A black and white photograph of the Dubai World Central building, a massive concrete structure with a prominent central tower and a large glass facade on the right. The sun is shining brightly from the right, creating a lens flare effect. The building's design features a series of diagonal structural elements at the top.

Dubai World Central and the Evolution of Dubai Logistic Cluster

Economic Note No. 10



DIFC

Dubai
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Executive Summary

The logistics sector has been one of the main forces pushing globalization. At the heart of the logistics revolution lays the integration of transport modes and the standardization of procedures which boosted synergies and economies of scale, to an unprecedented extent.

Dubai has been riding high on the wave of this advancements fulfilling a vocation that had suited the Emirate since the late XIX century when its ruler at the time, Sheikh Rashid bin Maktoum, declared its port a free zone. Dubai has thrived in its role as a regional hub reaching a position of prominence in the global logistics network and today it is one of the critical nodes in the global supply chain. This evolution underlines also the growing importance of our region in the world and its gradual transformation from an energy commodity exporter into a diversified economy with a broader economic base and a flourishing, internationally connected, service sector.

The opening of the Al Maktoum International Airport in June 2010 has strengthened and expanded this role. With global trade acquiring an even more strategic importance in the world economy, Dubai will reinforce its position at a time when Asia is supplanting the West as the main engine of growth.

Research highlights that the relationships between transport costs, production locations, and trade

patterns follow different stages. At the beginning of the process, when transport facilities slowly improve and costs drop, competitive advantages are the key driver of trade. Later, as the efficiency in transport grows, intra-industry trade starts to dominate, specialization increases and manufacturers exploit massive economies of scale.

To achieve wider supply chain optimization it becomes imperative for companies at different levels of the production chain to coordinate their operations. At the macroeconomic level we observe, as a result, that trade elasticities to global GDP have increased over the last decade all over the world. Likewise, we observe that intra-industry trade among high income economies, but also between low- and high-income countries dominates global trade relationships. As much as 44% of all shipments pertain not to finished goods, but to inputs.

Dubai's logistics sector is poised to catch the tail wind of this new phase in global trade where the services and the organization of logistics will be the dominant success factors and firms will therefore increase scale and specialization while building sophisticated buyer-supplier networks. To exploit fully the benefits of seamless integration between the major transport infrastructures in Dubai however a few hurdles must be cleared, such as the upgrade of regulation of intermodal links within the Emirate.

Introduction

The process of ever closer economic integration across the world which is synthetically referred to as “globalization” is mainly propelled by two powerful engines: telecommunication and logistics. The technological advances in Information Technology and Communication (ITC) have attracted most of the public’s attention because they have transformed the life of billions of individuals through cellular phones, internet and satellite TV. But the other engine of globalization has probably been even more momentous. By virtue of an impressive drive to standardize, connect and integrate procedures and physical handling of thousands of transport operations across industries and continents, the economies of distant areas can exploit today synergies unthinkable even two decades ago.

Essentially the economies of scale, technology transfers and process innovation brought about by the boost in international trade could not have been possible without a revolution in the transport sector which drove costs sharply down. An equally momentous process of globalization occurred in the closing decades of the XIX century when the telegraph, the railroads and the steamships transformed the trade and financial relations, paving the way for the integration of the Western Hemisphere into the world economy still dominated by Europe and its colonial empires.

The current wave of globalization was also enabled by institutional change and governance of international trade with the creation of the WTO on January 1, 1995 under the Marrakech Agreement, (which superseded the General Agreement on Tariffs and Trade (GATT)) at the completion of the Uruguay Round of negotiations. Custom tariffs were slashed drastically across the board through a multilateral framework applying to all major exporters and importers. More importantly, the international legal framework on import and export rules became clearer and subject to the judgment of an independent international court rather than national authorities or ad hoc interpretations. When China joined the

WTO in December 2001 (under a 900-page long Protocol of Accession which required 15 years of negotiations almost as complex as the Uruguay Round) world trade received an additional impetus. Furthermore a host of Regional Agreements, such as NAFTA, Mercosur, the Asean Free Trade Pact, not to mention the EU Single Market, have solidified and extended the benefits of multilateral agreements reducing the international price of tradables and shifting manufactures to lower wage countries.

The innovations at the end of last century have intensified global interactions, modified the economic geography, reshaped the relative attractiveness of routes and slashed entry barriers. But they have also deeply altered the fundamentals of the trade business and the logistics sector raising the bar in terms of organizational scale and investment needs. For example, containerization has led to a massive increase in capital intensity of ports, airports and intermodal facilities because mechanized transfer systems require wide space for maneuvering, warehousing and docking. Before the advent of containers, the typical seaport berth was 50 m wide and required one hectare of storage space. By the late 1990s, the typical size had increased to 300m and a terminal required 50-100 ha of storage to accommodate economically meaningful operations. Intermodal rail yards extend for 2 kilometers and link 100 ha of space. Airport Cargo operations require an area in the order of 10,000 ha.

Lower intermodal transport costs have strengthened the links between distant areas, with Dubai taking advantage of this transformation thanks to the completion of state of the art infrastructure built in anticipation of a large jump in global trade.

Dubai has indeed been one of the focal points of this transmutation, becoming in a very short time one of the pivotal trading hubs in the world. Taking advantage of its location mid-way between Asia and Europe, along the ancient silk road, its ports are among the most active and efficient in the world.

The cargo traffic at Dubai International Airport as well as at other UAE airports has grown exponentially even during the 2008-09 crisis.

History exerts a powerful influence on trade patterns, for example the main land routes in Europe still trace the Roman communication network, while the Strait of Malacca has been for centuries one of the lifelines of world trade. However novel transport technology or the addition of transport infrastructure may lead to a deep alteration of existing networks. The revolution in transport systems brought about by container shipping, jumbo aircrafts and adoption of IT in transport management, has derailed consolidated equilibria and forged a new spatial structure of transport routes worldwide. Dubai has taken advantage of this process, and actually anticipated it with remarkable foresight through the construction of Jebel Ali Port that was launched in the late 70s. With 67 berths and a size of 134.68 square kilometer (52 square miles), Jebel Ali is the world's largest man-made harbor and by far the biggest port in the Middle East.

With the onset of operations at Al Maktoum International Airport in June 2010 another milestone has been reached for the Emirate and the global logistics industry. Dubai has already given a substantial impetus to air transport in the

MENASA region and beyond thanks to its open sky policy which has attracted to its airport more than 130 airlines, a larger number than at some of the busiest (e.g. Frankfurt 120, Heathrow 100, Charles De Gaulle 122). As of April 2010, over 5,800 weekly flights operated from DXB to over 200 destinations. Currently Dubai Airport has a capacity of 60 million passengers per year and will accommodate up to 75 million people by 2012. Passenger volumes reached 41 million and cargo tonnage 1.9 million in 2009, (a 9.2% and 5.6% rise over 2008, respectively). Dubai Airports projects 48% cargo traffic growth by 2015 to 3 million tones.

This paper will offer a few elements to understand the impact of the new airport facility on Dubai. Section 2 will focus on the influence of macroeconomic conditions on global trade patterns; Section 3 will explain the evolution from inter industry trade to intra industry trade and the implication for the world logistics industry; Section 4 will describe the current role of Dubai in the Global Logistics Chain; Section 5 will offer an international comparison; Section 6 will evaluate specifically the impact of the Al Maktoum International Airport; Section 7 will summarize and draw conclusions. A Background Data appendix contains a host of figures which support the analysis.

The Macroeconomic Factors

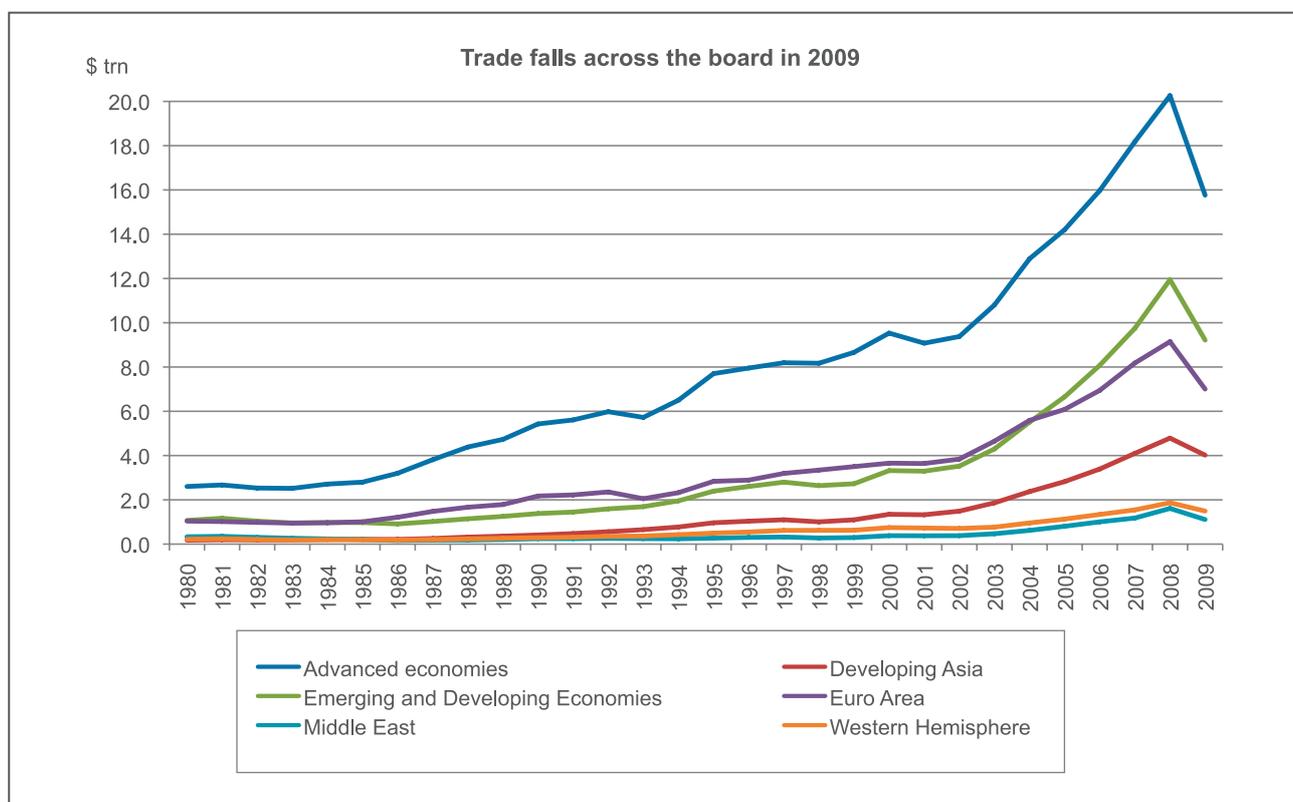
Economic leadership and influence is closely related to the change in global trade patterns. In this section we show how trade, by improving global productivity, is becoming a key driver of world growth and how, in turn, world growth spurs trade in a mutually reinforcing cycle. Dubai is heavily exposed to the vagaries of international trade being one of the most open economies in the world and a major node in the global logistics networks.

The growth of world population and the fast integration of large Asian countries in the world economy are pushing up global demand for products and a relocation of manufacturing activities across the globe (see DIFC Note No.4, Prasad et al. (2009)). As a consequence, the absolute volume of shipments and the value of traded products have

skyrocketed since the 1980s as depicted in Fig. 1 and in Fig. A1 in the Background Data. In 2008, as a result of the financial crisis, trade finance fell victim to a widespread bout of risk aversion (despite being one of the safest financial activities) and international trade dropped sharply and suddenly worldwide for the first time in the post World War II period. However, the recovery since the second half of 2009 has been equally spectacular especially for the Asian economies.

Trade grew enormously in all geographical areas, with the Middle East recording the highest growth rates (albeit from a lower base, Table 1 and 2). The emerging markets saw the growth rate of their import and export double from the 1990s to the 2000s.

Fig. 1 – The Effect of Trade Finance Crunch



Source: IMF DOTS

² Prasad et al. (2009): "Trade & The New Economic Geography Of The Middle East", DIFC Economic Note no. 4. Downloadable at: http://www.difc.ae/index.php/download_file/-/view/320/

Growth in trade greatly exceeded GDP growth, as depicted in Fig. 2 and in Table 3. Indeed, growth in trade is a driver of economic growth, in the sense that it reflects the increase in efficiency that paved the way for one of the most remarkable boosts to world prosperity in history. Stated differently, when trade

relations are facilitated by lower tariffs and the removal of regulatory barriers, and reinforced by improvements in transport, all economies in the world can specialize in fields where they enjoy a comparative advantage, thereby achieving huge productivity gains.

Table 1 - World merchandise trade by region, 2009
(Annual percentage change)

Exports			Regions	Imports		
1990-2000	2001-2008	2009		1990-2000	2001-2008	2009
7	10	-24	Advanced Economies	6	10	-20
12	18	-15	Developing Asia	14	17	-16
9	18	-21	Emerging & Developing Economies	10	18	-24
7	12	-25	European Union	7	12	-22
4	20	-16	Middle East	8	21	-40
11	12	-19	Western Hemisphere	9	13	-21

Source: IMF DOTS

Table 2 - Intra- and inter-regional merchandise trade, 2009
(% of total world trade)

Origin	Destination					
	Advanced Economies	Developing Asia	Emerging & Developing Economies	European Union	Middle East	Western Hemisphere
World	62.2	15.9	36.4	27.6	4.4	5.9
Advanced Economies	64.1	16.7	35.4	42.0	3.8	5.6
Developing Asia	63.7	15.8	33.4	15.2	6.8	3.7
Emerging & Developing Economies	59.5	14.5	37.6	23.3	5.5	6.0
European Union	72.9	6.9	26.5	65.1	2.5	2.2
Middle East	51.5	22.9	43.7	20.5	11.6	1.9
Western Hemisphere	59.7	10.9	37.8	13.3	1.3	22.0

Source: IMF DOTS

It is also noteworthy how trade has reshaped macroeconomic relationships and the relative size of economies. Trade elasticities to world GDP display a remarkable increase in the last decade. Table 4 shows how widespread this phenomenon is: advanced economies experienced a significant increase in import volume elasticity, while emerging markets saw this parameter double in the comparison between the 1990s and the 2000s. Within this country grouping developing Asia registered a

fivefold increase and the Middle East went from negative (a statistical artifact attributable to the effect of the energy commodities prices slump in the 1990s) to a figure in line with developing Asia. The picture remains qualitatively similar when we look at the export volumes elasticities. Although the increase is less dramatic for emerging Asia (only threefold) it is clear that the long term pattern of trade is pointing upwards.

Table 3 – Trade Elasticities Across Regions

Trade elasticities (% change in trade growth by % change in GDP growth)				
Period / Country Groups	Advanced Economies	Emerging Economies	Developing Asia	Middle East
1980 - 1984	-0.06	0.42	0.48	-1.13
1985 - 1989	3.10	1.22	1.67	-4.15
1990 - 1995	3.01	3.67	1.94	0.66
1996 - 1999	1.89	1.85	1.06	1.64
2000 - 2004	3.55	2.80	2.51	3.68
2005 - 2008	5.31	3.00	2.19	4.07
2009	7.22	-9.12	-1.82	-9.38

Fig. 2 – Trade in all Sectors Grows Faster than GDP

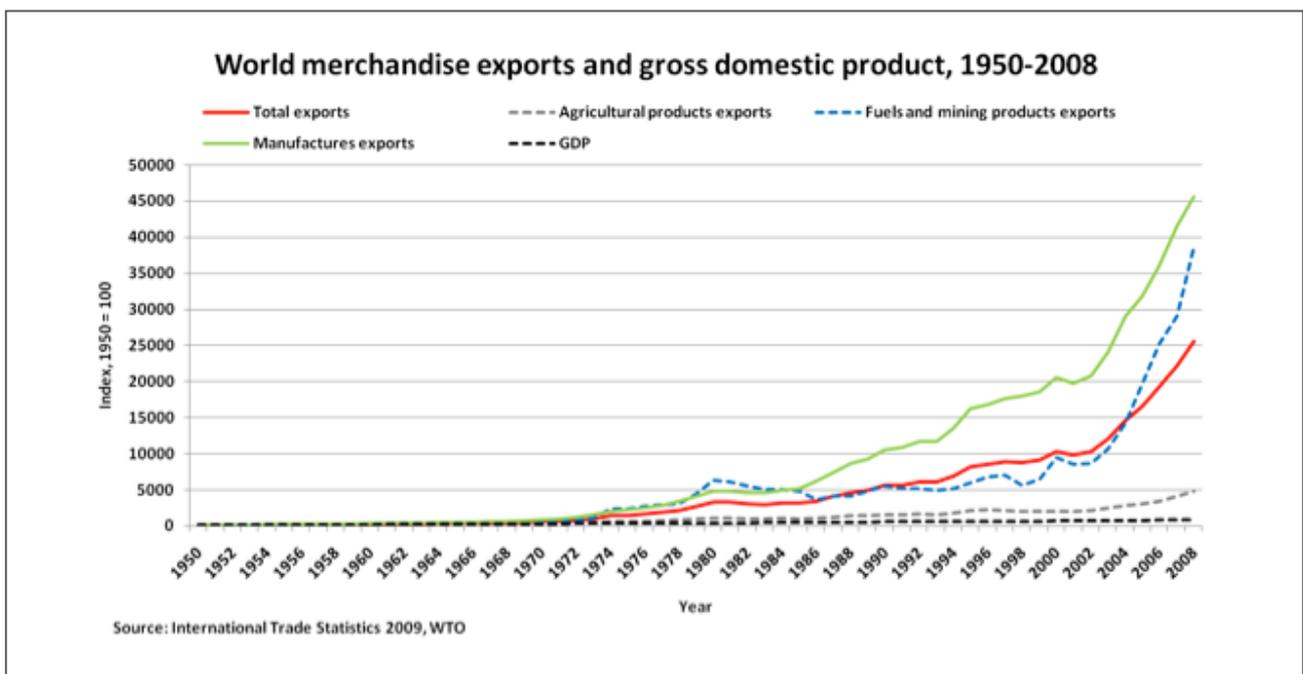


Table 4 - Estimated Trade Elasticities by Country Groupings (time period: 1990-2009)

Equation: Trade Volumes = $\alpha + \beta$ World GDP (data in logarithmic differences)

Country Groupings	Import volumes	Export volumes
Advanced economies	2.99***	3.01***
	<u>0.61</u>	<u>0.59</u>
Developing Asia	1.92*	3.57***
	<u>1.06</u>	<u>0.85</u>
Emerging Economies	3.39***	2.97***
	<u>0.59</u>	<u>0.53</u>
Middle East	1.81	1.80**
	<u>1.16</u>	<u>0.73</u>

*Note: Asterisks denote p values thresholds: *p < 0.1; **p < 0.05; *** p < 0.01;*

Underlined values denote standard deviations

Shifting our analysis to a finer granularity, we highlight how the logistics sector in Dubai, as measured by re-export data, is influenced by global conditions, and how this relationship compares to those observable in Hong Kong and Singapore. In particular we ran simple regressions between re-export in the UAE, Hong Kong and Singapore and the aggregate real growth rates for OECD countries. The results are reported in Table 5. Interestingly the coefficients for Hong Kong and

Singapore re-export are large and significant while for Dubai's the coefficient is small and insignificant. Only by resorting to a robust estimation method, the Least Absolute Deviation (LAD), to filter out the effect of an outlier, the coefficient estimate is close, albeit somewhat smaller than those for Hong Kong and Singapore. The regressions confirm that the logistics sector is quite sensitive to global conditions and in particular to the demand in developed countries.

Table 5 – Sensitivity of Re-Export to OECD Growth
(Variables in logarithmic differences; time period: Q2 2005 : Q4 2009)

Dependent Variable: Dubai Re-exports

Method: OLS	COEFFICIENT	STD ERROR	T STAT	P-VALUE
const	1.95	2.30	0.85	0.41
OECD	2.21	2.45	0.90	0.38

R-squared = 0.04

Method: LAD	COEFFICIENT	STD ERROR	T STAT	P-VALUE
Const	-2.70	2.78	-0.97	0.35
OECD	5.24	3.0	1.75	0.10*

Dependent Variable: Hong Kong Re-exports

Method: OLS	COEFFICIENT	STD ERROR	T STAT	P-VALUE
const	0.65	1.98	0.33	0.74
OECD	5.37	2.11	2.54	0.02**

R-squared = 0.28

Dependent Variable: Singapore Re-exports

Method: OLS	COEFFICIENT	STD ERROR	T STAT	P-VALUE
const	0.21	1.38	0.15	0.88
OECD	6.41	1.47	4.3	0.00044 ***

R-squared = 0.53

Inter-Industry Trade and Intra-Industry Trade

The acceleration of world trade growth over the last decade is attributable primarily to a qualitative shift in the structure of imports and exports. When trade routes first open, transport costs fall and liberalization fosters stronger economic ties, much of the initial effect involves finished goods and raw materials, as predicted by the classic comparative advantage theory. In other words countries establish trading relationships with faraway lands producing widely different goods, and therefore inter-industry trade is the norm. As transport costs drop, the internal supply chain within companies becomes integrated into a distinct logistics function and subsequently the logistics department of different companies amalgamate their operations to minimize inventories (and therefore capital requirements) popularized in the just-in-time concept. In a nutshell, internal integration paves the way to external integration.

As a result, trade in finished goods gives way to trade in semi-finished goods and intermediate goods and inputs which allows exploiting economies of scale especially in manufacturing. Integration goes hand in hand with decline in costs and improvements in logistics efficiency because this type of trade is more sensitive to transportation costs than trade in primary goods and final products. In the world's largest markets—North America, Western Europe, and East Asia—intra-industry trade represents a high and increasing share of total trade. An illustration of this evolution is the assembly of the Boeing 787 Dreamliner: its wings are produced in Japan, the engines in the United Kingdom and the United States, the flaps and ailerons in Canada and Australia, the fuselage in Japan, Italy and the United States, the horizontal stabilizers in Italy, the landing gear in France and the doors in Sweden and France. The manufacture involves 43 suppliers spread over 135 sites around the world collaborating in unison over a dedicated information system. With time, however, even in developing regions intra-industry trade,

mostly in parts and components, has surged, thanks to regional trade blocs, such as NAFTA, Mercosur or the GCC Custom Union.

Logistics, which was considered ancillary to production, now is one of the key competitive advantages in manufacturing. This globalization of economic linkages gives rise to profound dynamics where two processes dominate:

- **Specialization:**

Linked geographical entities are able to specialize in the production of commodities for which they have an advantage, and trading for what they do not produce. As a result, the global division of labor is shifting towards enhanced regional specialization insofar as reductions in production costs outweigh the additional transport costs.

- **Fragmentation:**

Geographically connected economies may experience a concentration of production activities into one country or district, due to economies of scale and the necessity to locate supplier of inputs near the factories.

Increased specialization and fragmentation generates more trade, providing opportunities even to some small economies without a technological edge. For example, a country like Cambodia may not be able to build sophisticated computers or modern cars, but it can produce the cables or wires that will be used in assembly lines elsewhere. Through this “vertical disaggregation” of production, economic activities have spread to developing regions.

Gauging the extent of intra-industry trade is not an easy task. A widely accepted measure of the intra-industry trade is the Grubel-Lloyd Index³ but with a caveat: the more disaggregated the trade data, the less the measured amount of intra-industry trade.

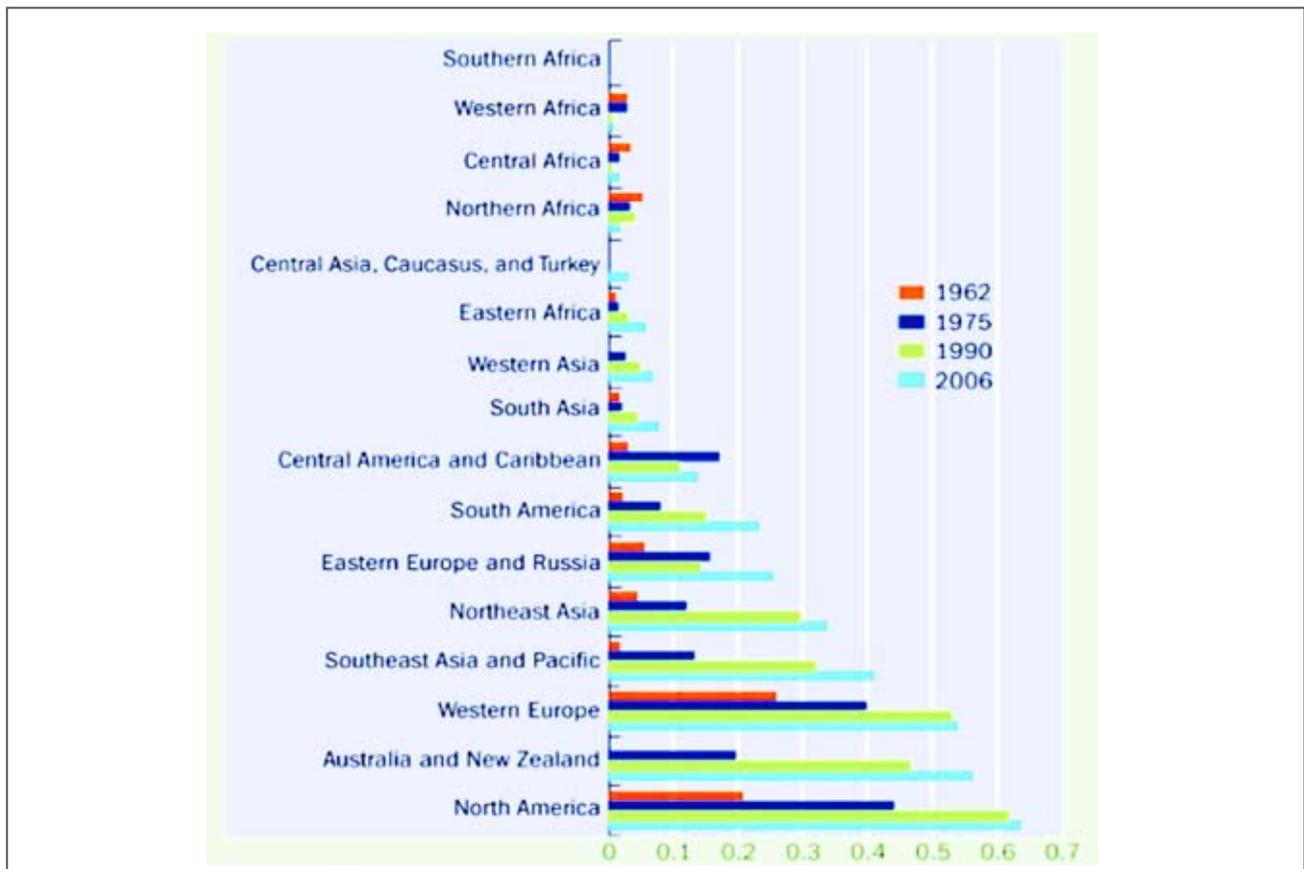
³ The Grubel and Lloyd (1975) Index measures intra-industry trade in the following way: for an industry i with exports X_i and imports M_i the index is $I = [(X_i + M_i) - |X_i - M_i|] / 100 / (X_i + M_i)$. i.e. is the percentage of total trade in the industry, $X_i + M_i$, that is accounted for by intra industry trade.

Using this index Brülhart (2009) made a wide-ranging assessment of global intra-industry trade. His estimates are presented in Figure 3 displaying that, measured at the 5-digit Standard Industrial Trade Classification (SITC) level, intra-industry trade increased from 7% of world trade in 1962 to 27% of world trade in 2006. Measured at the 3-digit SITC level, intra-industry trade increased from 20% of world trade in 1962 to 44% of world trade in 2006. Based on this evidence, one could conclude that intra-industry trade accounts for approximately one third of world trade.

The data compiled by Brülhart (2009) indicate that Western Asia, and most of Africa have not developed

much intra-industry trade⁴. This is one of the main distinctions between these two regions and the rest of the world with regard to international trade patterns. The evidence for Africa and Western Asia reflects their limited integration in global supply chains and limited sophistication of production. It also highlights an untapped potential for trade growth. In fact it is likely to attribute the low trade integration in Africa and the Middle East to the paucity of transport infrastructure and the lack of sophisticated logistics services as well the lack of sophisticated buyer-seller networks which is exactly the gap the current and future infrastructure in Dubai are intended to fill.

Fig. 3 – The Evolution of the Grubel Lloyd Index by Area



Brülhart, M. (2009) "An Account of Global Intra-industry Trade, 1962-2006," World Economy, 32:3, 2009

Geographical proximity plays a fundamental role in shaping the explain some of these patterns (for

example North Asia where Korea and China account for the predominant share).

4. Thorpe and Zhang (2005) conclude that intra-industry trade increased from approximately 25% to approximately 50% between the mid-1970s and the mid 1990s. They also suggest that vertical intra-industry trade increased to about 30 percent during this period. Evidence from the machinery sector presented by Ando (2006) suggests that these trends continued through at least 2000.

Dubai Logistics Cluster

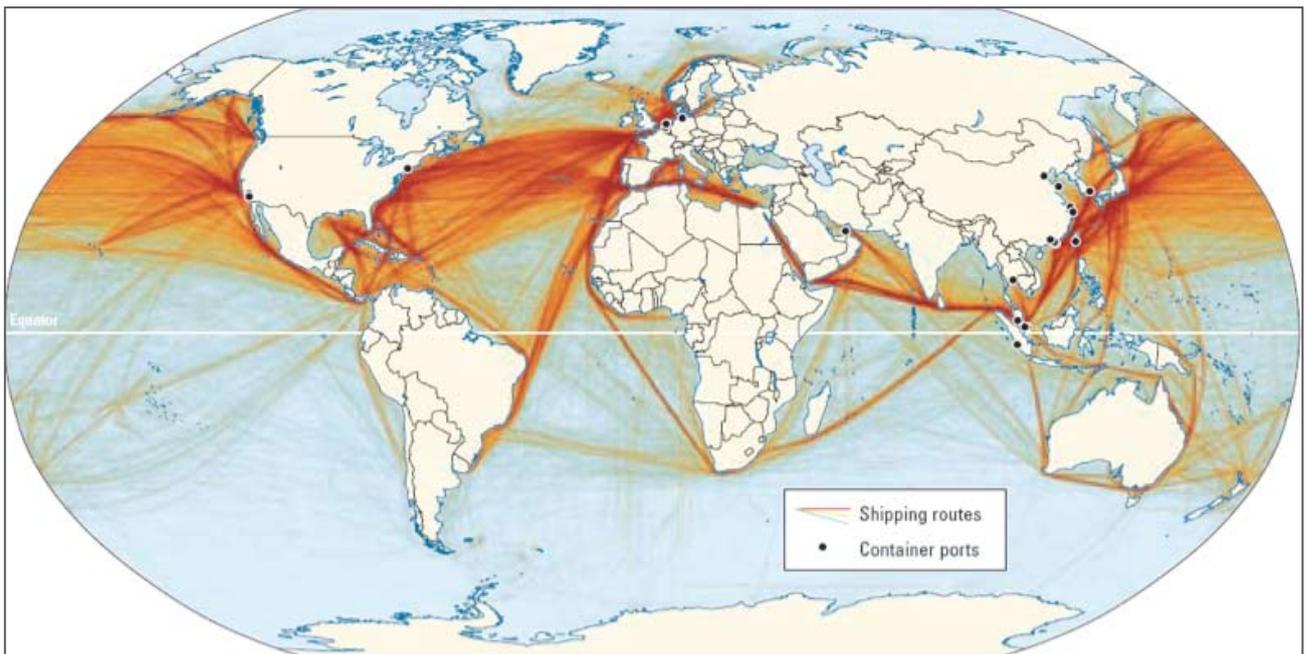
A logistic system spans three dimensions: a) the spatial or regional dimension (i.e. the transportation problem), b) the vertical dimension (flow of commodities from the initial use of resources to the manufacturing of final goods demanded by the consumer), and c) the time dimension (inventory and warehouse of merchandise and parts).

The patterns of logistics chains are not immutable: they change in response to new infrastructure and cost conditions. The changing pattern and growth of traffic have implications for infrastructure development and logistics in terms of handling capacity, route

development, frequency of services and trans-shipment.

Dubai has been the pillar of the Arabian Peninsula trade development since the 1970s. The emergence of Dubai as a logistics hub has had a positive impact on the rest of the Arabian Peninsula. Saudi Arabia, Qatar and Kuwait port facilities did not have the capacity to fully handle the surge in trade that spurred from the boost in economic activity over the last decade. Dubai is filling a gap that otherwise would have severely impaired the development of these economies.

Fig. 4 – The Main World Trade Routes



Source: "World Development Report 2009: Reshaping Economic Geography", World Bank

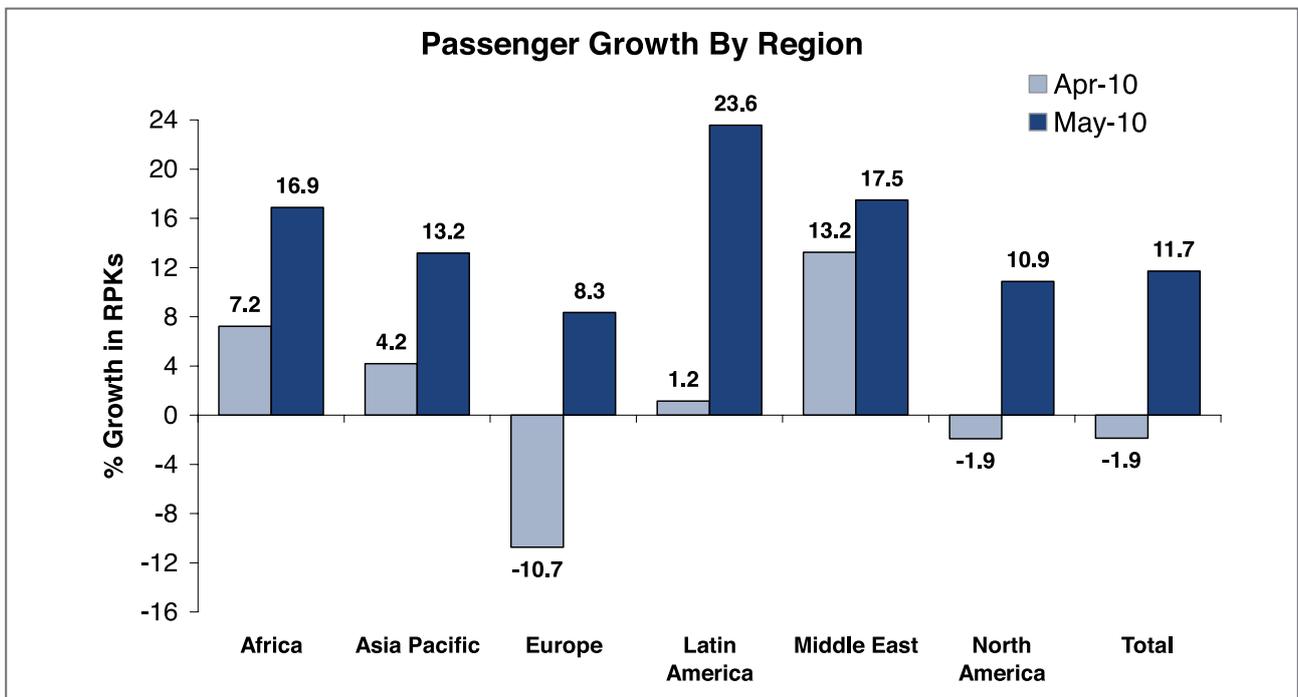
Logistics comes under the umbrella of “Transportation, Storage and Communication” sub-sector in Dubai’s GDP calculation. As per the latest data, this sector contributed close to 10% of overall GDP. In 2009, the data for the UAE indicate that the country logistics and supply chain industry grew by 3.6%. It is the only country in the Middle East to figure in the top 25 rankings of the World Bank’s Logistics Performance Index for 2010 (see next section).

This performance is likely to improve because the budget for the Dubai Roads and Transport Authority expenses in 2010 is AED 10.74 bn, of which AED 2.8 bn is Operational Budget, and AED 7.91 bn are Capital & Project Budget. This represents almost a third of the total Dubai Government expenditure in 2010 set at AED 35.7 billion⁵. Dubai’s main competitive advantage is the optimal combination of different transport modes (a

port, an airport and roads to reach all GCC countries and all the way to Lebanon). In the near future it could be complemented by the GCC railroad network. This state of the art physical connectivity, is enhanced by the cluster of several thousands of logistics companies in the Jebel Ali Free Zone, which bring know how, international projection and critical mass. The focus lies mainly on air and maritime transport modes – along with road/ rail transport.

Statistics released by the Airports Council International revealed that 23 of the 30 busiest airports worldwide have reported negative growth in international passenger traffic during 2009. Airports other than Dubai International reporting increases included Beijing (16.8%), Bangkok (4.9%) and Jakarta (13.3%). Dubai International looks on course to become the world’s fastest growing major airport.

Fig. 5 – Air Passenger Traffic



Source: IATA, May 2010.

⁵ Total revenue forecast for the year is AED 3.3 bn while the approved projects budget is estimated at AED 7.5 bn for undertaking about 120 projects (13 are new projects relating to roads, marine transport, public transport and operational building projects, and the remaining part will cover the completion of 107 projects currently underway). Of the budget, 46% will be allocated to Rail Agency, 29% to Roads & Traffic Agency, 13% to Public Transport Agency and the remaining 12% of the budget will be allocated to licensing and marine agencies as well as Corporate Support Services.

Cargo volumes in Dubai were up 5.6% in 2009 following a dramatic 26% jump in December and double-digit increases during the last quarter of 2009. The full year cargo traffic reached 1,927,520 tonnes compared to 1,824,991 tonnes during the same period in 2008. Dubai Airports Cargo handled 182,874 tonnes of freight in Dec 2009 compared to 145,176 tonnes during the corresponding month in 2008.

Dubai is the world's third largest re-export hub, after Hong Kong and Singapore. DP World's UAE Region is among the leading hubs in the world, serving more than 100 shipping lines. In 2009, the UAE Region of DP World recorded a decline in volume of 6% to 11.1mn TEU. This followed an impressive 11% growth in throughput with the handling of 11.8 million TEU in 2008, as compared to 10.65 million TEU in 2007.

The Dubai Logistics Corridor needs special mention. Last year Dubai's Jebel Ali Free Zone, or Jafza, and the Dubai Aviation City Corporation joined forces to form one of the largest multi-modal logistics platforms in the world linking sea, land and air for the first time in the Middle East. Once an Emirates railway system is established the Dubai logistics corridor will be further connected and integrated with UAE transport systems.

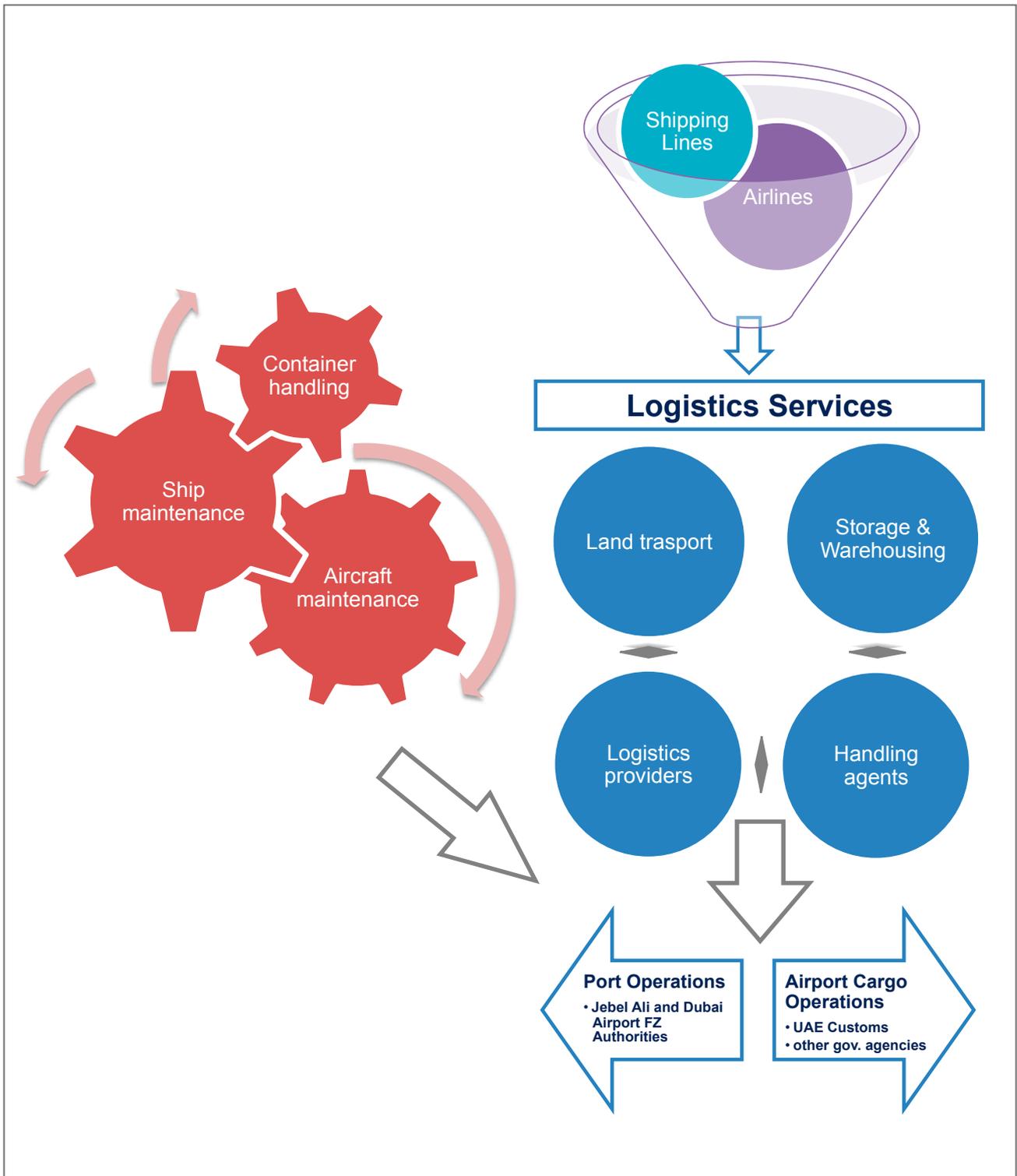
The further development of the sector hinges on two challenges: institutional and organizational. The first relates primarily to trade related public services. The second relates to the practices that are adopted for shipment and handling. Container management in this part of the world (and in many emerging markets) is marred by obsolete practices: for example containers became ubiquitous because they are instrumental for fully exploiting multimodal means of transportation. In the US and in Europe one can take a container from a ship load it onto a train or a truck to reach destination, within or outside the country, requiring merely some simple documentation such as a Bill of Lading⁶. In other parts of the world, this seamless process proves to be impossible or very difficult when goods need to pass customs.

Dubai facilities are serving a wide region, but access to other countries is hampered by factors outside the reach of the UAE authorities. A relevant example is the Customs service in Saudi Arabia where systems and procedures have not been modernized in line with the requirements of modern logistics chains. As a result it may take up to 5 days to go through Saudi customs, which impedes economic integration⁷.

⁶ A Bill of Lading document is necessary for shipment: this document issued by a carrier to a shipper, acknowledging that goods have been received on board as cargo for conveyance to a named place for delivery to the consignee who is usually identified.

⁷ 65% of re-export in Saudi Arabia goes through Dubai because of the various bottlenecks in the custom procedures in the Kingdom.

Figure 6 – Synopsis of Logistics Clusters



International Comparison: Logistics & Competitiveness

In this section, we focus on how the UAE has been ranked against its counterparts in three key global reports – a) the World Bank (WB) Logistics Performance Index; b) the Global Competitiveness Index (which tracks infrastructure performance as a key sub-index) and c), the WB/IFC Doing Business report which focuses on the efficiency aspects of “Trading across Borders”. Finally, the comparative Key Performance Index for Operational Logistics using these three broad indices is examined.

The WB’s Logistics Performance Index (LPI) aims to rank economies on the Ease of Shipping and Trade. It is based on a worldwide survey of operators (global freight forwarders and express carriers), providing feedback on the logistics “friendliness” of the countries in which they operate and those with which they trade. They combine in-depth knowledge of the countries in which they operate with informed qualitative assessments of other countries with which they trade, and experience of global logistics environment.

The LPI is the weighted average of the country scores on six key dimensions:

1. Efficiency of the clearance process (i.e. speed, simplicity and predictability of formalities) by border control agencies, including Customs;
2. Quality of trade and transport related infrastructure (e.g. ports, railroads, roads, information technology);

3. Ease of arranging competitively priced shipments;
4. Competence and quality of logistics services (e.g., transport operators, customs brokers);
5. Ability to track and trace consignments; and
6. Timeliness of shipments in reaching destination within the scheduled or expected delivery time.

According to the study, logistics performance is heavily influenced by the quality of public sector institutions and the effective coordination of border clearance processes among all border management agencies. In this area, customs perform better than many other agencies, pointing to the need for border management reforms in trade partners. In low performing countries, on average, half of the containers are physically inspected and one container out of seven at least twice.

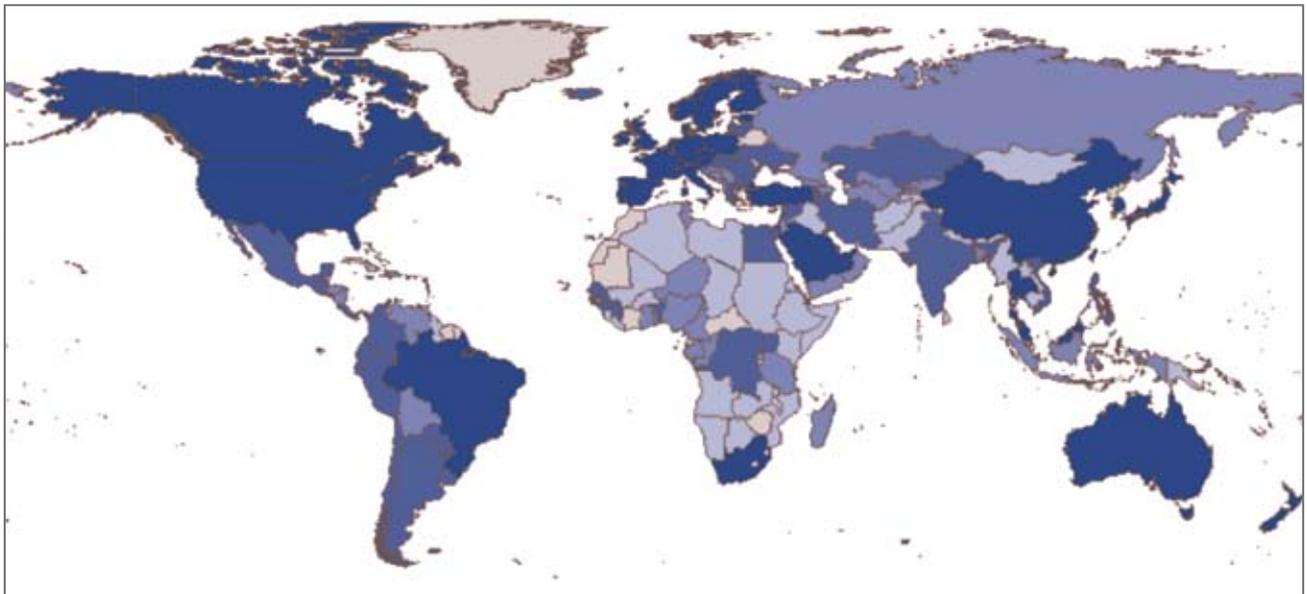
The LPI ranks the UAE 24th on a global basis, the highest in the Gulf and MENA. Germany is top-ranked overall in the world, with Singapore a close second. In the GCC region, the UAE comes on top in four out of the six dimensions – losing out to Bahrain (Tracking & tracing) and to Qatar in timeliness. In logistics competence, the UAE tops the region, with Bahrain and Saudi Arabia a close second and third. Not surprisingly, infrastructure is a particularly strong asset for the UAE.

Table 6 - The Logistic Performance Index and its components

Country	LPI	Customs	Infrastructure	International shipments	Logistics competence	Tracking & tracing	Timeliness
Germany	4.11	4.00	4.34	3.66	4.14	4.18	4.48
Singapore	4.09	4.02	4.22	3.86	4.12	4.15	4.23
Sweden	4.08	3.88	4.03	3.83	4.22	4.22	4.32
Netherlands	4.07	3.98	4.25	3.61	4.15	4.12	4.41
Luxembourg	3.98	4.04	4.06	3.67	3.67	3.92	4.58
Switzerland	3.97	3.73	4.17	3.32	4.32	4.27	4.20
Japan	3.97	3.79	4.19	3.55	4.00	4.13	4.26
UAE	3.63	3.49	3.81	3.48	3.53	3.58	3.94
Bahrain	3.37	3.05	3.36	3.05	3.36	3.63	3.85
Kuwait	3.28	3.03	3.33	3.12	3.11	3.44	3.70
Saudi Arabia	3.22	2.91	3.27	2.80	3.33	3.32	3.78
Qatar	2.95	2.25	2.75	2.92	2.57	3.09	4.09
Oman	2.84	3.38	3.06	2.31	2.37	2.04	3.94

Source: The Logistics Performance Index Report, World Bank, January 2010

Figure 7 - Logistics competence 2010

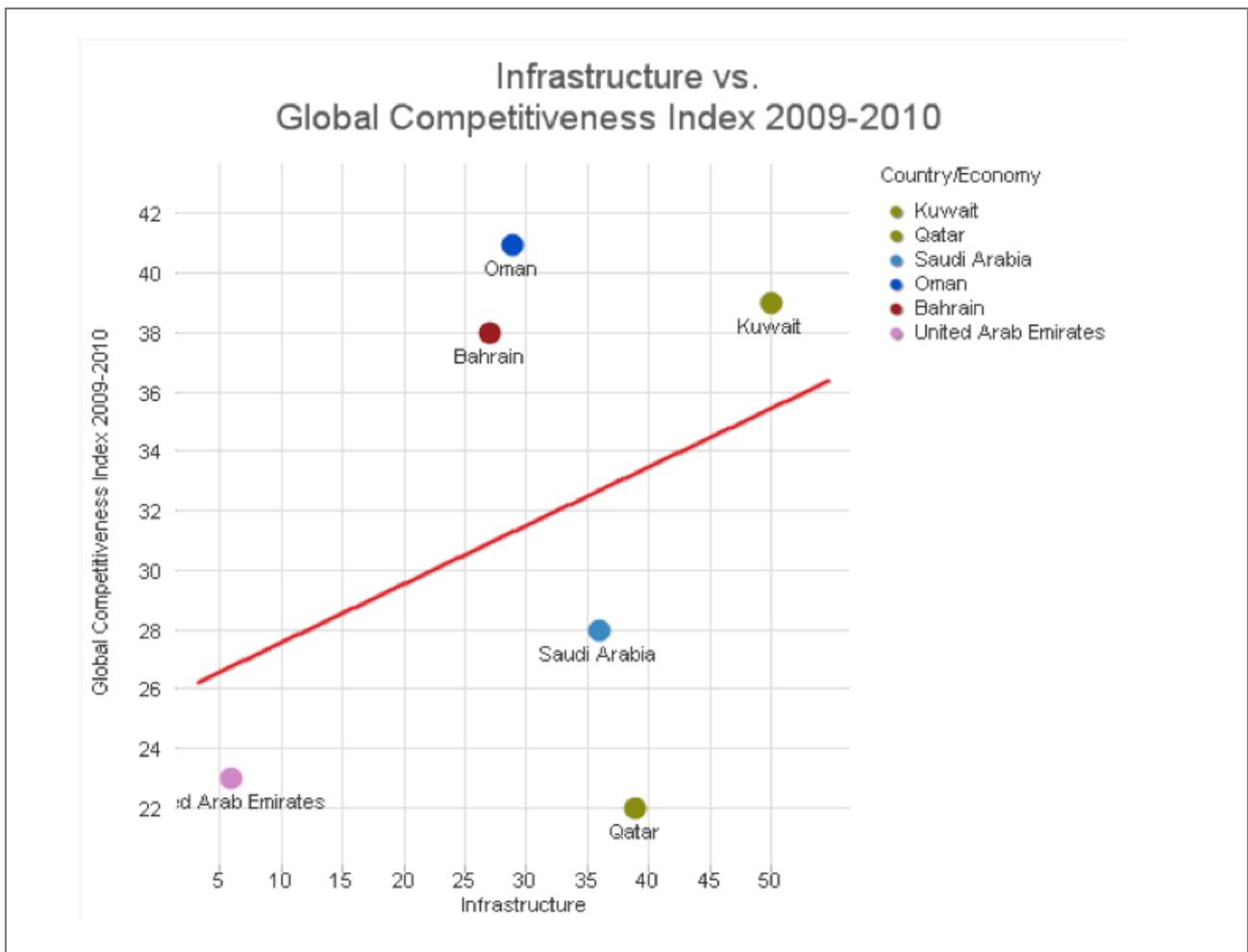


1 <= Logistics competence <= 2.29		2.29 <= Logistics competence <= 2.58	
2.58 <= Logistics competence <= 3.16		3.16 <= Logistics competence <= 5	
No data		1 is the lowest score and 5 is the maximum score	

In the Global Competitiveness Index, the UAE was ranked 23, with a score of 4.92 against 5.60 for Switzerland, the top performer. In terms of the infrastructure sub-component, UAE outranked all its regional peers (refer figure 8 below) – even Qatar which was ranked one above the UAE. As the cross-country evidence in Fig 8 illustrates, there is a clear and positive relationship between the availability of performing infrastructure and global competitiveness.

While physical infrastructures are a fundamental ingredient, it is also important to emphasize that complementary policies are also needed in order to fully exploit their benefits, specifically trade liberalization and transport regulations that do not thwart efficiency. In short the advantages of state of the art infrastructure are not automatic; complementary policies are also needed in order to realize the full potential.

Fig. 8 – The Link between Infrastructure and Competitiveness



Source: Global Competitiveness Report 2009-10, World Economic Forum.

The World Bank's Doing Business report ranked UAE among the top 10 reformers worldwide in 2008-09, lifting its overall ranking to 33 from 47 in the previous year, with a strong reduction in the cost of setting up a business due to the removal of minimum capital requirements for setting up a business. In the trading across borders sub-component, the

improvement in the UAE's performance of the UAE was impressive -with the ranking improving to 5 from 13 previously. This was possible because of a decrease in the number of document and time for export, combined with a reduction in cost to import and export by container.

Table 7 - Doing Business "Trading across Borders" component

Country	Documents for export (number)	Time for export (days)	Cost to export (US\$ per container)	Documents for import (number)	Time for import (days)	Cost to import (US\$ per container)	Ease of Trading RANK
Singapore	4	5	456	4	3	439	1
Hong Kong	4	6	625	4	5	583	2
Estonia	3	5	730	4	5	740	3
Finland	4	8	540	5	8	620	4
UAE	4	8	593	5	9	579	5
Denmark	4	5	744	3	5	744	6
Sweden	4	8	697	3	6	735	7
Korea, Rep.	3	8	742	3	8	742	8
Norway	4	7	830	4	7	729	9
Panama	3	9	729	4	9	879	10
Saudi Arabia	5	17	681	5	18	678	23
Bahrain	5	14	955	6	15	995	32
Qatar	5	21	735	7	20	657	41
Kuwait	8	17	1060	10	19	1217	109
Oman	10	22	821	10	26	1037	123

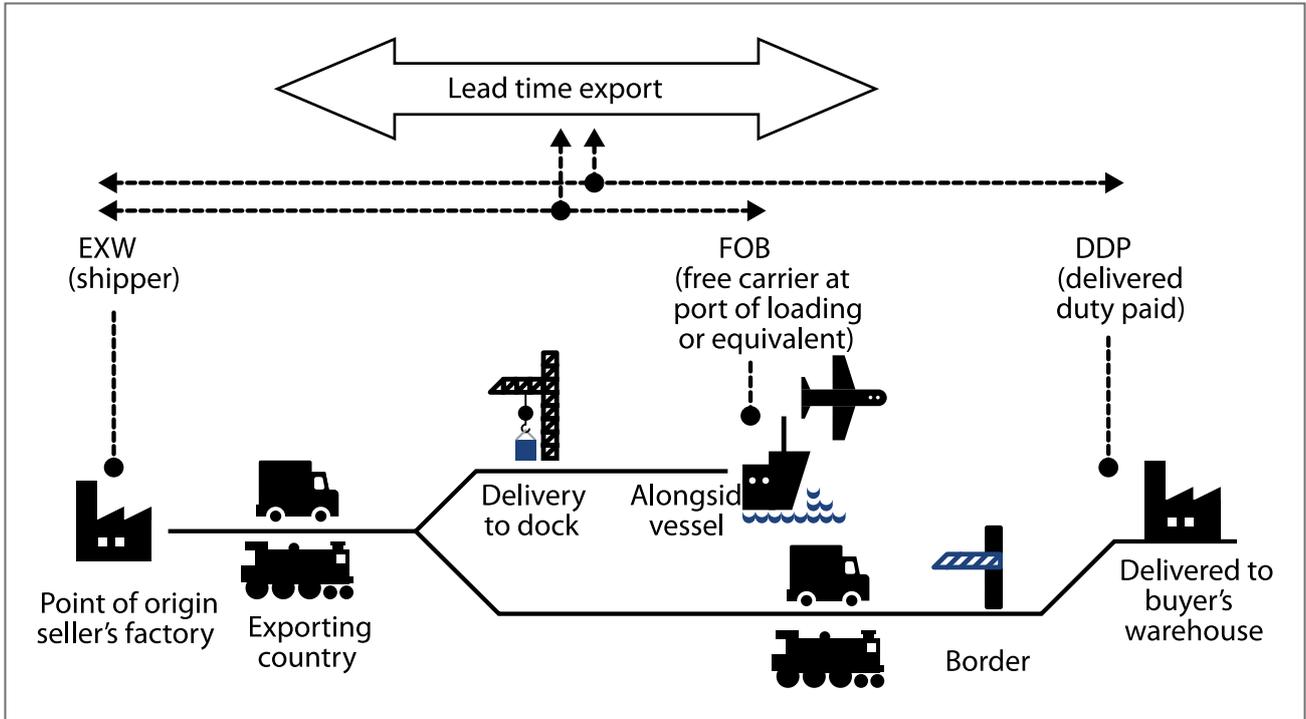
Source: *Doing Business 2010, World Bank*

Lastly, a new KPI Matrix for Operational Logistics was created with the above indices by the SP Jain Institute for Management in coordination with Dubai Economic Department⁸, which ranks UAE at 14. The Key Performance Index Matrix was based

on time, cost, and process/risk factors - developed to measure performance for operational logistics as depicted in Fig. 8, where lower numbers indicate better competitiveness and better infrastructure.

⁸ Batra, D. J. Jaininder and S. Sameep, "KPI Matrix for Operational Logistics" paper prepared for Global Logistics & Supply Chain Management Specialization under the supervision of R. Aserkar, D. Harris, and R. Krishnan, April 2009

Fig. 9 – Synopsis of Logistics Chain



Source: Logistics Performance Index 2010

Table 8 - KPI Matrix for Operational Logistics

Country	Rank	Score
Denmark	1	8.94
Hong Kong	2	8.82
Singapore	3	8.82
Ireland	4	8.76
Taiwan	5	8.76
Norway	6	8.67
Finland	7	8.61
Korea, Rep.	8	8.37
Netherlands	9	8.27
New Zealand	10	8.27
Bahrain	12	7.90
UAE	14	7.82
Qatar	23	7.23
Saudi Arabia	32	6.11
Kuwait	37	4.03

Source: Batra, (2009)

Dubai World Central as the Dawn of a New 'Aerotropolis'

The economic landscape of the XXI century will be dominated by "Aerotropolis", which represents the evolution from city airports into airport cities. It positions airports as the pivotal factor for business location, urban economic growth and global economic integration. Dubai World Central will be the quintessential Aerotropolis. In a world where major companies such as Nike, Apple, Dell, Benetton, are essentially managing a brand and a logistic network, while decentralizing production around the world, Aerotropoles will become the attraction force for clusters of economic activities.

The Aetropolis concept is the brainchild of John D. Kasarda, Professor of Strategy and Entrepreneurship at the University of North Carolina, who documented and researched how airports are evolving from transportation and supply chain-focused areas into mixed-use commercial centers. They meet the needs of both consumers and businesses by providing hospitality, entertainment, retail, office, meetings, exhibitions and conventions.

Aerotropolis attract businesses, especially those involved in time-sensitive products and high value added sectors such as microelectronics, pharmaceuticals, aerospace equipment, medical instruments, and perishables. They choose to locate in close proximity to logistics hubs because connectivity, speed and predictability are the fundamental competitive edge in their business. Their products have to be on the shelves in good condition at the right time and in the right place. The three A's – accessibility, accessibility, accessibility – will become the critical component of the three L's – location, location, location – in Aerotropolis real estate value.

Market connectivity is measured by a combination of the number of distant markets served and the frequency of service to these markets. The networking logistics problem is how many routes you have from your hub to reach your customers. Given that freight travel and passenger flights are typically joint products, it is easy to understand the enormous advantages

that an international airline such as Emirates, with an impressive number of international routes directly from Dubai, can provide to companies located in the vicinity of DWC. Companies need access to growing, profitable markets, and Dubai can grant access not only to GCC countries but also to the MENASA countries, accounting for around 2 billion people, many of them transiting into middle class in the near future.

Analogously retail and wholesale trade gravitates around Aerotropoles given the high incomes of the typical airline passengers (three to five times higher than national averages) and the huge number of people going through the terminals of a large airport, (a few dozen million annually compared to 8-12 million annually for a large mall) and often up to 300,000 people a day if one includes airport employees. It is not surprising that major airport retail sales per square meter average three to four times those of shopping malls and downtown boutiques⁹. South Korea's Incheon International Airport, for example, had over \$1 billion in retail revenues in 2008. The top performer is Dubai International Airport, with its kilometer-long shopping corridor that raked in a cool \$1.1 billion in retail sales in 2008. New York's John F. Kennedy International Airport leads the United States with \$442 million in concessions revenue.

The diversification of the modern airports implies that a greater percentage of their revenues would arrive from non-aeronautical sources. For some, such as Atlanta, Dallas, Hong Kong and Amsterdam Schiphol, non-aeronautical activities contribute approximately two-thirds of total airport revenues (Source: Kasarda, 2008). Since non-aeronautical revenue flows are rising and relatively predictable (i.e., they are not as sensitive to business cycles), there is an interest in securitizing them for major up-front airport capital infusions.

Dubai is investing \$33 billion in Dubai World Central's infrastructure¹⁰, which on June 27 opened its first cargo section at the Al Maktoum International Airport. This

⁹ Kasarda, J. D., Chapter 1 in Airport Cities: The Evolution, 2008

¹⁰ http://www.dwc.ae/site/About_US_Company_Facts.html

is the first phase of a massive project that will lead to the airport becoming the world's largest between 2018-2020, for both passengers and cargoes (in three phases).

It is estimated that DWC will have 400,000-square metre offices, 1,000,000-square metre warehouses, plots to build 24,000,000 square metre and 10,000 on site residential units. On completion, Dubai World Central will accommodate facilities to support 900,000 residents and 700,000 workers. The DWC investment is the first step in delivering upon the Government of Dubai's commitment to become the logistic and trade hub of the region by developing and implementing the infrastructure and systems required for seamless transition of goods between sea, land and air. The purpose-built platform acts as a logistics hub for the wider region increasing its regional and international linkages and inter-connectedness.

Dubai World Central, will have the first and only integrated sea-air corridor which allows containers offloaded from a ship to be airborne in two or three hours (including the administrative and custom clearing process).

The airport will have an annual cargo capacity of 12 million tons, more than three times that of Memphis International Airport, today's largest cargo hub, and a passenger capacity between 120 million and 150 million per year - more than the Hartsfield-Jackson Atlanta International Airport (90 million in 2008), currently the world's busiest passenger airport. A 140 square kilometre urban aviation community will complement the world's largest airport. Meanwhile, Abu Dhabi is developing the Khalifa Ports and Industrial Zone (KPIZ) at Taweelah which will be naturally benefitting from their vicinity with Dubai World Central.

Air cargo is probably the fastest growing segment of the global logistic chain and is catering to higher value goods, however one should not de-emphasize the importance of passenger traffic. In reality the bulk of freight is transported in passenger planes. So it is important how many airlines reach Dubai airport

and especially how many destinations can be reached from Dubai, because these flights pave the way for cargo regular freight flights. In other words passenger traffic is often the first stepping block to jump start freight traffic.

Initially DWC will face the problem of how to transfer goods from and to the existing Dubai Airport Free Zone, Dubai International Airport and other free zones. Current regulations prevent trucks over 2.5 tons from using the major urban thoroughfares such as Sheik Zayed Road. Furthermore the transfer of merchandise should bypass the customs, i.e. without inspecting the containers in order to speed up the process (or at least not to hinder it). This can be achieved through the use of container with electronic seals that can be tracked on GPS systems. Currently the ban on large truck urban roads implies that a myriad of small vans runs from Jebel Ali or from the airport to each and every shop in Dubai and in other Emirates. A viable alternative could be to organize a Consolidation Centre Warehouses for retailers located in close proximity (especially those in the major shopping malls) so to reduce pollution and congestion while boosting efficiency.

Increasing the efficiency of the public sector is another key challenge. Currently it is much easier to import goods as the customs are opened 7 days a week 24 hours a day. For export the government office facilities are available only 5 days a weeks, until 7 pm. Furthermore, the Dubai Chamber of Commerce's Jebel Ali Free Zone office which releases Certificates of Origin closes at 3:00pm and is closed on Fridays. Ideally all trade facilitation services should be available on a 24/7 basis.

The transparency of competition requires a clear governance scheme for the government-linked companies as well as a regulatory framework to supervise the behavior of key infrastructure service providers with monopolistic positions. Such a regulatory structure would also help to create clearer expectations about the long-term strategy of the government in this cluster. It could be supported by a more active approach to attract strong rivals to Dubai.

Currently Dubai is predominately a transit/consolidation hub with little physical value added to the product. A world class logistic hub should foster the establishment of higher value added services and manufacturing clusters inside and between industries. In other words, one plank of the Dubai development strategy needs to focus on adding value to goods that transit through its logistic hub building facilities for trade and value added in intermediate goods. An example is the new Nestle factory in the Techno Park, deliberately located outside a free zone in order to produce for the whole GCC market taking advantage of the ongoing trade liberalization process.

The new logistic facilities at Dubai World Central will provide ample opportunities to expand services currently in embryonic stage. For example in the MENASA region a growing and aging population is placing increasing demand on health care services and rendering drug life shorter. Dubai could emerge as the most suitable hub to provide these services all around the region, especially to pre-position stock of drugs to distribute in the area. This trend has already started with the creation of zones which attract companies specialized in Health Care, Pharmaceutical and Bio-technology sectors.

Environmental impact needs also to be part of the picture. An important initiative in this area -- promoted by the Dubai Economic Department -- has transformed a critical Dnata Cargo site - the FreightGate-5 airport cargo terminal -- into the first carbon neutral warehouse in the Middle East. Specific energy saving measures proposed for the warehouse were scrutinized through a cost benefit analysis, in order to assess their financial viability. The implementation, led by DHL Energy Performance & Management, produced savings in warehouse electricity usage of between 36% and 40%. This could serve as a model for green warehousing across Dubai that, according to estimates, can save almost 2 million tonnes of carbon dioxide annually by 2020 (equivalent to the current annual carbon footprint of some 60,000 UAE residents).

Lastly Dubai's logistics cluster needs to strengthen its ability to upgrade and develop workforce skills locally. There are some educational institutions, but their impact is still limited. Given the large investments in infrastructure and logistics, Dubai should invest in specialized education research and development in logistics as well as related fields such as engineering, robotics and architecture.

¹¹ Dnata is the largest supplier of air travel services in the Middle East.

Conclusions

In the 16th and 17th century seaports and waterways defined the location of cities. In the 18th century roads began to develop inward based upon trading opportunities. In the 19th century cities followed railroads and canals. In the 20th century cities built airports; in the 21st century airports will determine the location of cities and economic activities.

The internationalization and globalization of production and markets for inputs as well as intermediate and final products will place increasing demands on intermodal transport to an extent never experienced before. The future competitive edge of countries may well hinge on global supply chains and their supporting modal and intermodal capabilities.

The cost of logistics is critical as worldwide competition between global supply chains, sometimes dubbed "hypercompetition" radically transforms production methods and imposes new execution and implementation requirements to maintain customers stocked and inputs available to assembly lines.

At the same time, as the demand for logistics services and transport facilities swells, concerns are growing over the barriers to expand capacity, particularly in densely populated areas, where the demand is highest. Also financial constraints at a time of scarce credit availability are hitting plans to build new infrastructure. As a result, linehaul or terminal infrastructures a few decades old are being overwhelmed to accommodate the volumes moving intermodally in conjunction with supply chains.

The opening of Dubai's Al Maktoum Airport will mark a milestone in the worldwide logistics sector. It will be the largest integrated port and airport facility in a major urban area linked to an extensive network of highways covering a territory from the Indian Ocean to the Mediterranean. In perspective, it will be connected also to a state of the art railroad system, whose construction is due to start in 2011.

Intermodal transportation between India, South East Asia Europe and the Middle East could become the most advanced in the world. Integrating multiple transportation modes to such an extent is likely to set in motion a massive increase in efficiency and productivity in an area with a population in excess of 2 billion people.

There is a tendency for activities to agglomerate in order to take advantage of the value of specific locations. The more valuable a location, the more likely agglomeration will take place. The organization of activities is essentially hierarchical, resulting from the relationships between agglomeration and accessibility at the local, regional and global levels. In this process given the characteristics of modern manufacturing the location of customers for final products is largely irrelevant for the localization of mass goods production, but the location of suppliers of inputs might make a difference.

The opening of part of Dubai World Central development will significantly increase Dubai's trade, industrial and logistics capacity. Dubai World Central will constitute the foremost example of an Aerotropolis, providing an optimal response to the changing supply chain management requirements in global markets and distribution systems in a key geographical area with 2 billion people many of which are poised to make the transition to a middle class lifestyle over the next decade.

The brisk growth of the local economy as well as the GCC's has put strains on the road-based local transportation system (such as congested Sheik Zayed Road). Significant investments have to be made to address these bottlenecks. Dubai needs to make sure that local transport, important for the sea/air-connection, is not becoming a growth barrier.

The further spread of just in time, lean manufacturing and widespread outsourcing of non-core (and occasionally core) business activities

increases overall efficiency but heighten the risks and the consequences of disruptions. For this reason the main logistic centers need to develop a risk management culture and flexible practices to handle emergencies, possibly in conjunction with the global logistic operators such as DHL, UPS, Aramex or Federal Express.

The benefits of relocating manufacturing to lower wages countries are waning so further cost reductions entail more complex and longer logistic chains to make the world “flatter” and to exploit fully the economies of scale. Managing complexity

requires larger investments not only in equipment but also in human capital capable of handling unusual circumstances and performing multifaceted tasks with minimal supervision. Dubai is entering and creating a new economic geography where infrastructure and logistics with institutional trade facilities will multiply opportunities for trade and provide international connectedness for a region that has been, so far, on the periphery of global supply chains. This will be a source of dynamic comparative breaking the shackles of oil and gas dependence for the region.

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Background Data

Fig. A1 – World Export Trends by Region (Index 2000=100)

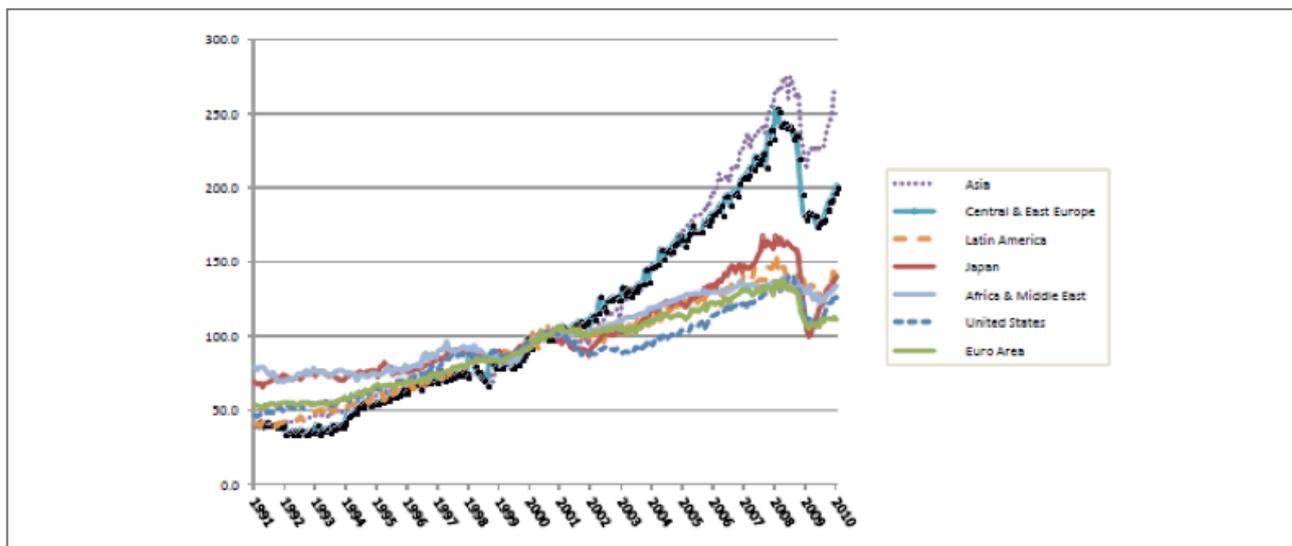


Table A1 - Leading World Maritime Ports by Total Mass Actual TEU (TEU, Twenty-foot Equivalent Unit)

Rank	Port name	Country	TEUS 2009	TEUS 2008
1	Singapore	Singapore	25,866,400	29,918,200
2	Shanghai	China	25,002,000	27,980,000
3	Hong Kong	China	20,983,000	24,248,000
4	Shenzhen	China	18,250,100	21,413,888
5	Busan	South Korea	11,95,4861	13,425,000
6	Guangzhou	China	11,190,000	11,001,300
7	Dubai	UAE	11,124,082	11,827,299
8	Ningbo	China	10,502,800	11,226,000
9	Qingdao	China	10,260,000	10,320,000
10	Rotterdam	Netherlands	9,743,290	10,783,825
11	Tianjin	China	8,700,000	8,500,000
12	Kaohsiung	Taiwan	8,581,273	9,676,554
13	Antwerp	Belgium	7,309,639	8,662,890
14	Port Kelang	Malaysia	7,300,000	7,970,000
15	Hamburg	Germany	7,007,704	9,737,110
16	Los Angeles	US	6,748,994	7,849,985
17	Tanjung Pelepas	Malaysia	6,000,000	5,600,000
18	Long Beach	US	5,067,597	6,487,816
19	Bremen/B'Haven	Germany	4,564,554	5,529,159
20	New York	US	4,561,000	5,265,053

Source: Hamburg Port website <http://www.hafen-hamburg.de/en/content/container-port-throughput-global-comparison>

Table A2 – Components of Logistics Performance Index

	Export Time & Cost						Import Time & Cost					
	Port or airport supply chain			Land supply chain			Port or airport supply chain			Land supply chain		
	Distance	Lead time	Cost	Distance	Lead time	Cost	Distance	Lead time	Cost	Distance	Lead time	Cost
	(kms)	(days)	(US\$)	(kms)	(days)	(US\$)	(kms)	(days)	(US\$)	(kms)	(days)	(US\$)
Germany	972.15	3.63	612	407.16	1.41	354	—	—	—	407.16	3.04	1,000
Singapore	224.07	2.17	422	119.06	2.38	298	75	1.78	335	241.03	2.51	409
Bahrain	—	1	150	—	1	150	—	2	250	—	2	250
Kuwait	75.00	2	5,000	75	2	3,000	75	3	5,000	75	3	3,000
Qatar	270.02	3.83	855	75	2	531	75	2.29	721	75	2.29	354
KSA	75	2.29	250	1,250.00	3	1,500	—	6.32	274	489.36	4.93	696
UAE	428.63	2.46	649	428.62	2.53	551	482.74	2.03	960	536.14	3.45	1,170

Source: LPI 2010.

Table A3 – Dubai Transportation 2009

Air Transport				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Flights Dubai International Airport	68,270	68,528	68,453	75,225
Passenger Movement at Dubai International Airport (000)	9,530	9,850	10,689	10,833
Arrivals (000)	4,646	4,677	5,292	5,299
Departures (000)	4,681	4,986	5,202	5,321
Transit (000)	203	187	195	213
Marine Transport				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Passenger Movement at Dubai Ports	138,438	31,363	9,744	47,472
Arrivals	72,275	14,870	4,928	23,345
Departures	66,163	16,493	4,816	24,127
No. of Vessels Calling at Dubai Ports	6,892	7,520	7,417	7,143
Public Transportation				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
No. of Buses In operation *	687	739	775	999
No. of Lines *	80	78	101	106
No. of Passengers (000)	24,315	21,661	20,944	22,093

* Non - cumulative Data

Source: Dubai Airports, Naturalization & Residence Department of Dubai Roads & Transport Authority, Dubai World



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