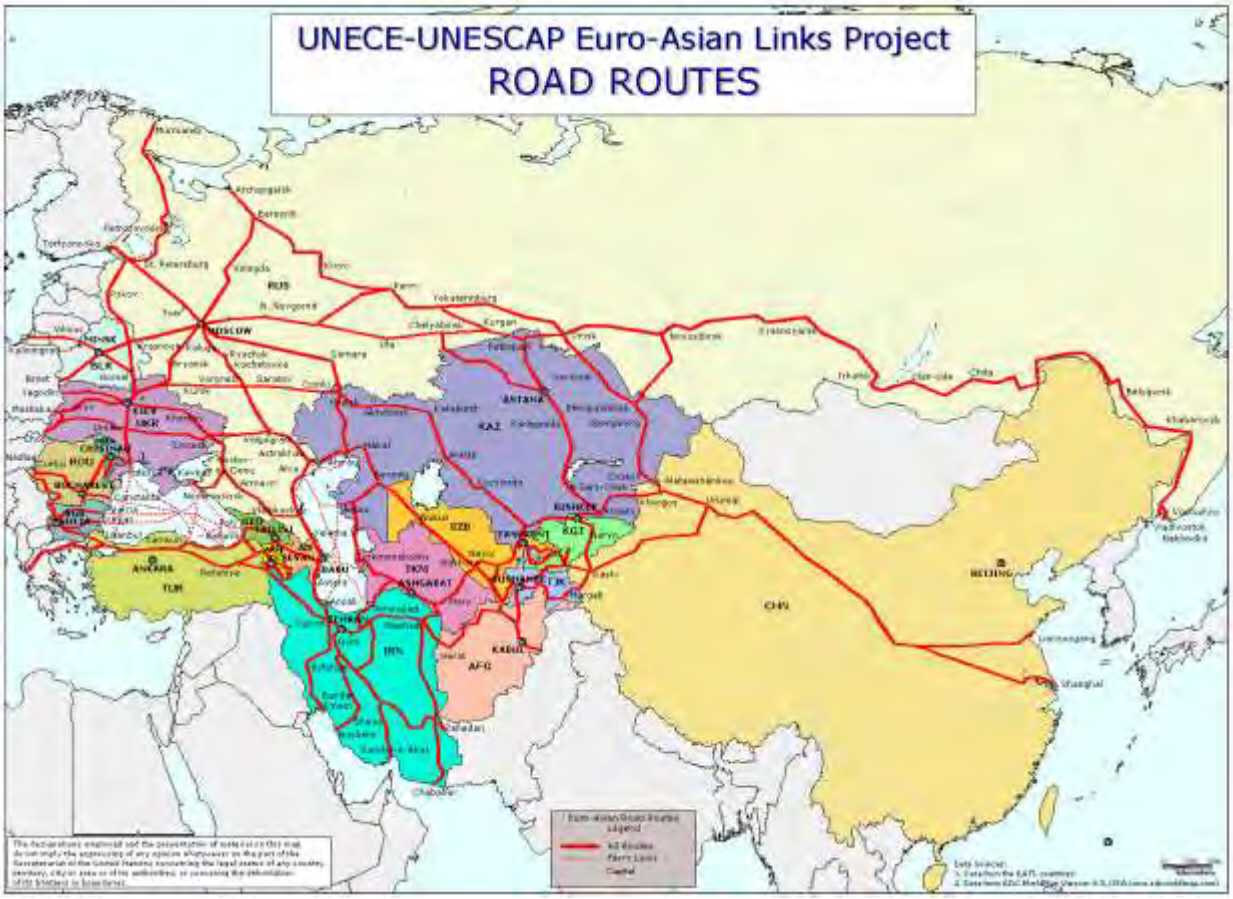
It is worth mentioning that the Iranian government envisages potential transit traffic of some 40 million tons from Central Asia, although the private sector more conservatively estimates a lesser tonnage. The present level of transit according to the Iranian customs is about 12 million tons (Iran Customs Administration - IRICA, 2011). Iran has developed her southern ports especially Bandar Abbas and Chabahar ports and would like to create major transit routes for the region by investing heavily in the transport system to meet designated transit potential.

Although price plays an important role for the choice decision, the choices between routes and modes are not based simply on price; they are influenced by combination of factors including cost, time, reliability and other service quality attributes. Therefore, price may be more important in poorer countries, but choices will undoubtedly be influenced by time, cost, and predictability in service delivery and this must be considered correctly in developing the designated transit routes in Iran in an appropriate way.

A report by UNECE-UNESCAP (2005) also emphasizes the importance and development of North-South road corridors (shown on Figure 4.10), indicating that “it could result in a major

shift in transit-trade routing from Central Asia and thereby exert a very positive impact upon both employment and production in the region."

Figure 4.10: Planned UNECE-UNESCAP Euro-Asian Transport Road Routes



Source: Transport Division UNECE, 2005

4.12 Transit costs

As compared to the other routes, transit through Iran is quite competitive; rail, which carries the CAR's non-oil external traffic, would be one of the most important links in this transit chain and Iran remains competitive for other neighbours such as Afghanistan and even the Caucasus, Turkey and Iraq to a certain extent. Its competitiveness will depend on costs throughout the chain, including any road trucking and sea-links. The land costs will be substantially influenced by payload and costs per ton-kilometre of freight. The payload in Iran is according to European standard 22-ton limit, although rail and road trucking rates per ton-kilometre, because of the

lower price of oil and gasoil in Iran as compared to the other routes, are still reasonably cheaper (World Bank, 2005: 10). At present the lowest cost for land routing into most of the central Asian countries is regarded to be rail from Bandar Abbas, although the Karachi route might be competitive for Tajikistan and to a lesser extent to Uzbekistan. The routing of container traffic will also depend on shipping rates and trading partners.

As it is the case that most of Central Asian as well as Afghan and even Caucuses countries' trucks do not meet international standards, a regional agreement, based on regional standards which would allow these trucks to participate to road transit, may increase the attraction of the corridor through Iranian territory, in which case, in comparison, usage of road routes through to Iranian ports would be highly encouraged and therefore for transit mostly direct road transport would be used by these countries.

4.13 Transit times

As it is understood from the international transport sphere, transit time of a route within a corridor plays a vital role in determining the choice of decision makers. For instance, the transit time from Bandar Abbas to Kabul is currently between seven to nine days which needs to be substantially reduced to be comparable with the other routes such as Karachi, although transit time on Karachi route is presently 10 days. There is no doubt that rehabilitation of main road networks will increase vehicle speeds but it must be born in mind that streamlining border formalities so as to impose minimal delays, acts as a key to reduction of transit time. For example, by increasing utilization of trucks (increasing kilometres per day through higher speed) and restricting the border crossing formalities to only one day, the transit time to Tashkent and Dushanbe would be reduced to 8-9 days (Tomczyk, 2009).

Although at present regional politics have added a further dimension to transit decisions, and have also impacted on routes through Iran to a certain extent, in fact any transit route or corridor basically depends on its competitiveness in terms of transit cost, time and service standards. It must be stated that Iran's land infrastructure has been largely improved, but obviously for any transit system to operate easily, the minimum documentation, prevention of bureaucratic delays and elimination of unwanted additional costs and uncertainties of numerous checking-posts, fees

and informal payments are needed to allow the rapid transit. If such a system could be developed, then Iranian transit routes and corridors could make the country a significant transit route and the obvious choice of neighbours to access deep sea shipping routes to the south, in the process promoting Iran's ports as main gates of transit in the Middle East for Afghanistan, Central Asia and Caucuses, Iraq and Turkey.

One of the most important features of transit trade is that it becomes a two-way street, and thereby it benefits the neighbouring countries through shorter trade routes as well as possibly opening up new markets across the region. The direct benefits of transit traffic may be limited to the incomes from services rendered to the vehicles as well as transit fees and possibly the transit bonds commissions (while this revenue will be partially offset by the road damage caused by very heavy trucks), but more important gains may be the indirect benefits derived from being the centre of an efficient regional transit network (World Bank, 2004: 36).

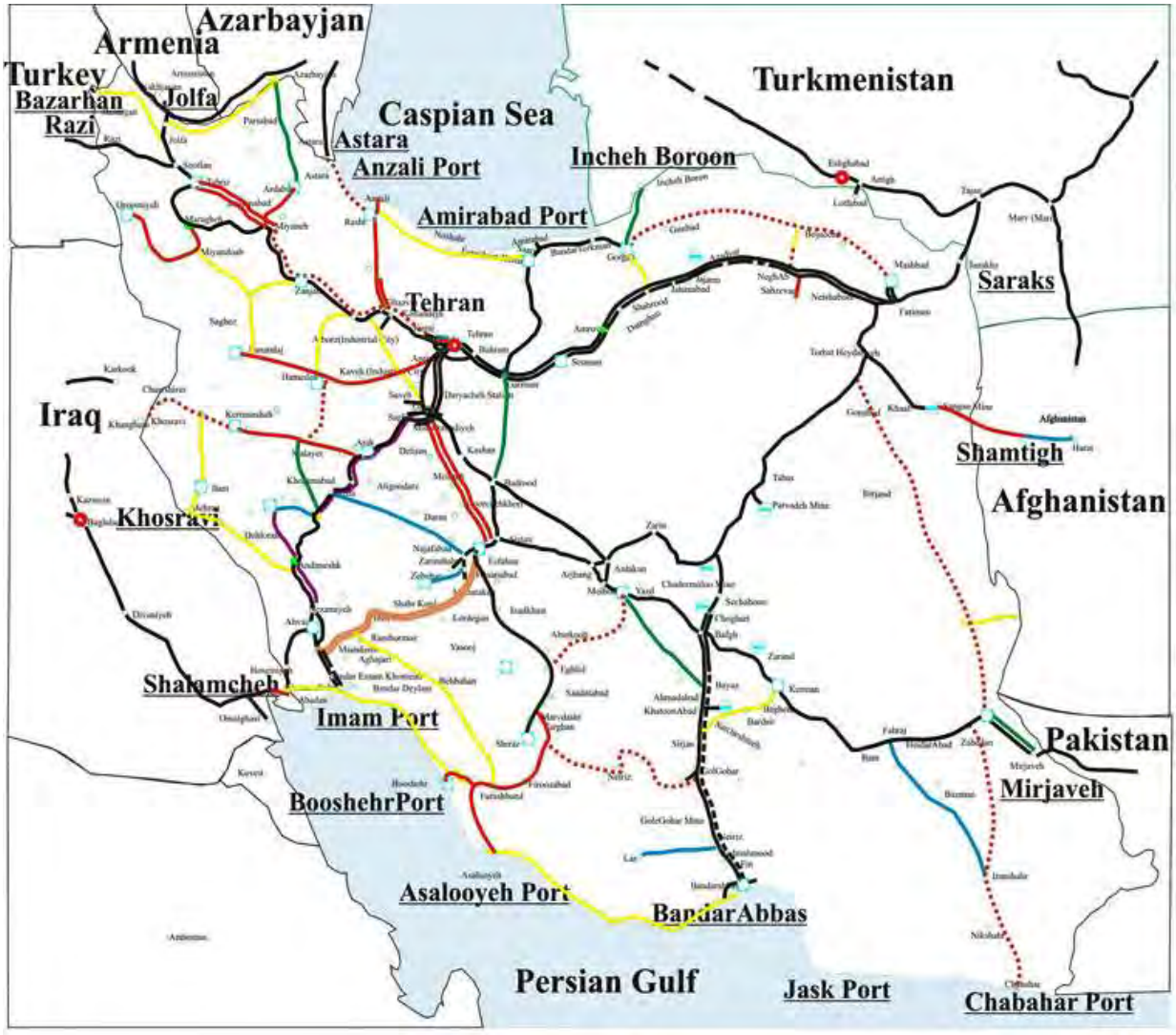
Iran is interested in attracting the neighbouring countries' transit traffic and expanding the use of its ports which, with parallel railway expansion and road corridor improvement, would help to offset the present disadvantages of some of the ports like Chabahar, at least for bulk traffic. For instance, in order to create a proper link between Afghanistan and Central Asian truck transport to Chabahar port, the road hauliers must be permitted to operate outside regulatory norms as at present its regulation so far as regulatory norms and load consolidation is concerned, effectively excludes these trucks (*Ibid.*, p.41). However, Iran would also be interested in the use of the direct rail route to Central Asia through Mashhad and Sarakhs.

4.14 Rationale and objectives in railway expansion and connectivity to the major ports

With the intention of providing rail connections between all major cities and seaports, the Iranian government's decision to double the railway investment budget for 2008-9 provided a boost to the pace of development. The government policy aimed at responding to substantial demand for travel, which the railway is unable to meet. Estimated demand is 90 million journeys a year, whereas the present timetable offers capacity for 25 million journeys which is less than 30% of demand. Therefore, to tackle this problem Raja which is the Passenger affiliated company of RAI (Rah Ahan e Iran) or Iranian Railway Company has the intention of increasing the capacity

by about 15% a year. The other aspect of full swing expansion of railway in Iran is connecting all the major cities and seaports and common border crossing links to the network as soon as possible (shown on Figure 4.11). The ultimate objective is to double the length of the network, which currently stands at 8300 route-km (Brice, 2008). A more detailed overview of eight major regional port-rail networks or corridors will be presented in sub-sections 4.14.1 to 4.14.8 that follow.

Figure 4.11: Iran's Railway Transportation Projects



Source: Transport Division UNESCAP - RAI Projects, 2010

4.14.1 Chabahar Port to Kerman-Zahedan railway

The eastern regions of Iran as shown on the Figures 4.11 & 4.12, gain their importance in the transport arena mainly because of bordering with Afghanistan and Pakistan in the east and in the north with Turkmenistan. As such, and with the access to the Oman Sea and the Indian Ocean, the Port of Chabahar provides a unique and safe sea-cum-land corridor for the international cargo exchange of the country itself as well as for the Indian Subcontinent and South Asian countries in respect of their trade with Afghanistan and the landlocked countries of Central Asia. In addition, this region benefits by being traversed by important international transportation corridors, amongst them the Asian Highway Network and the Trans Asian Railway. With regards to this significance, the Iranian government has ratified the establishment of an east transit corridor of the country. This corridor starts from the seaport city of Chabahar and covers Mirjaveh, the Iranian border city with Pakistan, then Dogharoon, the Iranian border city with Afghanistan and thereafter Sarakhs, Lotf Abad and Bajgiran, the Iranian border cities with Turkmenistan. In this regards the Chabahar-Fahraj railway is considered as an important connecting part within the Iranian east transit corridor (Tavoosi et al, 2004).

The project's main objectives:

- Connection between the port of Chabahar with the trans-Iranian railway, with resultant acceleration of economic, social and political development in the Sistan and Balouchestan province of Iran with overlap to the neighbouring countries.
- Establishment of a new transit route within the context of a north-south international corridor which is a rail-based transit, serving the same corridor starting from the Port of Chabahar, covering Sarakhs, the common border crossing point with Turkmenistan, and the two common border crossing points of Jolfa and Astara with the Republic of Azerbaijan, after passing through the northern Iranian Ports of Amirabad and Anzali on the Caspian Sea coast. This route also encompasses Razi station, the common border with Turkey, as well as Khosravi which is the common border with Iraq.
- Apart from the domestic aim of developing the eastern areas of Iran itself, at a regional level implementation of this project will result in reducing rail haul of commercial products to and from Central Asian countries by about 700 kilometres and to/from Afghanistan by 400 kilometres.

- Developing Chabahar port by construction of required transportation infrastructure in order to facilitate a capacity increment of the port from the present nominal capacity of 2.5 million tons to 6 million tons upon completion of this planned development project.
- Based on feasibility studies, the predicted traffic rate on this railway line in 2015 as the first year of operations is expected to be about 1.4 million tons of freight transportation of cargoes and 300,000 passengers. These amounts are expected to rise within five years to about 4 million tons of freight and 500,000 passengers. In the long run, in light of further cooperation within the North-South Corridor and in the context of the ECO regional transportation agreement, the freight ton carriage on this rail line is expected to rise significantly (CDTIC Iran, 2008:75).

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:

Domestic vision: Exchange of freight and passenger transportation between the port city of Chabahar and its free trade zone with rest of the country is regarded as the internal scope of this project.

Regional consideration: Promoting usage of Chabahar port and its free trade zone for exchange of cargo to and from the neighbouring countries like Afghanistan, Pakistan, Central Asian countries, Azerbaijan, Turkey and Iraq as suitable destinations for this purpose.

International observation: Expansion of transit of cargoes between the Indian subcontinent, and Far East and also African countries through the Chabahar port interface to and from Central Asian countries, Afghanistan, Russia, Caucuses, Turkey and Central European countries, while promoting the north-south transit corridor route linkage of this seaport.

Effects and benefits of the Chabahar rail line

Adequate and appropriate allocation of incoming and outgoing cargo among southern ports will prevent underutilization of port capacity and will reduce unwanted waiting time by vessels at anchor in roadsteads, resulting in reduced vessel delays and port congestion. This may be associated with:

- Productivity improvement and improved distribution of goods in transit in the region among different routes and seaports, which could be obtained through realization of the increased potential of Chabahar port and its free trade zone by this railway construction.
- Streamlining accessibility to the free trade zone and Chabahar seaport as well as Sistan & Balouchestan province for the rest of Iran's provinces.
- Developing tourism and consequently bringing about socio-economic improvement of the port city of Chabahar and Sistan & Balouchestan province.
- Saving consumption of fuel, decreasing environmental pollution and increasing safety in the transportation arena of the country.

Apart from the Chabahar-Fahraj rail line connection, the other related part of the eastern transit corridor of Iran is **the Zahedan-Birjand-Mashhad Railway**. Starting at Doomak station located on the Kerman-Zahedan rail line, this axis passes through the city of Ne-bandan and then continues towards Birjand, the centre of southern Khorasan province, to reach the cities of Ghaen and Gonabad before finally joining the Bafgh-Mashhad railway (UNECE, 2010:16) (see Figures 4.11 & 4.12). Objectives behind construction of this axis would be:

- Creation of a connection between centres of the Southern Khorasan province to the rest of Iranian railway network.
- Creation of a missing link in the eastern rail transit corridor of Iran in such a way to decrease rail distances from eastern neighbouring countries as well as Central Asian countries to the open seas through the Makran coast of Iran and the Indian Ocean.

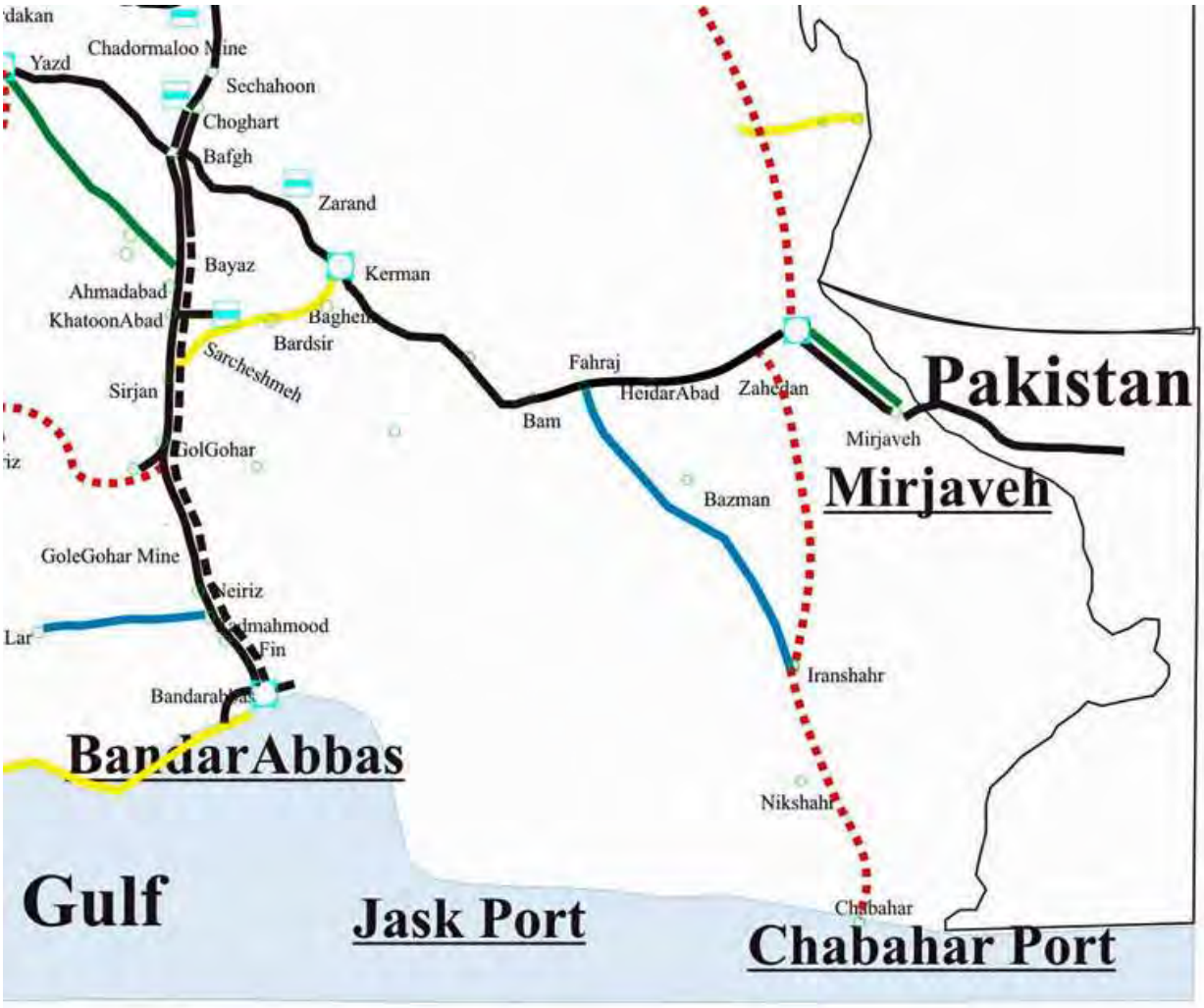
Predictions based on feasibility studies on this railway line by CDTIC Iran indicate that by 2015, which is regarded to be the first year of operations for this line, the amount of expected traffic of freight transportation could reach three million tons plus 1,000,000 passengers. Over a 20 year horizon, these annual levels could increase to five million tons of freight and 2,500,000 million passengers. In addition, a study by a relevant governmental organization (Deputy for Education, Research and Technology, Ministry of Roads and Transport, 2008) indicate that the Mashhad-Birjand sector will be of strategic benefit to the implementation of the Chabahar-Fahraj railway project as the justification for the later would be enhanced by the completion of the Zahedan-Birjand section.

Effects and benefits of the Zahedan-Birjand-Mashhad Railway would include:

- Decreasing lengths of haul of cargo passing between Central Asian countries through the Sarakhs-Mirjaveh route with Pakistan and the Sarakhs-Chabahar port route by about 650 and 340 kilometres, respectively.
- Promoting the commercial and touristic development of the region by improving inland transportation in the eastern border provinces of Iran.
- Saving consumption of fuel, decreasing environmental pollution and increasing safety in the transportation arena of the country.
- Providing grounds for easier access of other eastern provinces of Iran to the Chabahar free trade zone and the Chabahar seaport (CDTIC Iran, *op. cit*., p.78).

With the opening of the Kerman-Bam-Zahedan railway shown on the Figure 4.12 on 19/03/1388 Persian calendar date (equal to 9 June 2009), Southeast Asia was connected to Europe via Iran (Islamic Republic of Iran Railway - RAI, 2009).

Figure 4.12: South-eastern & central railway routes and missing links



Source: iranpoliticsclub.net - RAI, - South-eastern & central Projects, 2010

4.14.2 Shiraz-Bushehr-Assaluyeh railway

This axis which is shown in Figure 4.11 is projected to connect Shiraz, the centre of the Fars province, to the port city of Bushehr (the centre of Bushehr province) and en route to include the newly established Pars Special Economic Zone, which is located on the Persian Gulf coastline and which is one of the biggest petrochemical areas of the country. Before reaching Bushehr, this rail axis passes through the cities of Firousabad, Farashband and Ahrom. It is at Ahrom city that it then branches towards the South Pars Special Economic Zone and heads towards the coast of the Persian Gulf with a link of 205 kilometres that ends at the Assaluyeh port city (UNECE, *op. cit*., p.11).

The main objectives of this line are regarded to be:

- To create a connection between Bushehr port, the South Pars Special Zone of Assaluyeh port and the provinces of Bushehr and Fars to the Trans-Iranian rail network.
- Boosting the Iranian rail hinterland and its effectiveness on the expansion of port operations at the ports of Bushehr and Assaluyeh at the Persian Gulf shoreline.
- Connecting Bushehr province, Bushehr Port and the South Pars Zone to the national rail network.
- Adding another outlet to the North-South Transit Corridor through a new and suitable railway ending at the ports of Bushehr and Assaluyeh.

Traffic rate on this line, as per feasibility studies of the relevant governmental organization, is expected to increase to three million tons of freight and 800,000 passengers at the first year of its operation (2015). Longer-terms predictions are that its traffic may rise to seven million tons of cargo freight and two million passengers in 20 years (CDTIC Iran, *op. cit*., p.83).

So far as the scope of work on this axis line is concerned, domestically it promotes movement of exports, imports and passengers from the sea ports of Bushehr and Assaluyeh to and from other provinces of the country. Regionally, it provides a better foundation and provides more choice for the transit of cargo through Bushehr and Assaluyeh to and from coastal states of the Persian Gulf with Turkey, Central Asian countries, Caucuses and Russia and other international interests.

The effects and benefits of the Shiraz-Bushehr-Assaluyeh railway may be expected to include:

- Providing a basis for the economic, social and commercial development of Bushehr province and its seaports of Bushehr and Assaluyeh.
- Boosting safety of transportation and providing a more suitable means of transportation for the provinces of Bushehr and Fars and the country as a whole.
- Saving consumption of fuel, decreasing environmental pollution and increasing safety in the transportation arena of the provincial areas and the region.
- Promotion of tourism by availing safe and fast means of transportation in the provinces of Bushehr and Fars.
- Expediting the transportation demand of the South Pars Zone by fulfilling its need for easy access to primary materials supply from within the country and regional states.

4.14.3 Gorgan-Bojnourd-Mashhad rail line

With a total length of 640 km and covering the three provinces of Khorasan Razavi, Northern Khorasan and Golestan, which are all located in the northern Green Nature and agricultural areas of the country, and are bordering with Turkmenistan, this line will provide an easy access for all of these provinces to the eastern coast of the Caspian Sea (shown on Figures 4.11 & 4.13). Starting from the city of Gorgan (the centre of Golestan province), where the railhead of the Iranian railway network in the north is located, the rail line passes through Gonbad city to reach Bojnourd (the centre of Northern Khorasan province) before heading towards Ghoochan and Chenaran cities and ending at Mashhad Railway station. Following the main eastern Caspian transit axis, the line connects to Sarakhs Station at the common border crossing point with Turkmenistan on the Sarakhs-Mashhad transit axis line (UNECE*, op. cit.*, p.19). The rationale for and objectives of this line are:

- Providing a rail link to connect the province of North Khorasan to the railway network of the country.
- Construction of a direct rail route for connecting the Northern provinces to the holy Shrine of Imam Reza (PBUH) in Mashhad centre of Khorasan Razavi.
- Covering transit carriage of goods for Russia and the Caucuses to and from transit routes to the east of the Caspian Sea and then to international waters through south Iranian ports.

On the basis of feasibility studies by Ministry of Road and Transport, CDTIC (2008) traffic on "this route is predicted to be around 1.6 million tons of freight and 1.6 million passengers at the first year of operation (2014), increasing to 2.5 million tons freight and 2.3 million passengers during 20 years of operation. It should be mentioned that with construction of a transit axis to the east of the Caspian Sea, some percentage of transit cargoes of Russia will migrate to this axis." The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:

Domestic vision: facilitating transfer of cargo and passengers between north and northeastern provinces of the country covering Golestan, Gilan and Mazandaran provinces in the north and North Khorasan and Khorasan Razavi provinces in the north-east of Iran.

Regional and international considerations: providing a basis for exchanges of goods between regional states such as Russia and the Caucuses to and with Afghanistan, including Pakistan and southern international waters through extensions of this route (Railway Gazette, 2011).

Figure 4.13: North-eastern & eastern Iranian rail networks and missing sectors

Source: iranpoliticsclub.net – RAI, North-eastern & eastern Projects, 2010

Effects and benefits of the Gorgan-Bojnourd-Mashhad rail line include:

- Providing safe and comfortable travel for pilgrims in the Northern provinces to the Holy Mashhad.
- Achieving broad and suitable socio-economic and commercial aims by developing the transport infrastructure of North Khorasan province.
- Promoting inland tourism such as pilgrimage tourism and eco-tourism in the country's North-eastern provinces.
- Complementing the transportation requirements of the industrial areas of Northern Khorasan and Khorasan Razavi provinces.
- Boosting the cargo transit capacity further expansion of transit to and from landlocked Afghanistan and other Central Asian neighbouring states (see Figure 4.14).

Figure 4.14: North-South Transnational Railway Corridor

Source: Satrapia the Gazette of Central Asia, 28 April 2012

4.14.4 Sangan-Herat railway line

The province of Khorasan Razavi of Iran bears a part of this railway axis line that in total has a length of 190 km, out of which about 70 km is situated in Iranian territory, with the remaining

114 km is in Afghanistan (see Figures 4.11 & 4.13). This rail line creates a connection through Afghanistan's Herat province with the Iranian railway network.

That section of line which is heading towards Afghanistan starts from Khaf station located on Torbat Hydarieh-Sangan mine rail axis of Iran. After running for 77 km in Iranian territory, the line reaches the Goorian railhead and the Zandehjan border crossing point in Afghanistan, from where it proceeds toward the city of Herat (the centre of Herat province), which has agricultural and economic significance for Afghanistan (UNECE, *op. cit*., p.11).

The Iranian government has so far financed and also provided credit assistance to the Afghan government on implementation of this part of the project and as a result to the present, 140 km of this line, from Iranian Khaf to Afghanistan's Jono station, has gone under construction and continuation of the rest is supposed to be undertaken by the Afghan government (Grantham, 2012).

The objectives behind construction of this rail axis are:

- Creation of a railway connection for Afghanistan to access the Iranian railway network and through it to the Trans Asian Railway corridors.
- Procurement of a safe and secure passage through Iranian rail network for Afghanistan.
- Providing a rail connection for a landlocked Afghanistan to and from southern international waters and with Caucuses, Russia, Eastern and Central Europe through Iran.
- Consolidation and improvement of regional security of transport in the context of international relationships with the neighbouring countries.

Based on the feasibility studies of the Ministry of Road and Transportation it was indicated that provided construction of the entire route be completed and the line becomes operational, an estimated cargo traffic of two million tons and 173,000 passengers in its first year of inauguration would be securable (CDTIC Iran, *op. cit*., p.87).

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:

Domestic vision: safe transfer of passengers and more secure commercial exchanges of commodities between the north and north-eastern provinces of Iran with Afghanistan.
International observation and regional consideration: boosting exchange of freight as well as passengers between the neighbouring countries of Iran, such as Russia, Caucuses, Eastern and Central Europe also for the Persian Gulf states and other international players rail access is provided to and from Afghanistan.

The effects and benefits of the Sangan-Herat railway line could be seen as:

- Boosting Iran and Afghanistan's commercial exchanges.
- Providing a safer means of transport for greater transfer of passengers between the two countries of Iran and Afghanistan.
- Procurement of a suitable means of transport for accessing the relevant border regions of the two countries thereby resulting in enhanced economic, social and political developments in these regions.
- Providing a direct railway link for Afghanistan to access the international railway transportation corridors.
- Cost effects on the trade and transit of cargo to and from Afghanistan by providing a more cost effective and safer means of transport.

4.14.5 Ghazvin-Rasht-Anzali-Astara railway line

One of the most important rail axes under construction in Iran is this line which is a part of the Trans Asian Railway's main route on the North-South corridor and connects the Iranian railway network to that of Azerbaijan through the border at Astara (shown on Figures 4.11 & 4.15). Its Rasht-Anzali port deviation provides a potential sea connection for Iran to the Caspian basin ports of Russia and Azerbaijani and even regional Caucasian ports.

This rail axis could briefly be outlined as follows: its length is 205 km starting from Ghazvin, the centre of Albourz province (UNECE, *op. Cit*., p.9). It branches off 15 km south-west of Ghazvin towards Siah Cheshmeh station and after passing through the defile of Kouhin and the cities of Loshan, Manjil, Roodbar and Emamzadeh Hashem, it reaches Rasht, the centre of Guilan province, and ultimately ends at the port of Anzali. The other part of this axis is about 165 km

and separates from Rasht station to pass through the cultivated plains of Guilan, areas bounded by the Caspian Sea and the Albourz mountains, to continue through the cities of Rezvanshahr and Hastpar, to reach finally the Iranian port of Astara on the border. A connection is then provided over the border to the Azerbaijani port of Astara.

Gauge difference between Iran and Azerbaijan rail lines is a problem for quick exchange of cargo at the Astara border crossing point. Hence, according to an agreement concluded between the two countries, with participation of Russia on 4th May 2005, it was decided that a standard gauge rail line be constructed from the wharf of the Iranian port of Astara to an exchange station in Azerbaijan. At the same time and in parallel, a broad gauge rail line would be constructed from the Azerbaijani exchange station to run back to the wharf of the Iranian port of Astara. For this reason construction of a 6 km standard gauge rail in the Republic of Azerbaijan and three km broad gauge rail in Iranian territory by each party would be required. In addition for the rail lines to cross the border river of Astara Chai a bridge of 80 metres length should be constructed as well as bogey exchange facilities on both sides (Railway Gazette, 205).

The principal objectives behind construction of this line are:

- Establishing a link between Guilan province and its ports of Anzali and Astara with the Iranian railway network.
- Developing tourism and increasing safety and security in the transport sector of Guilan province.
- Creation of a railway crossing from the Astara border within the context of an international north-south transit corridor.

Feasibility studies of relevant governmental and international organizations reveal that freight and passenger transportation on the Ghazvin-Rasht-Anzali axis in the first year of operation will amount to 2.7 million tons of freight and 1 million passengers. Predictions on the Rasht-Astara rail axis show freight and passenger transportation in the first year of operations of this line (2013) can amount to two million tons of freight and 157,000 passengers (CDTIC Iran, *op. cit*., p.102).

Figure 4.15: North-western & western Iranian railway routes and missing links

Source: iranpoliticsclup.net – RAI, North eastern & eastern projects, 2010

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:

Domestic vision: to facilitate rail exchanges from other Iranian provinces with Guilan province and its affiliated ports of Anzali and Astara.

Regional consideration: providing a basis for the Republic of Azerbaijan to develop trade with the neighbouring countries in the west and east of Iran by developing commercial railway exchanges via this line.

International observation: facilitating transit traffic flows amongst countries which are situated on the northern part of the north-south corridor of the Trans-Asian Railway (such as Azerbaijan and Russia and the Caucuses region) with Iran and the other countries located in the southern part of this corridor (UNESCAP, 2009: 103).

This axis line's advantages are regarded to be:

- Providing direct rail access to the Persian Gulf via the Iranian railway network for Europe, Russia and Caucasian region.
- Increasing the level of rail exchange in the region by facilitating import and export activities through a developed north-south corridor, which reduces the travel time and cost significantly.
- Increasing social facilities of Guilan province by establishing a reliable transportation network in it.
- Providing a higher level of safety on the Tehran-Guilan transport route as a result of construction of this rail axis.
- Reduction of fuel consumption on the Tehran-Guilan transport axis.

4.14.6 Mianeh-Bostan Abad-Tabriz double track rail line

Construction of this line in the East Azerbaijan province in the north-west of Iran will shorten the distance from Mianeh to Tabriz (the centre of the province) by 92 km as the existing single track line covers a distance of 297 km between the two cities. This line which crosses the Sarakhs-Razi as well as the Mirjaveh-Razi rail lines creates important connections in the Iranian national railway network in addition to its significance in serving as a part of the northern corridor of the Trans Asian Railway in Iran. This new 205 km axis line passes through the towns of Torkmenchai, Bostan Abad and Basmmaj and their mountainous areas, before joining the existing line in Tabriz (shown on Figures 4.11 & 4.15) (UNECE, *op. cit.*, p.10).

To explain the rationale and objectives of this line it should be stated that the present Mianeh-Tabriz railway line is well situated on a transit route to and from Turkey and consequently also covers transit routes to/from countries of Central and Eastern Europe. At the same time it serves one of the most densely populated regions of the country, where there is high passenger

traffic and increased transport demand. However, due to shortcomings such as excessive length and low geometric specification, this rail route remains underutilized in comparison to the shorter road route. The new crosscut double track axis of Miabeh-Tabriz, which is under construction, reduces passenger and cargo travel time by up to four or five hours. Besides, based on feasibility studies the estimated traffic of this line in the first year of operation would amount to 2.3 million tons of freight and 2.2 million passengers and it is predicted to carry 7.2 million tons of cargo and 8 million passengers within 20 years of operation (2030) (CDTIC Iran, *op. cit*., p.91).

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as;

Domestic vision: it provides a foundation for greater and more rapid freight and passenger movement between Iranian provinces within the country, especially with East Azerbaijan province, and also through this province and its border regions with Turkey.

Regional consideration: increasing Turkey's exchange of freight with and from other direct neighbours of Iran, also by providing access through international waters to countries/areas like Oman, the Indian subcontinent and the southern states in the Persian Gulf region.

International observation: facilitation of multilateral transit exchange between countries which span the southern branch of the Trans Asian Railway (TAR) Corridor with Turkey, Eastern and Central Europe (UNESCAP, *op. cit*., p.92).

Expected effects and benefits of this line are:

- Reduction of the passenger trains travel time up to four hours for journeys between Tabriz and Turkey and vice versa.
- Reduction of freight transit time of up to five hours for journeys to the autonomous Republic of Nakhjavan as well as Turkey.
- Increased capacity of the Tehran-Razi line, thereby enhancing the attraction of the southern branch of Trans Asian Railway.
- Increasing safety of passenger through-transport in the region.
- Decreasing environmental pollution through fuel consumption saving resulting from distance shortening.

- Acceleration of economic, social and touristic activities in the border region of the East-Azerbaijan province of Iran with Turkey.

Also, it is expected that through interaction with Turkey and solving the issue of the Van Lake bypass, this line's performance will improve further.

4.14.7 Arak-Kermanshah-Khosravi rail line the border connection of Iran and Iraq

This rail axis as shown in Figures 4.11 and 4.15 covers the Iranian provinces of Central, Hamadan and Kermanshah and aims to connect Iran's rail network, through the Iranian mid-west border city of Khosravi to the railway system of Iraq with a total length of 641 km (566 km without the Hamadan branch) (UNECE, *op. cit*., p.10).

Arak, the centre of the Central province of Iran, is the starting point of this rail route. From Arak the line extends to the towns of Samangan, Shazand, Malayer, Jokar, Sahneh and Kermanshah and continues to Ghasre-e-Shirin and finally reaches the Khosravi border crossing. To create a connection to Hamadan province this line branches at the Malayer Junction towards Hamadan for 85 km, opening a possible future connection to Sannadaj, the centre of Kurdistan province. In Iraq this route passes through the cities of Khanegein, Mosul and then Ghameshli to reach Dei Alzour, Rogheh and Aleppo before ending at the Mediterranean Sea port of Lattakia in Syria (CDTIC Iran, *op. cit*., p.97).

The objectives behind construction of this line may be seen as:

- Integration of the western provinces of Iran into the country's rail network.
- Creation of a rail linkage to connect Iran to Iraq at a point which is close to Islamic pilgrimage centres in the latter.
- Providing a basis for the possible connection of the Iranian railway network to that of Syria via Iraq and especially to connect to the Mediterranean port of Lattakia.
- Preparing the groundwork to connect the Iraqi rail network to that of the Asian Railway Corridors.

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:

Domestically: A more substantial exchange of freight and passengers between Iranian provinces with the largest bordering neighbours to the west of Iran will be created.
Regional consideration: The grounds will be laid for fully-fledged rail exchanges between Iraq and Iran and via Iran with other regional neighbouring countries.
International observations: A connection with Iraq and ultimately with the Mediterranean through the seaport of Lattakia in Syria for countries spanning the TAR may be established (UNESCAP, *op. cit*., p.98).

Effects and benefits of this line could be:

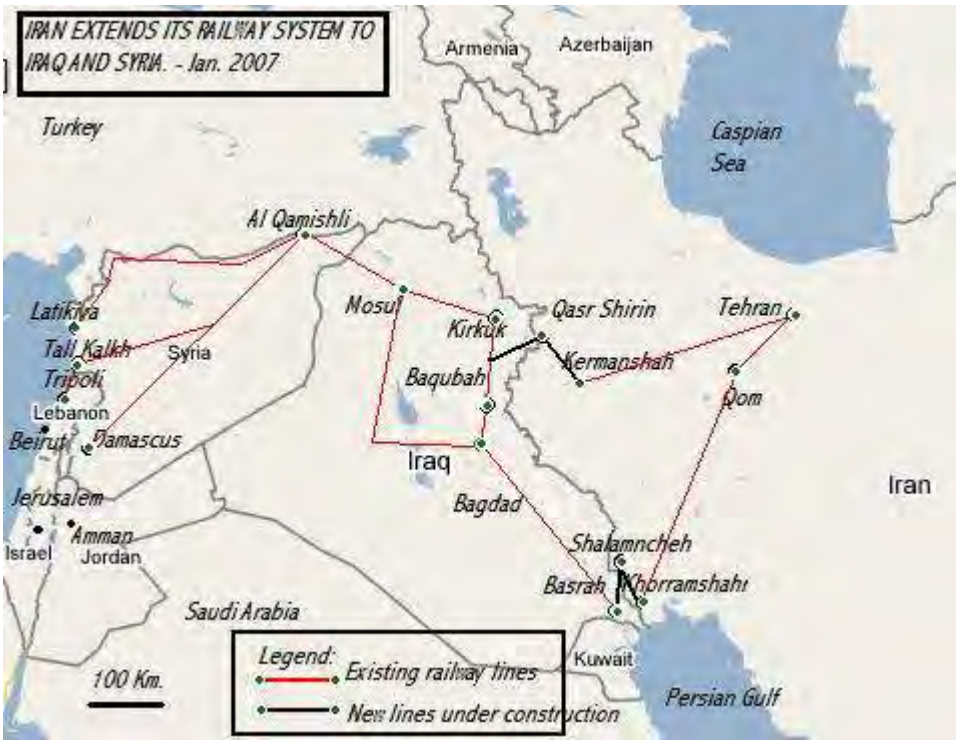
- Through improvement of transportation in the western regions of Iran, greater commercial and socio-economic development in these regions will be created:
- In response to the increased demand for rail exchanges of freight and passenger in the region a safer mode of transport will be brought into being.
- Promoting Iran and Iraq passenger services for the pilgrims of both the countries.
- Increasing import and export facilitation between Iran and Iraq.
- Promotion of safety and cost efficiency in using railway networks for transit traffic to and from Iraq and Syria via Iran.
- Developing international relationships by promoting security in the circle of socioeconomic, trade and transactions between Iran, Iraq and Syria.

4.14.8 Khorramshahr-Basra railway line

This rail line axis (shown on Figure 4.16), which connects the rail networks of Iran and Iraq through the border crossing of Shalamcheh, is located in the Khuzestan province at the extreme south-west of Iran.

This line, which branches off at Khorramshahr, has a length of 51 km. Starting from Khorramshahr and after a 16 km section in Iran, the line crosses the Iraqi border at Shalamcheh, it continues for a further 35 km inside the territory of Iraq and after passing over the Arvand river waterway on a 750-metre length bridge, it reaches the Iraqi port city of Basra (UNECE, *op. cit*., p.10). The 16 km Iranian section is already completed and the line will become operational when the remaining sections of tracks in Iraq are constructed (CDTIC Iran, *op. cit*., p.88).

Figure 4.16: South-western & western Iranian railway routes and missing links



Source: IR Railways, January 2007

Objectives of the line could be summarized as below:

- Improving safe and quick transportation between Iran and Iraq.
- Providing a basis for border development of both the countries.
- Increasing regional security and stabilizing international relationships through improving rail transport connectivity.
- Facilitating Iraq's rail network connectivity to the Trans Asian Railway through Iran.
- Connecting the Mediterranean port city of Lattakia of Syria to the Trans Asian Railway.
- Boosting freight transit to and from Iraq by offering the usage of Imam Khomeini port capacity.

Based on an agreement concluded between the two countries in a meeting of Iraq's minister of transport and the RAI President on July 16, 2005, both parties stressed on the earlier start of khorramshahr-Basreh railway and according to a short term plan, the Iran has started construction of the Khorramshahr-Shalamcheh-Basra as the first priority; the Kermanshah-

Khosravi-Khaneghein sector, which is under construction, forms part of longer term plans (Grantham, 2005).

The amount of traffic on this line in the first year of operations (2013) is expected to reach three million tons of freight and 800,000 passenger transportation and during 20 years of operations to increase to approximately seven million tons of freight and two million passengers (CDTIC Iran, *op. cit*., p.89).

The market outreach and prospects of this line, in domestic, regional and international terms, could be described as:
Domestic vision: Facilitating transfer of passenger and commercial exchanges between Iranian southern region provinces with Iraq.
Regional and international considerations: providing grounds for transit exchanges between the Indian subcontinent, south-east Asia and the Pacific with Iraq and Syria via Iranian territory (UNESCAP, *op. cit*., p.90).

Effects and benefits of this rail axis could be summarized as below:

- Facilitating movement of passengers, especially pilgrims, between the southern regions of the two countries of Iran and Iraq.
- Providing a railway access for about 1 million Iranian pilgrims who annually visit the Shalamcheh region which is place of Martyrdom for Iranian soldiers.
- Creation of job opportunities through an improved transportation system for the Khorramshahr and Abadan regions, which were much affected by the war of 1980-88.
- Improving commercial import export exchanges, especially between southern regions of both the countries of Iran and Iraq as a result of decreasing the cost and increasing safety of transportation.
- Possible access to Imam Khomeini port by Iraq for export and import of their cargoes, which are otherwise greatly constrained by draft and other limitations in the Iraqi ports.
- Providing grounds for further development of rail connectivity with other regional countries such as Kuwait and the Arabian Peninsula and other states located on the southern coast of Persian Gulf.

- Increasing regional security by developing international relationships through transport.
- Reduction in the impacts of transportation on the environment as a result of a potential migration of road traffic to rail.

4.15 Concluding remarks:

Iran as a trading state at the crossroads of the Middle East has historically been eager to strengthen its global and regional links with its neighbours and with the international community. Consequently, it has developed an integrated and functionally operational rail, road and port network to support its connection with Europe, Asia and the rest of world. The prospects for connecting Iran with the Caucuses, Eurasian, Central and South Asian countries are promising. In the transportation sector, the government of the Islamic Republic of Iran has undertaken several projects, which include facilities such as arterial roads, railroads, seaports and airports.

In this regard, and in order to develop the national network of roads and to improve the connections with the neighbouring countries, a significant acquisition of non-financial national assets amounting to $3.5 billion has been approved for the road projects of transport sector in 2010-11 alone (Central Bank of Iran Annual Review, 2011: 14). As a result, by end of 2013, completion of 745 kilometres of freeways, 5,626 kilometres of highways plus 2,970 kilometres of main roads, which are planned by the Ministry of Roads & Urban Development, are likely to materialise (ECO Trade and Development Bank, 2014: 21). At the same time establishment of a quick and affordable network between north and south, based on a land transport transit-oriented plan in the east of the country, has been developed. In addition, the largest road building projects in the country, which include the North Free Way connecting the capital Tehran to the Caspian region, as well as the Qom to Mashhad road, are also under construction. Also worthy of mention is that numbers of road passengers, goods carried and also transited cargoes on the Iranian road network stood at 896 million persons, 541 million tons of goods and 8.2 million tons of transit cargo, respectively, in 2010-11. This represents a decrease of 0.2% in passenger numbers, but increases of 4.9% and 41.9% in inland road transport and regional cargo transit in comparison with the previous year respectively (Ministry of Roads & Urban Development - TTO, Annual Report 2011).

On the other hand, total track length of the Iranian main railroad network reached 9,795 kilometres in March 2011 with an annual increase of 313 kilometres in length (RAI, 2011: 72). The country's major priority plan is to expand the railway system; upon completion of the plan, almost 4,683 kilometers of new standard gauge rail line will be added to the system and the overall expansion plan will also strengthen connections to border crossing points and seaports (CDTIC, 2011). Some of the projects which have been discussed in this chapter like Chabahar-Zahedan-Mashhad, Qazvin-Rasht-Anzali-Astara, Kermanshah-Khosravi and Khorramshahr-Shalamcheh-Basra will connect Iran to its neighbouring countries. Expected benefits upon completion of these projects will be $350 million in the form of increased annual transit revenues and creation of 7300 jobs as per estimations of relevant governmental organizations (thebusinessyear.com, 2013). These are key elements of the railway network's 20-year development vision that aims to create connecting links between the country's major seaports with mining, manufacturing, industrial, agricultural and provincial centres, and also to connect major metropolitan cities to tourism centres through building express passenger railroads. The statistics declared by the railway network of Iran (RAI) show that the amount of goods carried, including domestic and transit freight, in 2010-11 has been 33.5 million tons, showing a two per cent increase compared to the year before and the number of passengers carried 28.8 million persons showed a four per cent increase (RAI, 2011 pp.20-29).

Insofar as the sea transport sector is concerned, with an increase by 8.7% over the previous year, the nominal capacity of the commercial ports reached to 163 million tons of cargoes through pure non-oil terminals in March 2011. The national merchant fleet of Iran was 5.7 million deadweight tons in 2010-11 which reflected fleet growth of 5.6 per cent over the previous year. Improvement of services offered in the container terminals, as one of the key strands of the strategy of developing the country's logistical advantages, resulted in better performance and an improvement in unloading and loading time of the ships at Iranian ports. The port's container capacity in 2010-11 rose to five million TEUs which showed 13.6 percent increase over the previous year (UNCTAD, 2012: 81). On the other hand container operations in ports (throughput) which had risen to 2.7 million TEUs in 2009-10 further rose to 3.0 million TEUs showing both throughput growth of 10.8 percent and an increase in port capacity utilization to 59.9 percent (Port & Maritime Magazine, 2011).

There have also been some achievements in the aviation sector in the fields of passenger yield and renovation investment on purchase of aircraft. Passengers departing and arriving at airports in 2010-11 reached 40.1 million persons showing a 10.5 percent increase compared to a year before (Civil Aviation Organisation of Iran, CAO 2013). Cargo carried by air domestically reached 47.2 thousand tons showing a 24.2% increase, and international air freight reached 96 thousand tons, a 15.7% increase over the year before. In this sector the Imam Khomeini International airport of Tehran plays an important role in the transit of cargo and as per estimation of Eco Trade Development Bank needs further investment of about $2.5 billion to provide additional transit terminals (ECO Trade and Development Bank, *op. cit*., p.22).

Finally, it should be emphasised that the motivation behind all of these developments and projects is to boost utilization of key Iranian ports by interventions and actions that will facilitate transhipment and increase road and rail transit traffic of both freight and passengers on corridors of the country such as the North-South and East-West corridors.

CHAPTER FIVE

THE IRANIAN SHORELINE AND MAJOR PORTS

This chapter presents an overview of the port infrastructure of Iran, together with a commentary on the current administration of major Iranian ports, which are located on two shorelines of the country (shown on Figure 5.1). The southern shoreline is dominated by the Persian Gulf ports system and is associated with the foreign-going seaborne commerce of the country and the region. The northern shoreline comprises ports on the south coast of the Caspian Sea basin, and is primarily associated with regional sea trade.

For the Islamic Republic of Iran, approximately 90% of the export, import and transit of cargoes are carried out through the seaports, which are affiliated to the Ports and Maritime Organization (PMO) of Iran that acts independently in terms of port and maritime operations. The PMO, by designing required infrastructures and providing modern shore-side and maritime facilities, has focused its activities on the development and mobilization of the country's ports.

The sea trade demand of Iran is served by a range of seven main ports in the south in the Persian Gulf and the Oman Sea. From west to east, these ports are Khorramshahr, Bandar Imam Khomeini, Bandar Mahshahr, Bushehr, Bandar Assaloyeh, Bandar Abbas and Chabahar. In the Caspian Basin in the north, the principal ports are Anzali, Nowshahr, Neka, and Amirabad. The total traffic base of these ports is approximately 170 million tons of cargo of all types, other than oil traffic handled at dedicated oil terminals. During the last three decades there have been major changes in the role played and the power wielded by individual ports. The most obvious direction of change has been a substantial shift in the centre of gravity of maritime transport activity from the south-western port of Khorramshahr to the centre of the southern seaboard of Iran, and especially to the Port of Bandar Abbas. Over this time, and particularly during and in the aftermath of the Iran-Iraq war, the hinterlands of the south-western ports have shrunk to their immediate hinterlands, while the emerging ports have widened their sphere of landside influence (Port & Maritime Organization of Iran, 2012). The coastline of Iran in the south is 2,440 km and

Iran also borders with the Caspian Sea for 740 km in the north of the country (The World Factbook).

This Chapter deals with the ports and their economics: Section 5.1 and its subsections sets out the dominant southern shoreline of Iran that links the region into ocean-going sea trade through the Persian Gulf; and Section 5.2 and its subsections deals with the northern shoreline Caspian Sea ports of Iran. As set out in the introduction to this chapter, Figure 5.1 shows the shorelines of Iran.

Figure 5.1: The Iranian shorelines: the Persian Gulf and Oman Sea in south and the Caspian Sea in the north

Source: Iran map outline, 25 September 2013

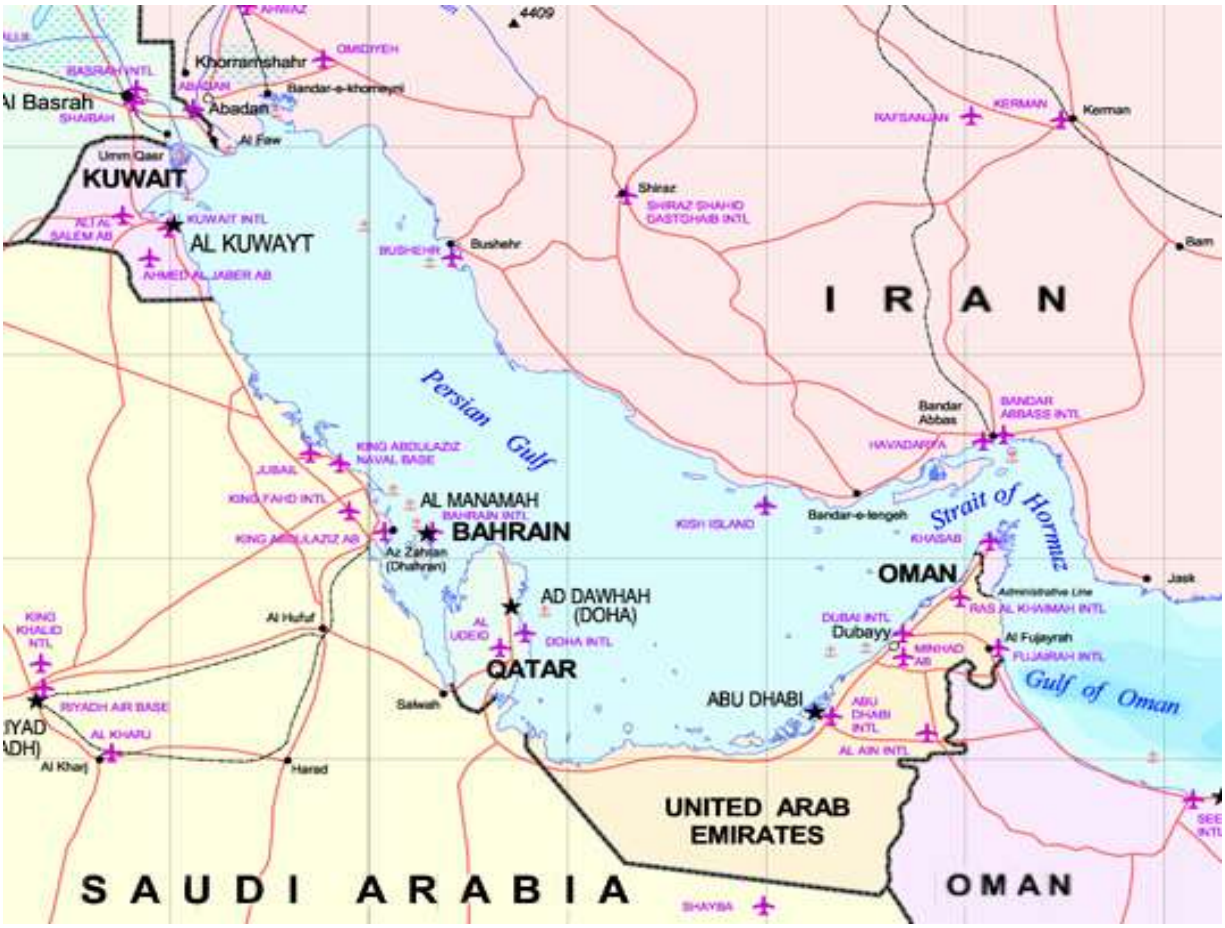
5.1 The southern shoreline of Iran and the principal southern ports and their economic functions

From west to east, the Iranian shoreline in the south-west of the country starts from the Iran/Iraq border, with a border river passage of 17 km long where Iranian port installations of Khorramshahr are also located in a part of its coast. For Iran this part of the river passage is called Arvand-Rud and in Iraq it is called Shatt Al-Arab. This river passage from border, before its confluence with the Karun River of Iran to form the Karun Delta, in the river port city of Khorramshahr is marked with a separation line known as the Tallweg line. Then this waterway passage after joining to Karun the only navigational river of Iran, will follow along the Arvand-Rud the common western border waterway between Iran and Iraq for about 65 kilometres towards south where it discharges to a point called Faw Delta in the Persian Gulf.

The Iranian shoreline then continues along the north-eastern shores of the Persian Gulf towards the Strait of Hormuz about 660 miles (1203 km) away, covering Khuzestan, Bushehr and Hormuzgan provinces. This coastline then extends about 430 miles (784 km) along the north and eastern side of Hormuzgan and the Makran coast of Sistan and Baluchistan provinces of Iran and ends at a coastal point on Gwadar Bay, at the common border point between Iran and Pakistan, 120 km east of Chabahar port (Ports and Maritime Organization of Iran).

The oceanic region comprised of the Persian Gulf, Strait of Hormuz and Gulf of Oman in which Iranian southern shoreline lies is one of the most important waterways in the world. As shown in Figure 5.2, the Persian Gulf is a large semi-enclosed bay which spreads over an area of 233,100 sq km, located at the north-west end of the Indian Ocean and curves north-westward for more than 600 miles (about 1000 km). Its width varies from about 50 to more than 200 miles (80 to 338 km) (HowStuffWorks, 2008). Most parts of the Persian Gulf are shallow; rarely more than 200 feet (60 m) deep and it has many islands of which Iranian Qeshm Island is the largest. The Persian Gulf to the south is bordered by a tip of Oman and the United Arab Emirates, to the west by the Saudi Arabian Peninsula, Qatar and Bahrain, to the north by Kuwait and Iraq and for entire east by Iran. The Persian Gulf waters witness slow currents and limited tidal ranges. Most river inflow into the Persian Gulf occurs in the northern end, primarily on the Iranian side by the Karun, Arvand, and Karkheh, Hilleh, Hendijan and Mand rivers (R. Michael Reynolds, 1993).

Figure 5.2: the Persian Gulf and Strait of Hormuz



Source: iranreview.org, 28.10.2010

The Persian Gulf since antiquity has been an important sea transportation route. It has been for centuries under control of Persians, at times Arabs, and Turks, and also at times under Western European control, until it gained much greater prominence with discovery of oil in Iran (by then Persia) in 1908. This greatly raised the area's maritime importance to a point where the Persian Gulf became a sphere of influence of major powers especially the British. During the two periods of global conflict in World War I and then during and after World War II, the Persian Gulf oil fields and especially the Iranian oil fields, which were amongst the most productive in the world, have been extensively exploited and utilized. As a result modern port facilities have been constructed in Iran and other neighbouring countries bordering the Persian Gulf (Columbia Encyclopedia, 6th Ed.). Nearly 50% of the world's total oil reserves are estimated to be found in

the Persian Gulf (Richardson, 2007). In peak periods, one ship passes the Strait of Hormuz each six minutes and approximately 60% of the world's marine transport of oil comes from this region (Reynolds, 1993).

In this section, the seven principal ports located on the southern coastline of Iran are discussed from east to west – this is, from the Gulf of Oman, through the Strait of Hormuz, up the southern shoreline of the Persian Gulf, and ending with the westernmost port of Khorramshahr, close to the border with Iraq. In each of these ports, the principal geographical features, navigational attributes (affecting port access), marine infrastructure and capacity, and shore side cargo-handling facilities and capabilities are set out. Although facilities for handling oil cargoes are detailed in certain of the ports, the principal focus of this study is on the handling of dry-bulk and particularly cargoes, and therefore the ports coverage excludes any detailed analysis of dedicated oil ports and pure oil terminals.

5.1.1 Chabahar Port

Chabahar port is located on the eastern shore of the Chabahar bay in the Sistan and Baluchistan province of Iran, on the coast of the Oman Sea. This port was established along the Makran coast, and has become a long-established centre of business, trade and navigation. Its historic importance as a trading centre can be seen from the ruins of a Portuguese castle on the road to the historical port village of Tis, some six kilometres from Chabahar. The other feature as shown in Figure 5.3 is that Chabahar port is close to main shipping routes to Africa, South-East Asia and Europe and is well placed to access the Central Asian states and neighbouring countries like Afghanistan and Pakistan.

In 1973 a master plan for Chabahar port was formulated by the Port and Shipping Organization of Iran and the related contract was signed with contractors. But this plan was delayed for a variety of reasons and after the revolution only a part of plan, comprising some short-term berth capacity and a breakwater was undertaken and completed (Ports and Maritime Organization of Iran, 2013).

Figure 5.3: Chabahar's position on the southern shoreline of Iran

Source: Iran Chamber, CIA World Factbook 15 September 2004

Chabahar Bay contains two ports one of which is Shahid Kalantari port and the other Shaid Beheshti port. The port of Chabahar's executive operation was started in 1981 and with completion of four jetties, the port became operational in 1982-83. It was during the Iran-Iraq

war that the Iranian government became aware of the importance of Chabahar port in Iran's import- export operations, because of its unique characteristics of being situated well away from and out of the dangerous choke point of the Hormuz Strait and Persian Gulf which at that time looked to be a threat. Hence at a later stage Shahid Beheshti port was built and equipped as the most important port in Chabahar Bay (Port & Maritime Magazine Jan-Feb, 2009).

5.1.1.1 Economic significance

Chabahar port, which is located 120 kilometres (74 miles) west of Pakistan's border, holds immense strategic and economic significance for Iran and other countries in the region. The port is already connected to the border crossing point of Millak which passes through a border bridge built by Iran on the Hirmand River to provide access to Zaranj in Afghanistan's southwestern province of Nimruz. This border serves as an entry point to Afghanistan, Central Asia and beyond, for which the Islamic Republic of Iran has made investments to facilitate smooth transportation of commodities domestically and also in order to create closer links and offer better access for its landlocked neighbour Afghanistan in particular, as well as other landlocked regional countries such as Turkmenistan, Uzbekistan, Kazakhstan, Kirgizstan and Tajikistan (Chandra et al., 2012) In fact, the strategic situation of the port is a consequence of its proximity to the open seas, through the Indian Ocean and has provided a great opportunity for entrepreneurs to boost the national economy by greater use of this port (Aghaz Biweekly, 2010).

5.1.1.2 Chababar Port Geographical situation and main features

The Port of Chabahar (Shahid Beheshti) is located in the southeast of Iran and on the northern part of the Oman sea in $25^{o}17'$N and 60^{o} 37'E (Chabahar Port Handbook, 2011: 3).

- United Nations Code for Trade and Transportation Locations, (UN/ LOCODE) IR ZBR.
- Admiralty chart/pilot 145/63.
- Distance from Tehran: 2371 km
- Distance from the centre of the Province (Zahedan) 767 km
- Distance from the nearest airport: 40 km
- The port is connected to Tehran and other cities by road and air

- The temperature range during the year is +22.8 to +32 degrees Centigrade
- The humidity range during the year is 62% to 89% (*Ibid.,* pp.5-8).

5.1.1.3 Development plan of port

The Port of Chabahar was designed and founded on the basis of its transshipment and transitional gateway position in the extreme southeast of Iran, to achieve its phased objectives as per the proposed master plan of 1973 (Revised 1982) by Ports and Shipping Organisation of Iran. The port development is planned to take place in six phases and upon completion and implementation, the port ultimately will have an annual handling capacity of 12.8 million ton of liquid bulk, 2.9 million tons of break-bulk and 6 million TEUs of container cargo by 2020 (Royal HaskoningDHV, 2007). Market studies show that the port is playing a major role in facilitating business between Central and Southeast Asia also Europe through north-south corridor with Indian subcontinent and other neighbouring countries (Organization for Investment Economic and Technical Assistance of Iran, 2009).

The first phase of the planned project intended to prepare the port to accept 100,000 dwt vessels and improve capacity to 6 million tons. This first phase, which is near completion, includes:

- Dredging of 17.5 million cubic metres of material from the seabed to form a deep-water approach channel and harbour basin.
- 1650 m of breakwater extension.
- Construction of container terminal capable of handling 640,000 TEU.
- 2 container berths with total length of 640 m and draft of 16 m.
- The container terminal to be equipped with four post-panamax quayside container cranes and 12 rubber-tyred gantry cranes (RTG).
- Construction of a multi-purpose terminal capable of handling 1.2 million tons of cargo per year
- Construction of three berths adjacent to the multipurpose terminal with a total length of 600m.
- Reclamation of 195 hectares of the terminal area.

5.1.1.4 Railway network

Chabahar port's connectivity to the rail infrastructure has been the subject of a planning exercise, and construction is about to get underway. This port will be connected to the Trans-Iranian Railway at the junction point of Fahraj on the Kerman-Zahedan line. The length of main line would be around 605 km starting from Chabahar Port and passing from Iran Shahr, Nik Shahr, Bampoor, and Bazman cities to end in Fahraj Station in Kerman-Zahedan at a distance of 269 km from Kerman. Before reaching to Fahraj, this route deviates from km 482 at Heydar Abad to join to Kalat station in the km 405 on main Kerman-Zahedan rail line (United Nation, ESCAP. 2009).

5.1.1.5 Present port facilities

Chabahar port presently has a handling capacity of 2.5 million tons of cargo and consists of two ports of Shahid Beheshti & Shahid Kalantari, each of which has five active berths. The Shahid Beheshti port complex includes berths, with specifications as shown in Table 5.1, as well as warehouses and storage areas. Total area of the port is 4,600,000 square metres; it has an open storage area of 308,000 square metres and a covered storage area of 18,000 square metres plus another area of 12,000 square metres which is under construction.

Table 5.1: Chabahar's Shahid Beheshti port berths specification

Type of berth	Length (m)	Draught (m)	Capacity (ton)
Multipurpose	150	8	25000
Oil	150	8	25000
Multipurpose	150	8	25000
Multipurpose	150	9	25000
Multipurpose	262.8	11	80000

Source: compiled by author from Chabahar port handbook

Similarly, the Shahid Kalantari Port complex is equipped with berth and cargo storage capacity, as shown in Table 5.2. The total area of this port is 350,000 square metres, with an open area of 35,000 square metres and a covered storage area of 3,000 square metres and a container terminal with an area of 90,050 square metres.

Table 5.2: Chabahar's Shahid Kalantari port berths specification

Type of berth	Length (m)	Draught (m)	Max Capacity (ton)
Coast Guard	120	4	-
Multipurpose	120	5.5	500
Multipurpose	120	5.5	2500
Multipurpose	120	5.5	2500
Multipurpose	225	-12.5 acquired 11.80	45000

Source: compiled by author from Chabahar port handbook

Insofar as principal imports are concerned, thus far the port has dealt with loading and unloading of bagged grain and fertilizers, bulk grain, containers and general cargoes. Apart from general cargo carriers, multipurpose vessels and container carriers the port can accommodate dry-bulk vessels and product tankers of up to 25000 ton dwt with permissible draft of not exceeding 8.9 m in Baheshti port and not exceeding 11.80 m in Kalantari port. In the past, the main berths at Chabahar port were closed to ocean-going vessels during the regular monsoon season in June, July and August, when only barge and lighterage operations were carried out. Currently, port operations proceed year-round.

The two areas comprising Chabahar port offer a range of cargo-handling equipment and shore gear. Hoisting machinery of various capacities and cargo-handling machinery of different types, as shown in Table 5.3, are available in the port.

Table 5.3: Chabahar port's cargo-handling & marine equipment

Cargo-handling & marine equipment	Number	Cargo-handling & marine equipment	Number
Mobile shore crane	3	Funnel (hopper)	11
Yard mobile crane	7	Grab	21
Road & yard mobile crane	1	Mini loader	1
Cereal suction (Grain + Fertilizer)	1	Conveyor	6
Reach stacker	3	Tractor	11
Transtainer	1	Tractor & mini cart	50+2
Top forklift	2	Tugboat	4
Forklift	10	Barge	5

Source: compiled by author from Chabahar port handbook

5.1.1.6 Chabahar Free Zone (CFZ)

The Chabahar free trade and industrial zone, which is located in the Chabahar Gulf in the vicinity of Chabahar port, was established in 1991 and is located 120 km from the Pakistani border. As much as 14,000 ha is allocated for industrial activities, trade and commercial services, in addition to residential and tourism and green area activities. The Chabahar free zone in national dimensions is regarded as a complement to the eastern transit route of the country, while from an ultra national point of view its proximity to act as an important gateway and a communication bridge to the Central Asian Republics and southern Asian countries is a strategic advantage. Its prominent situation in the light of its accessibility to international waters, the natural beauties of its coastal areas, and the virtual absence of competitors to its transit route combine to offer great opportunities for investment in trade, industry and tourism. This has given it a unique position which has attracted Iranian and international investment across a broad front.

Like other Iranian free zones, the Chabahar free zone attempts to attract capital investment and spearheads Iran's quest for economic diversification (Hakimian, Hassan. 2009). Offering economic incentives and facilities – from infrastructure to special rules and a favourable legal framework – the zone has aimed to entice domestic and foreign investors to create jobs and promote Iran's non-oil exports.

The Chabahar trade and industrial zone provides significant infrastructure for multi-modal transport activities. Some elements of this infrastructure are:

Shahid Baheshti Jetty: provides capacity to accommodate vessels of up to 100,000 gross tons to locate and to hold cargo in its 18,000 square metres of covered warehouse space.

Shahid Kalantari Jetty: with a permissible draft of -11.5 metres and 42000 square metres of covered warehouse space, it is able to accommodate multi-purpose vessels alongside the berth.

Konarak Airport: is the only airport connecting CFZ to other airports, located 20 kilometres from CFZ and offers regular flights from Tehran and other major cities in Iran and the United Arab Emirates. This provides transport opportunities for passengers.

Developed road network: provides access for the Chabahar trade and industrial free zone to neighbouring countries such as Pakistan and Afghanistan as well as the Central Asian Countries.

The inland transport terminal has a capacity to receive approximately 1000 trucks per day and this plays an important role in the free zone land route for import, export and transited goods.
Information, Communication and Technology: ICT in the CFZ creates conditions and adequate facilities in the domain for private sector participation and to promote technical knowledge and required man power to offer different types of electronic services for the companies in industries and trade and tourism fields in both free zone and mainland (freezones.ir, 2011).
In summary, the CFZ offers a number of opportunities and attractions for investors. These include

- Privileges of legal facilities for investors
- Possibility of investment for domestic and foreign investors
- Guaranteeing foreign investment in accordance with the applicable legal framework of the free zone
- Tax exemption for 30 years
- Duty Free import of machinery, spare parts, transport means and raw materials for construction
- Opportunity of employing up to 10% employees from foreign expatriates at any given industry or business place at the zone
- Possible re-export of transit goods without limitation
- No limitation on giving land for large industrial projects
- No customs duty on the export to the main land for the goods produced at the free zone by using domestic raw materials, exemption being in proportion to the added value of the produced goods
- Issue of certificates of origin for those goods exported from the zone (freezones.ir, *op. cit*., p.1)

5.1.2 Port of Bandar Abbas

The port city of Bandar Abbas is the main outlet to the open seas in southern Iran and is located on the Strait of Hormuz, on Hormuz Bay across from Qeshm, Larak and Hormuz islands. It is the capital of Hormuzgan Province in the south of Iran on the coast of the Persian Gulf (shown in Figure 5.4).

The Port of Bandar Abbas has been a major port for the Persian Empire and has always served a maritime function. During the reign of Darius the Great from 586 to 522 BC, records refer to the Port of Bandar Abbas as a port from which his commander Silacus departed to go to India and the Red Sea. At the time of the conquest of Persia by Alexander, the Port of Bandar Abbas was called Hormairzad. In 1514 the Port of Bandar Abbas was invaded and occupied, along with three islands adjacent to it, by the Portuguese who used it to protect their maritime commerce in the region calling it Gameron or Qamerun. In 1614 Bandar Abbas was named after Shah Abbas I the Great King of the Persian Safavid dynasty, who defeated the Portuguese and took the port back and rebuilt it into an important port city for Iran. Although at a later stage, due to the frailty and weakness of the Ghajar dynasty of Iran, and as a result of not paying proper attention to the coastline, the port was leased to the ruler of Muscat (Oman) in 1793, but control over it was regained in 1868.

At times in the past, the Port of Bandar Abbas was famous for export of pottery and cargoes like dates, citrus, tobacco and fish and has a long history of trade to other places, such as East African countries, the Swahili states and the Malabar coastline on the south-western shore line of the mainland Indian subcontinent (World Port source, 2013).

Figure 5.4: Persian Gulf: Province of Hormuzgan Islands and sea traffic lanes in Strait of Hormuz

Source: Colombia.edu, August 2004

5.1.2.1 Recent history of the port

In more recent decades, the Iran-Iraq war of 1980-1988, in which the Port of Khorramshahr (up to that time the most active port of Iran) was occupied and destroyed, promoted the development of Bandar Abbas as a major commercial port to replace Khorramshahr. It could, therefore, be regarded as the event that re-energised the development of Bandar Abbas port, although its importance in the maritime arena of the country was already established by the time of the fifth five year plan of the Iranian regime before the revolution, which had emphasized investment for development of the port. Some construction had already been started in the port coastal vicinity.

Bandar Abbas port is in the middle of the Strait of Hormuz linking the Persian Gulf to the Sea of Oman. Towards Iranian hinterlands it is connected to all the major cities in the hinterland of the country by road (highways) and railroad (double track) and by air through Bandar Abbas International Airport which connects it to most of the domestic major cities and also with regular flights to some of the Persian Gulf states.

Due to the strategic geographical location of Bandar Abbas, construction of Shahid Rajaee Port complex and execution of many industrial projects such as Bandar Abbas Refinery has given a major role to this port to play in the government's developmental plans of Iran also in the regional economy as a main water-gate.

Today, Bandar Abbas is home to some of the most important industries of the country including textiles, fishing, oil refining, steel and aluminium and it serves as a major shipping point for imports and exports (Iran Chamber Society, 2001).

Apart from commercial port facilities an Iranian shipyard – the Iran Shipbuilding & Offshore Industries Complex Co. (ISOICO) – is located 37 km west of the port. This company, which is a subsidiary company of the Industrial Development and Renovation Organization of Iran (IDRO), was established with the view to design, construct and repair different types of vessels as well as offshore structures. At a later stage in 2006 in a joint venture with the Islamic Republic of Iran Shipping lines, a new company called Bandar Abbas Pars Ship Repairing Company was formed mainly to carry out maintenance works on high capacity ocean-going vessels. The motor vessel *Iran Arak*, a container ship of 7,000 tons light displacement, 30,000 dwt, 185 m length overall and beam of 30 m, and with a container capacity of 2,200 TEUs was built in this yard and joined the national fleet in 2009. Two sister ships – *Iran Shahr-e-Kord* and *Iran Kashan* – were built and delivered to IRISL at a later stage in 2011. This shipbuilding complex is also equipped with a Logistics, Technical Services & Special Economic Zone which is active in supporting the yard's logistical services, using its related loading and discharging berths and also rendering services like transit and export of oil products and minerals plus warehousing of goods.

Because of its overwhelming importance in the seaborne commerce of the Iranian economy and indeed the economies of the Persian Gulf/Caucasus region, and because of the diversity of port facilities located in the areas around the city and its coastline, the port city of Bandar Abbas is analysed in three self-standing sections. The first of these (Section 5.1.3) covers the original port developments in Haghani and the port developments of Shahid Bahonar, which are within the metropolitan area of the city itself. The second (Section 5.1.4) deals with the newer complex of Shahid Rajaee and its associated facilities of Foolad and the so-called Persian Gulf Port. The third (Section 5.1.5) deals with the more minor "out ports", largely located on the islands in Khouran Bay. All of these ports are administered by the Ports and Maritime Authority of the Hormuzgan province.

5.1.3 Bandar Abbas old port or Port of Shahid Bahonar – geography and main features: The city of Bandar Abbas is situated on flat ground with an average altitude of 9 m (30ft) above sea level. Mount Geno, 17 km to the north and Mount Pooladi, 16 km to the northwest of city are the nearest elevated areas. The Port of Shahid Bahonar is located in 27^{o} 08 N 56^{o} 12' E from the sea position to the north of Qeshm Island at the entrance of the Persian Gulf (see Table 5.4 for mean features). The port is located almost adjacent to the western sector of the city of Bandar Abbas and has an area of 300,000 square metres with 90,000 square metres of warehouse space, and is connected to Tehran and other major cities of Iran by air, rail, paved roads and highways.

Table 5.4: Bandar Abbas Shadid Bahonar – port geography and main features

Port name: Bandar Abbas	Port UN/LOCODE: IRBND	Location: 27^{o} 08' N 56^{o} 12' E
Draft: 10.3 metres	Time Zone: -3:30	Port Size: Medium
Channel depth: 9.4 m	Anchorage depth: 21.6 m	Cargo pier depth: 10.3 m

Source: compiled by author from Port of Shahid Bahonar handbook

Vessel Traffic Services are operational in the port and any vessel approaching the port from the eastern side of the Strait of Hormuz or Gulf of Oman to proceed to Bandar Abbas enters the Traffic Separation Scheme (TSS) line area A which is between Larak and Hormuz Islands should contact the Vessel Traffic Centre on VHF an hour before entering TSS line area B which is between Qeshm and Larak Islands. Pilot embarkation and disembarkation is two miles from the port's turning basin.

The port is equipped with various capacities of cargo handling and hoisting equipment (see Table 5.5 for berth specifications).

Table 5.5: Shahid Bahonar port Accommodation and Equipment

Type of berths	Number of berths	Length(m)	Depth(m)
General cargoes	6	1050	10
Ore loading (conveyor belt)	1	190	10
Oil and gas load/discharge (Charlie 1 & 5)	2	380	10
Passenger terminal berth with ramps	1	190	10
Barge jetty	1	250	8

Source: compiled by author from the Port of Shahid Bahonar handbook

5.1.3.1 Shahid Haghani Passenger port

This port, which is located in the city centre of Bandar Abbas, is Iran's biggest maritime passenger port with a capacity of transporting up to 14,000,000 passengers annually. Renovation of $4 million was completed recently. This project was implemented over a 3800 square metre area and contains 2.5 floors which include ticketing centres, halls waiting rooms, restaurants, coffee shops and a rest centre. This port, which is affiliated to Shahid Bahonar port, is the main gateway for sea passengers travelling to and from the islands of Hormuzgan province (Trend.az, 2013).

5.1.4 Shahid Rajaee Port complex – location, infrastructure and facilities

The large port complex of Shahid Rajaee is situated 23 km west of the city of Bandar Abbas at the foot of the Kashar and Gachin mountains and north of Qeshm Island. Its geographical position is about latitude 56^{o} 04' E and longitude 27^{o} 07' N and its United Nations Code for Trade and Transportation Locations, (UN/LOCODE) is IR BSR (see port specifications in Table 5.6). Apart from its unique strategic position, the port enjoys advantages of having access to international open seas and free waters and enjoys benefit of access to international rail and road network and its closeness to free Zones (FleetMon.com port database, 2013).

The port is equipped with a Vessel Traffic Services (VTS) system, therefore, vessels proceeding to the port before entering Traffic Separation Scheme (TSS) areas must contact on VHF to the Vessel Traffic Centre to obtain permission to enter the traffic line. Pilot embarkation and disembarkation is two miles from the port's turning basin. The entrance channel width is 249 metres, its length 6500 metres and channel depth of 13.5 metres; this permits two-way vessel traffic. The port is capable of receiving ships of different types including container vessels, tankers, general cargo and bulk carriers (Guide to port entry, PMO website, 2013).

The construction plan of the port comprised a manoeuvring main basin and three subsidiary basins having berths, warehouses, wharfs and buildings with the related facilities. With the inauguration and opening of its first container terminal in 1983 (officially July 1984), the port became operational and loading/unloading operations were started.

The most important projects approved for the development of this complex in the early stages were an open grain silo of 110,000-ton capacity, a multipurpose coastal traffic harbour and expansion of cargo and container storage areas and container yards which are completed. Container terminal I or (CY 1) had an initial storage capacity of 16,000 TEUs, later expanded to 27,000 TEUs in three tiers which are now fully operational.

In terms of the port's container terminal development plan, a new terminal construction project was undertaken to construct container terminal II that at present with 70% progress is capable of stacking up to 70,000 TEUs in four tiers and is partly operational. Upon completion of construction of terminal II, the port's potential throughput will reach 6 million TEUs from the present 3.3 million TEUs. Phase 1 of the development plan of the port, which included the terminal II development project, and was inaugurated in 2008, has added an 850 m quay wall length and a 45 ha yard space as well as eight super post-Panamax twin spreader 68-ton quay cranes (Shore to ship gantries) and 18 RTGS to the port.

In phase 2, an additional 2020 metres of quay walls and 73 ha of yard space, including four new berths each with a depth of 15.5 metres for berthing post-Panamax vessels is under construction and due to be added to port's berthing facilities upon completion.

In addition to the above, creation of a 2500 ha cargo logistics zone is also in progress, which contains an industrial centre aiming at processing raw materials by value added activities into finished goods for re-exporting. Further, and in line with an expansion of the port's hinterland program dedicated to supportive activities, Bandar Abbas Shahid Rajaee port is currently constructing up to 15 container and oil terminals in back-up areas of the port with private sector participation on a joint investment basis on B.O.T (Build Operate and Transfer) in 80 ha land with an investment worth of 46 million USD. This is planned to increase total cargo throughput by up to 200 million tons per annum (Dredging Today, 2013).

5.1.4.1 Importance and significance of the port

Although Shahid Rajaee port looks principally to be a container port, in fact it is a common-user port that due to the significant role of non-container cargoes in Iran's economy, and forecasts represented in Iran's development program, has also an important role to play in the transportation of non-containerized cargoes. Shahid Rajaee port with its strategic position and level of equipment and facilities today is regarded as one of the economic poles of Iran and an advanced port in the Middle East region (Shahid Rajaee port complex. weblog, 2013).

Table 5.6: Bandar Abbas Shahid Rajaee Port Complex specifications

Area	2400 hectares
Location	North of Hormuz Strait
Cargo throughput	100 Million Tons
Roofed warehouses	193,095 m^2 (23 warehouses each 8640 m^2 area)
Container terminal throughput	3.3 Million TEUs
Berth depth	15 m
Number of berths	23 berths with 7.31 km Length
Domestic railway length	Existing: 23.5 km Under construction: 16 km

Source: compiled by author from the Port of Shahid Rajaee handbook

The container terminal 1 of Shahid Rajaee port has the following characteristics:

- Quay wall length 957 metres, with five berths

- Project commencement date: November, 1975
- Draft of berths: varying between 11.70 and 12.50 metres
- Official opening in July 1984 and nominal capacity: 1,500.000 TEUs per year

The container terminal 1 of Shahid Rajaee port has the following container-handling equipment

- Ship to shore quay cranes (post-Panamax gantry cranes); 2 units 1991 (the first commissioning in terminal 1) capacity: 35 ton – length of mobile boom: 38 m – constant boom 14 m – rail span 20 m
- Ship to shore quay cranes (Panamax gantry cranes); 2 units (1996) capacity: 35 ton – length of mobile boom 45 m – length of constant boom 14 m – rail span 20 m
- Ship to shore quay cranes (Panamax gantry cranes); 3 unit (2000) capacity: 35 ton – length of mobile boom 45 m – length constant boom 14 m – rail span 20 m
- Ship to shore quay cranes (post-Panamax gantry cranes); 3 units (2004) capacity: 45 ton – length of mobile boom 45 m - length of constant boom 14 – rail span 20 m
- Rubber Tyred Gantry cranes (RTG): 7 units RTG cranes (1993) stack height; 3 plus 1 – stack width; 6 plus 1
- Rubber Tyred Gantry cranes (RTG): 15 units RTG cranes (2002-2003) stack height; 4 plus 1 – stack width 6 plus 1 (Shahid Rajaee Port Complex, *op. cit*., p.1).

The Container Terminal 2 of Shahid Rajaee port has the following characteristics:
This terminal is developed within phase I of the port's development plan and has added 850 metres of quay length and 45 ha of yard space and eight Super Post-Panamax twin spreader 68-ton quay cranes and 18 RTGs to the port. Phase II is still under construction and when completed it will have added 2020 metres of quay length and 73 ha yard space to terminal 2, in the process increasing Bandar Abbas container terminal's capacity to 6.3 million TEUs annually. Details are:

- Quay wall length of berths: 850 metres
- Project commencement date: 21 Feb 2004

- Duration of the phase I of project: 36 months

- Official opening of the Phase I: 20 Feb 2008, Nominal Capacity; 1,800,000 TEUs per year

Container Terminal 2 of Shahid Rajaee port has the following Container handling equipment:

- Ship to shore quay cranes (Super Post-Panamax Rail-Mounted Gantry cranes): 8 units (2007), capacity; 68 tons, length of mobile boom: 61 m - length of constant boom; 24 m – Rail Span: 35 m

- Rubber tyred Gantry Cranes (RTG): 18 units RTG (2007), Capacity: 40 tons – Stack height: 5 plus 1 – Stack width: 6 plus 1 (*Ibid.,* 2) (Tidewater container terminal system, 2005).

5.1.4.2 Port of Shahid Rajaee Infrastructure and Marine and Cargo-handling Equipment

Shahid Rajaee port owns nine towing tugboats of different specifications, three pilot boats for pilot services, one buoy tender vessel for operating and servicing the beacons and six rescue ships, two dredgers and three service craft rendering barges of 500 and 350 and 150 tons capacity.

Shahid Rajaee port, which is the biggest commercial port of Iran, provides the largest container operations and sustains the highest container traffic, in the process playing an important role in Iran's economy and trade (see port's berth particulars in Table 5.7).

Through on-going modernization policy and as it is required for provision of port services, an array of powerful cargo-handling equipment, such as quay cranes, rubber tyred gantry cranes, trans-tainers, top lift trucks, reach stackers, coastal cranes, high lifting capacity mobile cranes, terminal trailers, cereal hoppers, pumps and many other items of hoisting and cargo-handling equipment have been purchased. These run side by side with specialized and skilled manpower supplies and an extensive software to ensure reliable handling systems in the port to undertake timeous loading and unloading of calling vessels. Hence the Port of Shahid Rajaee, apart from post-Panamax container carriers of 14,500 TEUs, can accept bulk carriers of up to 100,000 tons

dwt and large tankers of up to 80,000 tons dwt, handling a variety of dry- and liquid-bulk commodities (Shahid Rajaee Port profile, 2011).

Table 5.7: Bandar Abbas's Shahid Rajaee Port accommodation

Type of berth	Number of berths	Length (m)	Depth (m)
General cargoes	10	2000	11-14
Special cargoes (dry bulk…)	4	720	11-14
Container terminal	8	1850	14
Multipurpose liquid bulk…)	2	400	11-14
Ro/Ro platform/passenger	1	100	9
Liquid oil export, import (double)	2	440	11.5
Foolad oil terminal (for discharge of crude oil)	1	250	13
Private oil transit pier (STC Quay)	1	200	8-10

Source: compiled by author from the Shahid Rajaee port hand book

The arrival of the 14,000 TEU "MSC Beatrice", at that time the world largest containership, at Bandar Abbas has proved the port's ability to handle the largest generation of vessels. The vessel was berthed on Friday 16.07.2009 and loaded and discharged some 5,500 containers in less than 40 hours (container-mag.com 2009). The Shahid Rajaee Port Complex and its affiliated ports and harbours are shown in the satellite image in Figure 5.5.

Figure 5.5: Satellite image of Shahid Rajaee Port

Source: Port and Maritime Organisation of Iran website, July 2011

5.1.4.3 Shahid Rajaee port Special Economic Zone (SEZ)

The Iranian High Council of Free Trade Zones has accorded the Shahid Rajaee Port complex the status of a special economic zone and this has mainly been due to the special status of port location which acts like a gateway to and from the Iranian mainland for neighbouring countries. The area, through its direct railway link, offers the best port operations and services for ocean-going vessels, with a range of well-equipped apron and storage facilities. In the port, the zone is open to companies in the Persian Gulf and elsewhere in the world to take advantage of the benefits from the special regulation including berth priority for the vessels, streamlined non tariff and minimal customs procedures for the incoming, re-export and outgoing goods.

The zone in reality acts like a dock that is under customs bond and can therefore be used for duty free storage. It acts like a "temporary depot" or something like "customs warehouses and areas" in which goods are entrusted to the safekeeping of the port operator (platform licensee or public authority); with custom authority being advised of arrival of the goods by the help of manifest electronic data interchange (EDI). The goods then wait on the dock or in storage sheds for the decision concerning the final customs procedure applicable (Centre of Free and Special Economic Zones, 2013).

5.1.5 Affiliated ports and harbours

Within the port precinct and adjacent to the breakwater of Shahid Rajaee Port Complex, shown on Figure 5.5, there is a coastal traffic harbour basin known as Persian Gulf Port, providing 10 berths on 1000 metres of quaywall, including a dolphin berth, a bulk ramp, three multi-purpose berths and four oil jetties with a draft overall of 7.5 metres and receiving throughput of 6000 to 9000 tons at each of the piers (see Table 5.8 for port's specifications).

Table 5.8: Bandar Shahid Rajaee - Persian Gulf port (Coastal Traffic Basin) specifications

Berths number	Type of berth	Length (m)	Draft (m)	Receipt throughput (ton)
1	Dolphin	115	7.5	9000
2	Multipurpose	100	7	6000
3	Multipurpose	80	7.5	8000
4	Oil	125	7.5	8000
5	Oil	105	7.5	6000
6	Oil	105	7.5	6000
7	Bulk Ramp	125	7.5	8000
8	Multipurpose	125	7.5	7500
9	Oil	100	7	6000
10	Bulk Ramp	125	7.5	8000

Source: compiled by author from the Bandar Shahid Rajaee port handbook

With regard to the establishment of this part of the Shahid Rajaee port complex, it should be stated that the strategic position of the Strait of Hormuz has created many commercial

opportunities in the oil, gas and related sectors of the economy, particularly for companies active in the bunkering and international oil products trade. With this view in mind, the Persian Gulf terminal was redesigned and in 2001 it became dedicated to be used for supply of bunkers and oil products. Hence, in collaboration with the private and co-operative sector, sites have been allocated adjacent to the port for the establishment of shore tanks, storage facilities for oil products and bunker pipeline facilities. Today it is a major centre for bunkers and oil products and is open to domestic as well as international use by local and transit foreign-flag vessels.

5.1.5.1 Berths of Foolad Hormuzgan complex

The Foolad Complex berth facility, which is located outside Shahid Rajaee breakwater, has its own approach channel and turning basin. It provides an access bridge of 1630 metres in length and a T-shaped jetty equipped with loading gear unloading grabs plus a 6 km length conveyor belt and a steel structured Oil Dolphin jetty with suction connections to the shore, connecting to the Bandar Abbas refinery storage tanks (see berth specifications in Table 5.9). An additional berth in the eastern side of the present mineral T-jetty is under construction with a length of 310 metres (Shahid Rajaee port complex, 2013. *op. cit*,. p.1).

Table 5.9: Berths of Foolad Hormuzgan complex specifications

Row	Type of berth	Allowed length overall of ship	Permissible draft	Receipt throughput(ton)
1	Oil Dolphin	260 m	13.5 m	100000
2	Mineral jetty	310 m	13.5 m	100000

Source: compiled by author from Bandar Abbas Shahid Rajaee port handbook

5.1.5.2 Qeshm Island ports

This strategic island with an average length of 132 km and average width of 11.4 km lies in the Strait of Hormuz in latitude 26 to 27 degree and longitude 55 to 57. It is 1500 square kilometres in area and is Iran's most populated island with a population of 107,000 according to the 2011 census. The shortest distance between this island and mainland is 2200 metres. The island's main port is called Bahman port and has the following specifications:

Berth length 339 metres – entrance and inner breakwater depth max 10 metres, depth of berths 8 metres – berth construction year 1983-1990 – capacity of passenger halls – 5000 people – area of passenger halls: 4 x 1000 = 4000 m^2, with a roofed warehouse and gabled frames,

Apart from Bahman port, Qeshm Island has another port jetty knows as Kaveh which has a depth of 15 metres and it is under National Iranian lease hold (middleeastexoplorer.com. 2013). The island also hosts a free zone jurisdiction of 300 square kilometres. In 1991, the Iranian parliament (Majlis) approved the provision of this free zone although Qeshm Island enjoyed considerable leeway to determine its own policies. The Island retains the advantages associated with its connection to the mainland including the rights to explore and develop oil and gas opportunities. The Free Trade Zone (FTZ) has been set up in order for the Island to serve as a bridge between local, regional and global economies, with the creation of the largest free zone market area between Europe and the Far East (Centre for Free and Special Economic Zones, 2013).

5.1.5.3 Kish Island

This island is spread over an area of approximately 91 square kilometres and is located a distance of 18 nautical miles from the nearest point on the mainland coastline and 300 kilometres from Bandar Abbas. Kish is known to be Pearl of the Persian Gulf because of its unique natural vistas, calm sea and beautiful beaches, although in the past it has also been a major centre for pearl diving. Historically, around eight centuries ago, Kish became a commercial hub linking Persia to China, Africa and Europe. In 1970 the Island was identified as a major tourist centre, and in the following years Kish was named as the country's first free trade zone, to take advantage of its tourism and trade attractions. As a result of legal facilities governing the Kish FTZ and the policies adopted, such as 15 years' tax and excise exemption, as well as free entry to the Island for foreigners, it has been transformed into a haven for economic activities. Trade and tourism remain its main activities and Kish hosts 1.5 million travellers per year. The Island has a busy airport known as Kish International Airport, constructed in the 1970s (PMO Monthly, 2007).

Kish port shown on Figure 5.6 has a maximum draft of 7.5 metres alongside its general cargo pier, 10 metres at the oil terminal with berths for tanker vessels and 3.5 metres at the fishing port. Its UN/Locode is IR KIH and its geographical coordinates are, Latitude / longitude: 26^{O} 33.0' N 054^{O} 02.0' E. In order to enhance the performance of loading and discharging, the Kish free zone organization identified investment in port projects as being required and therefore construction of a container terminal in Kish commercial port commenced (Aghaz Biweekly, 2010).

Figure 5.6: Location of Kish Island

Source: Delta marine consultants' DMC website, 2004

5.1.5.4 Overview of maritime and economic strengths of Bandar Abbas

Bandar Abbas Shahid Rajaee port complex is expected to act as a port of transhipment/feeder services not only to the Iranian ports but also to other ports in the Persian Gulf and the Middle East and East Africa. It is expected to act as a trading centre which explains the high volume of imports and exports, which are not only meant or intended for Iran, but for the neighbouring

countries, especially the landlocked states as well as Euro-Asian countries in the region. The modernity of the port's installation, equipped with powerful gantry cranes, is complemented by an efficient back-of-port cargo distribution infrastructure.

The Bandar Abbas logistical platform including its special economic zone and its affiliated free zones such as Qeshm Island Free Industrial and Trade Zone, also Kish Island Free Industrial and Trade Zone with their optimum cost and delivery time relaxed procedures is and must continue to be of vital importance for Iran and its neighbours. This provincial capital city and consequently its port authority have acquired commercial and financial status not only to facilitate commercial transactions, but also to help the country as a whole to diversify its resources of revenue as much as possible.

The Port and Maritime Organization of Iran (PMO) is the body in charge of organizing and regulating maritime and port tariffs and is the correspondent of the International Maritime Organization (IMO). The PMO applies a large number of IMO conventions including the 1975 FAL Convention (Facilitation of International Traffic – ratified in 27 March 1995). It plans and promotes port activities and has been the driving force behind the development and ongoing expansion of several platforms in particular at Shahid Rajaee port. The container terminal offers good handling capacity and the port of Shahid Rajaee will have its capacity raised from 3.3 to 6 million containers. Its efficiency is up to standard global norms, although certain interface problems with rail are experienced.

5.1.6 The port of Assaluyeh

The port city of Assaluyeh is located in one of the most beautiful areas of coastlines along the Persian Gulf namely the area of "Nayband Bay", 270 kilometres south-west of the provincial capital of Bushehr in latitude; 27°30' N and longitude; 52°31' E. The port's UNCTAD Locode is IRPMA and Admiralty Chart/Pilot: 2883/-

5.1.6.1 Assaluyeh's Logistic Port

The port covers a land area of 150 hectares and is protected by a western breakwater of 2300 metres in length and an eastern breakwater of 1000 metres. The port's basin encloses an area of

100 hectares and is capable of accepting vessels of up to 80,000 deadweight tons. The port's nominal capacity is 10 million tons per year per annum with a principal traffic breakdown of one million tons of granulated sulphur, three million tons of containerized cargo and six million tons of break-bulk commodities. The port will ultimately have 10 berths, five of which are still under construction. Water depth alongside the berths is between 11 and 15 metres. The main jetty in this port is 2600 metres long and offers five operational berths. Figure 5.7 shows the Pars Special Energy Economic Zone (PSEEZ) which is located adjacent to the port of Assaluyeh.

Figure 5.7: Assaluyeh Pars Special Energy Economic Zone (PSEEZ) land use plan

Source: PSEEZ.IR website, 1998 revised May 3, 2010

5.1.6.2 Petrochemical port

As shown in Figure 5.7, this port forms part of the Pars Special Economic Energy Zone, especially with respect to the port structures, maritime facilities, on-shore facilities, equipment, and storage tanks related to port and shipping activities. A plot of land with an area of 100 hectares to the west of the zone has been allocated to this purpose. The port has 15 berths with a permissible draught of 15 metres which can accommodate ships of 80,000 deadweight tons. The nominal capacity of the port is 26 million tons of petrochemical products in liquid form.

5.1.7 Bushehr Port

The port city of Bushehr lies in a vast plain in south-western Iran and along the coastal region on the Persian Gulf (see Figure 5.8). It is the administrative centre of Bushehr Province of Iran and at times it has been the chief seaport of the country. It is located about 1218 kilometres south of Tehran.

Bandar Bushehr, which is a peninsula 12 kilometres long and three kilometres wide, began its modern port life by receiving ocean-going vessels soon after the construction of two new general cargo berths in the 1960s. Dredging operations which took place in 1970 gave it a better depth.

Figure 5.8: Aerial view of the Port of Bushehr

Source: bushehrport.pmo.ir, October 2009

After the Islamic Revolution a general development plan was formulated, in terms of which the port's waterfront was extended by 2000 metres, with an additional 1036 metres of berths. By 2009, the dredging done as a part of the development plan of Bushehr port was one of the biggest dredging projects in the country. Through this process, the mud and sediments were removed from the bed and walls of the external and internal channels and alongside the multi-purpose berth of the port, the new container berth, the Fajr oil terminal berth and the berth dedicated for the operation of motor dhows. Upon completion of dredging the access channel depth was increased from 6.5 metres to 10.8 metres in the external channel and 10.3 metres in the internal channel, and channel width was also increased to 140 metres in the internal channel and 150 metres in the external channel. In addition, a new turning basin with a diameter of 400 metres and a depth of 10 metres was created and the maximum axial radius of the turn of channel was also broadened to 800 metres. Depth alongside berths was also increased from 6 to 10 metres, which now makes it possible to berth ships of up to 30,000 tons. The Port of Bushehr is located in 28^{o} 58' N and 50^{o} 50' E in the north of Persian Gulf and virtually in the city centre. A local airport, three kilometres from the port, has daily regular flights to all major national destinations as well as international flights to Dubai and Jeddah. The Port of Bushehr is well connected to its neighbouring cities through the Borazjan highway to Shiraz (290 kilometres), Isfahan (700 km) and Tehran (1218 km), also through Khormooj, main arterial roads to the east link to Bandar Abbas (920 km) and the Genaveh main road to the west connects to Abadan and Khorramshahr cities (690 kilometres).

A railway project of 442 kilometres connecting Bushehr to Shiraz is under construction and is due to be completed in 2015. This project starts from Marvdasht, located on the Isfahan-Shiraz axis, and after passing from Firouzabad, Farashband and Ahrom cities it reaches Bushehr port. Apart from connecting Bushehr to the South Pars Special Economic Zone, which is located on the coast of the Persian Gulf within the same state, a rail route with a length of 205 kilometres starts from Ahrom and ends in Assaluyeh region (CDTIC Iran, 2011:11).

5.1.7.1 Bandar Bushehr main features and other specifications

The port has two approved anchorages, an outer anchorage 7.4 nautical miles away from the inner port at the sea end of a 7.4 miles access channel and an inner anchorage 2.4 miles away from the harbour. Upon arrival, vessels should anchor and wait at the outer buoy and await pilot,

pilotage being compulsory at this port. The access channel of 7.4 miles can allow passage for vessels with a draught of 10 metres and a maximum length overall of 170 metres. The port's marine equipment consists of seven tugboats, four dredgers, four multi-cats, three SAR boats, seven barges and five smaller boats. The port is well equipped with hoisting machinery and cargo handling shore gear of various capacities. Tables 5.10 & 5.11 & 5.12 provide details of the port's facilities and equipment.

Table 5.10: Bushehr Port's berth facilities

Berths number	Type description	Length (m)	Depth (m)	Draft (m)	DWT (tons)
1	Liquid bulk	250	11	10	25000
2	Reefer & container	194	12	10.5	30000
3	Reefer & container	194	12	10.5	30000
4	Reefer & general cargo	174	9.5	9	15000
5	Reefer & general cargo	174	9.5	9	15000
6	Reefer & general cargo	155	9.5	9	15000
7	General cargo (Dhow)	286	5	4.5	500
8	General cargo	110	7.5	7	5000
9	General cargo	110	7.5	7	5000
10	General cargo	110	7.5	7	5000
11	General cargo	110	7.5	7	5000
12	General cargo	110	7.5	7	5000
13	General cargo	110	7.5	7	5000
14	General cargo	140	2.4	2	_

Source: compiled by author from the Bushehr port website profile

Table 5.11: Shore gear and port equipment

No	Description	Unit	Capacity / power
1	Mobile Crane	17	16-120 tons
2	Reach Stacker	6	45 tons
3	Lift Truck	26	1-20 tons
4	Top lift truck	2	15 tons
5	Trailers	27	24 tons
6	Trucks for car handling	2	24 tons
7	Trucks for heavy lift cargoes	1	20 tons
8	Grab	3	
9	Spreader	4	
10	Cone	4	
11	TM Stacker	3	

Source: compiled by author from the bushehr.pmo.ir port profile of Bushehr port

Table 5.12: Warehouse capacity in Bushehr port

Covered warehouses	31,733 square meters
Open yard	64,761 square meters
Land for container yard	13 hectares
Port area	50 hectares

Source: compiled by author from the Bushehr port website profile and maroos.net

5.1.7.2 Sadra-Bushehr shipbuilding and repair yards

This shipyard is located in the harbour basin and is equipped with a synchro-lift of 2500 tons lift capacity. It has a steel processing workshop and comprehensive facilities and equipment for the construction, outfitting and repair of different types of vessels up to 2500 tons light displacement. Any kind of major repair to bigger size vessels would be done at the anchorage/offshore area. Sadra-Bushehr with a computerized service system for spares, which is connected to major supply centres worldwide, is able to render services to the shipping lines on a cost-effective basis whenever is required.

5.1.8 Bandar Imam Khomeini

This port, with above 70 years of recorded shipping activity and 11 million square metres in area, lies in the northwest of the Persian Gulf, at the extremity of the natural waterway of Khor Musa and is one of the largest and most active ports of the country. Bandar Imam Khomeini is situated 100 kilometres east of Abadan and Khorramshahr and 115 kilometres southeast of Ahwaz, the centre of Khuzestan province. Its possession of the natural, deepwater navigational waterway (channel) of Khor Musa, with an approximate length of 78 kilometres, has given it a unique position amongst Iranian ports (bikport.Pmo.ir, 2013). This access channel is one of the most important natural channels of Iran; since it does not need dredging because the depth of water in this channel during high and low tides differs between 30 to 42 feet. Minimum channel width is 250 metres (Sailing Direction Enroute, 2011: 400).

5.1.8.1 Port history

Upon completion of construction of two wooden berths at the bottom end of Khor Musa in 1937, the port was established, coinciding with the start of the Trans-Iranian Railway. Initially, the port was named after the waterway and gained great importance in the sea transportation of the country. In 1973 the residential area in the hinterland vicinity of the port was relocated to a newly built location known as Sar Bandar and this opened up a new area for port development. In 1979, following the Islamic Revolution, the port's name was changed from Bandar Shah Poor to Bandar Imam Khomeini. The port has now become one of the most important commercial centres of the region.

5.1.8.2 Bandar Imam Khomeini Port geography, main features and other specifications

Bandar Imam Khomeini is located on the north-western coast of the Persian Gulf at latitude $30^{o}25'$ N and longitude $49^{o}04'$ E. Arriving vessels anchor at the outer buoy Khor Musa. It is a compulsory pilotage port. UNCTAD LOCODE IR BIK and Admiralty Chart no. 1269. The berth specifications of this port are shown in Table 5.13.

Table 5.13: Berth infrastructure of Bandar Imam Khomeini port

Berths Name	Number of berths	Length (m)	Depth (m)
Old Eastern wing	3 berths	540	13
Old Western wing	3 berths	540	13
Jetty	4 berths	771	12.5
Container	5 berths	1051	10-15
General cargo	5 berths	911	9.8
Multi purpose	6 berths	1093	9.8
Silo Jetty	1 berth	280	15
Silo Jetty (imports)	1 berth	280	14
Barge & Dhow berth		842	6.5
Gulf Jetty	1 berth	207	6.6
Trans-Terminal Jetty	1 berth	75	3.6
Ore imports Jetty	1 berth	220	10

Source: compiled by author from BIK port website and Maroos.net

5.1.8.3 Warehouses, cargo handling and marine equipment

The total area of covered warehouses of the port is 287,940 square metres and the total area of open warehouse yard space is 10,980,790 square metres. Tables 5.14 & 5.15 show the port's marine and shore equipment, respectively.

Table 5.14: Marine equipment of port of Bandar Imam Khomeini (BIK)

Type	Number	Remarks
Barges	11	Cargo lighterage, fresh water and bunker supply
Tugboats	12	Tow services and firefighting
Floating crane	2	Cargo hoisting
Boats	10	Pilot and coast guard and guiding applications
Dredger	6	Dredging applications

Source: compiled by author form the port of BIK port website profile

Table 5.15: Shore equipment and facilities in Bandar Imam Khomeini

Type	Number	Tonnage
Cranes	40	20, 85, 100, 140 to 220 Tons
Tractor	53	-
Trailer	143	32 tons
Lift truck	119	3 to 25 tons
Push truck	10	-
Top lift truck	5	13 to 35 tons
Rail crane	6	15 tons
Transtainer	2	35 tons
Grain evacuators	5	-

Source: compiled by author form the port of BIK website profile

5.1.8.4 Bandar Imam Khomeini Port advantages

The port benefits from the existence of a favourable national hinterland and from the proximity of neighbouring countries such as Kuwait, Iraq, Turkey, Azerbaijan and Armenia. It is in most respects the closest Iranian port to the Caucasus and the Caspian Sea basin countries through rail and road connections.

The port is the closest southern port to the main agricultural centres of the country, to domestic markets and to the most populated regions of the country. It is the most favourably-located port to energise and exploit the opportunities the East-West corridor and it enjoys the shortest land and rail routes to the north for activating the North-South International Corridor.

Major developments have included the completion of construction of a 150,000-ton berth as well as lengthening of the eastern and western berths from 386 to 523 metres, adding to the port's capacity to handle more grain and bulk cargoes.

The proximity of Bandar Imam Khomeini port to the large petrochemical complexes and enterprises such as the Imam Khomeini port petrochemical complex, the Razi Petrochemical Company and the Farabi Petrochemical Company, in addition to construction of the largest

Petrochemical Special Economic Zone of Iran in the port vicinity, with an annual production of approximately 11 million tons of solid and liquid products, has given a great advantage to the port to offer enhanced services to customers. World class port terminal facilities for bulk shipments, in addition to loading facilities at sites close to customers confer additional logistics advantages on the port.

The port's proximity to the largest industrial centres located in the west, north and central parts of the country implies that Khuzestan province and its industries, Abadan and Isfahan, Shiraz, Tehran, Tabriz, Arak's Refineries as well as petrochemicals, automotive and heavy industries in Tehran, Tabriz and Arak, are within range of this port's sphere of operations.

One of the additional advantages that port has is the existence of 100 kilometres of internal rail line, which links the harbour with the warehouses and docks and is an important facility for direct delivery from alongside ship to the business and industrial centres of Iran or the neighbouring countries.

As a result of a comprehensive planning process and by taking advantage of all the capabilities and potentialities existing in and around the port, Bandar Imam Khomeini port (BIK) achieved a record level of 40 million tons of cargo in the year 2012 (BIK port records).

5.1.9 Mahshahr Port

In the same waterway channel of Khor Musa, the Port of Mahshahr is located 10.4 kilometres east of Bandar Imam Khomeini port in latitude of 30^{o} 28' N and longitude of 49^{o} 11' E. The port is presently operated by the National Iranian Oil Company (NIOC). The port's United Nations Code for Trade and Transportation Locations is UN/LOCODE) IRPMA and its Admiralty Chart no. is 1269/63 (ship-officer.com, 2014:1276).

The port is capable of accepting tankers of up to 80,000 tons deadweight for loading of different types of liquid bulk, oil and chemicals products. The port's berth facilities and their usage are set out in Table 5.16.

5.1.9.1 Port Approaches

There are no anchorages at Mahshahr roadstead and calling vessels after leaving Khor Musa under direction of a waterway pilot and entering into the channel, follow up to the outer channel at the port of Imam Khomeini, where vessels will be granted free pratique. This is where the channel pilot will disembark and the Oil Company berthing master will board incoming ships. The Oil Company has its own pilotage system. After leaving the Bandar Imam Khomeini outer channel, entrance to port of Mahshahr is well marked by light beacons and extends for a distance of 11.2 kilometres to the Mahshahr port itself.

Table 5.16: Port Mahshahr berthing facilities

Berths	Number	Commodities
Packed products Jetty	_	Packed products- used by barges & small crafts to supply vessels at main jetties
NIOC Jetty	_	Only National Oil company's cargoes
Liquid Bulk Jetty	No.1	loading and discharging of Clean Products
Liquid Bulk Jetty	No. 2	Loading and discharging of Fuel Oil
Liquid Bulk Jetty	No. 3	Loading and discharging of Clean Products
Liquid Bulk Jetty	No. 4	Loading and discharging of Clean Products
Liquid Bulk Jetty	No. 5	Loading and discharging of Fuel Oil
Liquid Bulk PCC jetty	No. 6	Lease hold of petrochemical company for Loading petrochemical exports

Source: compiled by author from Maroos.net and port of Mahshahr website

5.1.10 Khorramshahr port

The port city of Khorramshahr is situated in the north-west of the Persian Gulf and in the south-west of the Islamic Republic of Iran. This port also has a border with the south-east of Iraq through the Shalamcheh ground border post, 17 kilometres west of the city at the confluence of Karun River and Arvand-Rud waterway, where the Shatt' al Arab of Iraq, reaches to the Karun Delta in Khorramshahr.

In the early 1920s the port was one of the first modern port constructions In Iran. The port has a

long history in maritime activity. During the Second World War this port became more important and new expansions took place. Before the Islamic Revolution the port had 20 quays and handled 4 million tons of general cargo in 1978. With Iraq's invasion of Iranian territory on 20 September 1980, the city was occupied and the port facilities became seriously degraded under occupation. After the war, reclamation started and the entire pre-war infrastructure of the port, including quays, warehouses and yards, was reconstructed.

5.1.10.1 Geography, main features and other specifications of Khorramshahr port

The port is located 120 kilometres from Ahwaz, the centre of Khuzestan province, and 997 kilometres from Tehran. The nearest airport is 3 kilometres from the port. It is situated 30^{o} 36' N and 48^{o} 9' E of Persian Gulf (ship-officer.com, op cit., p1286). The nearby Arvand Free Zone provides a 155 square kilometres industrial and security zone that surrounds Khoramshahr, Abadan and Mino Island along the Arvand-Rud waterway.

Total area of the port is 230 hectares covering 93,600 square metres warehouse, 341,827 square metres of yards, and 48,000 square metres of hangar shed spaces and 40 hectares of leasehold lands. Total berth length in the port is 2766 metres including seven container terminal berths and 18 multipurpose berths, each with 5000 tons capacity and used mainly for loading and discharging of general cargoes, but also sometimes for passengers.

Advantages:

- Easy access to international routes via sea, air, road and railway.
- Nearness to the most populous areas and industrial, agricultural and mining centres of the western provinces of the country.
- Providing accessibility to the sea passenger terminals within the state.
- Providing cost effective feeder services and a viable transit route as the state's second container terminal port.
- Its proximity to Iraq gives it specific commercial and economic opportunities.

- Profiting from advantages of the Arvand Free Zone which has been established with the aim of stimulating regional and national development of trade and industry.

5.2 The northern shoreline: Caspian Sea ports of Iran

The Caspian Sea, which is the largest inland body of water in the world, spreads over an area of 438,000 square kilometres and is located at the crossroads of Europe and Asia. It may also be described to be the largest lake in the world, with links to the Black Sea and the Baltic Sea through the Volga and Volga-Don rivers. The coastline of the Caspian Sea extends over 6400 kilometres, with coastlines in Kazakhstan (1600 km), Iran (820 km), Russia (695 km), Turkmenistan (650 km) and Azerbaijan (600 km). The length of the Caspian Sea is about 1205 km and its average width is 554 kilometres. The depth of the lake increases from north to south and at its deepest point is 1025 metres, with an average depth of 208 metres. It contains a number of small islands, covering an area of approximately 2,000 square kilometres. The sea is fed by over 130 rivers with largest streams flowing from the north and smallest from south coast. The Volga River, which alone supplies 80% of Caspian Sea basin water, is the largest river. The Caspian Sea has no connection to the open seas and it is through the Volga and then through Volga-Don channels that ships pass to reach the Black Sea and the Baltic Sea. The channel has a depth of 4.2 metres and ships of 5000 tons displacement can pass through it (iranicaonline.org, 1990). The ports on the Caspian are mostly shallow-water ports, with Iranian ports each having a depth of less than 10 metres. The most important and active ports of Iran in the Caspian Sea are Bandar Anzali, Bandar Nowshahr, Amirabad and Neka, and these are designed to handle international dry-cargo and container traffic and to ship or take crude oil and petroleum products.

According to the archaeological studies around the Caspian Sea, traces of settlements along the Caspian Sea date back 12 thousand years and it has been the cradle for many civilizations in surrounding territories in the northern regions of Iran, the western regions of Turkmenistan and the eastern regions of Azerbaijan. The Caspian Sea is home to approximately 1,600 marine species and over 70% of the world's caviar is supplied from this sea.

The Caspian Sea is utilized extensively for shipping, business, and oil, passenger and fishing exchanges. The Caspian Sea has always provided the means of income and trade for its coastline communities, and in particular from the 19th century with industrial exploitation of oil in Baku it

gained a new international significance. Before then, the sea's importance had been limited to fishing and shipping, but in recent decades, issues like exploiting the seabed's resources also found a great significance.

At present, in the Caspian Sea, Russia possesses the largest fleet, although in the recent years Iranian companies have also tried to gain a larger share in this area. Khazar Shipping Line is a subsidiary of the Islamic Republic of Iran Shipping Lines (IRISL). It provides marine transportation services in the Caspian Sea and runs regular services from Bandar Anzali, Nowshahr and Amirabad ports of Iran to Aqtau, Astrakhan, Makhachkala, Turkmenbashi and Baku ports.

Transfer of oil and fuel in the Caspian Sea is mainly realized through pipelines; alongside these, tanker ships carry crude oil, for instance from Russia and Kazakhstan to the Port of Neka in Iran for further transfer by Neka-Rey pipeline to Tehran Refinery. The sea transportation of goods from Iran to Europe, as compared to the route of Persian Gulf through ports of Caspian Sea is more suitable and economical due to favourable climate, low transport cost and shortness of route.

5.2.1 Bandar Anzali

Bandar Anzali is situated on the south-western coast of the Caspian Sea in latitude of 37^{o} 28' N and longitude 49^{o} 28' E, 365 kilometres from Tehran and 40 kilometres from Rasht, the capital city of Guilan province. It is one the most humid places in Iran and has a rainfall of 2000 mm annually. Its distance from the nearest airport is 35 kilometres.

The port is situated in the Lagoon of Anzali which has an approximate area of 37 square kilometres. The metropolitan area had a population of 140,000 as per the most recent census of 2011. The Lagoon of Anzali is a body of water that lay previously within the main body of the Caspian Sea, but which has gradually separated and isolated as a result of shrinking of water and now is separated from the Caspian Sea by a wall of sand that has been formed over a long period of time by the currents (Scott, 1995: 36).

Anzali port, having an ancient record of cargo handling, is one of the active ports among the Caspian Sea littoral states and a busy port on the northern corner of Iran. In addition to enjoying tourism attractions, the port is also important in being situated on a major Europe-Asia communication route. Investments made in the field of establishing appropriate infrastructures, multi-purpose warehouses and various terminals as well as purchase of modern loading and unloading equipment, marine traffic equipment and using information technology for electronic trading, and dealing with the port and customs formalities has further provided the necessary infrastructure, and consequently has made this port distinctive from the rest of Iranian ports in this region.

5.2.1.1 Berthing facilities, warehouses, shore and marine equipment of Anzali port

Anzali port has an area of 71 hectares, with 22,709 square metres of covered warehouses and 1,215 square metres of other shed space. The marine infrastructure provides 11 berths with a total length of 1657 metres and a depth of 5.5 metres (anzaliport.pmo.ir, 2013). The port's accommodation, shore equipment and marine facilities are shown in Tables 5.17, 5.18 & 5.19, respectively.

Table 5.17: Berthing infrastructure of Anzali port

Number of berths	Pier type	Length (metres)	Draft (metres)	Ship's tonnage
1	General	89.126	5.5	5000
2	General	24.126	5.5	5000
3	General	24.126	5.5	5000
4	General	24.126	5.5	5000
5	General	156	5.5	5000
6	General	156	5.5	5000
7	General	156	5.5	5000
8	General	156	5.5	5000
9	General	156	5.5	5000
10	General	192	5.5	5000
11	General	90	5.5	5000

Source: compiled by author from the port profile on anzaliport.pmo.ir

Table 5.18: Shore gear of Bandar Anzali

Equipment units	Number	Capacity
Cranes light and heavy	53	5 to 100 tons
Rail crane	10	15 tons
Reach stacker	40	40 tons
Light trucks	66	3 to 15 tons
Top lift truck	2	35 tons
transtainer	1	40 tons
tractor	58	-

Source: compiled by author from anzaliport.pmo.ir

Table 5.19: Marine facilities of Anzali port

Type	Number	Remarks
Dredgers (hopper suction and hooked grab)	2	Hopper suction and hooked application
Tugboats	4	Tow services and fire-fighting
Boats (pilot, rescue and coastguard)	6	Pilot & rescue & coastguard applications
Barges	2	Lighterage and barging operations

Source: compiled by author from port profile on anzaliport.pmo.ir

5.2.1.2 Anzali Free Trade Zone

It was after the downfall of the Soviet Union that the role of Iranian northern ports and especially Anzali port on the economy of the region was increased. This situation resulted in the establishment of a special economic zone in Anzali in 1996 which was later registered as a free trade industrial zone in 2003. Its status was ratified by the board of ministers in 2004. This zone has an area of 3200 hectares of land and waters to a depth of two kilometres from the coastal range in two distinct sections each one with its specific features, in the east and west of the port and has about 8 kilometres of sea frontage (anzalifz.ir, 2013). The advantages of Anzali free zone could be summarized as below:

- Availability of modern transportation installations.
- Easy access to the North-South Transit corridor.
- Proximity to Astrakhan and Lagan ports in Russia and Krasnovodsk port in Turkmenistan, Aktau port in Kazakhstan and Baku in Azerbaijan.
- Connections to regional markets and access to a consumption market of over $300 billion value of cargo trade and services in newly developed states of former Soviet Union.
- Accessibility to one of the greatest oil and gas reserves of the region and the world.
- Accessibility to the domestic lead, zinc and iron mines.
- Proximity to five national power stations.
- Easy access to European ports.
- Availability of port areas for setting up oil storage tanks, for purpose of further domestic sale or transit to countries such as Turkey and others.

5.2.1.3 Rail connection plan and construction to Bandar Anzali

The rail connection to Bandar Anzali is under construction as part of the Ghazvin-Rasht-Anzali railway line. This project covers the north part of Iran and passes through Guilan province. The axis is located in the main route of the North-South Corridor of the Trans Asian Railway (TAR) and will soon be connected to the railway network of Azerbaijan via the Iranian border city of Astara. The Ghazvin-Rasht-Anzali railway length is 205 kilometres and branches off from 15 kilometres west of Ghazvin at Siah Cheshmeh and after passing through the Kouhin defile and the cities of Loshan, Manjil, Roodbar, Emamzadeh Hashem, and Rasht (the centre of Guilan province) it ends in the port city of Bandar Anzali. On the way back from Anzali, the Rasht-Astara axis, which has a length of 165 kilometres, is separated from Rasht station, and after passing through Rezvanshahr and Hashtpar cities, it reaches Astara port. This rail line mainly passes through the green and cultivated plains of Guilan province between the Caspian Sea and the Alborz Mountains. Parts of this terrain are highly mountainous, therefore the line passes from a valley which has the main artery road and newly-constructed Ghazvin-Imamzadeh highway crossing through it, to Rasht and then Anzali port. This part of the rail line, because its

steep topography, has a maximum gradient of 30 percent in some parts and about 41 kilometres of this route has been designed in double track (unescap.org, 2009).

5.2.2 Nowshahr Port

The Port of Bandar Nowshahr is one of the most active Iranian ports on the Caspian Sea coast and is located in the Mazandaran province of Iran. Nowshahr County, with a population of around 50,000, is located on the Caspian coast close to the Alborz Mountain chain and with Noor city in its east and Chalous city in its west. At present its distance to Tehran is 200 kilometres but upon completion of the Tehran-North freeway, this distance will decrease to 120 kilometres. This port city is connected to Sari, the centre of Mazandaran province, by a 35-kilometre highway; also to Guilan province in the west and Golestan province in the east, via main roads and by air. This port city is an attractive destination for domestic tourism and is well equipped with hotels and private villas to accommodate large numbers of visitors (medlibrary.org, 2013).

5.2.2.1 Port History and geographical information

Port construction started in 1930-31 by the Bur Works Company of the Netherlands and the Agerman Company of Belgium and the port was established in 1939-40. Project cargoes and parts of the Karaj steel plant of Iran were the first consignments to be carried on a Russian vessel to this port in 1939 (Floor, 1984).

As a commercial port, Bandar Nowshahr has evolved into a major economic centre for exchange and sea transportation of goods to and from the ports of other littoral states on the Caspian Sea coast in recent years. The port of Nowshahr has at least 500 vessel calls annually. Geographical coordinates are longitude 51^{o} 36’ E and latitude 39^{o} 30’ N and the port lies on the southern coast of the Caspian Sea in the north of Iran and is almost the closest northern port to the capital Tehran. Its climate is humid and it is located in an area of immense natural beauty. An airport is located two kilometres from the port (nowshahrport.pmo.ir, 2013).

5.2.2.2 Nowshahr port features and specifications, shore gear and maritime equipment

Amongst the most important features and attributes of the port are the following:

- Proximity to important industrial and production centres and to the most populated areas of the country like Tehran, Central, Semnan and Khorasan provinces.
- Suitable climatic conditions for export, import and goods in transit, particularly fruit, vegetables, dried fruits and other perishables.
- Advanced and high technology telecommunication, loading and unloading equipment.
- Availability of passenger terminals for passenger traffic from Nowshahr port to other Caspian Sea basin countries.

Tables 5.20, 5.21, 5.22 & 5.23 show, respectively, the port's specifications, warehouse areas, shore facilities and marine equipment.

Table 5.20: Specifications of Nowshahr port

Application/Features	Indicators
Length of western breakwater	1340 metres
Length of eastern breakwater	700 metres
Width of entrance channel	190 metres
Commercial dock	4 berths
Oil dock	1 berth for tanker vessels
Dock	1 berth for Roll-On/Roll-off (RORO) ships
Draft	5.5 metres
Ship admittance capacity	6000 tons
Total land area	20 hectares

Source: compiled by author from Nowshahr port profile on nowshahrport.pmo.ir

The port area at Bandar Nowshahr is comprised of two main parts one at the east lake basin and the other area at the west side of it, each of which is further divided into subparts. The Port of Nowshahr has seven standard roofed warehouses with an area of 25,733 square metres which are used for storing different types of import, export and transit commodities. It has also an open stack yard at the western area which is 26,291 square metres (nowshahrport.pmo.ir, 2013, *op. Cit.*,).

Table 5.21: Nowshahr port warehouses

1	Western transit warehouse	Area 3200 square metres
2	Eastern transit warehouse	Area 3168 square metres
3	Southern dock warehouse	Area 4500 square metres
4	Raksel co. transit warehouse	Area 4500 square metres
5	Irsoter co. transit warehouse	Area 4500 square metres
6 & 7	Double warehouse	Area 6873 square metres

Source: compiled by author from Nowshahr port profile on nowshahrport.pmo.ir

Table 5.22: Port equipment

Type	Number	Tonnage
Cranes	26	20 to 25 Tons
Top lift truck	1	35 ton
Lift trucks	46	3 to 15 tons
Tractors	27	
Trailer Trucks	54	
Light and heavy vehicles and machinery	29	

Source: compiled by author from the port profile on nowshahrport.pmo.ir

Table 5.23: Marine equipment

Type	Number	Remarks
Dredging machine	2	Dredging applications
Tugboat	2	Tow services and firefighting
Boat	2	Pilot and guiding applications

Source: compiled by author from the port profile on nowshahrport.pmo.ir

The port is also well equipped with a number of telecommunication and navigation assistance equipment such as coastal VHS-DSC with phone patch, HF, GPS, Marine VHS-DSC, Compass, Depth Finder (Fathometer), Radar, VHF and Coastal VHS-DSC.

5.2.3 Amirabad Port

The Port of Amirabad lies on the south-eastern shores of the Caspian Sea about 55 kilometres northeast of Sari, the centre of Mazandarn province. The port began its activities in 1996 and later in 1997 has been enhanced in its potential capabilities through its designation as a special economic zone by the Supreme Council. In phase I of its development, port capacity was 6.5 million tons, but this is designed to increase to 18 million tons by the final phase. The Port of Amirabad was established to take advantage of the strategic importance of the Caspian Sea to surrounding markets and trade, as well as its potential to improve the country's transportation and communication networks. In fact, Amirabad port could be regarded as a special economic zone of Behshahr insofar as its 1000 hectares of zone-supporting lands are poised to perform an important role in the local and national economy and play a competitive role in the international trade arena. Furthermore, the Port of Amirabad is near to other industrial centres and tourist attractions like Miankaleh Island, Lapo Swamp, and historic Abbas Abbad (worldportsource.com, 2013).

5.2.3.1 Geographical information and main features

The Port of Amirabad, the broad location of which is shown on the figure 5.9, lies in the north of Iran on the Caspian Sea south-east coast, with a latitude 36^{o} 50' 28" N and longitude of 53^{o} 18'40" E of geographic coordinates. It has a distance of 330 kilometres to Tehran and its distance to the nearest airport (Sari Dasht-e-Naz International Airport) is 35 kilometres. At present the Port of Amirabad is the only northern port of Iran to be connected to the national railroad system and is accessible through air, road and railroad. Its capacity will expand to 10 million tons annually with second phase of port development, which is already underway. Amirabad port is equipped with the most advanced maritime and telecommunication facilities and is suitable for oil, industrial and trade investments. In future and in line with the expansion of SPZ, the number berths is planned to increase to 34 berths by 2020 (amirabadport.pmo.ir, 2013). The ports code (UN/LOCODE) is IR AMP. Tables 5.24, 5.25, 5.26, 5.27 & 5.28 show the port's specifications, land & warehouse areas, grain silo particulars, marine equipment and shore gear facilities, respectively.

Table 5.24: Amirabad port specification

Type of berth	Number of berths	Length (m)	Draught (m)	Acceptance capacity
Grain jetty No. 1	No. 1	100	4.67	6500 tons
Rail & Truck traffic	No. 2 Ro-Ro Jetty	188	4.67	6500 tons
Multipurpose east	No. 3 to 6	650	4.67	6500 tons
Multipurpose south	No. 7	220	4.67	6500 tons
Multipurpose west	No. 8-9	360	4.67	6500 tons

Source: compiled by author from the port profile on amirabad.pmo.ir

Total area of the Amirabad port and its petroleum and industrial zones is 1060 hectares of land and with the port back up areas in future will increase to 2120 hectares (civileng.pmo.ir, 2013:1).

Table 5.25: Land areas and warehouses

Covered warehouses	Number	Area square metres
Warehouse	No. 1	12000 m^2
Warehouse	No. 2	10000 m^2
Warehouse	No. 3	10000 m^2
Warehouse	No. 4	10000 m^2
Open Stack Yard	-	12 hectares operational area

Source: compiled by author from the port profile civileng.pmo.ir.

The Silo number 1 is constructed with 50% partnership investment from the Kazakhstani government.

Table 5.26: Grain Silos Amirabad port

Silo	No. 1	53,000 tons capacity
Silo	No. 2	25,000 tons capacity

Source: compiled by author from the port profile civileng.pmo.ir.

Table 5.27: Amirabad port marine equipment

Tugboat	Pilot & Rescue Boat	Dredger	Total
5	4	1	10

Source: compiled by author from the port profile on amirabad.pmo.ir

Table 5.28: Amirabad port equipment and shore gear

Tractor	Transtainer	hydraulic cranes 20 to 64 ton	Hydraulic grab crane	Reach stacker	Carrier	Lift-trucks	Grain sucking machine	Gantry cranes
15	1	11	4	1	17	17	2	2

Source: compiled by author from the port profile on amirabad.pmo.ir

Figure 5.9: The port of Amirabad's connection with the North-South Corridor

Source: amirabadport.pmo.ir website, December 2012

5.2.3.2 Amirabad Port Special Economic Zone (SEZ)

In 2005-2006, the Amirabad SEZ was one of the pivotal infrastructural projects in Mazandaran province, and this promoted its status as a major engine for economic expansion, both in its

region and in the country at large. A bright and new chapter was registered in the performance of Amirabad port, whose turning point sparked outstanding growth in loading and unloading operations, especially exports and also attracted private sector engagement in the northern Iranian ports.

Performance of Amirabad (SEZ) became brighter especially between 2005 and 2009 with physical progress of development projects such as Pier No. 9 at Amirabad port – Substation transformer (TR5) - construction of gas pipeline and pressure reduction station - building the entrance weighbridge - implementation of support wall project for the protection of coastal lands within the special zone - implementation of local rail-road - implementation of the access road and surrounding the port - implementation of the project for the rail-based Ro-Ro pier No. 2 of the zone port - landscaping operations in western and southern parts of pound No. 1 - and construction of Control Tower and Centre for Marine Telecommunications of the zone are among other development projects which became operational. As a result of efforts and serious attention of the government and through purchase of modern equipment and facilities, capacity of Amirabad port has been increased. On the other hand, purchasing and commissioning a 500-port telephone system and its peripheral equipment, together with fibre optic infrastructure, are among major development plans for establishing IT and ICT infrastructure. These are considered among the most important measures taken in this port to play a significant role in its alignment with major ports of the country and with other Caspian Sea basin neighbouring ports and the world (Aghaz Biweekly, *op. cit*., pp.9-11).

The advantages of the Amirabad port Special Economic Zone can be summarized as follows:

- Free partnership in investment between local citizens and foreigners.
- Free entry and exit of capital and guaranteeing the same for the interests thereof.
- Possibility of transit, transshipment, exports as well as re-export of goods without any customs formalities.
- Direct communication through road and railroad with the Middle East, Far East, Russia and North European countries.

- Long and short term leasing of storage areas to applicants at competitive prices.
- Import of raw material to the zone without any customs duties and formalities.
- Possibility of importation and utilization of machinery, spare parts and capital vehicles without any payment for customs duties.
- Enjoying advantages of modern loading and discharging equipment and facilities and presence of railroad in the zone.
- Exemptions from commercial benefit tax for processing, exchange and completion of goods imported for re-export (amirabad.port.ir, 2013).

5.2.4 Neka Port

The northern Port of Neka is located approximately five nautical miles west of Amirabad port. Expansion of oil exploration industries as well as building oil storage facilities to increase the oil swap of the country at Neka, has given a great significance as a commercial outlet to this previously small-scale port terminal at the southern end of the Caspian Sea basin. Recently, the Iranian Oil Terminal Company (IOTC) signalled its plans to increase its oil swap arrangement capacity from current volume of 200,000 to 500,000 barrels per day, by building new oil storage facilities and preparing a big stockpile as well as facilitating more berthing and adding dredging operations at this port (dredging today staff, 2012). The off-loading of oil at this port allows Iran to bond its national economic interests with Russia, Kazakhstan, Turkmenistan and Azerbaijan. On the other hand, in the absence of a pipeline route from the Caspian Sea to the Persian Gulf through Iran, which is the shortest and possibly the cheapest route for Caspian Sea oil transit and trade to Asian and other markets, Neka port's performance is in the best interest of all the Caspian states. The oil swap project saves Iran the cost of carrying 500,000 bpd of oil from south to north of the country to feed the Tehran, Arak and Tabriz oil refineries (presstv.com, 2013).

5.2.4.1 Geography, main features and port facilities

Neka is a small town with a population of 46,152 as per the 2006 Iranian census. It was formerly called Naranj Bagh and is located 20 kilometres to the southeast of Sari, the centre of Mazandaran province. Figure 5.10 shows the Port of Neka's location and its infrastructure.

Figure 5.10: Neka port connections to Iran's crude oil and natural gas infrastructure

Source: Us energy information administration, HIS Edin, October 2009

The port is situated 320 kilometres north of Tehran on the fringes of the Caspian Sea coast at geographical coordinates of 36° 39'03" N 53° 17'57" E and is close to Bahshahr, an industrial centre in the northern territory of Iran. The railway runs across this port town, which has a

suitable network of communications, along with oil reservoirs and a timber industry. In addition, one of the biggest thermal power plants of the Middle East, with normal capacity of 2035 MW, is located in Neka. Iran started its oil swap with the Caspian Sea and Central Asian states in 1997 and joined the market for carriage of crude oil shipments on the Caspian Sea in 2003 when it launched its first tanker. Therefore, in order to address the shallow water problem at the Port of Neka, a deep-water offshore mooring jetty was projected and built several kilometres into the sea, with an oil pipeline running from it to the port's shore facilities. In addition to construction this off-shore mooring jetty, oil terminal storages and docks in the port were also expanded. The Neka-Ray pipeline shown in Figure 5.10 with an initial capacity of 370,000 barrels of oil per day plays an important role in this Caspian Sea oil outlet port (pipelinesinternational.com, 2006).

5.3 Conclusions

New destinations in the Middle East and Central Asia, and the trading needs of Southern Asia and the Caucasus region, have created great opportunities for Iran's sea, land, and air transport activities and links. Consequently, the authorities in different sections of the country's transport sector are engaged in constructive work on domestic connections and international linkages to strengthen the country's position as a key transport corridor in the region. In the country's fifth Five-Year Development plan (FYDP) the Iranian government allocated approximately $34 billion to the transportation sector in 2010 (Central Bank of Iran Annual Review, 2011:14; and thebusinessyear.com 2013) with the intention of enhancing its international land, sea and air connectivity (ECO Trade and Development Bank, 2014: 21).

Based on the Iran Country Partnership Strategy 2011-2012 report published by the Economic Cooperation Organization (ECO), (Trade and Development Bank), the nominal capacity of the commercial ports of Iran increased by 5.6% over the previous period of 2010-2011 with a non-oil traffic base of over 150 million tons.

Bandar Abbas, which is Iran's main container port and one of the largest hubs in the Persian Gulf, has lead this growth, with the port's cargo traffic reaching 2.5 million TEUs in 2010. This was 95% of the country's total TEU handling activity; in addition, the port accounted for 37% of the country's total transit traffic in 2011. The other main ports, such as Bandar Imam Khomeini

in the Persian Gulf and Bandar Anzali and Amirabad ports on the Caspian Sea, have also been active in transit activities.

Although economic restrictions on Iranian seaborne commerce have hampered port activities, growth in the main exports, including oil products, machinery, transportation equipment and chemicals, is expected to resume as soon as sanctions are lifted and relations with western world are normalized. During the sanctions period, trade with China recorded an increase of 52% in cargo volume terms in 2011.

Passenger traffic by sea also increased in 2011; according to statistics released by the Ministry of Roads and Urban Development, 3.8 million people arrived in Iran by sea during 2010-2011. The increased number of tourists and the larger volumes of cargoes coming into the country by sea reveal the significance of the country's role as a transport bridge through a myriad of seaport links to the north-south and east-west corridors of the region.

The strategic geographic position of Iran, its huge population, the substantial consumer and manufacturing markets of its neighbouring countries, the easy access it enjoys to international waters (and the 90% share of maritime transportation in the country's annual trade), and its good location in respect of the International North South Transit Corridor and TRACECA Corridors all combine to confer major sea transport and cargo transit advantages on the ports of the country. This underscores the importance of establishing strong multimodal transport linkages to integrate the shipment of cargo from origin to destination using different modes of transport, including through the ports. A strong ports system can intertwine all the above-mentioned factors and bring about development of transit commerce on a significant scale in Iran. In fact, transit will achieve its clear potential and development only when cargo is transported from origin to destination and the cargo owner is assured that his/her cargo will reach its final destination safely and cost-effectively. Therefore, every organization or body that is responsible for cargo transportation should be mindful of removing existing difficulties and bottlenecks in the first place and then developing required infrastructures for cargo transit. Iran's port and maritime activities have carried and must continue to bear a great part of this responsibility to provide the best possible facilities and infrastructures for handling of imports, exports and transit

of cargo through the ports in a way that can contribute to lower finished costs. An important point on the question of cargo transport and transit through the ports is the mere fact that on the one hand traders, forwarders and carriers have responsibility and on the other hand governmental organizations such as ports and customs administrations are responsible. In this respect, the country has to seize this golden opportunity that presents itself and use every potentiality of government and the private sector to enhance cargo transit through ports. This in turn will increase cargo traffic and lead to increased public income, which creates opportunities for new investments and job creation in the field of transportation as whole.

In addition, implementation of port projects has dramatically increased the capacity of Iranian ports, particularly in the south of the country; even though Iran has been the target of sanctions by the western world, it has not stopped its development projects in its ports. Iran's ports have a great share in the national economy due to their strategic locations.

Although traditional port factors such as hinterland size and physical infrastructure play an important role in port competition, recent debates on port developments have centred on strategic responses of port authorities, operation managers and owners to the emergence of global supply chains. Hence, as Jacobs, & Hall, (2007: 327) indicate "the competitive performance of a port authority or operator, given the rise of the integrated logistics sector, depends increasingly on its strategic relationship to the supply chains and rather less on traditional factors." The hypothesis is that the strategic supply chain choices of a port authority or operator are conditioned by the dominant actors in the broad market context and hinterland within which a port operates.

CHAPTER SIX

ASSESSING POTENTIAL TRADE AND TRANSPORTATION LINKS OF IRAN

The first overarching goal of this study was to assess current and potential trade and transportation links of Iran by addressing a simple question: what are the prospects for the Iranian ports and seashore and their associated landside multimodal corridors to present the country as a transportation hub of transit and trade in the Middle East and Eurasia? A comprehensive overview of transport linkages at the regional and intercontinental levels was presented to show that Iran has the ingredients to become a major transportation hub, facilitating transformation by deeper integration into Eurasia and acting as a commercial bridge between east and west, as well as between north and south. Developing a comprehensive understanding of this constitutes the second overarching objective of this study.

In this chapter, which is the logical extension of the previous chapter four, dealing with the ports and seashore, and chapter three, dealing with the landside multimodal corridors that link these ports to inland destinations, the essential purpose is to draw together these substantial prior discussions. Considering the most suitable geographical situation of Iran to transport goods between Europe and Asia and placement of this country in the forefront of several major international corridors (both east-west and north-south), and certain pivotal Asian Land Transport Infrastructure Developments such as “ALTID” and Transport Corridor Europe-Caucasus-Asia “TRACECA”, in the field of commerce, the transportation system in this country becomes very important.

6.1 Background and main features

Like Persia in the old Silk Road, Iran has grasped its strategic location at the crossroads of Eurasian infrastructure corridors on both east-west and north-south trade and transport axes. Iran is the natural hub for land transport between Europe and Asia, across Turkey, the Caucasus, Central Asia, and other neighbouring countries such as Iraq in the west and Afghanistan, Pakistan and the Indian Subcontinent in the east, while at the same time, offering an efficient

gateway for Russia, Caucasus, and Central Asia and the rest by way of the Iranian port cities, to the Persian Gulf and Indian Ocean and beyond to the open seas of the world (Figure 6.1). In Chapter Three, after detailing the remarkable developments of the Iranian railroads, which concretised this role as a Eurasian hub, achievements like Mashhad-Sarakhs-Tedzhen on the Eurasian land-bridge towards Central Asia, and the railroad connection from the Iranian city of Kerman up to the border with Pakistan that linked by rail the Indian Subcontinent to Europe for the first time in history, were discussed. At the same time, the establishment of passenger and container train service on the Istanbul – Ankara (Turkey) – Tabriz – Tehran – Mashhad Iran) – Tedzhen (Turkmenistan) – Tashkent (Uzbekistan) – Almaty (Kazakhstan) line was addressed (Schiller Institute, 2001).

Figure 6.1: Iran's rail and road border/customs crossings with neighbouring countries

Source: Iranian Road Maintenance & Transportation Organization (RMTO) site, 2013

Over the last decade, merchandise trade between Europe and East Asia grew rapidly, reflecting the dynamism of an increasingly dominant and export-oriented Chinese economy. The Euro-Asian land transport links, could complement the rapidly expanding number of seaports and maritime routes handling the bulk of trade flows between East Asia and Europe, thus enhancing economic development prospects not only for China and Russia as major emerging market powers, but also in other countries along the Euro-Asian routes such as Iran, Turkey, Ukraine as well as the ten landlocked countries participating in the Euro-Asian Transport Links (EATL) projects. These are Afghanistan, Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan and Uzbekistan.

Along the Euro-Asian land bridge, the landlocked countries for access to international markets depend on each other. A whole route can render economically non-viable for international transport by a weak or missing link in one country. Transport operators are discouraged from exploring alternative routes by continued persistence of non-physical bottlenecks, such as excessive documentation requirements, unofficial payments, delays at border crossings, and unexpected closures of borders. The countries spanning the Euro-Asian land bridge as a result facing relatively high transport costs, which is weakening their export competitiveness and preventing them from accessing new export markets that would boost their economic development. “Most of the identified Euro-Asian routes are intermodal as they have to cross the Caspian and Black Seas; this requires the combined maritime, rail and road modes within the existing Euro-Asian routes” (United Nations, 2008).

One of the objectives of this study was to explore the potential of multimodal transport of goods between the Middle East through Iranian territory and south East Europe with emphasis on sea/rail intermodal opportunities. South-east Europe-Middle East corridors may be analysed through Iran-Turkey sea/rail or sea/road routes.

As an effective through-transport connection, the Turkey-Iran rail route was constrained by two missing links in the past. One of these has recently been resolved, while the other remains a constraint. These missing links were the Bosporus Channel and a Lake Van bypass. The Bosporus issue has been largely sorted out by construction of a rail tunnel, which has been completed. On Lake Van, two Ro-Ro ferries are crossing constantly on a 24-hour basis, on six-

hour, 120 km lake crossings. These impose a traffic limitation of 1.3 million tons per year in both directions, since only one single line for mixed use passenger and freight carriage is available. This multimodal sea/land route has the potential to attract transit traffic between Iran and S.E. Europe (International Union of Railways – UIC, 2008: 28).

In Iran, the design speed on most double lines is 160 km/h for passenger trains and 120 km/h for freight trains (Railway Gazette, 2005). In fact, the maximum speed of freight trains running in common rail-lines with passenger trains is 60 km/h for loaded trains and 80 km/h for unloaded trains, but the average operational speed is about 30 km/h for loaded trains, due to level crossings, passage through towns and due to the priority that passenger trains have over more heavily-loaded freight trains (Tables 6.1 & 6.2). On the Mashhad-Bafgh line, since there are no passenger trains, the average speed is about 60 km/h (International Union of Railways – UIC, *op cit.,* p.24).

Table 6.1: Import cargoes (in 1000 ton) coming to Iranian borders on rail – 2003-2012

Year	Mirjaveh	Sarakhs	Bandar Abbas	Bandar Imam	Julfa	Razi	Khorram -shahr	Amir- abad	Total
2003	49	825	1,026	3,379	0.5	135	10	106	5,531
2004	62	741	958	3,430	0	202	36	254	5,683
2005	78	755	1,116	3,331	0	155	0	92	5,527
2006	42	1,034	1,063	3,189	0	228	0,4	0	5,556
2007	30	755,6	1,047	2,497	0	198,5	3	0	4,531
2008	24	782	940	2,358	0	176	8	0	4,288
2009	7	1164	942	1817	0	163	13	0	4,106
2010	4	687	1,228	1,367	0	157	0	0	3,444
2011	0	394	1,178	1,396	0	108	2	0	3,079
2012	0	463	841	1,334	0	197	0	26	2,861

Source: RAI (Islamic Republic of Iran Railway), March 2013

As Tables 6.1 & 6.2 show, import volumes in particular and also to a certain extent export volumes by rail have exhibited considerable instability, notably at the three major border

crossings. Indeed, import tonnages have fallen to a marked extent over the reporting period. This is in large measure a function of political issues in the neighbouring countries. Amongst other consequences of these, because of the ongoing conflict between Azerbaijan and Armenia, the Julfa border crossing has not been operational. The Mirjaveh crossing has also been affected to a smaller extent by unrest in the Baluchistan province of Pakistan, although a decision by Iraq to favour road borders instead of rail is a more important factor.

Table 6.2: Export cargoes (in 1000 ton) going out of Iranian borders on rail: 2003-2012

Year	Mirjaveh	Sarakhs	Bandar Abbas	Bandar Imam	Julfa	Razi	Mah shahr	Khorra mshahr	Amir abad	Total
2003	41	293	2,864	406	1	56	556	5	0	4,222
2004	55	313	4,218	616	0	83	452	10	17	5,764
2005	76	348	5,016	344	0	57	338	8	5	6,192
2006	44	365	5,451	434	0	63	535	0	0	6,892
2007	34	459	5,386	425	0	68	103	0	0	6,475
2008	21	425	5,016	199	0	55	0	0	0	5,716
2009	8	752	5,409	346	8	37	26	0	0	6,587
2010	5	1,004	6,390	87	0	57	167	45	0	7,755
2011	1	860	4,495	76	0	88	242	54	0	5,816
2012	1	992	5,150	68	0	133	0	57	83	6,485

Source: RAI (Islamic Republic of Iran Railway), March 2013

The Iranian transit roads have a total length of 19,000 km and they concern mostly the axes:

- Bazargan (Turkey) – Turkmenistan borders
- Bazargan (Turkey) – Persian Gulf ports (Bandar Imam Khomeini, Bandar Abbas)
- Bazargan (Turkey) – Afghanistan border and Pakistan borders
- Bandar Abbas – Afghanistan and Pakistan borders
- Bandar Abbas/Bandar Imam Khomeini – Turkmenistan borders

- Bandar Abbas/Bandar Imam Khomeini – Caspian Sea ports
- Bandar Abbas/Bandar Imam Khomeini – Azerbaijan, Armenia and Georgia
- Bandar Abbas/Bandar Imam Khomeini – Iraq borders

The last three transit routes, which pass through Bandar Abbas, correspond also to the North-South Transit Corridor which starts at Helsinki, transits St. Petersburg and Moscow, continues to Astrakhan and the Caspian Sea (or branches around it) and then passes through the Iranian ports or railheads on the Caspian (Bandar Anzali, Bandar Nowshahr and Bandar Amir Abad) to continue through Bandar Abbas and onwards to India (Mumbai) or other more distant destinations. This is a multimodal corridor on which road, rail and sea transport should cooperate effectively (International Union of Railways – UIC, 2008).

In general the road network reaches all locations – for example big cities, ports, production and logistics centres – not only in the study area but also to the countries where the cargo has its final origin or destination. Thus one does not really face any missing links as in the case of the railways. But although roads go everywhere, there are many barriers to efficient road transport, as road links also face capacity limitations. Many Metropolitan areas lack bypass roads, and many roads are in bad condition and in need of maintenance. In addition, there are closed borders for political reasons, inefficient border facilities with associated border delays, there are incompatibilities to technical standards for vehicles (for example axle weight), breach of international conventions (TIR), need to form convoys, lack of transit permits etc. However, although all these barriers exist, road transport is much more efficient and more competitive, compared to rail, in most cases, due to the door-to-door service it offers, its flexibility and effectiveness for many non-oil, non-bulk consignments.

6.2 Iran routes from the perspective of the New Eurasian Land Transport Initiative (NELTI)

It has been demonstrated that “commercial road haulage shipments between Asia and Europe are perfectly feasible and that the remaining impediments are of a procedural nature” (NELTI Report, 2009). The idea, to develop Eurasian transport links for harnessing the potential of road haulage had been discussed at international level for transcontinental road transport operations,

since the late 1990s. A NELTI project that officially started on 16 September 2008 in Tashkent (Uzbek Republic) was organized by the International Road Transport Union (IRU), in order to implement a project which stretches over the territories of twelve countries (10 CIS member countries, as well as Turkey and the Islamic Republic of Iran). Therefore, Coordination Centres were set up and shipments have been undertaken along three principal routes, each of which has had off-shoots:

- The Northern route with an approximate length of 6,500 km extending from the Chinese borders via Uzbekistan, Kazakhstan, Russia and Belarus to the European Union covering the territory of 13 countries, and three different road segments in Central Asia, Russia and European Union.
- The Central route which has different legs leaving from the Black Sea. It is approximately 5,100 kms in length, covering territory from Central Asia, via Turkmenistan, Azerbaijan and Georgia, to Europe.
- The Southern route, at approximately 4,600 km, is the shortest. Starting from Kyrgyzstan it leads to the European Union through Uzbekistan, Turkmenistan, the Islamic Republic of Iran and Turkey.

Amongst the three mentioned routes the South corridor is the most "commonly-used route since Iran has a relatively reliable infrastructure network." Expert estimation of NELTI confirms that "50% of the annual 8,000 trips heading from Turkey to Kazakhstan use the South corridor and travel time on the Southern route varies from 12 to 17 days upon the origin and the destination of a trip" as shown in Table 6.3 (NELTI Report, 2009: 15).

Table 6.3: The southern corridor – principal routes

Itinerary	Distance (kms)	Border crossing	Total days with European speed	Real observed days
Istanbul - Almaty	6219	4	9	17
Istanbul - Osh	4600	5	7	13
Tashkent - Sofia	4545	4	6	12
Istanbul - Atirau	5190	4	8	8

Source: International Road Transport Union (NELTI site), 2009.

The major reasons for these time differences are waiting time at border crossings, and driving restrictions in some areas. In general, waiting times on Southern route borders are the longest and according to NELTI observations, the average time that operators are spending on border crossing is more than 80 hours per trip, which is equal to 3.5 days of lost time. Amongst the most time-inefficient of these are the Iran-Turkey border, where average waiting times of over 30 hours have been reported, and the Iran-Turkmenistan border crossing. These rank amongst the most time consuming of the border crossings used in the Southern route. This increases the total travel time by 20% (18 days instead of 15 days). At times one of the impeding factors in this route has been the duration of Iranian transit visas given to drivers which previously had a seven-day validity period, and contributed to delays, but this validity period has been extended to 14 days, mitigating this problem (see Table 6.4).

Table 6.4: Southern corridor main border crossing and waiting times

Border	Waiting time
Kyrgyzstan – Uzbekistan	From 1 to over 96 hours
Uzbekistan – Tajikistan	From 3 to 41 hours
Turkmenistan – Uzbekistan	From 3 to 14 hours
Islamic Republic of Iran – Turkmenistan	From 2 to 122 hours
Islamic Republic of Iran – Turkey	From 14 to 32 hours

Source: International Road Transport Union IRU – NELTI site, 2009

The average speed of the operator on trips over this corridor is 255 km/day, which is low; this is the case in Turkey as well as Iran, Tajikistan and Uzbekistan, since in some regions driving time is only from six in the morning to nine in the evening. The border crossing payments along the Southern route are the highest in comparison with other routes, which represents over 40% of expenditure, the other major component of 59% being fuel costs and only 1% is for unspecified costs (*Ibid*,. p.16).

In comparison, and based on the monitoring results of IRU NELTI, it could be concluded that the route that is least intensively patronised by operators is the Central route and according to the

driving log books the majority of trips are made over the Northern and Southern routes (MDG Review, 2009: 34).

By way of comparison with norms in the "European Union, transport time per kilometre would be 20% higher; the difference is even more visible with the time factor rising to +80% in instances when goods are moved from Moscow to Tashkent" (NELTI Report, op cit., p16). This leads to an average speed performance by road in the CIS, of only 37.5 km/h as compared to 70 km/h in the EU. The average distance covered per day along the Northern route is 490 kms, for the Central route 360 kms and for the Southern route 250 kms, respectively (OSCE Economic and Environment Forum, 2010). Border waiting times vary greatly from one border to another, exceeding in almost each case three to four hours. To make a trip from Kazakhstan/Kyrgyzstan to Europe using any of the three routes, it takes almost the same time from 12 to 17 days. Cost structure between three routes differs slightly. In general the expenditures on fuel followed by border crossing payments and other official costs represent around 70% of trip expenditure. On the Southern route, border crossing fees are the highest amounting at times to 2000 USD per trip; it is 370 USD along the Central route and 520 USD along the Northern route. At times, these may constitute up to 25% of the total trip expenditure.

The commercial viability of shipments between Asia and Europe, including the level of freight costs of approximately $4,000 - $5,000 for each way depending upon the route taken, have been confirmed by the actual data. Between the three principal routes, the volumes of shipments have differed and the largest volumes were seen on the Northern and Southern routes. Approximately 10,740 km (5,370 km each way) has been the average distance covered by each vehicle on a round-trip. Based on the average volume carried the average load has been of 14.4 tons per vehicle each way (28.8 tons per round-trip) (NELTI Report, *op cit*., p.17).

By the proportion of enforced halts in the overall shipping time and the proportion of costs which have to be met by hauliers en route and at border crossings (both official payments and unofficial levies), the type of obstacles encountered during road shipments are revealed. Each of these is shown in Table 6.5.

Table 6.5: Individual factors, affecting the costs in time and resources to road haulage

Factor	Actual value
Total sum of official dues and payments, excluding fuel costs and drivers' board and lodging	$167.20
Total sum of unwarranted levies, bribes and extortion paid out by drivers	$143.70
Drivers' working time (hours)	$ 60.50
Time of vehicle en route (days)	$4167
No of stops (more than 15 minutes) en route	$5917
Number of border crossings	$1084
Length of halts en route (days)	$1880

Source: IRU NELTI project, economic cost of non-physical barriers, 2009

Approximately 45% of shipping time and 25% of freight charges incurred by road hauliers has consisted of "non-production" costs (NELTI final report – IRU 2009). This would mean, shipping times could be reduced and freight charges brought down, thereby increasing the effectiveness of shipments by minimizing these two factors, which are characteristic of the obstacles encountered along the route. This would render road haulage between Europe and Asia considerably more competitive.

6.3 Eurasian intercontinental cargo transit and key issues affecting it

To a large degree, sea transit routes between China and Europe are associated with basically competitive conditions (Peng, & Xueyue, 2003). With extensive and cost-efficient fleets at their disposal, international shipping companies can keep their port charges and freight rates low. For consignors as they strive to minimise the transportation component of the price of commodities in order to keep them competitive in the destination country, in many cases the shipping cost is the main consideration. The tariff charged by shipping companies, at least in the near future, will be even more competitive than other modes of transport, following the recent huge crisis-related drop in the Baltic Dry Index (minerals, metals, grains, etc.).

However, the above appears to be true only for east-west transit. For north-south traffic, which is the other main direction for transit through the Eurasian Economic Community (EurAsEC)

countries, EU-Central Asia Monitoring analysts (EUCAM, in working paper 07, 2009) believe that "overland transportation costs can compete with sea freight."

Table 6.6: Sea and rail container freight costs in Eurasia

Destination port (loading port: Shanghai)	USD/Container			Delivery time in days
	20'DC	40'DC	40'HC	
Hamburg	1,475	2,500	2,650	26
Kotka	1,620	2,700	2,800	32
Tallinn	1,925	3,240	3,415	32
Riga	1,925	3,300	3,475	32
Klaipeda	1,925	3,300	3,475	32
Novorossiysk	2,025	3,750	3,875	32
St. Petersburg	1,980	3,170	3,270	32
Vladivostok	1,350	1,950	1,950	10
These ocean freight rates can be compared with the rail freight rates offered to the same company. Transportation is by TSR; destination Moscow				

Destination	USD/container			CNY container			Delivery time
	20'DC	40'DC	40'HC	20'DC	40'DC	40'HC	
Moscow	3,585	6,510	6,510	28,680	52,080	52,080	15

The insurance surcharge is $300-550 per container (depending on the customs code of the commodity). These tables show that sea shipping costs are around 50% lower than rail freight. Rates are quoted for Dry Container (DC) 20 & 40 plus 40 ft High Cube (HC) in $ (USD) & Chinese Yuan ¥ (CNY)

Source: EUCAM (EU-Central Asia Monitoring) Working Paper No. 7, 2009

According to estimates, to deliver one ton of cargo from Germany to India through the Suez Canal, it costs $3,500 and takes 40 days (Table 6.6). Container freight along the alternative north-south transport corridor will cost $2,500 and take 15-20 days (Emerson, & Vinokurov, 2009: 6).

6.3.1 Customer service and compliance with international quality standards

The major sea carriers offer a high standard of service, including cargo tracking, sophisticated logistics networks and guarantees of on-time and secure delivery, in addition to their competitive rates, for which they use state-of-the-art technology, to offer discounts to regular customers, etc. By comparison, the land routes suffer from both physical and non-physical disadvantages. As transbaltic.eu, (2010: 26) states "Physical barriers include the obsolescence and shortage of rail cars, containers and locomotives; the non-compliance of existing infrastructure and technology with international quality standards (route handling capacities, etc.); inadequate processing capacity at border-crossing points; poorly developed logistics and communications networks and motorway service facilities; and different rail gauges – throughout the CIS, the 1,520-mm gauge is used, whereas in Europe and Asia (China, Iran, Southeast Asia, etc.) the gauge is 1,435 mm." This poses additional problems which compound the shortage of transshipment centres and insufficient handling capacity at border crossing points (see Table 6.7). "Non-physical barriers are largely man-made non-technical barriers to trade, such as protracted customs procedures at border-crossing points, which significantly increase the waiting times for vehicles and rolling stock; random inspections, often requiring sealed transit containers to be opened; non-harmonised transit tariffs across the CIS; and migration rules determining the time drivers are allowed to stay in the Eurasian Economic Community (EurAsEC), which differ from country to country" (*Ibid*., p. 26).

Table 6.7: Trans-Asian Railway routes physical and non-physical trade barriers

Shipping point	Route	Distance (km)	Number of border crossing points	Number of bogie crossing points
Lianyungang (China)	Via Kazakhstan and Russia	9,200	4	2
Shenzhen (China)	Via Mongolia and Russia	11,040	4	2
	Via Kazakhstan and Russia	10,300	4	2
Tumannaya River	Via China, Mongolia and Russia	8,900	4	2
	Via china, Kazakhstan and Russia	9,900	4	2
	Via China (Manchuria) and Russia	9,000	3	2
	Via Russia	10,300	2	1
Nakhodka (Russia)	Via Russia	10,300	2	1
Rajin (North Korea)	Via China (Manchuria) and Russia	8,900	4	2
	Via Russia	10,300	3	1
Pusan (South Korea	Via North Korea and Russia	11,600	4	2
	Via North Korea, China, Mongolia& Russia	10,780	6	2

Source: UNESCAP (1996) Feasibility Study on connecting Trans-Asian Railway routes

6.3.2 Time advantage associated with overland transit routes

However, overland transit through Iran has an important competitive advantage and that is the reduction of delivery times. From eastern China and other Southeast Asian countries to Western Europe by rail or road the shortest cargo delivery time is 2-2.5 times shorter than sea shipment via the Suez Canal. Although, where delivery time is calculated for large shipments, this advantage is less apparent. For instance, for vessels working on Asia-Europe routes the average container capacity increased to 7,100 TEUs by 2007, whereas, in 2007 an average container train was able to carry up to 270 TEUs only (The national railway company of Kazakhstan – Tamir Zholy 2007, report).

For certain cargoes (perishable goods or urgent door-to-door shipments), shorter delivery time is also a critical factor. In addition, faster delivery means shortened transaction times and quicker receipt of cash from the bank. Therefore, "the time factor is a valuable competitive advantage that overland routes can offer for certain commodities, customers, and of course for land-locked regions that have no viable alternative to rail and road transit" (Emerson, & Vinokurov, 2009: 7).

6.4 Transport links between Europe and Asia, new challenges

The main objectives of this study are to provide insight into and analysis of the current situation in freight transport links between Europe and Asia from Iran in terms of time and cost in order to provide alternative approaches to transportation. The land route between Europe and Asia which is one of the oldest trade links in the world has not been properly used to its full potential for large-scale inter-continental trade. Rather, it is maritime transport that currently dominates inter-continental trade; international maritime companies have significantly expanded their capacities in order to meet the increasing demand from industries for the number of containers leaving Asia. While most of the transport is by sea, the development of efficient and coordinated inland routes may provide a credible and efficient alternative for transport solutions between Asia and Europe. Today, a number of transnational companies have established their factories in Iran especially Chinese and Korean companies operating in Iran through their representative companies in search of low-cost labour and expanded markets. With Europe being one of the largest markets for Chinese goods, shipping goods from Chinese ports to European ports takes a much longer time up to 40 days. Instead there is an alternative international sea, rail network through Iran route which takes 25 days and one that is successfully used by some companies linking Chinese and Far eastern ports to Europe. Inter-governmental cooperation, as well as physical and non-physical obstacles to efficient transit and transport border crossing operations, plays an important role in successful development of an alternative transport route.

Iran has always been a land bridge along the major commercial routes between Europe and Asia. The Silk Road trade brought wealth and prosperity to the country and the region of Eurasia for centuries. The disruption of transport along the ancient trade route brought stagnation and reduced opportunities for economic development to the region with a long-lasting negative pact.

Over time, a number of commercial cities faded away with the loss of their prominence they once held along the Silk Road.

Presently, 80% of world's trade is carried out through some 30 increasingly saturated and polluted ports. Physical isolation from main maritime trade flows has blocked the economic development of landlocked countries. As no continental country is closed to road transport, recreating the ancient Silk Road for international trade seems to be a viable alternative for trade between Asia and Europe. Any success of Iran's hub strategy largely depends on the ability of the country to attract some of the regional and Euro-Asian continental container trade by creating alternative and competitive intermodal transportation and logistics networks across Eurasia (Ziyadov, 2011).

With the increase in the purchasing power of a growing middle class in Asia, demand has increased sharply, in particular for textiles, luxury items and vehicles. As a consequence of this, EU-China trade has increased substantially in recent years. China is by far the EU's biggest source of imports, and it has become one of the EU's fastest growing export market for which China's accession to the WTO in 2001 was an important driver in this direction (EU Ambassador Pangratis, 2012).

Over the past years EU-China trade has tripled in value, increasing from $132 billion in 2000 to $389 billion in 2009 and exceeding $569 billion in 2012, according to the recent data from Eurostat (see Table 6.8).

Table 6.8: Distribution of EU-China trade by mode of transport in 2012

	Total	Percentage
EU-27	$569 billion	100%
By Sea	$389 billion	62%
By Air	$132 billion	23%
By Rail	$ 2.2 billion	0.4%
By Road	$ 40.6 billion	7%
Other	$ 44.5 billion	7.6%

Source: Eurostat data, 2013

Despite the advantageous costs of maritime transport, rail freight rates are becoming competitive and lower than the sea-air freight rates. While air transport remains the fastest mode of cargo shipment between China and Europe, it is also the most expensive. The ship-air combination is 50% cheaper than the direct air option, and delivery time is about 10-12 days. The sea shipping costs are almost 50% lower than railways, transport takes a longer time, but deliveries are more reliable. However, a recent comparative study carried out on nine routes, both sea and rail, has made many countries realise that rail still had significant potential to optimize costs and travel time (see Table 6.9).

Table 6.9: Shipping time (days) and cost for a container carried on nine rail routes across Eurasia

Routes	Rail		Sea	
	Cost $	Time	Cost $	Time
Krasnodar (Russia) - Kaliningrad (Russia)	1510	2,9	4784	9,4
Khabarovsk (Russia) - Potsdam (Germany	6598	14,2	6140	24,5
Ussuriysk (Russia) – Kiev (Ukraine)	5548	12	5958	19,3
Shanghai (China) – Warsaw (Poland)	8464	18,6	5979	23,7
Hangzhou (China) – Kaluga (Russia)	4464	11,5	6427	26
Morvarid (Iran) – Pushkin (Russia)	6054	10,6	3136	15,6
Almaty (Kazakhstan) – Istanbul (Turkey)	5570	10,4	4708	28
Tashkent (Uzbekistan) – Varna (Bulgaria)	5632	6,9	7151	22
Vesoul (France) – Kaluga (Russia)	1995	4,2	5968	6,8

Source: Based on SNCF data, November 2011

In five of the nine scenarios analysed, both in terms of costs and time, rail transport performed better than maritime transport. However, in all nine scenarios, so far as time is concerned rail transport performed better than maritime transport. The comparative study of Euro-Asian inland transport showed that Euro-Asian rail transport and its combination with existing maritime routes

and road transport is a competitive transport option. Although for guaranteeing regular and efficient rail services along the EATL routes, the establishment of an efficient corridor management, governments' cooperation and rail companies' effective response to market needs are prerequisites.

Transportation costs are a barrier that may reduce trade. The costlier the transportation the more it prohibits and 'taxes' trade in a similar way that tariffs do. Transport costs and connectivity are crucially important for trade competitiveness. High transport costs constrain the ability of landlocked countries to compete effectively in global markets. The result is that they trade less and become marginalised in the world economy (UNCTAD, 2013 pp.140-141).

6.4.1 TRACECA road transportation routes

From West Europe to Baku in Azerbaijan, there are several alternative trucking routes, one of which is the Southern Route. This in turn has several options as shown below:

Rotterdam → Germany → Austria → Hungary → Bulgaria → Turkey → Georgia → Baku, Azerbaijan (Option 1)

Rotterdam → Germany → Austria → Hungary → Bulgaria → (Ferry to) → Georgia → Baku, Azerbaijan (Option 2)

Rotterdam → Germany → Austria → Hungary → Bulgaria → Turkey → Iran → Baku, Azerbaijan (Option 3)

The length of the southern route is 5,600 km, with an estimated transit time of 9-11 days. For a standard truck the total route cost excluding fixed and some variable costs from Rotterdam to Baku is approximately $3500-3700. As indicated above, this route has an extension in Bulgaria which is shown as option 2 and necessitates taking a Ro-Ro ferry from Burgas, Bulgaria to Poti Georgia for which the cost is approximately $1600 (Ziyadov, *op cit*., p.36).

The distance from Rotterdam to Burgas is 2,300 km and the driving time is about 3½ days. However, since there is only one scheduled ferry from Burgas to Poti each week, it makes option 2 unattractive. There is also a route from Turkey to Azerbaijan via Iran which is option 3. It adds 400 km to the southern route, but it was used during the war in Georgia in August 2008 and

the same route is used by south Caucuses countries for the shipment of goods to Turkmenistan and other Central Asian countries.

In the cases of Caspian passage for countries like Azerbaijan CASPAR is the only operator. There are daily trips to Aktau and priority is given mostly to rail freight and containers and not loaded TIR trucks. A loaded T.I.R. truck on a CASPAR ferry is charged $900 from Baku to Aktau; this is apart from the additional payments such as ramp access fees and unaccounted fees which bring the total at times to $1300 and therefore this is regarded as a demerit of the option 2. Traveling to Central Asia the Turkish trucks use three different routes:
Turkey → Samsun (by ferry) → Russia → Kazakhstan → Kyrgyzstan (Option 1)
Turkey → Georgia → Azerbaijan (by ferry) → Kazakhstan (Option 2)
Turkey → Iran → Central Asia (Option 3)

A truck from Turkey using the Russian route (Option 1) takes 10-12 days and the Azerbaijani route 14-20 days. It is only the Iranian route which does not face a ferry connection and which takes a maximum of 10 days. According to IRU estimation the average daily cost of a truck in these routes with ferry connections is up to $1000 and on those routes the ferry charge and cost of delays will constitute additional costs (Economic Prosperity Initiative- EPI, 2012: 20). According to the national association for transport companies in Turkey, out of 41099 Turkish trucks that travelled to Central Asia, Afghanistan and Pakistan in 2010 only 917 trucks passed through the Azerbaijani route and the rest through Iranian and Russian routes (TRACECA Progress Report IV, 2013 pp.62-64). A Turkish trucking company charges about $12000 including all expenses for a full truck from Istanbul carrying goods to this destination (*Ibid*,. p.25).

6.4.2 TRACECA rail transportation routes

TRACECA's second leg is its rail transportation mode, constituting part of a 7,000 km-long rail link between Europe and Asia. Here again amongst countries en route, Iran has some of the greatest potential in offering transportation routes between the two continents; routes providing the shortest routes, with less impediments and barriers, to the Mediterranean Sea ports of Turkey and alternative access points to Iraq, Armenia, Azerbaijan (Nakhchivan), Turkmenistan,

Afghanistan, and Pakistan, all have rail passage through Iran. On the main rail lines of the TRACECA route, which is our point of discussion, the shortest connecting Europe to China is passing between Istanbul and Dostik at the Kazakh-Chinese border (Table 6.10).

Table 6.10: Istanbul (Turkey) to Dostik (Kazakhstan-China border) alternative rail routes

Route name	Distance/km
Istanbul – Kars – Akhalkalaki – Tbilisi – Baku - Caspian Sea (ferry) – Turkmenbashi – Ashgabat – Tashkent –Almaty – Dostik	6873
Istanbul – Kars – Akhalkalaki – Tbilisi – Baku - Caspian Sea (ferry) – Aktau – Kandiagash – orsk – Akmola - Tashkent –Almaty – Dostik	7089
Istanbul – Kars Dogukapi – Masis – Yerevan – Barkhundarli – Baku – Caspian Sea (ferry) - Turkmenbashi – Ashgabat – Tashkent –Almaty - Dostik	6913
Istanbul – Kars – Dogukapi – Masis – Nakhichevan – Julfa – Baku – Caspian Sea (ferry) - Turkmenbashi – Ashgabat – Tashkent –Almaty - Dostik	6936
Istanbul – Van Lake (ferry) – Kapikoy – Tehran – Mashhad – Sarakhs – Tashkent – Almaty –Dostik	7286
Istanbul – Van Lake – (by rail) – Kapikoy – Tehran – Mashhad – Sarakhs – Tashkent – Almaty – Dostik	7545

Source: Ministry of Transport of Azerbaijan, 2012

Out of the above mentioned routes, those to Istanbul through Masis Yerevan and Masis Nakhichevan cannot be used due to the Nagorno-Karabakh conflict between Armenia and Azerbaijan. The Turkmenistan route, although short, is limited by rail track capacity weakness, and it is short of locomotives. On the other hand, because most of these routes involve a Caspian Sea passage with ferry time loss being a probable concomitant, the lengthier Istanbul-Tehran-Sarakhs route is generally more preferred and more heavily patronized as it is associated with less delays and fewer barriers. The northern rail routes of TRACECA also have the worst rating for speed; sometimes the average speed over these routes may be as low as 9 km/h, taking account of all delays and stoppages. These northern corridors are also expensive, for example freight forwarder charges along the Azerbaijan-Georgia segment alone are between $1300-1500 for a 20ft container from Poti to Baku and another $350-400 needs to be added to this for a

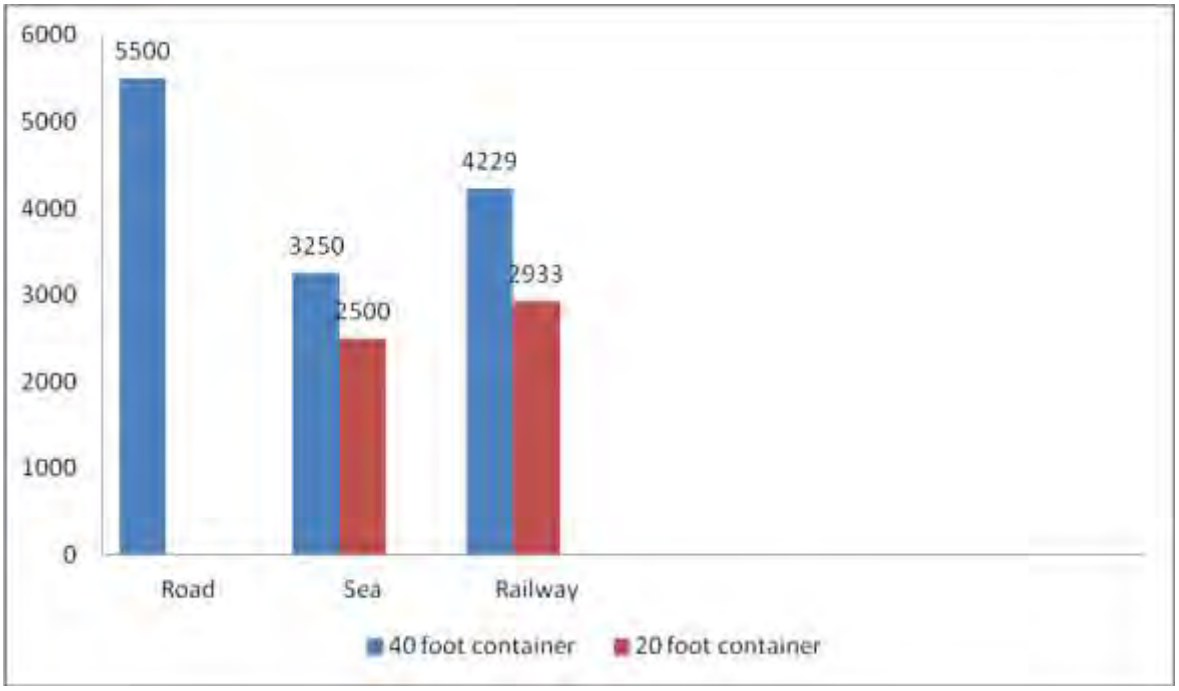
CASPAR ferry transfer to the port of Turkmenbashy. This makes it more expensive than the shipping cost of the same container by sea from Castellon (Spain) to Poti ($1,725), from Shanghai to Rotterdam ($1,200-$1,400) or from Bandar Abbas to Rotterdam ($6,500) (UNECE, 2010).

The Southern Corridor or the third Eurasian corridor network connecting Europe and Asia runs through the Islamic Republic of Iran. For centuries Iran has acted as a transit bridge both for the East-West and North-South corridors, moving goods from South Asia to Russia and North Europe and today again Iran is positioning itself to become a major hub for euro-Asian land and maritime based trade.

One of the promising East-West railway lines through Iran is the railway between Pakistan, Iran and Turkey, which has been initiated by ECO. The total length of the Islamabad-Tehran-Istanbul railway is 6,566 km, of which 1,990 km is in Pakistan, 2,570 km in Iran, and 2,006 km in Turkey. On August 14, 2009 the first train left Islamabad and reached Istanbul as its final destination on August 28. A regular block train service started from August 2, 2010 and the three countries have agreed to reduce the railway tariffs by more than 30% over the next seven years and to reduce tariffs to below a 15% rate on 80% of tradable commodities (unece.org, 2010: 16). Even though the inaugural journey took 14 days, it has since been reduced to 10½ days. The railway from Tehran to Razi (Turkish-Iranian border) and from Razi to Istanbul and Ankara is single track. At the time of inauguration the average speed was 35 km/h, although the train could reach a highest speed of 160 km/h on an Iranian section between Salmas and Razi (*Ibid*, p.22). The principal limitation or bottleneck on this route is identified in Turkey, where transshipment by ferry across Van Lake takes 13 hours. In addition to the transposition of wagons at the border point of Zahedan where there is an Indian gauge of 1676 mm, the Taftan-Quetta section in Pakistan, which takes between 18 to 36 hours, is in need of rehabilitation. These limitations notwithstanding, it is clear that the Islamabad-Tehran-Istanbul route is faster than sea or even at times road transportation, since it takes 37 days by sea and up to 17 days by road to transport a container from Islamabad to Istanbul, as compared to the 11 days that it takes via rail. This transit time is planned to be reduced to eight days. Regarding the costs, the ECO team conducted an analysis of tariffs and compared the prices of shipping a 20 ft and 40 ft

container from Islamabad to Istanbul by road, sea and train (Figure 6.2). By road, the estimated price is $5,500 per container, while the sea shipment is the cheapest: $2,500 for 20 ft and $3,500 for 40 ft container. With the reduced rail tariff, the through transport cost by rail comes to $2,933 and $4,299 for 20 ft and 40 ft containers, respectively (Economic Cooperation Organisation – ECO, 2010: 23).

Figure 6.2: Container shipping costs from Islamabad to Istanbul



Source: Economic Cooperation Organization (ECO), 2010

The Southern Corridor is a route of choice for Iranian trucks. Iran had more than 20,000 trucks operating globally, of which 12,000 were working mainly with Central Asian countries, Afghanistan and Pakistan, and about 8,000 were travelling to/from European destinations, including Turkey. In terms of exports, Iranian carriers transported most (about 70%) of Iran's exported cargo between 2004 and 2008, while the remaining 30% was carried by foreign trucks (RMTO, 2004).

As an "Iran route", this Southern Corridor is likely to remain one of the most competitive routes for cargo shipments between Europe and Central Asia, Afghanistan and Pakistan. This Southern

Corridor will also be the main competitor for the Central Corridor via Azerbaijan for cargo going to/from Central Asian and Afghanistan, also for freight transport to China's Xinjiang province in the long term. Except for a ferry transfer across Lake Van in Turkey for rail shipments, it does not require any ferry transfers, which is one of its advantages.

In 2008, about 9.8 million tons of cargo was transported by road in Iran, of which 3.1 million tons were exports, 2 million tons imports, and 4.7 million tons transit freight. Some 25% of exported and imported goods were exchanged on the western border with Turkey, while 32% of export/import cargo was exchanged in eastern Iran with five Central Asian states, Afghanistan and Pakistan (RMTO, 2008).

Presently, Iran is the major transit route for Central Asian countries including Uzbekistan. Exports of Uzbek cotton passed previously through Kazakhstan and Russia, the Baltic port of Riga, and the port of Ilyichevsk in Ukraine. In 2010, Uzbekistan's export of cotton stood at around 700,000-750,000 tons; part of it (about 300,000 tons) was sold through the Iranian port of Bandar Abbas, while around 200,000-250,000 tons were directly sold to China. About 100,000 tons were shipped via the port of Ilyichevsk in Ukraine, 50,000-70,000 tons via port of Riga, and 50,000-70,000 tons were exported to Russia (Ministry for Foreign Economic Relations, Uzbekistan, 2010). In fact, the Iranian government created attractive conditions for Uzbekistan at the port of Bandar Abbas and has managed to increase this cotton traffic via Iran. On the other hand, the demand for Uzbek cotton has shifted from Europe to Asia and that is also why most of its cotton exports went through Iran.

Another important non-oil product is grain. Grain products are one of the strategic exports of Kazakhstan. In 2009, Kazakhstan's production of grain was 20.8 million tons of which 17 million tons comprised wheat. During the 2009-2010 grain season, the country exported 8.3 million tons of grain and flour products (World Markets Review, 2010). With the aim of diversifying its markets, the Kazakh government built grain terminals in Iran and Azerbaijan. It has finished a jointly-owned terminal of 700,000 tons processing capacity in the Port of Amirabad in Iran as well as a 500,000-ton facility in Baku, Azerbaijan. Kazakhstan will be able

to sell its grain through Amirabad mainly to Middle Eastern and North African markets including sales in Iran's domestic market (Trend News Agency, 2014).

In 2006, Kazakhstan adopted a long-term transport strategy aiming to build new modern highways and railways to facilitate Euro-Asian continental trade and transit along the North-South and East-West axes. It invested $30 billion across 80 infrastructure projects, including railways and motorways. In 2010, another state program was approved, covering 59 infrastructure projects. The ongoing construction of railway projects will enable Kazakhstan to increase its rail cargo traffic in the near future to 100 million tons a year in the direction of Turkmenistan, Iran, Turkey and EU (Asian Development Bank - ADB, 2009).

There are various rail and road corridors across Eurasia categorised by different international organizations, including UNECE, UNESCAP, ADB's CAREC and IRU. Each corridor is important in its own right, and each merits an in-depth analysis. However, this study has limited itself to an examination of three main East-West corridors connecting Asia to Europe via Central Asia and Iran. The three main East-west corridors are the Central Corridor (TRACECA) via the South Caucasus; the Northern Corridors (Trans-Eurasian Express or TEE, Trans-Siberian Railway (TSR) and Trans-Kazakhstan Route) across Russia and Central Asia; and the Southern Corridor that runs through Iran.

6.5 The International North-South Transport Corridor (INSTC)

The North-South Transport Corridor that for centuries connected South Asia with North Europe is also an ancient route and European, Russian and Indian traders played an important role in managing commerce through Persia in this corridor in the past, passing through either side of the Caspian Sea overland to India via present day Afghanistan, or through the port of Bandar Abbas in the Persian Gulf towards the port of Surat of Gujarat in India.

As stated earlier, the modern-day International North-South Transport Corridor (INSTC) agreement was first signed between Russia, Iran, and India in Saint Petersburg in 2000 and it was originally designed for utilising the Russian and Iranian ports in the Caspian Sea, particularly the ports of Astrakhan and Olya in the north and Anzali and Amirabad to the south. As new

members such as Azerbaijan, Armenia, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkey, Ukraine, Belarus, Oman and Syria (and Bulgaria as an observer) joined, two alternative land based routes were added and so currently the INSTC consists of three alternative transport routes. All the three routes are multimodal and use more than one type of transport mode for cargo shipments.

6.5.1 The Central INSTIC Route

This is the first and original route which starts in Helsinki, Finland and goes through St. Petersburg to the Russian ports of Astrakhan and Olya and after crossing the Caspian Sea reaches primarily to the Iranian ports of Anzali and Amirabad, but now also to the Port of Nowshahr in the south of the Caspian Sea. It continues through Iran through the Special Economic Zone of Shahid Rajaee Port of Bandar Abbas in the Persian Gulf and Chabahar, towards India. It should be added that there is a possible land-based route from Iran to India which passes across Pakistan which is not usable in the short term.

The western INSTC is the second route which is land-based, linking Helsinki to Bandar Abbas either by road or by rail by traversing the western shore of the Caspian Sea and crossing Azerbaijan. This route, which is potentially the shortest and perhaps fastest, goes to Iran and then by sea to India. At present this route's principal limitation is the missing rail link between Azerbaijan and Iran. This Qazvin-Rashat-Astara segment is currently under construction.

The eastern INSTC is the third alternative route which goes across Russia, Kazakhstan, Turkmenistan along the eastern shore of Caspian Sea to Iran and then to India. This route has a possible extension to Afghanistan and Pakistan, although it has a missing link between Kazakhstan and Turkmenistan, which is under construction.

As an illustration of the opportunities provided by these routes, a loaded container from Mumbai could arrive by ship at the Port of Bandar Abbas, and then may be transported to the Iranian Caspian sea ports by truck or by rail. Thereafter, the container could proceed by ship to the Russian ports of Astrakhan or Olya, from where the container could be loaded back on rail or truck to be transported to its final destination.

One of the goals of the INSTC is to absorb the current annual container traffic between Europe and the countries of the Middle East and South Asia, which is estimated at 3.5 million TEU, plus taking overland the cargoes of founding members such as Russia, Iran and India to use this route in their freight operations (Strategic Partnership 1520, forum 2010). According to experts, (Stig Nerdal, Senior Adviser, UIC) the INSTC will cut the delivery time of cargo from Mumbai to Northern/Russia to 17-19 days, which is shorter than 28-42 days required for traditional ocean shipping via the Suez Canal and the Mediterranean Sea. From Mumbai to Rotterdam, the duration of a direct sailing would be about 15 days at 18 knots, but a normal trip takes between 24 to 31 days because of the roster of intermediate ports in a standard sailing schedule. Passage between Rotterdam and St. Petersburg takes at least two days under normal circumstances but in most of the cases due to the dwell-time of between 3 and 10 days for the container in the Port of Rotterdam, shipments from Mumbai to St. Petersburg usually take a minimum of 28 and a maximum of 42 days (UIC, 2010).

According to a 2008 simulation study by the International Union of Railways (UIC) on the western INSTC route and on the assumption that the Iran-Azerbaijan rail segment was constructed and running, the distance and transit time for loaded container from Delhi, India to Helsinki were estimated (International Union of Railways – UIC, 2008).

According to their findings, to ship a container from Delhi to Helsinki would take about 19 days and 20 hours and from Mumbai to St. Petersburg 17 days and 13 hours, which is considerably shorter than the alternative traditional overcrowded ocean route via the Suez Canal and the Mediterranean Sea (Table 6.11). In addition, it was reported that terminal transshipments and border crossing took seven days and 18 hours or 39% of the total transit time, which is regarded as a disadvantage, although in freight operations delivery time is only one component and the more important than length of voyage is the shipment cost (*Ibid,*. p.14).

Table 6.11: Distance and transit times by rail from Delhi, India to Helsinki Finland via western INSTC route

Rail Section by Country	Time	Share (%)	Distance (km)	Share (%)
Finnish Section	0d 05h	1%	266	3%
Russian Section	3d 08h	17%	3,233	34%
Azerbaijan Section	0d 21h	4%	528	6%
Iranian Section	2d 14h	13%	1,865	20%
Indian Section	2d 02h	11%	1,510	16%
Railway Carriage (Total)	9d 03h	46%	7,402	79%
Terminal and border crossing	7d 18h	39%	0	0%
Sea Transport	2d 22h	15%	1,987	21%
Total	19d 20h	100%	9,389	100%

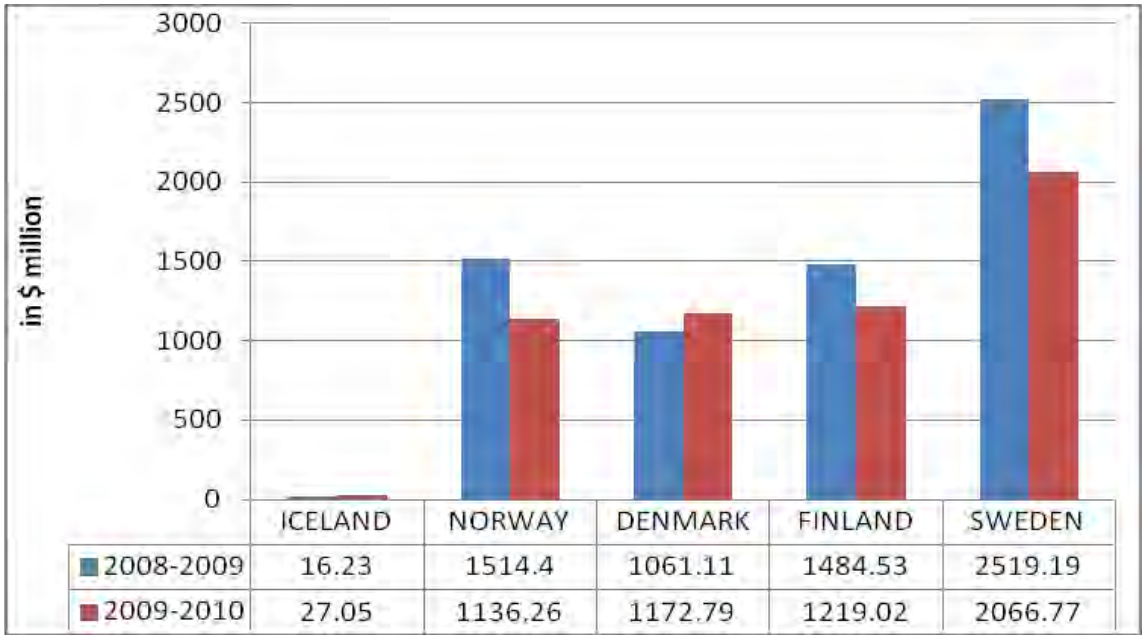
Source: Transport Utvikling AS Norway, 2008

From the above it could be understood that the INSTC countries should work on a unified approach for minimising border delays, streamlining customs procedures and reducing rail tariffs for speedy cargo shipments from Bandar Abbas to St. Petersburg.

Based on information in the IMF direction of trade data base for 2009, the trade turnover between Russia and Iran was $3.7 billion, and that between Russia and India was $4.5 billion (The Trade Representation of the Russian Federation in India, 2010). Both Russia-Iran and Russia-India trade were clearly dominated by Russian exports accounting for 94% of bilateral trade for Iran and 79% for India. Russia's exports to India were estimated at 20 million tons annually and in 2008 consisted of power station equipment, fertilizers, chemical products, minerals, plastic goods and wheat, while Russian imports from India were mainly machinery and pharmaceutical goods (*Ibid,*. p.2). Annual shipment of goods from India to Russia reaches to 5 million tons, almost all of which bypasses the INSTC route currently (Fars News Agency, 2009). Iran and India's trade reached $14 billion in 2010; up from $12 billion in 2009 (Indian Ministry of Commerce & Industry 2009/2010). In fact, Iran's oil export made up 90% of this trade equal to $12 billion. India's import of oil from Iran is about 21 million tons annually, which was equal

to some 400,000 barrels per day. Iran is interested in creating more favourable conditions for India to access the CIS market via Iranian territory. India is regarded key to the success of the INSTC as its rapidly growing trade with European and Scandinavian countries presents a valuable opportunity to this corridor. India's export to the EU-27 rose from $8.8 billion in 1996 to $40 billion in 2009 and India's total trade with EU-27 was $82 billion in 2008-2009, decreasing to $75 billion in 2009-2010. Also worth mentioning is India's trade with Scandinavian countries, which was $6.6 billion in 2008-2009 and $5.6 billion in 2009-2010 (Figure 6.3) (World Bank, 2009/2010).

Figure 6.3: Indian trade with Scandinavian countries (2008-2009/2009-2010) ($ millions)

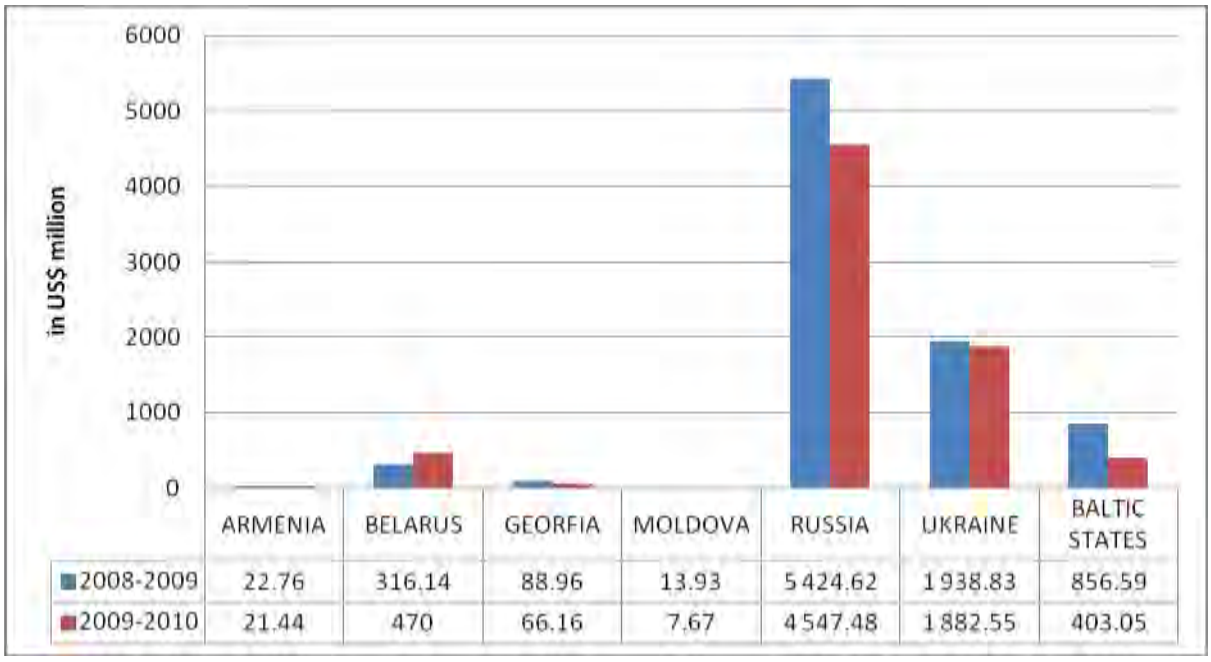


	ICELAND	NORWAY	DENMARK	FINLAND	SWEDEN
2008-2009	16.23	1514.4	1061.11	1484.53	2519.19
2009-2010	27.05	1136.26	1172.79	1219.02	2066.77

Source: Ministry of Commerce and Industry of India, 2010

Indian trade in 2008-2009 with central Asian countries was about $519 million and in 2009-2010 $482 million. India's trade with other CIS countries and the Baltic States of Estonia, Lithuania, and Latvia was $8.7 billion in 2008-2009 and $7.4 billion in 2009-2010 (Figure 6.4). Out of this trade with Russia and Ukraine made up 85% in 2008-2009 and 87% in 2009-2010 (Indian Ministry of Commerce & Industry 2009/2010).

Figure 6.4: Indian trade with CIS (excluding central Asian states and Azerbaijan) & Baltic States (2008-2009/2009-2010)



Source: Ministry of Commerce and industry, Government of India, 2010

Indian experts (Sachdeva, 2010) predict that by 2015, India's combined trade with the EU-27, CIS, Iran, Afghanistan and Pakistan could reach to $600 billion. Hence, Indian goods destined to Northern Europe and Russia could potentially enter from the Iranian Ports of Bandar Abbas and Chabahar, and through one of the three INSTC travel to their final destination.

In relation with Azerbaijan, within the overall INSTC trade matrix, Iran-Azerbaijan bilateral trade has been low, reaching about $500 million in 2010. Azerbaijan's trade turnover with Russia in 2010 was $ 1.9 billion, consisting of $774 million export to Russia and $1.1 import from Russia. Azerbaijan's trade with India in 2008 was $2.5 million out of which apparently $2 billion was due to Azerbaijan's oil export to India; their trade in 2009 and 2010 was $322 million and $330 million, respectively. Within the INSTC route, Azerbaijan-Ukraine trade is worth mentioning; Azerbaijan's import was $465 million and its export was $889 million, mostly oil (IMF Year Book, 2011).

Iranian trade turnover with the South Caucasian Armenia was $580 million in 2010. These two countries planned to work together on energy and transportation projects and plan to connect their railways. Armenia at present has two open borders one with Iran and other with Georgia (Ministry of Foreign Affairs of Armenia, 2011).

Iran annual trade with the Central Asian Republics is about 3.5 million tons and the volume of goods shipped by Central Asian Republics via Iran to Persian Gulf is estimated at 1.5 million tons (Vestnikkavkaza.net, 2011).

At present, estimated cargo traffic along the INSTC is 6 million tons, even though INSTC cargo traffic in 2004 reached 10.2 million tons (Kurtov, 2008). In fact 90% of this traffic is Russia-Iran trade and most of it is processed through Caspian ports. The volume of transit via the western land route of INSTC through Azerbaijan is around 1-3% of the total trade. Iran's import from Russia mainly consists of ferrous metals, timber, minerals, charred coal, and petroleum products and its exports are non-ferrous materials and food products. The cargo shipments between Russia and Iran along the INSTC in 2010 reached 3.2 million tons, out of which 2.1 million tons equal to 66.1% were Russian exports and 190,000 tons or 5.9% its imports and 900,000 tons or 28% their transit shipments and virtually all of this trade was conducted via maritime transportation through the Caspian Sea, from Astrakhan or Olya ports of Russia to Iranian ports of Anzali and Amirabad (Egizarian, 2013).

6.5.2 The Western INSTC Route

In 2010, more than 66,500 trucks crossed the Iran-Azerbaijan border of Astara, which is within the INSTC Southern road corridor, carrying 1.3 million tons of cargo, out of which about 37% was transit freight. At the Astara border crossing point cargo turnover was dominated by imports with over 43,200 trucks carrying 700,000 tons, 54% of total turnover, followed by transit trucks numbering 18,950 carrying 480,000 tons equal to 37% and exports 4,400 trucks, carrying 120,000 tons, equal to 9% of total turnover (Customs Committee of Azerbaijan, 2010). This route is an expensive option and it takes five to seven days with two drivers for a loaded truck from Bandar Abbas to arrive in Baku with a cost of about $2400. For the same truck to reach to Sumar the border crossing between Azerbaijan and Russia from Bandar Abbas takes seven to ten

days with two drivers and an additional $1500 cost. The high transit cost of this route is because of unofficial payments at borders, delays at border and national restrictions on the number of trucks permitted for entry into a country, as well as general difficulties of travel like lack of logistics services. Carrying cost of a 20-foot container by truck from Yerevan to the Port of Poti is around US$800. From Baku to Bandar Abbas (2,800 km) transporting a container by road costs only US$1,500, slightly more than the same transport from Baku to Poti (950 km) for US$1,300 despite a distance three times higher. Transport of a container (TEU) from Poti to Yerevan by road costs US$1,845 for only 650 km compared to Yerevan to Bandar Abbas US$1,700 for 2,800 km (TTFSC Policy Note).

6.5.3 The Eastern INSTC Route

The INSTC eastern land segment lies along the eastern shores of the Caspian Sea and crosses Kazakhstan, Turkmenistan and Iran. This land corridor is connected to Iran via Kazakhstan, Uzbekistan then Turkmenistan which is a longer route. Iran, Kazakhstan and Turkmenistan proposed to build a new railway line from Uzen (Kazakhstan) to Kizalkaya-Bereket-Etrek (Turkmenistan) to Gorgan (Iran). This line would be 600 to 700 km shorter than the previously built Soviet rail line. The total length of this rail link is 951 km out of which 146 km in Kazakhstan, 723 km in Turkmenistan, and 82 km in Iran. Its construction is due to be completed in 2014 and it is planned to handle 3.5 million tons of cargo annually. Iran's annual turnover with Central Asian countries is estimated to be 3.5 million tons, for the most part comprising crude oil. In addition to this tonnage Central Asian countries are exporting about 1.5 million tons of cargo via Iran to the Persian Gulf for further carriage to different destinations (Iran Customs Administration - IRICA, 2011).

An analysis of the pertinent empirical data suggests that the EU, as one of the core powerhouses of the world economy, is the main consumer of the region's raw materials and according to Eurostat data, and as shown in Table 6.12, 44% or $45 billion out of $102.3 billion aggregate export of the region's raw materials in 2010 went to the European Union (Egizarian, 2013: 3).

Table 6.12: Export of North-South regional Central Asian and Southern Caucasus to the EU 2010

Country	Export, $m	Export to the EU	
		Volume, $m	EU Share in Export %
Armenia	1,011.4	501.3	49.5
Georgia	1,575.1	290.4	18.4
Azerbaijan	21,360.2	10,853.9	50.8
Kazakhstan	59,830.3	30,782.3	51.4
Uzbekistan	5,898.7	547.8	9.3
Kyrgyzstan	1,755.9	1,539.5	87.7
Tajikistan	1,195.0	42.8	3.6
Turkmenistan	9,700.0	483.1	5.0
Total	102,326.6	45,041.1	44.0

Source: Calculation based on Eurostat, national statistical services of the region, 2013

Russia and China with 41.5% of the region's total imports are the leading exporters to the region (see Table 6.13).

Table 6.13: Ranking of Russia and China in the Imports of the North-South Corridor region in 2010

Country	Volume of Import, $m	Russia		China	
		Share, %	Score	Share, %	Score
Armenia	3,782.9	16.0	1	6.6	3
Georgia	5,156.3	5.6	5	6.5	4
Azerbaijan	6,600.6	17.3	1	8.9	4
Kazakhstan	30,839.3	39.1	1	12.9	2
Uzbekistan	3,525.9	54.0	1	33.6	2
Kyrgyzstan	3,222.8	33.6	1	20.7	2
Tajikistan	2,657.0	32.0	1	9.0	3
Turkmenistan	8,183.0	14.2	1	10.2	2
Total	63,967.8	29.3	1	12.2	2

Source: Calculation based on the Eurostat figures of national statistical services of region, 2013

With construction of the Qazvin-Rasht-Astara railway, the direct rail link between Russia and Iran through Azerbaijan will be faster and more cost effective than the land-sea-land route of central INSTC involving Iranian and Russian ports. On the other hand the western route in addition will open another route and a new access gate at least for Iran to European markets, which would be through Azerbaijan and via Georgian ports such as Poti. This means that Iran's Caspian ports will be direct contenders for transit cargo with regards to the western overland segment of the North-South corridor through Azerbaijan and the eastern segment that passes through Turkmenistan and Kazakhstan.

6.6 Euro-Asian Iranian routes: an application of the UNESCAP Time/Cost-Distance Methodology

The aim of this study is to compare the existing Euro-Asian maritime routes with selected rail routes identified as "Iran routes". In order to illustrate the time and costs involved in transportation of goods within what this study has termed "Iran routes", in Euro-Asian transport links a UNESCAP Time/Cost-Distance Methodology is used. This methodology is used to compare Euro-Asian maritime and rail links from the perspective of a logistics manager.

The data required can be an initial estimate of indicative freight rates by a forwarder or transport carrier or an ocean carrier for an individual consignment, or even an average figure, looking at one route and one particular shipment of goods, and the minimum information needed is the route, mode and distance plus either time or cost of carriage.

Step 1: Establish the route that is going to be examined, for example the EATL Rail Route 4 (or Almaty-Istanbul) passing through Iran, and its origin and destination points of action i.e. A to B via C and D

Step 2: The modes of transport are being used should be determined (e.g. Road/Rail or Sea/Rail).

Step 3: The distance between all the points should be ascertained.

Step 4: The elapsed time for the goods to reach each point, should be checked.

Step 5: The proportions of the total cost that are taken up by each leg of the journey, modal transfer, border crossing or other cost/tolls that are encountered should be ascertained.

This study considers the traditional maritime transport routes and attempts to compare these to rail transport on EATL Routes and their relative scenarios.

In line with the methodological approach set out in earlier sections of this study, details concerning the type of block trains used, and other technical aspects of Euro-Asia transport which already offers connections between China to Germany have already been elaborated. The further development of this and indeed the principal objective at this point is to compare the traditional maritime transport routes with various inland transport options to discover which of these may be considered attractive or relevant in terms of overall through-transport cost effectiveness.

To develop this exercise, this study presents the maritime and landside routes in terms of a stylized structure made up of discrete but standard transport phases, or linked sets of actions on the part of shippers respectively. The case of a maritime-cum-landside set of connections is set out in Box 6.1.

Box 6.1: Maritime transport cost structure

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Road transport from shipper to the port of origin	Terminal handling charges at the port of origin	Freight rate – port of origin to port of destination	Terminal handling charges at port of destination	Road transport from port of destination to final client

Source: This study, author's compilation

A similar set of stylized and linked actions may be set out for a transport operation that is conducted principally by rail, but obviously with road connections to railheads. This is presented in Box 6.2.

Box 6.2: Rail transport cost structure

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Truck to railway station cost	Loading and other costs at the origin railway station	Rail freight cost	Unloading and other costs at the destination	Truck cost from railway station to city of final destination

Source: This study, author's compilation

For illustrative purposes, to present a single case study in more detail, scenario 4 of the EATL project has been selected for presentation. This EATL Rail Route 4 covers the Almaty (Kazakhstan) to Istanbul (Turkey) route, passing through the east-west southern corridor, which passes through Iranian territory. Table 6.14 sets out the cost of carriage of a TEU through a maritime route via the Port of Bandar Abbas in Iran.

Table 6.14: Maritime Transport: Almaty via Bandar Abbas port to Istanbul via Istanbul port costs per TEU

Route	Kilometres (km)	Cost ($)	Time (hrs)
Almaty – Bandar Abbas by road	2,873	2,300	71
Bandar Abbas port THC costs	-	150	-
Bandar Abbas port other costs	-	150	-
Bandar Abbas – Istanbul by sea	6,711	1,650	25 days/600 hours
Istanbul port THC costs	-	220	-
Istanbul port other costs	-	220	-
Istanbul port – Istanbul by road	20	300	1
Total maritime transport	6,711	2,370	601
Total road transport	2,893	2,600	72
Total	9,604	4,970	673

Source: This study**,** compiled from different Iranian sources

A comparable maritime route, which is also selected for presentation here, is a route from Almaty via Bandar Abbas port to Istanbul port and then delivery to a final consignee in Istanbul city. The similarities for the purposes of comparison are obvious: both involve the transport of a cargo parcel from the same origin to the same destination, but via competing modal routes. These maritime and landside routes are set out in distance, cost and time terms, in Tables 6.14 and 6.15, respectively.

Table 6.15: Rail Transportation: Almaty to Istanbul via Mashhad–Tehran–Tabriz (Iran route)

Route	Kilometres (km)	Cost ($)	Time (hrs)
Almaty – Almaty rail station by road	20	150	1
Almaty rail station loading cost	-	30	-
Almaty rail station other costs	-	30	-
Kazakhstan by rail	969	998	28
Uzbekistan by rail	670	938	40
Turkmenistan by rail	469	1,220	32
Iran by rail	1,972	1,340	63
Turkey by rail	1,945	800	85
Istanbul rail station unloading cost	-	30	-
Istanbul rail station other costs	-	45	-
Istanbul rail – Istanbul by road	20	300	1
Total rail transportation	-	5,431	-
Total road transportation	40	450	2
TOTAL	6,065	5,881	250

Source: Compiled from different Iranian sources

These exercises for the common Almaty to Istanbul route show up the maritime and rail-landside or “Iran” routes in a starkly asymmetric fashion. The maritime route emerges as the more attractive and favourable one in terms of direct out-of-pocket shipper costs, while the rail/multimodal landside route outperforms the maritime route quite comprehensively in terms of

offering substantially shorter transit times. For shippers who place a high priority on time, or who are moving high-value commodities where the capital costs of longer transit times are high, the “Iran route” may well be an attractive option.

The competitive position of rail is therefore likely to be sensitive to commodity type, commodity value, time sensitivity and the special needs of transport users, but clearly a more satisfactory measure of transport costs, from the perspective of users, must be one that includes time costs as well as direct out-of-pocket freight costs.

This approach and technique may then be applied to a much fuller range of transport routes, including several pivotal east-west (or vice versa) transcontinental routes, to present a spectrum of route-specific characteristics, with particular focus on comparative direct user costs and time (costs). This is attempted, across nine route scenarios, in Table 6.16.

Table 6.16: Comparison of rail and maritime transport between Asia and Europe

Scenarios	Route	Rail		Maritime		Best Transport Means	
		Cost ($)	Time (hrs)	Cost ($)	Time (hrs)	Cost	Time (hrs)
Scenario 1: EATL Route 1	Khabarovsk (Russia) to Potsdam (Germany)	6,967	341	6,533	589	Maritime	Rail
Scenario 2: EATL Route 2	Hangzhou (China) to Kaluga (Russia Fed.)	4,714.65	277	6,786	624	Rail	Rail
Scenario 3: EATL Route 3	Tashkent (Uzbekistan) to Varna (Bulgaria)	5,946	165	7,550	529	Rail	Rail
Scenario 4: EATL Route 4	Almaty (Kazakhstan) to Istanbul (Turkey)	5,881	250	4,970	672	Maritime	Rail
Scenario 5: EATL Route 5	Morvarid (Iran) to Pushkin (Russia)	6,390	256	3,310	374	Maritime	Rail
Scenario 6: EATL Route 6	Ussuriysk (Russia) to Kiev (Ukraine)	5,857	289	6,290	463	Rail	Rail
Scenario 7: EATL Route 7	Shanghai (China) to Warsaw (Poland)	8,937	446	6,300	569	Maritime	Rail
Scenario 8: EATL Route 8	Krasnodar (Russia) to Kaliningrad (Russia)	1,595	70	5,050	225.2	Rail	Rail
Scenario 9: EATL Route 9	Vesoul (France) to Kaluga (Russia)	2,107	101	6,300	163	Rail	Rail

Source: compiled from Euro-Asian Transport Links, studies of UNESCAP & UNECE, 2010

Growth of trade between Europe and Asia and its impact on the flow of transport in future results in development of Euro-Asian transport links. It is in this context that development of transit to and from landlocked developing countries along Eurasian routes is becoming important.

An overview of trade flows among the participating countries in the EATL projects which are now 27 countries shows that China's export is representing a high percentage of Asian export to Europe and this is apart from additional intra-Asian trade flows growth.

Although the vast distance between the two continents, combined with numerous border crossings, political instability, the lack of security, rent-seeking practices, delays at borders and unpredictability bearing discourage the use of inland transport, still without any doubt transport of goods from Asia to Europe is dominated by maritime routes. On the other hand a conclusion which is the result of a simple comparison between maritime and the land transport costs often leads to the indication that a land bridge is not financially competitive. For instance a comparison between maritime versus inland transport, comparing the cost and time required for the transport of a container from Shanghai port to Hamburg can lead to wrong conclusions. In actual fact products carried by containers to be transported from production to final consumption areas are often being shipped from places which are located far away from ports. Hence, for these shipments the total costs of the entire supply chain, which includes road transport costs of moving containers from/to the warehouse/port, terminal handling charges, and documentation and other administrative costs, must be compared by the logistics managers.

Railway transport can be more competitive both in terms of time and cost, when production areas are situated relatively far from the ports, such as in China and India, and especially for the cargoes which are destined to southern and eastern European countries by rail.

As shown in Table 6.16, out of nine scenarios analysed, all showed in terms of travel time rail transport outperforming maritime transport. Hence, this study shows that Iranian rail transport, and its intermodal combination with maritime and road transport, is a feasible and competitive transport option presuming that efficient rail corridor management is established, that governments are willing to cooperate and that rail companies serve customers' need in an effective manner along the whole corridor.

CHAPTER SEVEN

CONCLUSIONS

7.1 The broad area of analysis of this thesis

This research on transport has exercised an overall objective to identify current and future challenges for corridors of Iran or what it has termed an "Iran Route" in the ECO region. This route's role and importance in regional integration and the extent of its possible contribution to economic growth and cooperation within Euro-Asian intercontinental trade, has been discussed with a view to propose a plausible policy framework.

As transport corridors, because of their role in economic development in general and development of trade in particular, are currently gaining more importance in developing countries and emerging markets, this research has therefore examined the potential of trade movements amongst Iran and her neighbouring countries by identifying the comparative advantages of relevant freight routes of Iran to each country adjacent to these transport corridors.

The research has aimed to emphasise the need for efficient transport corridors such as various routes through the territory of Iran may provide to landlocked neighbouring states as well as ECO and Eurasian member countries, to the extent of suggesting inclusion of their use in their trade and transport development agendas. This thesis has further identified the physical and non-physical barriers to trade and transit transport that may potentially impede the smooth flow of cargo among the ECO member countries, given existing trade movement patterns for inter- and intra-regional as well as intercontinental transit trade via Iran.

The research has used data, outcomes, and expertise from various sources, including organisations such as WB, IMF, WTO, UNESCAP, UNECE, IRU, ECO, EurAsEC, ADB, etc, and initiatives such as INSTC, TAR, TRACECA, EATL, NELTI, ALTID and CAREC, among others. The research has sought to provide a sound rationale of how the development and promotion of an "Iran Route" as an alternative transport corridor, can facilitate the trade and transport flow between Asia and Europe by taking a part of burden from the shoulders of time-consuming traditional ocean routes via the Suez Canal.

Transit facilitation among ECO members is another key conceptual process upon which this thesis has based its analysis, within the ECO Transit Transport Framework Agreement and other international organisations.

It has also presented a prioritisation of transport through Iran by adopting a methodology technique proposed by UNESCAP and by including criteria such as missing links, transport costs and non-physical barriers for involvement of ECO member countries, and their impact on regional and interregional potential trade.

It is expected that this research may be used as a reference guide for future researchers to conduct comprehensive approaches for analysing specific routes in transport corridors of their due diligence, as it is for those who are actually involved in development of transport as a means to economic growth, development and integration of nations that this work has been directed.

Iran has a relatively high value for intra-regional trade compared with the other countries in the ECO region, as its regional and international transport corridors connect the Middle East with Europe and Asia.

The first and most fundamental justification for greater usage of transport routes through Iran is found in the needs of the national economy itself. Since an already diversified industrial base of Iran is constantly growing, it obviously needs sources of energy and raw materials; these sources naturally need to be transported through Iran routes.

As it is understandable from the industrial policy of the country, the domestic market in the first instance provides the national consumers with items they want, and extended production runs allow and create export capacity and it is from this virtuous circle that the Iran Route for transporting products to foreign markets are fluid and time managed and in turn production export capacity brings in currency and self-financing capacity.

Transit transportation through an “Iran Route” is also justified by the needs of the neighbouring economies; in this respect the research has dealt with the neighbouring countries’ land transportation linkages and especially the imperative of the part of landlocked states for access to the sea via shortest distances and lowest costs. According to the scenario developed in this work, the myriad of goods they require may be off-loaded in large quantities, rapidly and at attractive

cost in Iranian ports for further carriage to these countries through Iranian freight routes. Therefore this study highlights this "Iran Route" with its direct land and sea access as a landbridge which reduces the cost of trade between Asia and Europe by providing an effective alternative to one of the busiest seaborne trade routes of the world in the short and long term.

The research has used a scenario approach as an analytical tool and thereby some of the key issues related to this route have been identified and developed as its conceptual basis.

7.2 Previous research and purpose of the study

As has been indicated in the literature review, there are some relevant pieces of published literature that have addressed in part the themes of this study, but still there is lack of a systematic study of an "Iran Route" and a systematic appraisal of the country's potential in this context.

In the light of previous discussions, the main purpose of this study has been:

To review the "Iran Route" concept and to develop an appropriate model for Iran that can assess the potential of the transport system of the country by identifying influential variables affecting its volume and supply of transport, while evaluating the implications of this route (or this range of routes) for the neighbouring countries and the rest of the world. The study has focused on the domestic and international implications of a greater utilisation of such an "Iran Route" as well as the predicted future trade and transport possibilities with the neighbours through a full swing of these routes and their related corridors. It has also examined the role that may potentially be played out by this route in the ECO region.

This thesis has recognised that competitiveness of this "Iran Route" may manifest itself is in its maritime services availability; its port logistics availability; its port connectivity and regional services; the condition of its hinterland and the quality of transport infrastructure within that hinterland; and finally its port strategy and policy for the region.

The concept of an "Iran Route" (or suite of routes) is a reference to combinations of various sea-cum-land and sea-cum-sea routes using Iranian landbridges under multimodal transport Bills of Lading for movement of different shipments from their origins to their final destinations.

Various routes through the territory of Iran differ in characteristics with regards to the volume and direction of trade and transport. The previous studies on a potential Iran landbridge as mentioned in Chapter Two for the most part did not reveal fully its the multi-vectored features, although there are comprehensive and valuable studies in this regard, including Bavarsad (1997) and Derakhshan (2005), who applied scenario planning to model a transport system for Iran using these terms.

7.3 Summary of main features of research and overview of findings

The study makes a contribution to understanding the specifics and particularities of elements of an "Iran Route" or Iranian landbridge, in a way that has hitherto not been achieved. Such an "Iran Route" as a multimodal and multi-vector route, depends on and needs a highly effective coordination by neighbouring countries.

In competition with traditional water transport or ocean routes, an "Iran Route" offers advantages in terms of transport distance, transit time (in particular) and at times in terms of final transport costs to users.

In Chapter One it was found that the container fleet constitutes a strong backbone for the Iran route as a container fleet plays a significant role for a successful transport corridor.

Chapter Two, however, demonstrated that with a growing share of containerization in the foreign trade of Iran, a greater need for improved and faster container hub port services has become increasingly necessary. It has necessitated the development of infrastructure for all modes of transport associated with the handling of the container trades and their related operations.

In Chapter Three it was found that modes of transport in Iran, except for road, are for the most part still highly centralized and owned and administered by organs of government.

In Chapter Four, this research has shown that in the major ports of the country infrastructure such as berths and maritime support services e.g. tugs, pilot boats and also in cargo handling equipment and warehousing are both extensive in their present form and also the recipients of several major expansion projects, which should lead to further significant improvement in port capacity and productivity.

To address the principal strengths of an “Iran Route”, criteria such as involvement of ECO member states, regional and international trade potentials, missing links, non-physical barriers, traffic density, transport costs, facilitation of intermodal transport, logistics centres, connection with capital cities, connection with locations of economic importance, existence of trade agreements, other transport costs, distance from ports and road pricing have been addressed.

The research has approached the Iran route concept and its application to both demand and supply areas in the domestic, regional and international economy as its multi-facetted customer base, although further research needs to be carried out in order to provide more insights and implications of these corridors. Therefore, based on the earlier presented findings, a number of recommendations for improving the existing situation follow.

Implementation of multimodal bills of lading for an “Iran Route”, in the broad context of the ECO Transit Transport Framework Agreement, should be established and encouraged by the carriers like IRISL and others. This would be possible to be preserved under supervision of a National Transit Transport Coordination Committee from the public sector related to the FAL convention and may include the private sector as well.

The north-south corridor should be given priority as a transit route of significance as it is one of the main trunks of a more fully-functioning “Iran Route” and can play a significant role in any future land bridge between the Persian Gulf and North-west Continent via the Caspian Sea or its landward by-passes, and then through Russia, as an alternative to the Suez Canal.

The south to north-west provincial corridor should be given priority as a transit route as it is one of the routes through Iran that plays an important role in the movement of cargo and containers between the Persian Gulf and South-east Europe through Turkey and at times via the Southern Caucuses and Black Sea as an alternative to the Suez Canal.

The south to north-east provincial corridor should be given priority as a transit route as it is one of the routes through Iran’s territory that has an important role in the movement of cargo and containers between the Persian Gulf and Central Asian Countries, and Afghanistan.

Expansion of joint venture companies like IRISL Multimodal Transport Co, which can play important role in the promotion of multimodal transport, should be encouraged among carriers and private entities.

Road links must continue to play their important role for the success of Iran-route services in particular to Central Asian Countries and South Caucuses and Turkey, Iraq, Afghanistan and Pakistan. Organisations such as the Road Maintenance & Transportation Organisation (RMTO) have played a very important role in management of the road network and transit operations, and their efforts for planning facilities dedicated to transport rely on the services of the Transport Terminal Organisation (TTO), which reports to the Ministry of Roads & Urban Development. This organisation has set up road freight centres in urban and industrial zones, has established road vehicle parking areas, and has upgraded/renovated border crossings and border terminals. Disagreements between the Customs administration and TTO managers at border crossings when processing cargoes should be resolved in favour of travellers and cargo in transit.

Container traffic in the Port of Bandar Abbas ranks highest amongst main Iranian ports. As containerized trade increases within the foreign trade of the country, expansion of container related infrastructure in ports should be continued by the PMO in line with forecast increases in demand. This constitutes an essential measure of container-handling demand in the port corridors of Iran route. In other words, efficiency of ports in their form and size should be optimized. Exploration of opportunities for at least a road freight land bridge between each of the ports and hinterland of Iran routes domestically and regionally should be considered.

Although the railways network of Iran is extensive, it still comprises a large number of single track lines and some older lines, neither of which are suitable for high speed or heavy load trains and the volume of goods transported on them is still small. High priority should be given to the construction of missing rail links, double tracking, electrification and rail projects of key ports like Chabahar and Bushehr in the south and Anzali in the north to facilitate probable higher trade with Russia and other littoral states of the Caspian Sea, and possible increases in cargo and container movements from India to Russia and vice versa in the central and eastern corridors of an “Iran Route”.

Iranian border crossings are mostly equipped with computer terminals running Automated System for Customs Data (ASYCUDA) applications and some customs offices are equipped with e-declaring systems. On the other hand the goods on trucks in transit to Sarakhs, Lotf Abad, Dogharoon or the Caucuses and at most other border crossings have to undergo X-ray inspection as IRICA regulations dictate, but still modernization of customs administration with respect to both procedure and equipment is of great importance on any and all of the routes through Iran.

The rationale behind an "Iran Route", like any other corridor, should always be the seamless flow of freight and passenger traffic along its constituent parts. And perhaps the most crucial issue for Iran route is the need to create a system which offers seamless, trouble free, safe and reliable passage for freight and passenger with minimum inconvenience and variation in cost and time, risk and comfort.

7.4 Conclusions and recommendations

The economic development of countries is heavily dependent on trade and transport and both currently play an important role in regional cooperation. This study, which contains a detailed assessment of the provision of transport infrastructure and transport services in the Islamic Republic of Iran at a national and a multi-country level, envisages Iranian routes as of potential importance for international traffic to connect Asia and Europe. It has also worked and elaborated to a certain extent on transport and trade facilitation policies.

Furthermore, usage of geo-economical information that offers valuable knowledge in the course of this study is an attractive manner that offers a profound insight on the recent transport and trade development of projects in Iran. The study has focused on a comparison between Euro-Asian railway links and the traditional maritime transport routes, and has identified and highlighted a range of transport routes through Iran route that could be used as a viable alternative for further advancement of transport services for trade between these two continents.

This Iran route analysis could serve as the basis for the recommendations that, once implemented more fully, could shorten the economic distance between countries of the region with the main markets of Asia and Europe.

In order to respond to the question “Does Iran have the potential to become the crossroads of Eurasian and the Central Asian Republics and the other landlocked neighbouring countries?”, this study has taken several steps to elaborate the significant potential of Iran to exploit its geographic location and the attributes of its transport sector in the development of trade and transport in the region. This is in line with the current approach of government for promoting transport corridors by improving both hard and soft infrastructure along the corridors of the country to permit a gradual approach and to enable the more time efficient carriage of standardized truck and their container payloads.

With regards to the question about the role of regional organisations and multilateral agencies in acting as brokers of cooperation among national governments to substantiate the overlap of corridors, healthy guidelines could be extracted from this study. On the challenge of identifying comparative advantages in transport and trade the study has highlighted several potential directions of public policy.

With these in mind the study suggests the features of an ideal transport network for Iran, which would contain good quality standard rail while having proper road connections in all the directions in such a way that the country could reorient its trade in case of unexpected disruptions.

The main features of transport in Iran are its multi-vectored characteristics and its ability to meet the complex needs of cross-regional trades. Its feature of linking landlocked Central Asian and Caucuses and other landlocked neighbouring countries as well as linking regional markets through its seaport corridors to the open seas has been identified and discussed quite extensively in this study as a comparative advantage and as a way for promoting local, regional and international trade.

Integration of the country into the regional and global economy, for which regional cooperation such as ECO has an institutional role, is important, especially for a country like Iran that is located in a region which is rich in mineral resources, oil and oil products that need the least-cost means of transport for mobilisation when there are not many feasible alternatives for export from or import to such long distance locations in Europe and Asia.

Potential for reducing the cost of trade and increasing shipment volumes are always regarded as opportunities in the Iranian transport arena. In this regard, a clear task for national government is to maintain the country's physical infrastructures, to reduce bureaucratic red tape that slows the seamless nature of transport processes, and to eliminate corruption that increases the cost of trade and prevents proper gains from trade and transport.

Bureaucratic obstacles have always affected trade flows adversely; therefore, to solve them under national control by reducing their incidence and impact would without doubt be a good practice especially in a country that stands at an international trade and transport crossroads, as Iran does.

7.5 Directions for future research

The study focuses on an "Iran Route" landbridge at an international and intercontinental macroeconomic level. This is appropriate given the objectives of this study, although it might be too broad to observe and unpack properly problems at a more disaggregated level. These route- or location-specific problems would include those such as services provided by different individual ports, problems encountered at different border crossings, and by particular modes of transport on particular routes.

In these kinds of cases, there is a clear need for further detailed studies of the port, road and rail links of an "Iran Route" at an individual level.

In the context of specific routes crossing the territory of Iran and at times connecting to neighbouring economies, there is a need for more detailed modelling on a route-by-route basis, to analyse *inter alia* transit time, cost and modal frequency of service and origin-destination levels.

Formation of a national policy based on international transport service characteristics such as usage of a special uniform 'Multi-modal Bill of Lading' or 'Through Bill of Lading' applicable to a range of "Iran Routes", at least within the context of the ECO region Transit Trade Agreement of 1995, seems to be required.

Future researchers might also consider the capture and analysis of real and longer-term data of shipments and shippers in the ECO region and consider various options to respond to the transport demands of these shippers.

A more comprehensive conceptual understanding of an "Iran Route" also requires a more systematic approach toward the collection and publication of transport data related to this route.

Information and education on the concept of an "Iran Route" should focus on critical physical supply and service issues, integrated transport systems, and modal movements, all of which can be perceived as landbridge-type operations and not as traditional modal carriage of goods.

Further studies on the concept of this "Iran Route" should also focus on how its corridors might achieve their development potentials and spinoffs for the areas through which they run, while considering the service and physical supply issues, modal movement and integration of systems as a practical consolidated network of transport arrangements across modes for the carriage of passengers and goods.

7.6 Iran's future transport economic context and its environment surrounding Iran routes

The Iranian economy is influenced by of a number developments originating from inside and outside the region, which provide significant opportunities for the transport sector of Iran.

Firstly, prospects of growth for the future show that energy demand in the Asian continent itself will be sustained at high levels because expanding areas like China, India, and South-East Asia are short of hydrocarbons. Consequently, robust demand for Iran's energy exports will be maintained in the long term, and this in turn generates the basis for capital formation that is required for expansion of the transport infrastructure.

Secondly, nations around Iran are enjoying and will continue to enjoy high growth rates arising mainly from outsourcing of industrial activities in the region on the part of the developed nations of North America and European countries. This will result in an increased flow of goods and services between Asia and Europe. The resultant traffic will have to pass either near Iran or through Iran and therefore in order to prevent these traffic flows from bypassing Iran, it would be

essential to plan for the attraction of a major part of this future traffic through an “Iran Route” that in most cases also provides shortest and least-cost routes for these states.

Thirdly, the vigorous expansion in the South Caucuses and Central Asian countries, which is fuelled mainly by exploiting fossil fuel oil energy sources and which has been buoyed by strong world demand, has lead to a rise in the domestic consumption of different goods and a clamour for imports into these countries. These commodities are either coming by road from China or will be offloaded in the ports of the Persian Gulf. In the first instance there is no guarantee that they will pass through Iran, as other countries such as Pakistan are also trying to exploit a direct route to Central Asia. In the second instance, involving sea-cum-landside routes through ports in the Persian Gulf and beyond, it is the routes offering the fewest stoppages and the least costly transhipments that are most appealing to cargo owners and transport operators alike. In most cases, it is the Iran-route port corridors that indeed offer the best potential.

Finally, it should be stated that the Iranian transport sector has the capabilities to enjoy the benefits of opportunities offered by these global and regional change processes. Consequently, the scenario that has been presented here, of an Iranian national economy, bolstered by deep-rooted comparative advantages in its transport sector, moving to secure a more central position in the international transport supply chain, is a compelling scenario. The central prop in this dynamic exercise remains a viable “Iran Route” or Landbridge that can act effectively as an alternative for the traditional ocean routes between Asia and Europe, particularly in the container trades, and compete with established routes through the Suez Canal and Mediterranean Sea.

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Appendix 1 Ethical Clearance Certificate

UNIVERSITY OF
KWAZULU-NATAL

University of KwaZulu Natal
Research Office, Govan Mbeki Centre
Westville Campus
Private Bag x54001
DURBAN
4000
Tel No: +27 31 260 3587
Fax No: +27 31 260 4609
tshrec@ukzn.ac.za

24 MARCH 2010

Mr. F Rezkhaneh
School of Economics & Finance
WESTVILLE CAMPUS

Dear Mr. Rezkhaneh

ETHICAL APPROVAL NUMBER: HSS/0132/10D
PROJECT TITLE: "The provision of efficient transport services in the Iranian maritime and land transport interface"

In response to your application dated 23 March 2010, Student Number **206525761** the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL.**

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study must be reviewed and approved through the amendment /modification prior to its implementation. Please quote the above reference number for all queries relating to this study.
PLEASE NOTE: **Research data should be securely stored in the school/department for a period of 5 years.**

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steven Collings (Chair)
HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

cc. Supervisor (Trevor Jones)
cc. Mrs. C Haddon