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Euro-Asia comparative study of logistics cost

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Abstract—This study aims to describe and compare infrastructure systems of Asian and European countries. The first part is a survey to show similarities and differences between the two systems. Comparison between transportation costs is made. Road and air transports are studied, starting from Paris for Europe and from Bangkok for Asia to other cities within their respective continents. It was shown that it is not possible to rank in one part Asian countries and in second part European countries. It is better to rank Asian and European countries together because they represent the same level of development in one hand and the emerging countries in the other. Freight transport has been shown to be cheaper in Asia than in Europe, even if the price depends on destination. However, border crossing is more expensive in Asia than in European Union.

Keywords—Logistics cost, supply chain management, transportation, Europe, Asia

I. Introduction

LOGISTICS is the management of business operations, such as the acquisition, storage, transportation and delivery of goods along the supply chain. Efficiency of this operation depends on many factors. According to Wood et al. [1], infrastructure is a main criterion important to logistics excellence. Infrastructure provides information about logistics performance of a co untry. Developed and well maintained infrastructures make exchanges easier and it is an important attribute in order to trade with other countries.

Nowadays, Europe and Asia are two major actors of international trade. In fact, Asia's and Europe's gross domestic products surpassed that of the US. More and more exchanges are achieved between these two regions. That's why this study aims to compare Asian and European countries logistics infrastructures. Moreover, one of the major objectives is to reduce the logistics costs. This study compares different transportation costs (road and air freights) in the two places.

II. Review of Background Information

Some researchers have tried to compare logistics infrastructure between Europe and Asia. Bang [2] led a study of the logistics system in Northeast Asia where he compared their transportation systems with other major countries in the World, including the US, Germany, and the UK, shown in Table 1. In terms of road density represented by length of roadway per 1000 k m^2 of land, Northeast Asian countries excluding Japan show relatively low road density, compared to Germany and the UK. It is the same remark concerning the rail transportation. For the airports (comparing area of each country and the number of airports), Germany and the UK are leading. However, this study does not take into consideration some major Asian countries, particularly Singapore and Hong Kong.

Bookbinder et al. [3] compared many European and Asian logistics systems, focusing on development and maintenance of the logistics system infrastructure. They classified the logistics systems into four general attributes in three tiers. Infrastructure was one of them as illustrated in Fig. 1.

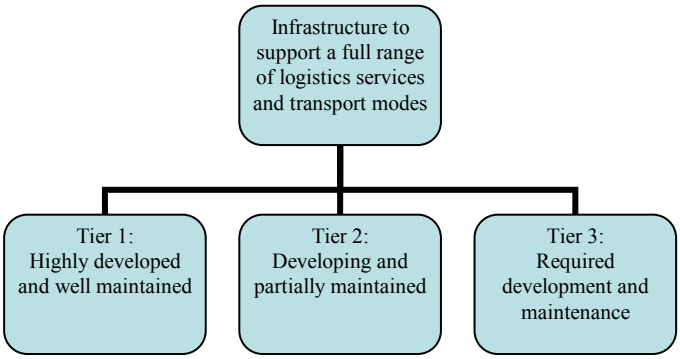

Fig. 1 Definition of logistics infrastructure tiers.

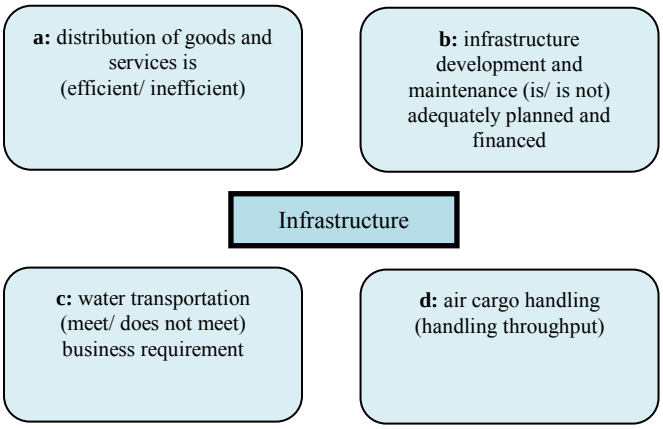

Fig. 2 Specific attributes that determines logistics infrastructure tiers.

Table 1 Overview of transport infrastructure in East Asia and other major countries (adapted from Bang [2])

		South Korea	North Korea	China	Mongolia	Japan	US	Germany	UK
	Population (million)	48.3	22.5	1287	2.7	127.2	290	82.3	60
	Area (1000 km^2)	98.5	120.5	9597	1565	377.8	9629	357.0	244.8
	Land	98.2	120.4	9326	1554	374.7	9159	349.2	241.6
	Water	0.3	0.1	271	10	3.1	470	7.8	3.2
Road	Road length (1000 km)	87.5	31.2	1400	34.0	1152	6335	230.7	371.9
	Road density (km/1000 km^2)	888	259	146	2	3050	658	231	372
Railway	Railway length (1000 km)	3125	5214	71600	1815	23170	46	231	372
	Railway density (km/1000 km^2)	31.7	43.3	7.5	1.2	61.3	45.8	230.7	371.9
Airport	Number of airport	102	72	500	50	175	14801	551	470
	Airport with paved runways	69	34	351	10	141	5131	328	334

According to the World competitiveness yearbook [4], this attribute was divided into four specific attributes (a, b, c and d), shown in Fig. 2. Based on a statistical cluster analysis, Bookbinder et al. [3] can provide a non-standardized data matrix. The standardized results do not give detail on each attribute. Table 2 provides raw ranking scores for cluster analysis. After calculation of average, the ranking of each country can be evaluated, shown in Table 3. It was shown that infrastructure development is homogeneous between Asia and Europe. It is not possible to separate between Asian and European countries. However, Table 3 also shows the noted difference between developed and emerging countries. With the occasional exception, emerging countries of Europe (Eastern European countries) and Asia (Indonesia, India, the Philippines) are at the end of the ranking. The leading countries are Singapore, Germany, Hong Kong, and France. These countries have the same level of development and maintenance. Wilson [5] regrouped countries in Europe and Central Asia (ECA) and conducted a comparative study with South Asian countries, focusing on the constraints for development of trade facilitation. For South Asia, Wilson [5] pointed out the lack of infrastructure such as poor road, rail, air and shipping link. For instance, in 2004, the percentage of paved road is approximately 37% for South Asia, while it is

Table 2 Raw ranking scores for infrastructure attribute

	Infrastructure			
	a	b	c	d
Austria	10	9	13	105
Belgium	24	23	16	27
Canada	11	12	9	51
China	25	24	30	28
Czechoslovakia	31	35	35	223
Denmark	2	3	2	46
Finland	5	4	4	124
France	6	8	15	14
Germany	4	2	3	9
Greece	38	31	28	571
Hong Kong	7	5	5	2
Hungary	27	30	33	232
India	46	47	47	64
Indonesia	41	39	43	63
Ireland	33	27	29	112
Italy	39	41	37	69
Korea	37	34	40	7
Luxembourg	9	7	17	38
Malaysia	16	13	24	40
Mexico	35	38	36	571
Netherlands	17	18	7	15
Philippines	44	40	42	50
Poland	43	42	44	176
Portugal	23	21	25	116
Russia	40	46	41	135
Singapore	1	1	1	10
Slovenia	32	36	26	359
Spain	21	15	22	55
Sweden	8	11	6	93
Taiwan	22	22	20	17
Thailand	26	26	31	24
UK	28	28	27	13
USA	13	16	14	1

Table 3 Country ranking for infrastructure attribute

	Average of specific attribute	Ranking
Singapore	9	13
Germany	23	16
Hong Kong	12	9
France	24	30
USA	35	35
Denmark	3	2
Netherlands	4	4
Luxembourg	8	15
Taiwan	2	3
Canada	31	28
Belgium	5	5
Malaysia	30	33
UK	47	47
China	39	43
Thailand	27	29
Spain	41	37
Korea	34	40
Sweden	7	17
Austria	13	24
Finland	38	36
Philippines	18	7
Portugal	40	42
Indonesia	42	44
Italy	21	25
Ireland	46	41
India	1	1
Russia	36	26
Poland	15	22
Hungary	11	6
Czechoslovakia	22	20
Slovenia	26	31
Greece	28	27
Mexico	16	14

Table 4 Estimated air freight cost for door-to-door service to cities in Europe

	distance		Minimum charge			Per kg		
	(km)	kg	THB	USD	Euro	THB	USD	Euro
Berlin	880	70	18000	555	450	260	8	6.5
Rome	1110	70	18000	555	450	260	8	6.5
Porto	1208	70	17580	543	440	252	7.8	6.3

Table 5 Estimated air freight cost to cities in Southeast Asia

	distance	Minimum charge		Per kg	
	(km)	THB	USD	THB	USD
Vientiane	520	700	20.59	16	0.47
Hanoi	993	700	20.59	30	0.88
Hochiminh city	669	700	20.59	20	0.59
Phnom Penh	530	700	20.59	16	0.47
Yangon	584	700	20.59	18	0.53

Table 6 International priority express cost rate to Southeast Asia

	10 kg box		Additional rate per kg > 10 kg, up to 20 kg		21 kg box		Additional rate per kg > 21 kg, up to 44 kg	
	THB	USD	THB	USD	THB	USD	THB	USD
Laos	3753	110.38	137	4.03	5411	159.15	291	8.56
Cambodia	3753	110.38	137	4.03	5411	159.15	291	8.56
Vietnam	4308	126.70	191	5.62	6536	192.23	319	9.38
Myanmar	4308	126.70	191	5.62	6536	192.23	319	9.38

Table 7 Estimated air freight cost for door-to-door service to cities in Southeast Asia

	distance	Charge for 70-100 kg		
	(km)	THB	USD	Euro
Vientiane	520	280	8.7	7
Hanoi	993	125	3.9	3.1
Phnom Penh	530	125	3.9	3.1

about 86% for ECA countries. It was shown that it is not possible to separate between European and Asia countries' infrastructure. Logistics infrastructure is similar between developed countries in Europe and Asia. But, difference exists if developed and emerging countries of Europe and Asia are to be compared.

III. Logistics Cost Analysis

After the comparison of infrastructure between European and Asian countries, this part of the study presents comparison of road and air freight costs between European and Asian cities.

A. Air Freight

Estimation has been made for air freight cost from Paris to other capital cities in Europe using a freight operator. The estimated cost is displayed in Table 4. For Southeast Asia, Table 5 shows air freight cost between Bangkok and other cities in the region using Thai Airways Cargo. Table 6 shows express delivery cost to main cities in Southeast Asia. In all cases, the freight transport using a freight operator such as UPS, which delivers door-to-door service, is more expensive. In order to compare freight cost in Southeast Asia and Europe, Table 7 presents estimated air freight cost from Bangkok to three cities in Southeast Asia. With an exception of Laos, prices were found to be cheaper in Asia than in Europe.

B. Road Freight

By using an international freight operator, the transported weight using road is limited to 70 kg. This type of operator offers different services with different delivery times, prices, and insurance policies. Table 8 shows estimated road freight cost in Europe. Contrary to Asia, the border crossing fee is non-existent in European Union. Table 9 shows border crossing fee in Southeast Asia. They vary greatly, depending on which country to enter. The border crossing fee was found to account between 20 – 50% of the total transport cost.

In Europe, according to "comite national routier" which is an official French technical agency, the relative part of diesel price in the transport cost is 24%. In France, a liter of diesel bought costs 0.94 Euro or 37.7 Thai baht (THB). This value is close to the average value in Europe. So main transport cost (fuel cost) is similar between the two regions.

Table 8 Estimated road freight cost to cities in Europe

	distance	20 kg			50 kg			70 kg		
	(km)	THB	USD	Euro	THB	USD	Euro	THB	USD	Euro
Berlin	880	12000	370	300	18000	550	450	22700	700	570
Rome	1110	12000	370	300	18000	550	450	22700	700	570
Porto	1208	12000	370	300	18000	550	450	22500	693	565

Table 9 Cost of border crossing for transport in Southeast Asia

	Total cost (THB)	Border crossing cost (THB)	Percentage of total cost (%)
Bangkok-Vientiane	547	131	24
Bangkok-Hanoi	2907	757	26
Bangkok-Phnom Penh-Hochiminh city	751	381	51
Bangkok-Yangon	760	150	20

IV. Conclusion

This study shows that globally Western European countries and developed Asian countries are equally well developed with respect to logistics infrastructures. These countries present a high level of development and maintenance. Some countries of ECA are now new EU members. This new membership could allow them to develop their logistics systems. Regarding the costs, Asian transportation is cheaper than European, as expected. It is noted here that free border crossing is a r eal advantage for EU members. If the border crossing tariff in Asia can be negotiated, it w ill encourage more trade.

Acknowledgment

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