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Review

Integration of Oman Ports into Global Supply Chains: case of Duqm Port

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In the Globalized world, country's integration into Global Supply Chain (GSC) is gaining more and more importance as it leads to gaining comparative advantages, boosting business development with attraction of investments. Within this, country's integration into GSC can be viewed from different perspectives and within different disciplines. This study is based on the assumption that Oman is integrated into GSC through its ports. Empirical investigation and analysis of four parameters of port integration into GSC proves that Duqm Port (one of the biggest ports of Oman) is integrated into GSC. The case of Duqm Port proves that Oman indeed is integrated through its ports into GSC. Further development of the study intends empirical investigation of other three biggest ports of Oman, as all ports of Oman have their specialization and could not be compared and evaluated based on the same methods.

Keywords: Oman Ports**,** Supply Chains**,** Duqm Port

INTRODUCTION

Within Globalisation, each country is integrated into different international relations: trade, technology transfer, human resources migration, capital flows, and industrial cooperation. The importance and benefits of such integration are undeniable. Oman is integrated into global economy in different ways: first of all through the supply of energy resources, active membership of integration unions and international organisations, participation in added value creation on the beginning stages like processing raw materials, and production of ready-made goods. But in conditions of limitation of oil and gas resources in Oman, government of Oman head for diversification in order to build strong economy that is independent from natural resources, according to The Vision of Oman 2020 (Ministry Of National Economy 2008). Within this, one of the fundamentals of economic development is to build infrastructure enabling development of different regions, industries and private sector. International relations are inevitable part of any economy and the more local economy is integrated into "Global Village" and participation in Global Supply Chain the more benefits it enjoys: inflow of foreign direct and portfolio investments, diversification of export-import operations, upgrade in productive capacity, improvement in technology, development of financial sector, development of private sector, development in human resources, etc. (UNCTAD 2011). Integration into GSC helps national economies to gain comparative advantages, and at the same time makes them interdependent (Costinot, Vogel, Wang 2011)

So the general scientific problem is the phenomenon of integration of developing countries into GSC.

Within general problem there are many specific aspects, which are broadly investigated by different specialists. One of the particular aspect of the general problem is the means of integration into GSC, which researchers divided into 2 dimensions: company level and country level (Gereffi 2011). This research will be concentrated on country level. Country integration into GSC can be studies through its participation in international trade, added value creation, and integration of country infrastructure with world logistical systems. There are many elements compiling country infrastructure, but the current study will concentrate on transportation and communication systems, particularly on ports as strategic points of country integration into GSC. So, particular aspect of the general problem to be investigated is integration of ports of small open economy into global supply chain.

Many developed countries and developing countries are doing research on their ports and integration to GSC (Carbone 2003, Khan 2012; Haddock 2008; Koopman 2010, Notteboom 2008), but the author has found a lack of researches about Oman. As Oman is blessed with very beneficial geo-political allocation, its economy is naturally integrated into Global Supply Chain through seaports. The case of Duqm port may be a game changer in the power relocation in Indian Ocean within trade and shipping roots. That why, the main scientific importance of the study is to fulfill the gap in researches about Oman economy and its ports integration into Global Supply Chains. The study is limited to the case of Duqm port, but the further development of the research will include evaluation of 4 (out of 7) Oman ports integration into GSC to conclude the prove of hypothesis.

The goal of the study is to investigate Duqm port as a part of Oman logistical system and its integration into Global Supply Chains.

Objectives

1. To study Oman economy, its history, future development plans and recent trends as patterns of Oman integration into GSC.
2. To study the development of infrastructure of Oman and variety of ports with their specialization.
3. To study Duqm Free Zone and Duqm Port, its functions, capacity and geopolitical role.
4. To showcase the integration of Duqm port into GSC through discussion of its 4 parameters
5. To prove the stated hypothesis: Oman integration into GSC through its ports on the case of Duqm Port

The main results of study is seen in proving the hypothesis that Oman is integrated into GSC through its ports by applying theoretical concepts of 4 parameters of measuring integration of port into GSC on the case Duqm Port integration into GSC.

The hypothesis

Oman is integrated into Global Supply Chain through its ports, and particularly Duqm Port.

Methodology

To achieve its goal and objectives, the study will use Exploratory Descriptive Analysis method based on observation, abstraction and generalization. The Domain Analysis will be used to analyse collected data. The data will be gathered from secondary (recent publications, internet sources) and primary (interview with Oman Dry Dock Company) sources.

Oman economy and its infrastructure

Brief history

In 1996 Oman opened new page in its history by having the official constitution of the country, issued by Royal Decree in 1996 that is called the Statute of Oman. Before 20th century Oman as it is now did not exist on the world map. There was absolute monarchy with the supreme power of Sultan, and it was called Sultanate of Muscat, allocated on the western coastline of Arabian Gulf. There was imamate of Oman that united lands of tribes of the interior lands between Muscat and Saudi Arabia. Also, there were no clear borders in between Arabian Peninsula countries before 1970. The history of Oman reaches in its roots to 2000 BC. Throughout centuries Oman experienced many changes, being occupied by Persians, Portuguese, British and being a powerful empire with controlled territories of east coast of Africa and its islands and eastern coast of Arabian Gulf. After slavery was declared illegal, economy of sultanate declared and empire lost its power. After oil was discovered in Arabian Peninsula, Omani tribes set at variance and Oman was divided into regions, where each region had its Sheikh as a governor. Regions' economy was based on traditional sectors such as agriculture (dates, goats, camels), fisheries and handicrafts. There was no national authority responsible for the supervision of the incipient banking system. The number of banks was small and the banking activities were limited in scales. When Sultan Qaboos Bin Said overthrown his father and became a sultan of Oman in 1970, he united all interior and coastal regions and fixed borders with UAE, Saudi Arabia and Yemen. Oman as it is now started its development from 1970, as oil revenue has been directed to the development of infrastructure, especially banking, education and medicine sectors. In 1974 Central Bank of Oman was established. The two monetary authorities that preceded the establishment of the Central Bank of Oman (the Muscat

Currency Authority in 1970 and the Oman Currency Board in 1972), were not vested with full banking status, but, they had well prepared the ground for the emergence of the Central Bank of Oman. (CBO 2012)

Before 1970 Oman used Indian rupees as its currency. But in 1970 Oman introduced its currency named rial Saidi that was equal to British pound. Modern currency rial Omani replaced real Saidi in 1973 and was pegged to USD at 1 rial equal 2.895 dollar till 1986. (CBO 2012) From 1986 the rate was not much changed and till now real Omani is one of the most stable currencies in the world.

Before "oil" era, Oman was famous on international markets for dates, frankincense and some traditional handicrafts. Export of oil opened new ways of Oman integration to the world economy. Oman became a member of Arab League and the United Nations in 1971. In 1981 Oman became one of the founders of the Gulf Cooperation Council. Despite Oman is oil and gas producing country, Oman did not became a member of OPEC nor Organisation of Arab Petroleum Exporting Countries. Joining World Trade Organisation in 2000 helped Oman to liberalize its markets and improve its position in world economy. Since 2006, Oman's exports increased on average by 7.8% each year, while imports increased on average by 13.3% each year. (CBO 2012)

Oil revenue has been directed to the development of infrastructure, especially education and medicine sectors. Within the limitation of Oman's oil resources, the production and revenue has been declining since 2001 (Oman Chamber of Commerce and Industry, 2013). Oman's government put efforts to provide conditions for diversification of economy and development of non-oil industries. Among priorities of economic development are natural gas resources, tourism, real estate sectors.

Vision 2020 and current achievements

The main policy areas of the vision 2020 have been outlined by Oman government within six main areas: development of human resources, development of private sector, economic diversification, improving standard of living, stable macroeconomic framework, preservation, safeguard and development of accomplished achievement.

To implement vision 2020 Government took course on significant structural transformation of the economy, within which the main shift should be from oil-based to diversified economy with higher levels of savings and investment with appropriate sources of national income.

Such structural changes in economy are seen in following sectors:

1. **The crude oil sector's** share of GDP to drop to 9 percent in 2020, in contrast with 37.2 percent in 1995 and 44.3 percent in 2006.
2. **The gas sector** to contribute around 10 percent to GDP in 2020 compared with 0.9 percent in 1995 and 3.6 percent in 2006.
3. **The nonoil industry sector**'s contribution to GDP to rise from 8.4 percent in 1995 and 14.2 percent in 2006 up to 29 percent in 2020.
4. **The Services sectors** to contribute around 47 percent to the GDP in 2020 compared with 52.3 percent in 1995 and 44.7 percent in 2006.
5. **Gross domestic investment** to increase its share of GDP to 34 percent in 2020, compared with 15.0 percent in 1995 and 18.5 in 2006. (OMNE 2008)

There have been put serious efforts to follow the plan in economy structural changes and diversification.

The crude oil and gas sector

Due to favourable conditions of prices in international market, crude oil and gas sector continue to play significant role in economy of Oman. Crude oil rose by 10.9 percent and natural gas rose by 10.4 percent in 2012. Accordingly, share of crude oil in GDP accounted for 48.4 percent and share of natural gas – 3.8 percent in 2012, Central Bank of Oman (CBO) reported in its annual report 2012. (CBO 2013)

Oil and gas essentially contributed to value addition within the economy in the performance of non-petroleum industrial activities of such industries as fertilizer, petrochemicals, aluminium, power generation and water desalination.

Contrast of crude oil production (336.2 m.b.) to its export (279.8 m.b.) shows that significant portion of oil and gas being used by existing and new refineries. About only 83 percent of oil was exported in the last five years, and the rest was used domestically, according to annual report of CBO. (CBO 2013)

The nonoil industry sector

A steady decline of non-oil GDP has been recorded since 1995 reaching 52.9 percent in 2010. During the period from 1996 to 2010 the share of manufacturing in GDP increased almost twice in its value reaching 10 percent in 2010. Non-oil export also increased during that period from 20 percent in 1996 to 26.8 percent in 2010. (Mansour 2012)

According to Eighth Five-year Development Plan (2011-2015) the non-oil activities are expected to grow by an annual rate of 10 percent at current prices and 6 percent at constant prices. In order to enhance the role of private sector in economy, among governmental efforts to diversify the economy, promote business environment, increase employment opportunities and attract local and foreign investment, several initiatives have been taken to

create infrastructure facilities in industrial clusters, industrial estates and free zones. One of the priorities of governmental attention is development of Duqm Special Economic Zone (DSEZ) centered around the multi-purpose commercial port, industrial area, new town, fishing harbor, tourist zone and other infrastructural facilities.

To support and promote Small and Medium Enterprises (SME) CBO has advised the banks to liberalise lending policy for SME segment, to extend credit to SME at as low interest and other costs as possible, while allocating 5 percent of their total credit to SME.

According to CBO report, in 2012 the GDP from non-petroleum industrial activities slowed down to 4 percent, comparing to its growth of 16.6 percent in 2011.

The share of manufacturing in 2012 was estimated by CBO as 61.2 percent, building and construction 29.3 percent, electricity and water supply 7.4 percent, mining and quarrying 2.0 percent. CBO reported slow growth rate of manufacturing of 2.5 percent in 2012 as against 22.6 percent in 2011 and building and construction sector - 4.7 percent in 2012 as compared to 5.8 percent in 2011. (CBO 2013)

General picture of hydrocarbon and non-hydrocarbon shares in GDP at current prices during the period of 2008-2012 and their contribution to GDP is presented in Chart 2.3 (a) and Chart 2.3 (b).

The Services sectors

Demand on services increase significantly due to last three years rapid growth of the economy based on growing needs of other sectors. Competition in service sector became stronger as under WTO and trade agreements foreign service providers extend their services to Oman. So, Government has been supporting increase of domestic supply of efficient service at competitive prices.

According to Eighth Five-Year Development Plan (201102015), special emphasis has been placed on promoting opportunities of sustainable tourism development by allotting land, encouraging investments in hotels, developing integrated tourism complex and parks in various parts of the country.

Shart increase of value added in services has been reported by CBO in 2012: 16.4 percent (RO10.6 bn) comparing to 10.6 percent rise in 2011. The share of service sector in GDP rose to 35.4 percent in 2012 from 34.0 percent in 2011. CBO stated that all the elements of service sector experienced positive growth of different degrees during 2012 (30.1 percent - public administration and defense; 15.3 percent – wholesale and retail trade; 12.3 percent – transport, storage and communication), providing 58.1 percent in total services sector GDP. CBO registered growth of financial intermediation sector of 10.5 percent in 2012, compared to 8.1 percent in 2011. Development of tourism activities in Oman was reflected in sharp growth of value added of hotels and restaurants by 14.9 percent in 2012 compared to 1.4 percent in 2011. (CBO 2013).

Gross domestic investment

Oman Government took opportunity of certain set of fevourable conditions (oil prices, increased production, increase in government revenues, expansionary fiscal policy) and directed its current expenditures to rising public wages and spending on defense and national security during the year 2012.

Investment expenditures share declined to 9.6 percent in 2012 from 11 percent in 2011. Current expenditure on participation and support to private sector stood at 6.3 percent of GDP in 2012, compared with 6.2 percent registered in 2011. (CBO 2013).

Oman Infrastructure and ports

Oman infrastructure current developments

Water supply

With the growth of population and industrial development the demand for water is growing, providing winning contract for new projects. Two new projects are under Oman Power And Water Procurement Company (OPWP) supervision: in Quarayyat and Suwayq, which are aimed to expand capacity by 405 000 cubit meters per day (m3/d) by 2018. Barka and Ghubra projetcs are on final stages of their development and will increase capacity from late 2013. An independent water project at Ghubra in Muscat will involve designing, building, financing, operation and maintaining a desalination plant with capacity of 42 gallons per day, that will be completed by 2014, according to Ahmed Saleh Al Jahdhami, chief operation officer of OPWP. (BMI 2013)

Transport sector

Railway line. Within general GCC plan on building railway network, Jordan will join it to integrate its domestic network with Saudi Arabia and GCC region. Oman and UAE are cooperating in building 136km length railway line connecting Sohar and Buraimi with UAE border. (BMI 2013)

Roads and port development

Nineteen deals for road and port development projects are signed by Oman Ministry of Transport and Communication valued at more than OR151mn

(US$392.4mn), from which fifteen deals worth OR95.5mn (US$247.39mn) for road development projetcs and four deals worth OR55.6mn (US$144.03mn) are for port development projects. Within road deals expand of Sinaw-Mahoot-Duqm road received OR41.6mn (US$107.76mn) and development of Sohar roundabout received OR21mn (US$54.40mn). From allocated funds, port of Sohar will have floating berths for carrier shipping liquids, and port of Khasab will also have floating berths, premises and stores. (BMI 2013)

Airports

Muscat International Airport received OR1.6b (US$4.2b) to expand and set its capacity from 6.5 m to 12 m passengers per year, with the option buit into the design to take the capacity to 24m, 36m and 48 m passengers annually as necessary. According to Oman Airport Management Company (OAMC) Salalah airport will expand and increase its capacity to 1m passengers a year, together with four new airports to be built in Duqm, port sity of Sohar, Ras Al Hadd and Adam. (OBG 2012)

Medical city

The Omani government has a plan to build a medical city in 2013 in Nothern Batnah, according to Ahmed Al Qasmi, director general for planning at the Health Ministry. On the area of 5mn square meters will be allocated residential space, shopping malls and hospitals. The project is part of the country's health care system to serve the future demand in the growing medical sector. (BMI 2013)

Housing support

Housing area had been allocated with expenditures of OR448m (US$1.2 bn) over next five years. Government provides plots and housing loans, direct construction of housing for lower income groups and plans to build 8000 homes, which it says should provide sufficient housing for all those needing families. (OBG 2012)

Schools and Hospitals

Health planned expenditure is OR271m (US$703.9m) and education - OR245m (US$636.4m), most of which is being spent on improving capacity in these two key sectors. However, OR36m (US$93.5m) are allocated to build 65 new schools to cope with the increase in youth cohort. New hospitals building in Suwaiq, Mahout, Sinaw, Dhalkut and Mazyoona would receive OR55.5m (US$144.2m) and OR48m (US$124.7m) is for hospital in Salalah. (OBD 2012)

Oman ports and their specialization

Throughout centuries, Omani ports profited from their strategic position – location along two routes through Persian Gulf and Red Sea connecting East and West. Naturally, Oman ports are involved in coastal trade between countries of Red Sea, Gulf and Indian Ocean, as a transcontinental trade between Europe, Africa, the Gulf, India, Malaysia, Indonesia and China.(Chronicle of the MENA 2013)

According to ministry of Transportation and Communication of Oman (MTC April 2010), there are eight major ports of Oman: Port Sultan Qaboos, Port of Salalah, Port of Sohar, Port of Khasab, Port of Shinas, Port of Duqm, Mina Al Fahal, Qalhat LNG. (OMTC 2013).

Port Sultan Qaboos

Historically and traditionally main port of the country, Port Sultan Qaboos recently going through a series of expansion: to the existing container terminal and the conversion of sidewalks, specialized berths, there is a plan to set up a building for the reception of tourists and travelers, equipped with the latest devices. To stimulate tourism and receive more travelers, port contains 13 berths total length of 2592 meters and depths between 4-13 meter and a capacity of up to 350000 containers per year. From 17.07.2011 Port sultan Qaboos started its converting to the port of tourism, with the transfer of commercial activities to the Sohar Port. (OMTC 2013)

On 17/7/2011 issued guidance of the High converting Port Sultan Qaboos to the port of tourism and the transfer of commercial activities to the Sohar Industrial Port, and the Ministry is currently preparing outlines and detailed studies of the project and the preparation of programs and mechanisms for the transfer of commercial activities of the Port Sultan Qaboos to the Sohar Industrial Port. (OMTC 2013).

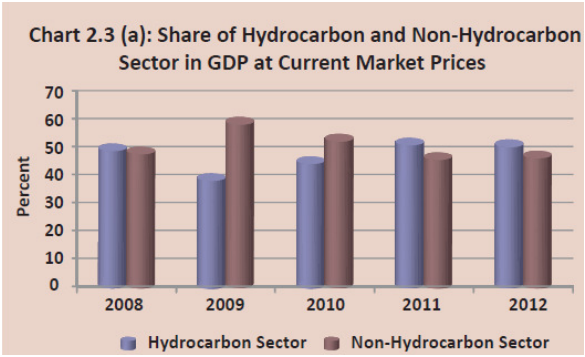
Port Salalah

Due to its proximity to the path of global shipping lines, port of Salalah has great importance with the opportunities to promote the commercial position of Oman. In 1996 the implementation of the first expansion of the port began from the establishment of four container berths total length 1236 meters and depth of 16 meters. Second phase of expansion started in early 2005 with creation of other berths for containers total length 969 meters and depth of 18 meters with the construction of wave breakers length of 2825 meters. Operation of new quay in 2007 and 2008 increased the operational capacity

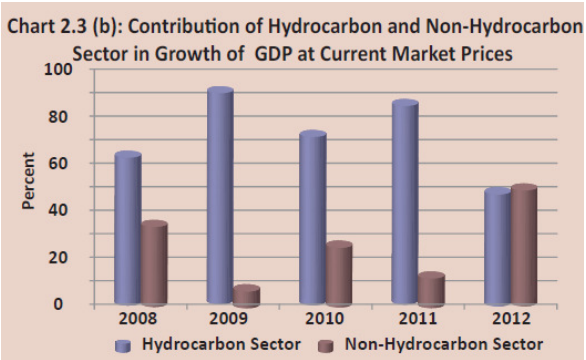
Table 1. Pattern of Structural Changes throughout the Five-Year Plans

	1976-1980	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006-2010***	2010
Non-oil/GDP	43.5	48.9	57.8	62.4	61.1	58.1	57.3	52.9
Manufacturing/GDP	0.7	1.7	3.2	4.1	4.5	8.3	10.4	9.5; 16.73(a)
Non-oil Exports/ Total Exports*	3.8	7.3	9.7	19.4	22.4	19.1	23.1	26.8
Non-oil Revenues/ Total Revenues**	7.8	11.3	17.9	21.1	24.5	23.4	23.0	24.0

Reference: Ministry of National Economy, Oman, The Development experience and investment climate, 2008; and Ministry of National Economy and Central Bank of Oman.
* Including re-exports
** After transfers
*** Average 2006-2010, (calculated by author on the basis of data provided by Ministry of National Economy, National Accounts Bulletin, 12th issue, April 2012)
(a) Industry includes manufacturing, construction, mining and quarrying and electricity and water
Source: (Mansour 2012)



Source: CBO 2013



Source: CBO 2013

of the port as 5mlt TEU per year. (OMTC 2013).

Further expansion of the port started in May 2010 with implementation of the plan to construct liquid jetty and general cargo along 1200 meters and a depth 18 meters in order to keep up with growing demand for import-export trade and service of Salalah Free Zone.

In nearest future, Government intends to establish other three general cargo in addition to construction of facilities to receive fast ferries.

Port of Salalah has 2 main terminals: the container terminal (seven berth total lenghth 2428 meters and depth 16-18 meters) and general cargo terminal (station on 12

Table 2. Capacity of Duqm Port, 2013

Data	Duqm Port		
	Number	Length (m)	Depth (m)
Container berth & General cargo berth	8	2250	- 18
Dry dock berth	6	2800	- 10
Service berth & Government berth	4	980	- 10
Total	18	6030	
break water	2	8700 (total)	-10-19
Land area (km2)		60	
Sea area (km2)		75	
Total area (km2)		135	

Source: Ministry of Transport and Communication, 2013 (OMTC 2013)

berths with length 2002 meters and depth 3-16 meters). (OMTC 2013).

Port of Sohar is gaining more strategic importance for the country as its main purpose is to serve trade and industry in relation to large industrial projects. In 1996 the establishment of breakwater and digging a channel for entry of ship and port basin and berths of various kinds began. In 2002 the third phase has been completed and the harbor is now ready to receive the latest generation of cargo ships, which has 21 berths total length 6270 meters and depth 16-25 meters, capacity of up to 3 mln containers per year, with possibility to expand capacity to 6mln containers per year. (OMTC 2013).

The project of movement of traffic from and to port through bridges and roads, together with the project of the bridge and road leading to the aluminium smelter and highways has been completed.

The establishment by the southern breakwater at the port, which serves the manufacture of liquid has been started. Within the project designs for completion of infrastructure works at the port, design of the security gates and entry system automation with lighting and landscaping and beauty, designs for parking and roads leading to the administration building has been prepared and are ready for implementation. (OMTC 2013).

Port of Duqm consists of two breakwaters length 8.7 km, commercial berths length 2250 meters and depth 18 meters and government berth 980 meters and depth 10 meters. Port's capacity is up to 3.5mln containers per year considering port expansion to a capacity up to 20 mln containers per year. (OMTC 2013)

Also, there is the dry dock for maintenance and repair of ships of various sizes, including vessels of oil and gas giant which has a capacity to 600000 tons. The project comprises two docks with length 410 meters each and every one of which display 95 meters and 80 meters high, 14 meters and 10 meters depth and dry dock berth length is 2800 meters. Project includes construction of buildings, workshops and service facilities required for operation, with completion of superstructure and 17 projects including installation and equipment and mechanisms necessary for operations. Also, internal network of roads of the port has been started its construction. Designs for completion of infrastructure projects at the port, including security gate, fences and iron bars for cranes and equipment yards handling, building, workshops, service and associated facilities has been prepared and are ready for implementation. Also, three lighthouses navigation and three stations, DGPS coast of Oman to the Arabian Sea will be built to facilitate the process of navigating to and from the port for maritime safety. (OMTC 2013).

Port of Khasab. A number of development projects began in 2002 due to the enhanced importance of the port Khasab within encouragement of commercial traffic in Mussndam Governorate and development of local economy of the province. Among them, establishment of wavebreakers along 1015 meters, deepen the harbor basin to 10 meters and channels access 10.5 meters, installation of 7 docks floating have been completed in 2007. Construction of a floating pier and facilities for the reception of fast ferries at the port has been completed recently. (OMTC 2013).

Port of Shinas has been developed to facilitate local trade between the states of North Batinah in connection with fishing and trade of livestock and agricultural products from 2002. Recently the pier floating for reception of fast ferries at the port has been completed. (OMTC 2013).

Duqm Free Zone and Duqm Port

The Duqm Free Zone

The Duqm Free Zone is a Special Economic Zone

established by Government on the territory of Al Wusta Governorate near fishing town Duqm. The DSEZ is a very important project for Oman as it's main purpose is to contribute to the county's GDP, create employment for Omani people, to boost social and economic development of the area, diversify sources of national income, according to HE Yahya bin said bin Abdullah Al-Jabri, Chairman of the Special Economic Zone Authority at Duqm (Jankovic 2013).

Accordign to SEZAD, mission of DSEZ is to improve the business environment of Duqm, develop its infrastructure service, manage its strategic assets and facilities, build its human resource capabilities in order to attract local inward and foreign direct investments in transportation and logistics services, industries, and tourism in accordance with the approved master plan, international best practices, good governance and the sustainable use of natural resources. (Muscat Daily 2013) DSEZ has an area of 1777km^2 fronted by about 80 km of coast line. The DSEZ consists of eight zones: Seaport, Industrial Area, New Town, Fishing harbor, Tourism Zone, Logistics Hub, Education and Training Zone and Airport. There are 32 projects going on there – comprise a mix of infrastructure, industry, utility, logistics, tourism and leisure, health, fishery and environment-related investments – according to Zainab Al Kharusi, Environmental Specialist at the SEZAD. Within 32 projects, 10 have already been completed: Duqm Port, dry dock, power plant, desalination plant, power distribution network, water distribution, City Hotel, Duqm Hospital expansion, Veronica floating hotel and temporary fishing jetty.

Another 15 projects are under construction: Duqm Airport, sewage treatment plant, Crown plaza Duqm, as reported by Ms. Zainab. (Prabhu 2012).

Master Plan of DSEZ allocated heavy industries in the northern end of the Zone, whilst new Duqm town and sea resorts will be further south.

365 km2 have been designated to industrial and logistics use. A Mater Industrial Strategy is targeting petrochemicals, building materials, minerals and inorganic chemicals, fishery and aquaculture, food manufacturing, clean technologies, life sciences and allied business, allocating industrial and commercial enterprises in the area near to the port and airport. (SEZAD Jancovic) Among heavy industries, the biggest of the industrial projects envisioned at the DSEZ is a refinery and petrochemical project worth RO2.5bn, together with RO185mn project of developing of gas pipeline network from the central Oman gas fields to Duqm. (Prabhu 2012)

23 km^2 have been designated for new town Duqm that is planned to accommodate up to 67 000 residents. This area will act as a catalyst for the urbanization and commercialization of the Al Wusta region, said HE Yahya Al Jabri. (Jancovic 2013).

Special attention and the main accent was given to development if infrastructure in DSEZ. Implementation of the road project worth around OR235ml is in progress. (Prabhu 2012). A high standard arterial road network will link Duqm with all majour town and cities in Oman as well as to connect Duqm with the UAE and KSA.

According to Chairman of SEZAD, Duqm Airport is scheduled to be open in 2014 and will serve domestic and international flights with capacity of about 500000 passengers per year, accommodating cargo and passengers traffic. (Jancovic 2013)

The planned rail network will connect Duqm to Muscat and onwards to the UAE and other GCC nations within creating a multimodal transport system in and around Duqm.

Among another large investment projects are: a flood protection venue worth OR83mn, the Rock Garned, Nafun fisheries harbor. (Prabhu 2012). Fishing harbor is planned to have 6 meters depth with all fecilities required to accommodate small and medium sized fishing boats. Chairma of SEZAD sees there retail, wholesale and export markets, fish processing, canning, fish oil and animal feed industries. Also, Government will provide space for fish and shrimps farming, a training center and extension services to provide to the local fishermen with the latest techniques. All this should operate alongside a marine research center and will be completed to the highest international standards and a quality assurance center for fresh and processed fish export. (Jancovic 2013)

Duqm Port

Technical characteristics and capacity of the port are presented in the table below.

The Duqm Port plays a paramount role in development of DSEZ. In early 200 the Government of Oman embarked on a visionary project to create a new port in Duqm. In 2007 the Ministry of Transport and Communication started to build the first phase of the port. In 2010, the Port Duqm Company (PDC) was created as a joint venture of Oman government and Antwerp Port to co-invest, operate and manage the port and industrial zone. (Jankovic 2013)

In 2006 Oman Drydock Company (ODC) has been established in Duqm to develop and diversify heavy industries in Oman. ODC secures a total of 1.3mn m^2 in Duqm and is equipped with facilities of two docks for ultra Large Crude Carrier (ULCC) class, five quays 2800 meters long, 14 units of Jib Cranes and Slop and Sludge treatment facility, including slop tanks to store 10000m^3. Also, port has 5 workshops – Pipe and Outfitting, electric Shop, Machinery Shop, Hull Shop, Blasting and Painting Shop and Cryodenic Shop, facilitated with modern and high tech materials. (Jankovic 2013)

The dry dock is working at full capacity. The port already started commercial activity, though on a limited scale. Petroleum Development Oman (PDO) and other oil companies have started to use the port to ship and

transport large equipment to their oil fields in and around Duqm, that brings them appreciable costs reduction. Other logistics companies, including DHL, have expressed an interest in setting up an office in Duqm. (The Business Year 2013)

Integration of Duqm port into Global Supply Chain

Theoretical background

Using theoretical analysis of new strategic role of seaports in logistics and Supply Chain Management, a conceptual framework of four parameters to measure the importance of a seaport in the supply chain integration was discussed by Radhika D. (Radhika 2012). Such parameters are: extent of establishment of Port Information Communication Systems, extent of provision added value services over traditional services, extent of integration of multimodal systems and operations and extent of port engagement in Supply Chain Integration Practices.

Cachon and Fisher defined *Information and Communication Systems* as the establishment and use of seamless communication systems that facilitate efficient servicing of supply chain operations and achievement of supply chain goals. (Cachon 2000). Sharing of information among ICS is viewe as a building block in supply chain relationship. It leads to high levels of supply chain integration by enabling organisations to improve reliability, dependability and speed. Also, information and communication systems in supply chain impact costs and service quality, reflected accordingly on supply chain performance.

Robinson defined *Added Value Service* as the port's ability to add value to the services that it provides in the context of facilitating the objectives of the supply chain system further. (Robinson 2002) Among Added Value Services are: pre-assembly, providing facilities to cargo services, playing the role of distributor, developing continuous replenishment, cross docking activities, ability to launch new tailor made services for port users to cater for specific needs of market segment.

Parola and Sciomachen defined Multi Modal Systems and operations as systems facilitating efficient and effective multi-modal operations, or efficient use of multiple modes of transport interconnected by facilities at the port. (Parola 2005). Ports serve both direction of logistics operations: (1) receiving goods from ships and moving them to land through road or rail and inland waterway modes and (2) receiving cargoes arriving by road/rail and waterways and moving them to ships. Therefore, ports system has to perform high level coordination, interconnectivity and interoperability. So, inter-connecting multimodal infrastructure and systems facilitating intermodality are the among key parameters of ports' integration in the supply chains.

Bichou and Gray defined Supply Chain Integration Practices as the extent to which the port planning and organizing activities, processes and procedures beyond its boundaries in the supply chain and monitors performance in such activities. (Bichou 2004) These can be in form of involvement in the introduction of new shuttle train services to the hinterland, together with railway companies, rail operators, terminal operators, shipping companies or large shippers. Also, it is related to collaboration of port with other members of supply chain in order to identify cost-effective and supply chain performance enhancing solutions for the goods passing through the system. (Radhika 2012).

Empirical study of four parameters of Duqm Port integration into GSC

ICS. Joint venture Port of Duqm Company (50 % Omani Government and 50 % Port of Antwerp) is running the port. As Peter Broers, CEO of PDC stated, the project has been started from scratch, which provides opportunity to develop it in a comprehensive way, using the lessons from experience with other similar projects. SEZAD invited Port of Antwerp to play a landlord role in managing Duqm Port, using experience of a big player in the European market and adapting best practices. The Port Authority will engage professional terminal operators for each specific discipline: a container-operator, a dry-bulk-operator, a liquid-bulk-operator, and a multi-purpose-operator, that will improve the performance of the port. (Jankovic 2013)

SEZAD stated that Special attention is being paid towards designing and constructing first stage facilities relying on latest technologies, including information technology system. This enhances efficiency and reduces operation costs. (SEZAD 2012)

The ICS of Duqm has been compiled considering experience of Port Antwerp, which is using APCS.

Antwerp Port Communication System is a network of systems and solutions for electronic communication, that comprises the exchange of data between business to government, business to business, and between government agencies.

The system bundles an efficient, electronic message and information exchange. The communication services support all types of goods and transport modes. The Port Authority, Customs, shippers, shipping companies, ship's agents, forwarders, Terminal operators, road and rail carriers, barge operators, logistic service providers are all connected. Electronic messages and solutions support the efficient handling of the day-to-day administrative and operational activities. As the imported data and information is reused within the whole logistics chain, electronic communication results in lower costs and less errors. (Port of Antwerp 2013)

Based on provided by SEZAD information, one can conclude that Duqm Port uses latest technology to establish efficient Information Communication System in the Port to connect with main multi-purpose operators.

Added Value Services

Minister of Transportation and Communication stated that soft operation of Duqm Port include receiving a number of containers loaded with equipment and tools that are used in the Duqm port Area. (CW 2013). According to SEZAD, the marine services provided by Duqm Port are high standard services of pilotage, towing and emergency response service. (Jankovic 2013). ODC has been receiving ships since last year and PDC is supporting their activities with knowledge from Antwerp. Pilots form Antwerp are guiding large vessels into the locks of drydock, so with special qualification they bring extra service needed. (Jankovic 2013).

Additionally to its primary activities, ODC is also provides a variety of industrial services, related to construction and fabrication of modular offshore structures, repair of jack-up rigs, fabrication of steel structures and related industrial works. (CW 2012).

Therefore, mentioned facts proves that Duqm Port is providing not only primary services of receiving ships, loading and transportation of cargo, but also soft operations as distribution of containers, pilotage, towing and emergency response services, drydock services, and variety of additional related industrial works.

Multi-Modal Systems and Operations

According to revealed by SEZAD statistics, ODC is equipped with 2 docks for ULCC class, 5 quays 2800 meters long, 14 units of Jib Cranes and Slop 7 Sludge treatment facility, including slop tanks to store 10000m^3. (Jankovic 2013)

The infrastructure of the Port of Duqm Company (PDC) consists of 9.6-kms of breakwater, 2.25-kms commercial berth for project cargo, bulk and containers and a roughly 1km long quay wall for vessels calling at the port. A water depth of —19 metres in the approach channel and — 18 metres at the commercial berths allows safe reception and handling of ships with capacities of up to 150,000DWT. (Logistics Aide 2013)

Oman Transport and Communication Minister announced plans for ODC add a floating dry dock to its ship repair and maintenance yard at Duqm Port. The floating facility would save small and medium size vessels from needing to dock in the port's giant docks, it will be Paramax-size facility suitable for small and medium sized commercial and military vessels. (CW 2012)

Mr. Peter Broers reported that the sub-structure works of Phase 1 of the port are almost finished, such as quay walls, dredging works for channel, etc. For the next two years the focus will be on construction of the superstructure, such as pavements, crane beams, technical buildings, gate buildings, with equipment such as ship to shore cranes, etc. Also, CEO of DPC stated that there is an opportunity to have a cruise ship terminal in the port. (Jankovic 2013)

Provided facts give a basis for conclusion that Duqm Port has modern standards of infrastructure and best available technologies on the market, within which the dry dock and port has such facilities as two docks for ULCC class, five quays, fourteen units of Jub Cranes and SlopandSludge treatment facility, five working shops facilitated with modern and high tech materials, together with two breakwaters, commercial berth, multipurpose handling facility, buildings, roads, waterhouses, water, electricity and sewage treatment systems and connection to the rail network with proximity to the airport, considering a possibility to have cruise ship terminal.

Supply Chain Integration Practices

According to SEZAD, Duqm Port has 5 working shops: Pipe and Outfitting, Electric Shop, Machinery Shop, Hull Shop, Blasting and Painting Shop and Cryogenic Shop with modern and high tech materials. Also, buildings, roads, warehouses, electricity, water and sewage are designed to be world class of operational capacity, productivity and stability. (Jankovic 2013). CEO of DPC reported that road system is already in place and will be improved in future, rail network is going to be developed in coming years, big international airport is under construction. (Jankovic 2013).

Roads, rail and pipelines are connecting Port of Duqm with KSA and UAE helping in transporting of goods without the need to go through Persian Gulf and the Gulf of Hormuz .(Logistics Aide 2013)

Building a container terminal with annual capacity of 200000 TEU is in plan, making Duqm Port a regional trading hub. (CW 2012).

Collaboration of Duqm Port with ODC brings its results: ships have been received by ODC since 2011and DPC is supporting ODC activities with knowledge from Ntwerp, guiding large vessels into the locks. (Jankovic 2013).

DPC together with SEZAD are working to engage professional terminal operators like container-operator, dry-bulk-operator, liquid-bulk operator, multi-purpose-operator to improve the performance of the port. (Jancovic 2013).

According to SEZAD, Duqm Port collaborate with Petroleum Development Oman (PDO) and other oil companies that have started to use the port to ship and transport large equipment to their oil fields in and around Duqm. Many logistics companies, including DHL, are of the way to set up an office in Duqm. (The Business Year 2013).

Based on mentioned facts, one can conclude that Duqm Port executes such supply chain integration practices like involvement in the introduction of train services to the hinterland together with railway operator, terminal operators, also connection of pipelines, collaboration with other companies of Supply Chain (logistic companies, airport, oil companies) in order to maximize cost-effectiveness of supply chain

performance.

CONCLUSIONS

In the Globalized world, country's integration into Global Supply Chain (GSC) is gaining more and more importance as it leads to gaining comparative advantages, boosting business development with attraction of investments. Within this, country's integration into GSC can be viewed from different perspectives and within different disciplines. The main hypothesis stated by this study is if Oman is integrated into GSC through its ports. Analysis of Oman economy, its historical development and current trends shows that Oman is a small open economy that started its intensive integration into "global village" from late 20th century. Naturally, due to its geopolitical position, since ancient times Oman participated in international trade and its ports played and are playing now significant role in transcontinental trade and shipping routes. As Oman is witnessing stable economic growth despite world financial crisis and recession, Omani government put efforts to diversify its economy, support human resources, and utilize natural resources for sustainable development and prosperity. Among governmental initiatives, the majour attention is devoted to building suitable infrastructure, providing opportunities to boost development of regions, private sector and increase employment opportunities. Following five years development plans, implementing Vision 2020, one of the biggest in the MENA region projects is Duqm Special Economic Zone (DSEZ). It was established in 2010 and is currently in various stages of implementation. One of the strategic importance points is Duqm port, blessed with unique allocation, has been developing as international transshipment hub and logistic center. Port Duqm integration into Global Supply Chains had been studies through four main parameters: Information Communication Systems, Added-Value Services, Multi-Modal System and Operations and Supply Chain Integration Practices. Investigation of Duqm SEZ and Port provided basis for evaluation of Duqm port integration into GSC by all four parameters:

Information Communication Systems: Duqm Port uses latest technology to establish efficient Information Communication System in the Port to connect with main multi-purpose operators.

Added Value Services: Duqm Port is providing not only primary services of receiving ships, loading and transportation of cargo, but also soft operations as distribution of containers, pilotage, towing and emergency response services, drydock services, and variety of additional related industrial works.

Multi Modal Systems and Operations: Duqm Port has modern standards of infrastructure and best available technologies on the market, within which the dry dock and port has such facilities as two docks for ULCC class, five quays, fourteen units of Jub Cranes and SlopandSludge treatment facility, five working shops facilitated with modern and high tech materials, together with two breakwaters, commercial berth, multipurpose handling facility, buildings, roads, waterhouses, water, electricity and sewage treatment systems and connection to the rail network with proximity to the airport, considering a possibility to have cruise ship terminal.

Supply Chain Integration Practices: Duqm Port executes such supply chain integration practices like involvement in the introduction of train services to the hinterland together with railway operator, terminal operators, also connection of pipelines, collaboration with other companies of Supply Chain (logistic companies, airport, oil companies) in order to maximize cost-effectiveness of supply chain performance.

Empirical study and analysis of four parameters of port integration into GSC proves that Duqm Port (one of the biggest ports of Oman) is integrated into GSC. The case of Duqm Port proves that Oman indeed is integrated through its ports into GSC. Further development of the study intends empirical investigation of other three biggest ports of Oman, as all ports of Oman have their specialization and could not be compared and evaluated based on the same methods.

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