ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

DEVELOPMENT OF ASIA - EUROPE RAIL CONTAINER TRANSPORT THROUGH BLOCK-TRAINS

NORTHERN CORRIDOR OF THE TRANS-ASIAN RAILWAY

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Introduction

One main feature of economic development in the last decade of the 20th century has been the globalisation of markets and, consequently, the increase in the international exchanges of products between assembly plants and/or between manufacturers and consumers. To facilitate these exchanges, the need arose for efficient and reliable international transport routes and networks. Developing these routes/networks meant either developing new infrastructure, or upgrading existing national and international infrastructures so that they could accommodate the increase in traffic volumes. The improved political climate and a return to peace on the Asian continent made possible the actual development of such linkages that had hitherto only been left at the study stage.

Recognizing the reality of the globalization process and acknowledging the benefits that the process, if properly engineered and conducted, could have for the economic and social development of the countries of the region, ESCAP identified the development and strengthening of intra- and inter-regional transport and communication linkages as a major objective of phase II (1992-1996) of the Transport and Communications Decade for Asia and the Pacific. In this context ESCAP, in 1992, initiated the integrated Asian Land Transport Infrastructure Development (ALTID) project comprising the Trans-Asian Railway (TAR) and Asian Highway (AH) projects as well as facilitation of land transport. ESCAP also adopted resolution 48/11 of 23 April 1992 on road and rail transport modes in relation to facilitation measures.

In view of its practical importance, the ALTID project formed a priority component of the New Delhi Action Plan on Infrastructure Development in Asia and the Pacific (1997-2006) launched by the Ministerial Conference on Infrastructure held in New Delhi in October 1996. Renewed support to the ALTID project was also expressed by the 55th Commission of ESCAP held in Bangkok in April 1999. The Commission renewed the mandate of the secretariat to continue and, whenever possible, to speed up the implementation of the ALTID project, thus giving new impetus to ESCAP resolution 52/9 of 24 April 1996 on Intra-Asia and Asia-Europe land-bridges which laid emphasis on concrete actions towards the development of reliable and efficient Intra-Asia and Asia-Europe transport linkages to facilitate international and bilateral trade and tourism.

With this mandate, the Transport, Communications, Tourism and Infrastructure Development Division of ESCAP developed the ALTID project implementation strategy featuring also a step-by-step approach. Accordingly, a series of studies were conducted aimed at defining a network of road and rail linkages of sub-regional, regional and international importance. More specifically, in the field of railways, an important feasibility study was completed in 1996 on the Trans-Asian Railway Northern Corridor of Asia-Europe transport links, namely a study on connecting the rail networks of China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula. Also in 1996, another study was completed on the development of the Trans-Asian Railway in the Indo-China and ASEAN sub-region. Additionally, in 1999, a study on the development of the Trans-Asian Railway in the Southern Corridor of Asia-Europe routes was completed with a view to connecting Thailand and Yunan province of China with Turkey as well as Europe and Central Asia through Myanmar, Bangladesh, India, Pakistan and the Islamic Republic of Iran. Nepal and Sri Lanka also took part in the study.

The links forming the Trans-Asian Railway network were identified by the participating countries in accordance with the criteria set out in E/ESCAP/864[1], i.e. the nominated links should be one or more of the following:

(a) capital to capital links (for international transport);

(b) connections to main industrial and agricultural centres (links to important origin and destination points);

(c) connections to major sea and river ports (integration of land and sea transport networks);

(d) connections to major container terminals and depots (integration of rail and road networks).

The overall TAR network defined on the basis of these principles is illustrated in Map 1 featuring also the following main Asia-Europe land-bridges:

- Western Europe-Russian Federation to the Korean Peninsula direct or through Kazakhstan and China, or through Mongolia and China;
- Europe-Turkey-Islamic Republic of Iran-South Asia-South-East Asia/southern China;
- Europe-Turkey-Islamic Republic of Iran-Central Asia-China;
- Northern Europe-Russian Federation-Central Asia-Persian Gulf.

In 1997, noting that the formulation of both AH and TAR networks was nearing completion and acknowledging the success of the ALTID project and its wide support by the countries concerned, the Commission at its 53rd session laid down a new set of objectives for the ALTID project. One important objective was that increased emphasis should be placed on improving the operational efficiency of the routes, including transport logistics. Accordingly, the Commission endorsed a refined strategy for the implementation of ALTID and initiated a related series of projects and activities to be carried out. Among the major projects adopted was the joint ESCAP/OSShD[2] demonstration project on container transport on the routes of the Northern Corridor of the Trans-Asian Railway.

[1] "Selected issues in fields of activity of the Commission and its regional institutions as well as reports of regional intergovernmental bodies".
[2] Organisation for Railways Cooperation.

As indicated above, in 1996, recognising that Asia-Europe container traffic was a booming trade and that a vast majority of volumes were transported by sea, and also acknowledging that the railways had the potential to offer much better transit times than shipping, ESCAP completed a feasibility study on connecting the rail networks of China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula. The study (i) defined a network of routes making up the TAR Northern Corridor (TAR-NC), (ii) stipulated routes requirements in terms of technical indicators (loading gauge and axle-load) and commercial indicators (minimum average speed), (iii) dealt with operational aspects including tariff issues, and (iv) stressed the importance of cross-border traffic facilitation measures.

The TAR-NC network originally identified (Map 2) was made up of the following routes:

Origin	Route	Distance (1)
Lianyungang (China)	via Kazakhstan-Russian Federation	9,200 km
Shenzhen (China)	via Mongolia-Russian Federation	11,040 km
	via Kazakhstan-Russian Federation	10,300 km
Tumen River Area	via China-Mongolia-Russian Federation	8,900 km
	via China-Kazakhstan-Russian Federation	9,900 km
	via China (Manzhouli)-Russian Federation	9,000 km
	via Russian Federation	10,300 km
Nakhodka (Russian Federation)	via Russian Federation	10,300 km
Rajin (Democratic People's Republic of Korea)	via China (Manzhouli)-Russian Federation	8,900 km
	via Russian Federation	10,300 km
Pusan (Republic of Korea) (2)	via Democratic People's Republic of Korea, Russian Federation	11,600 km
	via Democratic People's Republic of Korea, China, Mongolia, Russian Federation	10,780 km

(1) Distances were then calculated with Frankfurt (Germany) as final destination.
(2) Links between Munsan and Dandong (approximately 500 km), and between Sintanri and Chongjin (approximately 700 km). The reconstruction of short track sections is needed to connect the networks of the Democratic People's Republic of Korea and the Republic of Korea, as well as an agreement between the two countries to make the routes operational for international traffic.

In order to consider the findings and recommendations of the study, a Policy-level Expert Group Meeting was convened in Bangkok in October 1995. Given the conclusions drawn in the study, a follow-up demonstration project "Development of Asia-Europe Container Transport through Block Trains - Phase I" was endorsed by the participating countries under generous funding from the Republic of Korea.

Based on the principle that Asia-Europe land-bridges have the potential to be competitive against related sea routes, the purpose of the project was to assist transport policy makers and planning authorities of the participating countries to determine the tasks that need to be implemented in order to develop services attractive to shippers. More specifically, this involved determining the required package of transit times, tariffs and level of services, that the railways along the Northern Corridor of the Trans-Asian Railway need to offer if they are to compete against well-established shipping lines.

ESCAP, in cooperation with OSShD, implemented the project over the period February 1998 to October 1999. In addition to the countries mentioned above which participated in the feasibility study of 1996, Belarus, Germany and Poland also participated.

Because of the need to identify a focal origin/destination place in Europe for the routes of TAR-NC, Germany was included into the project in view of its central location in the heartland of Europe and its integration into the European rail and road networks. Therefore, the country represents an ideal hub for pick-up and distribution of cargo and Berlin was selected as the origin/destination point of cargo for the calculations of distances and transit times. With Germany into the project as origin/destination and the Russian Federation as the westernmost country on the defined TAR-NC, it was important to secure the participation to the project of Belarus and Poland (i) as transit countries from/to Germany but also (ii) in view of the fact that their common territorial border also marks the transition between the TAR-NC rail systems with a track gauge of 1,520 mm and the railways of Central and Western Europe with a track gauge of 1,435 mm.

In the course of the implementation of Phase I of the demonstration project, and also as indicated by countries located outside of TAR-NC, the need for a special publication was identified to assist the countries in developing an international railway route /land-bridge.

Accordingly, the present publication contains the following chapters. Chapter 2 describes the routes concerned. Chapter 3 evaluates current container traffic between North / Northeast Asia and Europe and looks at the potential distribution of volumes along the different routes making up TAR-NC. Chapter 4 reviews the criteria by which shippers/freight forwarders will decide to commit their goods to rail or, in other words, by which the railways along TAR-NC are likely to divert traffic from ocean carriers and by which one route within TAR-NC may be preferred by comparison with the others. Chapter 5 looks at the technical and organizational practices on which the railways on one hand, the railways and the customs administrations and other parties concerned on the other hand, need to agree ahead of the actual demonstration runs.

It is hoped that the publication will serve as useful guidelines to help the countries perceive the actual benefit to be derived from the development of efficient rail services along the routes making up the Trans-Asian Railway Northern Corridor and that it will highlight those components of the services that should receive specific attention for the services to be able to attract shippers and keep their loyalty. For similar reasons, it is hoped that the publication will serve also as useful guidelines in developing any international railway route/land-bridge.

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- Chapter 2 -

Routes of the TAR Northern Corridor

The five following core routes have been adopted as forming the TAR infrastructure in the northern corridor with, for the purpose of evaluating distances and transit times, Berlin (Germany) chosen as final destination in view of the country's location in the heartland of Europe and its integration into the European rail and road networks making it an ideal hub for pick-up and distribution of cargo. The routes are :

Route i: it originates in the Russian port of Vostochny (the container port for Nakhodka in the Russian Far East region of Primorsky), travels across the Russian Federation, Belarus and Poland before reaching Germany. The route, referred to as the Trans-Siberian route, is about 11,600 kilometres, is electrified and double-track. It has 3 border-crossings including one break-of-gauge points.

Route ii: it originates in the Chinese port of Lianyungang or in the consumer and/or industrial centres located in the eastern part of China, travels across China in a north-westerly direction, crosses Kazakhstan, the Russian Federation, Belarus and Poland before reaching Germany. The route is 10,200 kilometres. It has 5 border-crossings including two break-of-gauge points.

Route iii: it originates in the Chinese port of Tianjin or in the consumer and/or industrial centres located in the eastern part of China, travels across China, Mongolia, the Russian Federation, Belarus and Poland before reaching Germany. The route is 9,500 kilometres. It has 5 border-crossings including two break-of-gauge points.

Route iv: it originates in the ROK and travels through the DPRK from where it continues either through China, or the Russian Federation. Several variants exist for its continuation to Europe.

Variant iv-a: from the ROK the route travels through the DPRK to Namyang, the border point with China, across the north-eastern part of China to Manzhouli, the border point with the Russian Federation, joins the railways of the Russian Federation at Zabaïkalsk, and continues through the Russian Federation and across Belarus and Poland before reaching Germany. The route offers the advantage of running across the Tumen River Area, a growth triangle geographically located in China, the DPRK and the Russian Federation. The route is 10,950 kilometres. It has 5 border-crossings including two break-of-gauge points.

Variant iv-b: from the ROK the route travels through the DPRK to Tumangang, the border point with the Russian Federation, joins the railways of the Russian Federation at Khasan and continues through the Russian Federation and across Belarus and Poland before reaching Germany. The route is 12,350 kilometres. It has 4 border-crossings including two break-of-gauge points.

Variant iv-c: from the ROK the route travels through the DPRK to connect with the rail network of China at Dandong from where it travels to Beijing from where the rest of the journey to Europe copies the above-mentioned route iii. The route is 11,250 kilometres. It has 6 border-crossings including two break-of-gauge points.

However, whatever variant is used, railing containers originating in the ROK from the rail terminal of origin through the DPRK to the border with either China, or the Russian Federation will only be possible after one or both of the two following gaps have been completed:

(a) the 20-km gap between Munsan (ROK) and Gaesong (DPRK), and/or

(b) the 31-km gap between Shintanri (ROK) and Pyonggang (DPRK).

In view of the short distances involved, it is felt that, were the decision made to operationalise route iv, all the constituents can be put in place quickly, expectedly within 18 months. The use of such a route would eliminate one intermodal transhipment between sea and rail at either Chinese ports or the DPRK port of Rajin or the Russian port of Vostochny (see route v below). However, there would still be a need for rail-to-rail transhipment at either Tumangang/Khasan at the border between the DPRK and the Russian Federation (variant iv-b), or further on at Manzhouli/Zabaïkalsk between China and the Russian Federation (variant iv-a) or at Erenhot/Zamyn-Uud between China and Mongolia (variant iv-c).

Route v: it originates in ports of the ROK and, after feeder service by sea to ports in either China, the DPRK, or the Russian Federation, continues to Europe along the above-mentioned routes i, ii, iii and iv.

In this route, the shipping alternatives are as follows :

From:	***To:***	
- Incheon	a) Chinese ports, i.e.	Tianjin Quingdao Lianyungang Shanghai
- Pusan	a) Chinese ports, i.e.	Tianjin Quingdao Lianyungang Shanghai
	b) DPRK port, i.e.	Rajin
	c) Russian port, i.e.	Vostochny

Table 2.1 gives a summary of the above routes with indication of the overall distances to Germany (i.e. Berlin as destination point), the number of border-crossings as well as the number and location of break-of-gauge points.

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- Chapter 3 -

Assessment of Container Traffic Volumes

The defined TAR Northern Corridor serves the movement of cargo generated between countries located both outside and within the corridor. However, movements within the corridor are still difficult to identify with any accuracy at this stage in the economic development of the countries concerned. Consequently, it is thought appropriate that the operationalisation of TAR-NC should, in a first approach, concentrate primarily on transit traffic for which existing volumes are already known or, in other words, on the international movements of containers between China, Japan and the Korean Peninsula on one hand, and Europe on the other hand. This means that traffic that TAR-NC services will try to attract will be traffic diverted from shipping, i.e. traffic which currently covers the main trans-continental leg of the Asia-Europe journey by sea. The level of diverted traffic will depend mainly on the net benefits perceived by potential freight customers to be offered by the railways over ocean carriers.

The sustained and continuing[1] growth of containerised traffic through Asian and European ports shows that the volumes of goods carried in containers over long distances keep increasing. This situation provides the railways with an opportunity to develop new services and carve a niche on the market segment of time-sensitive cargo by capitalising on shorter transit times.

An assessment of container volumes likely to be carried on the TAR network and the distribution of these volumes along the various routes making up the TAR-NC is essential to properly evaluate the technical specifications of the future network and the required level of investment.

3.1. Assessment of Container Traffic Volumes

A first indication that traffic is growing is given by traffic throughput in the ports of north/north-east Asia and the ports of western Europe.

Table 3.1: Evolution of container throughput in China, Japan, the ROK and in selected European countries with main ports (TEUs).

	1985	1995	1997
Asia			
China	446,700	4,678,875	5,797,274 *(1)* 20,364,505 *(2)*
Japan	5,510,833	10,740,681	10,891,987
ROK	1,278,538	4,502,596	5,636,876

[1] If somewhat at a slightly abated pace since the Asian crisis of 1997.

Europe			
Belgium	1,574,300	2,863,391	3,628,108
France	1,341,184	1,703,210	2,045,131
Germany	2,152,933	4,445,279	5,216,520
The Netherlands	2,762,979	4,812,967	5,573,889

(1) Excluding TEU throughput of Hong Kong (2) Including TEU throughput of Hong Kong

Source: Containerisation International Yearbooks - 1987, 1997 and 1999.

Since container traffic between Asia and Europe is currently moved by sea with only a marginal fraction being carried on the railways, a look at current shipping volumes is the best indicator of the market into which commercially-attractive rail services could make a dent. Four countries are of particular importance for this exercise due to their relative geographical proximity to the railheads of the TAR-NC routes in the main ports of China and the Far Eastern ports of the Russian Federation. These countries are China, Japan, the Democratic People's Republic of Korea (DPRK) and the Republic of Korea (ROK). So far as other Asian countries are concerned, their geographical location make it unlikely that these countries will ever consider moving cargo up to ports in China or the Russian Federation since this would in any case entail a fairly long feeder sea journey which will always be best directed to the main shipping hubs of the region such as Singapore or Hong Kong from where frequent main line shipping connections to Europe can be easily secured.

Table 3.2 below shows recent trends in two-way container flows between China, Japan and the ROK on one hand and Europe on the other hand.

Table 3.2: Container flows along Europe / Asia trade routes over the period 1995-97 (thousands of TEUs)

	Westbound to Europe			**Eastbound from Europe**		
	1995	**1996**	**1997**	**1995**	**1996**	**1997**
China	623	661	717	216	230	245
Japan	346	374	401	354	372	401
ROK	256	264	309	232	237	278
Total	***1,225***	***1,299***	***1,427***	***802***	***839***	***924***

Source: Ministry of Maritime and Fishery of the Republic of Korea, 1998 - quoted by Korea Maritime Institute (KMI)

The above figures, however, include *all* containers, i.e. full and empty TEUs as well as in-transit containers, handled in the ports of all three countries. In the case of some major hub ports, the inclusion of in-transit containers can lead to some distortion of figures actually reflecting true demand linked to industrial production. The ROK port of Pusan is a typical case in point. The location of the port together with its high efficiency has made it a sought-after relay hub in the region and some 21% of the containers handled by the port are linked to transhipment activities as shown in Table 3.3.

The future possibility exists of having containers originating on the US West Coast (and possibly in Australia although this may appear less certain in view of the availability of straight shipping relations between Australia and Europe) bound for Central Europe, Central Asia or the Russian Federation relayed through ports of China, the Korean Peninsula or the Russian Federation to continue to their final destination on the TAR-NC. However, this means that services offered along TAR-NC would have to be of a level at least equal to that provided by the experienced US coast-to-coast intermodal rail operation with fast connections with shipping services in ports of the east coast. Since this future appears distant for the time being, TAR-NC catchment area should, in the development stages, concentrate on cargo originating in North-East Asia.

Table 3.3: Container movements in Port of Pusan - Period 1997-98 (unit: TEU)

	1997	1998
Import	1,992,846	2,153,775
Export	2,136,207	2,385,316
Transhipped	1,104,827	1,213,864
Total	***5,233,880***	***5,752,955***

Source: Korea Container Terminal Authority website, http://www.kca.or.kr/eng/Statistics/content.html

Elaborating on the above Table 3.2, Tables 3.4-a, 3.4-b and 3.4-c indicate recent trends in the exchange of *full* TEUs between the three countries concerned and northern, southern and eastern Europe[2].

Table 3.4-a: Container flows between Northeast Asia and Northern Europe (thousands of TEUs)

	1994	1995	1996	1997	1998	1999	Project. 2003
Westbound to Northern Europe							
China	648	695	757	845	949	966	1,377
Japan	318	342	310	320	356	367	440
ROK	99	106	106	107	131	143	191
Total	***1,065***	***1,143***	***1,173***	***1,272***	***1,436***	***1,476***	***2,008***
Eastbound from Northern Europe							
China	178	207	206	241	285	322	411
Japan	272	364	334	344	322	333	391
ROK	124	138	155	162	124	135	190
Total	***574***	***709***	***695***	***747***	***731***	***790***	***992***

[2] Standard&Poor's makes the following geographical divisions :
Northern Europe comprises Austria, Belgium/Luxembourg, Denmark, Finland, France, Germany, Ireland, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom.
Southern Europe comprises Greece, Italy, Portugal, Spain and Turkey.
Eastern Europe comprises all other European countries including the Russian Federation and extends to the Central Asian republics by virtue of association with the « Economies in Transition » in countries of the former Soviet Union.

Table 3.4-b: Container flows between Northeast Asia and Southern Europe (thousands of TEUs)

	1994	1995	1996	1997	1998	1999	Project. 2003
Westbound to Southern Europe							
China	152	166	173	201	237	254	342
Japan	75	58	57	66	75	78	95
ROK	33	39	38	48	61	67	92
Total	***260***	***263***	***268***	***315***	***373***	***399***	***529***
Eastbound from Southern Europe							
China	61	50	53	56	48	54	62
Japan	62	79	75	73	75	77	96
ROK	27	27	35	30	21	24	32
Total	***150***	***156***	***163***	***159***	***144***	***155***	***190***

Table 3.4-c: Container flows between Northeast Asia and Eastern Europe (thousands of TEUs)

	1994	1995	1996	1997	1998	1999	Project. 2003
Westbound to Eastern Europe							
China	75	78	77	90	90	89	125
Japan	14	13	16	18	19	17	20
ROK	30	43	69	50	50	48	59
Total	***119***	***134***	***162***	***158***	***159***	***154***	***204***
Eastbound from Eastern Europe							
China	112	135	130	130	129	139	190
Japan	66	74	72	74	58	59	63
ROK	48	56	66	43	30	37	52
Total	***226***	***265***	***268***	***247***	***217***	***235***	***305***

Source: Standard&Poor's DRI, "Container Watch 1999/I".

One of the perennial and crucial issues in the container trade is the imbalance of traffic between two given points and the ensuing need to reposition empty containers. The problem reached a new dimension in the wake of the recent economic downturn in Asia which, due to the devaluation of Asian currencies, led to an increase in westbound Asia-to-Europe traffic and a fall in eastbound Europe-to-Asia traffic. In 1997, in the port of Pusan, for example, the distribution of full vs. empty TEUs in the incoming direction was 74% and 26%

respectively while in the outgoing direction the distribution was 93% and 7% respectively. Since the imbalance situation affected all trade directions with Asia, these figures can be applied indiscriminately to ROK-Europe as well as ROK-North America trade.

For lack of available imbalance figures in trade between Europe on one hand and China and Japan on the other hand, but acknowledging that a similar pattern of imbalance between westbound and eastbound trade is reported, the same distribution has arbitrarily been kept for all three countries. Applied to 1999 traffic figures this would thus give the following overall container flows.

Table 3.5: Overall container flows between China, Japan, the ROK and Europe (thousands of TEUs)

	Westbound from							
	Northern Europe		**Southern Europe**		**Eastern Europe**		**Total**	
	Full	**Empty**	**Full**	**Empty**	**Full**	**Empty**	**Full**	**Empty**
China	966	73	254	19	89	7	1,309	99
Japan	367	28	78	6	17	1	462	35
ROK	143	11	67	5	48	4	258	20
Total	***1,476***	***112***	***399***	***30***	***154***	***12***	***2,029***	***154***

	Eastbound from							
	Northern Europe		**Southern Europe**		**Eastern Europe**		**Total**	
	Full	**Empty**	**Full**	**Empty**	**Full**	**Empty**	**Full**	**Empty**
China	322	113	54	19	139	49	515	181
Japan	333	117	77	27	59	21	469	165
ROK	135	47	24	8	37	13	196	68
Total	***790***	***277***	***155***	***54***	***235***	***83***	***1,180***	***414***

The figures in Tables 3.2 and 3.5 differ only marginally if one keeps the following in mind:

i. KMI figures for 1997 need to be updated upwardly to accommodate the slight growth recorded in 1998 and 1999 in overall volumes between North-East Asia and Southern and Western Europe,

ii. the geographical distribution adopted by KMI is somewhat different from that adopted by Standard&Poor's. Thus, KMI study does not place Central Asian countries in Europe,

iii. KMI has not included traffic with the Russian Federation in its exchanges with Europe.

Consequently, it can be said that overall container trade flows between North-East Asia and Europe stand at around 2 million TEUs westbound and 1.5 million TEUs eastbound. A majority of these volumes are between Asia and *Northern* Europe. In the westbound direction 73% of volumes go to Northern Europe while in the eastbound direction 67% of volumes come from Northern Europe.

So far as the future development of the container trade is concerned, a number of institutes and organisations have been trying to make projections despite the volatility of Asian economies since the 1997 crisis. In its "Container Watch - 1999/I" report, Standard&Poor's posted the following average annual growth rates for the periods 1998-2003 and 2003-2010.

Table 3.6: Anticipated average annual growth rates in the container trade

	Westbound to Europe		**Eastbound from Europe**	
	Period 1998-2003	**Period 2003-2010**	**Period 1998-2003**	**Period 2003-2010**
China	7.7%	7.4%	7.6%	7.4%
Japan	4.3%	5.4%	6.5%	7.5%
ROK	4.3%	5.4%	8.8%	9.5%

Source: Standard&Poor's DRI, "Container Watch 1999/I".

However, future trends in overall container trade between North-East Asia and Europe presents little relevance for the development of TAR-NC at this stage given the insignificance of the current share of rail on this market.

If current global container volumes were to stagnate at their 1999 levels, they would still be offering enough potential for the railways to develop. Indeed, capacity on the Trans-Siberian route is reported to be able to accommodate yearly traffic volumes of 300,000 TEUs[3]. As this is the most technically-developed route to date (i.e. double-track and electrified) and the one likely to have the least number of obstacles to smooth transit, it can be assumed that ascribing the same capacity to the route through China and Kazakhstan is proper - it in fact in all likelihood constitutes an optimistic scenario - and that therefore, capacity problem would expectedly start to appear when rail captures only about 16% of 1999 traffic volumes.

According to KMI, the market shares of shipping and rail on the container market between the ROK and Europe over the period 1995-97 stood as shown in Table 3.7.

[3] See « International Conference held on Trans-Siberian Railway » in Containerisation International, December 1998, p.31, and « OSShD realigns after political changes » in Rail Business Report, 1999, p.27.

Table 3.7: Market share of sea and rail on container market between ROK and Europe - 1995 to 97. Volumes in thousands of TEUs.

	1995		1996		1997	
	Volumes	Market share	Volumes	Market share	Volumes	Market share
Sea Transport	448	92%	475	95%	561	96%
Rail Transport	40	8%	26	5%	26	4%

Source: Korea Shipping Gazette quoted by Korea Maritime Institute.

Although figures are not available for China and Japan, there is reason to believe that the situation would reflect a similar picture. As important as the narrow market share of rail itself, Table 3.7 also points to a halving of the market share over the period. In overall terms, as of December 1998, volumes transported along the Trans-Siberian line - which has so far been the main railway route for land movements of containers originating in Asia with final destination points in Europe - fell to 40,000 TEUs down from 140,000 ten years earlier[4]. This points out to vast possibilities for the development of rail-carried container services along TAR-NC. Efforts have already been successfully applied to improve transit-times and reduce rates. Future efforts by the railways concerned now need to concentrate on the other factors making up the desirable level of services likely to attract customers the "level of services" issue is addressed in details in chapter 4). These factors are very often peripheral to core railway activities but, nevertheless, need to be addressed by the railway administrations themselves as poor performance in the concerned areas would be detrimental to them. Such areas are mainly greater transparency and ease of border-crossing procedures, adequate security of cargo and hands-on user-friendly cargo-tracking facilities.

3.2. Distribution of Container Traffic among TAR-NC Routes

As seen in chapter 2 there are five main routes constituting TAR-NC and, whereas the main efforts in developing TAR services will be directed towards winning traffic to rail over from shipping, it is important to look at what is the possible distribution of traffic along those routes. In this connection, the following observations can be made:

(a) route i., i.e. the Trans-Siberian route, has already been used in the past for container block-train operation between Asia and Europe and has proved its operational viability from a technical point of view. The reduced number of border crossing and break-of-gauge points gives the route a high competitive profile against shipping services;

(b) route ii, through China and Kazakhstan, has to date been used for the movements of containers in block-trains only up to Central Asian countries, i.e. Kazakhstan and Uzbekistan, from the ROK and China and only for small volumes of traffic. Route ii has clear commercial viability on this market segment given that the alternative shipping route through ports in the Islamic Republic of Iran or Pakistan and subsequent land-movements by rail or road is not easy. So far as movements

[4] « Containerisation International », December 1998, p. 31.

from Asia to Europe are considered, route ii has a high number of border-crossing points and two break-of-gauge points. Therefore, setting up the proper organisation at these particular points will be crucial if the route is to compete consistently and reliably with other TAR-NC routes as well as with shipping services;

(c) route iii through China and Mongolia has to date not been used for block-train container movements between Asia and Europe;

(d) so far as routes iv and v are concerned, the above remarks are valid as they make use of routes i, ii and iii over most of their distances;

(e) given the importance of delivering high quality performances if rail wants to compete with shipping it is essential to reduce to the bear minimum imposed by technical requirements the time spent by containers at border points as well as at terminals where transhipment is necessary for break-of-gauge reasons. This means that such terminals will have to be well-equipped and to a certain extent already used to this kind of operations. The two potentially best equipped and most experienced terminals on TAR-NC for such operations are at Druzhba/Alataw Pass at the break-of-gauge point between China and Kazakhstan and at Brest at the break-of-gauge point between Belarus and Poland.

In general, it can be assumed that, eventually, each of the TAR-NC routes will have its share of Asia-Europe traffic, either generated or diverted from shipping, provided the proper technical standards and operational capabilities are put in place. A certain amount of competition between the various TAR-NC routes may even be expected. However, it is important that the TAR-NC be developed as an efficient and integrated rail network for container traffic, especially if one considers the fact that all routes connect at some point with route i, i.e. the Trans-Siberian route. Thus, all routes could easily carry loads originating on one route and having a fixed rendez-vous with another load originating on another route at a dedicated yard along route i. Thus, Karimskaya, Ulan Ude and Ekaterinburg would be the meeting point between traffic travelling along route i from places located east of these cities and traffic travelling along the routes with which they offer a connection with route i. That is to say for traffic coming from across the north-eastern part of China, from across Mongolia and from across Kazakhstan respectively.

It is important to develop such synergies between routes as one route could then serve as a diversion for traffic in case of temporary operational problems on another route (e.g. natural disasters, derailments, speed restrictions, heavy track maintenance operation, etc.) thus leaving the commercial quality of the TAR services intact. They would also guarantee the optimisation of assets utilisation (e.g. locomotives, track occupation, etc.) and may help railways deviate from their past “heavy train mentality” knowing that space left unfilled at the terminal of origin would be occupied during the journey. This speaks in favour, along with the development of an information system, of developing an integrated jointly-defined space-booking system for the entire TAR-NC.

From a commercial point of view, the main traffic generating areas in North-East Asia are to be found in the eastern third of China, Japan and the ROK with, in the future, the possibility of the Tumen River area becoming an additional such area. Leaving technical standards and operational capabilities aside, traffic to and from these areas are likely to distribute as follows:

Cargo to/from Europe

(a) out of Japan and the ROK: containers could converge to either Vostochny or Rajin from where the natural option would be to rail them through route i.

(b) out of Tumen River: containers could either travel to Tumangang/Khasan and then continue along route i, or join Europe-bound cargo out of the north-eastern provinces of China to continue along a line section in the north-eastern China connecting with route i at Karimskaya (Russian Federation) already 2,500 km west of Vostochny.

There are various combinations for distributing traffic originating in this area. The final choice will be dictated by the type and availability of the transport infrastructure that will be put in place. Thus, it might be of interest to have a broad-gauge, i.e. 1,520 mm, line serving a major terminal in the Tumen River area.

At the same time the option through north-eastern China should be developed in parallel as it offers a containers-routing alternative which could prove useful in the future to ease movements out of Vostochny in case the port develops into a major hub in the far-east.

Whatever the picture of transport in the area, it seems that the Tumen River area in general, the DPRK in particular, are set to become a major transport hub in the area, especially if the possibility of rail movements from the ROK through the DPRK added some of the Europe-bound traffic out of the ROK and Japan to the already high volumes of containers handled in Pusan.

(c) out of China: depending from where in the eastern third of China, or from which port, containers originate, containers can be routed along route ii, route iii or through north-eastern China to connect to the railways of the Russian Federation at Manzhouli. Ultimately, the operational capabilities of each route will tip the choice towards one option or the other.

Cargo to/from Central Asia

(a) out of Japan and the ROK: containers could converge to either the Russian port of Vostochny or ports in China, the port of Lyanungang being the most likely option. From Vostochny, containers would then be railed along route i up to Novossibirsk from where it junctions off towards Kazakhstan. From Lyanungang, they would then be railed through Urumqi and Alataw Pass and on to or through Kazakhstan.

The route through China and Kazakhstan has a distinctive distance advantage of around 3,500 km over the route through Novossibirsk but it has one break-of-gauge point, at the border between China and Kazakhstan, and has a number of single-tracked and/or diesel-power sections. A lot will therefore depend on the efficiency of container transhipment and on how train priorities are set. Also, the transit times of east↔west movements on Chinese Railway may be affected by the high traffic density on north↔south corridors.

(b) out of Tumen River: containers could either travel to Tumangang/Khasan and then continue along route i through the Russian Federation, or join Europe-bound cargo out of the north-eastern provinces of China to continue along a line section in the north-eastern China connecting with route i at Karimskaya (Russian Federation) already 2,500 km west of Vostochny, or else be directed towards Beijing to continue through Mongolia and connect with route i at Ulan Ude (Russian Federation). All of these routings are possible and the actual option will depend on the operational capabilities of each route. At this stage, for example, the first option would imply a detour going east to Tumangang and then back in a westerly direction on the railways of the Russian Federation. Shortly, after the origin of each route a break-of-gauge point would be encountered either between the DPRK and the Russian Federation (first option), or between China and the Russian Federation (second option) or between China and Mongolia (third option).

Notwithstanding future economic developments, the above elements point to route i, either in its entirety or over a fairly long section, as the backbone of TAR-NC for the movements of containers between North / North-East Asia and Europe while route ii is better suited for traffic between North / North-East Asia and Central Asian countries. However, whatever the calendar for operationalising the various TAR-NC routes, it is important that a phased strategy be established with a view to developing *all* routes as part of an integrated intermodal network. Given that four of the routes indicated in Chapter 2 connect with route i at various places along its alignment, it is important that the technical and institutional interfaces between networks be properly defined and adequately managed to ensure smooth transfer of cargo from one network onto the other. Additionally, adopting an approach of intra-railway competition by which one route would seek to garner all traffic could prove fatal to all the railways concerned while leaving an open field to shipping.

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- Chapter 4 -

Freight Forwarders' Choice of « Best Route »

At the end of 1996 the European rail industry met with a barrage of harsh criticism from its users, i.e. the shipping lines, the shippers and the freight forwarders. Speaking for the shipping lines P&O Nedloyd's Chief executive officer Tim Harris expressed his disappointment in rail services on offer by describing the railways as *"state-owned, bureaucratic entities"* and pointing to the fact that they were *"a series of disjointed series of country entities each with their own policies, operating procedures, union agreements, purchasing agreements, etc, which seem to find it difficult to get on* [and] *even when they do the whole system is racked by a multitude of technical compatibilities"*[1]. This judgement was also echoed by the chairman of the European Shippers' Council which commented that *"although everyone wants to promote the use of rail, there is still a major credibility gap and unless shippers can be assured of quality and reliability the shift will not happen"*[1].

Although, at the time, these statements were aimed at European railways, the negative perception of some railways by shippers or freight forwarders often reverberate through the entire mode as they look increasingly for more sophisticated world-wide distribution solutions as their supply chains go global.

In view of this, and considering that the transportation business has become highly competitive, keeping the customer satisfied has taken renewed importance as overcapacity in the shipping industry means that very often the shipper is now in a position to be more demanding, especially at a time when freight rates in a number of trades are becoming more uniform. Logically, this situation places emphasis on service differentiation and the level of services provided to the customer is becoming the difference between securing and not securing business.

Keeping the customer satisfied entails first and foremost an understanding of who the customer really is. At this point some definitions are in order.

4.1. Definitions

Multimodal Transport Operator. According to the definition in the Multimodal Transport Convention, a Multimodal Transport Operator (MTO) is *"…any person who on his own behalf or through another person acting on his behalf concludes a multimodal transport contract and who acts as a principal, not as an agent or on behalf of the consignor or of the carriers participating in the multimodal transport operations, and who assumes responsibility for the performance of the contract"*.

[1] Containerisation International, « Slow train to revival », September 1997.

The United Nations Conference on Trade and Development (UNCTAD) has categorised the MTOs in "ocean based" MTOs, or Vessel Operating Multimodal Transport Operators (VO-MTOs), and those not operating vessels, or Non-Vessel Operating Multimodal Transport Operators (NVO-MTOs)[2].

VO-MTOs are ship-owners who have extended their services beyond carrying the cargo from port to port to include carriage over land and even by air. They may or may not own the other means of transport (by road, rail or air). If they do not, they arrange for these types of transport by subcontracting with such carriers. In addition, they would also subcontract inland stevedoring and warehousing services as well as a number of other ancillary services.

NVO-MTO are other transport operators who neither own, nor operate vessels, and who subcontract the ocean voyage. They often own only one type of transport, very often trucks and, in rarer cases, airplanes or railways, and, in most cases, at only one end of the route.

Freight forwarders/Logistics providers. According to the Fédération Internationale des Associations de Transitaires et Assimilés (FIATA), a freight forwarder is the *"person concluding a contract of freight forwarding services with a customer"* where freight forwarding services are *"services of any kind relating to the carriage, consolidation, storage, handling, packing or distribution of the Goods as well as ancillary and advisory services in connection therewith, including but not limited to customs and fiscal matters, declaring the Goods for official purposes, procuring insurance of the Goods and collecting or procuring payment or documents relating to the Goods"*[3]. With increasing emphasis being placed by large multi-national companies on their logistics needs and the trend to outsource the provision of all these needs to freight forwarders, these are now also very often referred to as logistics providers.

4.2. Business Environment of Container Traffic

Two of the well-recognised features of international business are to be found in (i) its highly competitive nature and (ii) its global nature. These two features combine to put pressure on shippers to reduce costs while at the same time develop an organisation able to project their goods and image around the world's consumer markets with near-zero defect.

These features are well illustrated by the transferring by western European producers of production facilities to the eastern and southern peripheries of the European continent and, more extensively, to Asia. In the other direction, the establishment by manufacturers in Japan, the Republic of Korea and other manufacturing centres in Asia of production facilities for automobiles and electronic products in the United Kingdom or elsewhere in continental Europe is another example. The multi-national companies creating this trend have a requirement for organising the delivery of components to their manufacturing sites for shipment of the finished products to distribution facilities for repackaging, relabelling and resorting, for inventory control and for final distribution to the consumers of the products.

[2] Multimodal Transport Handbook, UNCTAD, Geneva, March 1995.
[3] FIATA Model Rules for Freight Forwarding Services, Stockholm, January 1997.

The trend is made easier, and therefore even accelerates, as information technology gives manufacturers undreamed-of power to manage much more complex choices in optimisation processes.

In intercontinental movements by sea, a look at the total transportation chain costs reveals that only one third of the costs relate to actual ocean transportation while two thirds relate to inland transportation. Considered alone, the logistics arrangements relating to one shipment are estimated at up to 25% of total costs. In this context, and given the view generally expressed by shippers that, despite the recent economic crisis in Asian countries, traffic will continue to grow, the tendency by shippers is to focus on strategic business operations while improving the economics of their logistics chains. This means that depending on the business trend of the day and the elements on which shippers lay emphasis at a given period in time due to economic conditions of the moment, they will resort to outsourcing a more or less extensive part of their logistic needs to either the ocean carriers themselves, or freight forwarders (or dedicated logistics providers).

One important aspect of transport that transport operators must understand is that the transport business is not an end in itself but more, in the eyes of shippers, a necessary evil that is costly, do not add value to their products and constitute a potential source of disruption in the distribution process. As consumer markets are in a constant evolutionary process, so are the manufacturing processes and objectives of industries, so are their marketing philosophy and strategy,… and so are their transport and logistics requirements. The result is for transport operators or freight forwarders to adapt their own strategy and identify what will make the shippers' minds tick and what will influence the way in which they decide to address their transport and logistics needs. Sometimes, evolution in shippers' behaviour is market-led, at other times, it is more capital-led when the prevailing economic environment puts increased pressure on margins and renewed emphasis on balancing books as has been the case with shippers operating on the Asia market where the economic crisis of 1997 has put them in a cost-cutting mood.

Current trends in the way shippers operate and their future strategies in buying capacity from freight operators were indicated in a recent survey of 1000 shippers world-wide[4].

Among the most significant findings is that 50% of shippers ship on terms which allow them the choice of carriers and another 37% ship on a combination of terms giving them partial control of carrier choice. Meanwhile, when arranging inland haulage, shippers favour ocean carriers (30%) over freight forwarders (19%), a trend confirmed by shippers' preferences in the provision of total supply chain logistics services. Ocean carriers scored 23% with freight forwarders scoring only 12% and specialist logistics providers 13%. The preference for distribution requirements still went to in-house logistics departments (36%). With 88% of shippers indicating that global freight contracts are likely to be important to them in the future, there is confirmation of the need by shippers of integrated services. Regarding their priorities in ranking carriers' services, schedule reliability came on top with 43% of responses while transit times only scored 12%. This demonstrates that between competing carriers, the reliability of advertised schedules will be a greater determinant than transit times in the choice of one carrier over its competitors. In the current cost-sensitive

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[4] Conducted by Containerisation International and published in « CI poll shows shipper priority », November 1999.

times, 38% of shippers designated freight rates as their most important consideration. Surprisingly, other elements of service such as cargo tracking and tracing, Electronic-commerce and reliable booking and documentation received very low priority (4%), if any.

So far as TAR-NC services are concerned, the above indications call for the following comments:

- reliability and rates remain among the "all-time, top-scoring" determinants for shippers in their selection of a transport mode;
- the fact that transit times are receiving fairly low priority is misleading. Indeed, in the minds of shippers the comparison is of transit times *between ocean carriers*, which means, in practical terms, that any difference in this area between competing ocean carriers would be in most cases of one or two days only, that is to say not significant enough to change the focus of shippers away from rates. If shippers were confronted with a possible reduction in transit times of 7 days or more as TAR-NC services are likely to offer, they would probably think differently;
- the low priority given to such element as cargo tracking and tracing, Electronic-commerce, reliable booking and documentation accuracy is equally misleading. In the current highly cost-sensitive times, these elements are receiving low priority because they are already in place and have become transparent as they are not subject to operational vagaries, as is reliability, or to economic circumstances, as are rates. As a result, they are taken for granted and their priority goes down. But while shippers would trade a day or two in transit times for cheaper rates, they would most certainly not accept a curtailing in the mass and quality of the information provided, nor in the ease of access to it.

Even if a sizeable number of shippers seem to temporarily favour in-house logistics (36%), the trend is still to outsource logistics to carriers, freight forwarders, logistics providers or a combination of several of these (64%). It is clear that the complexity of distribution together with increased pressure for one-stop-shopping have combined with the just-in-time philosophy in industries to force onto whoever is in charge of logistics a new extended role, a few steps away from traditional freight forwarding and customs brokerage. The "basket" of services offered by logistics providers should now contain such elements as:

- transportation management, including optimising the choice of carriers based on service requirements and freight rates,
- logistics management, including the tracking of cargo, flexible routing, packing/packaging, storage and distribution as necessary,
- trade and transportation documentation, including the electronic development and transfer of shipping documents, customs clearance, and other regulatory requirements,
- international trade finance,
- payment-related contract,
- insurance.

There is a trend for enhanced and more professional forwarding activities which will not disappear. This will no doubt lead to a restructuring process within the profession itself but it will also have consequences on the transport operators offering transcontinental services. Indeed, the requirement by shippers trading multi-nationally for "one-stop shopping" when purchasing distribution services has led and will continue to lead freight forwarders to go beyond their traditional function of offering individual freight services and instead accepting full responsibility for integrated transport chains. The one direct consequence is that the use of interoperable, interconnecting, multimodal services is no longer a shipper's choice, but a considered act of those providing cargo logistics services.

For the railways along TAR-NC, associating with freight forwarders/logistics providers may be a new experience. The pluses and minuses of doing so can be summed up as follows:

Minuses

- because of the substantial volumes of container traffic they control, the huge global forwarding groups can negotiate ocean freight rates at knockdown prices and, therefore, have a direct impact on the profitability of transport operators.
- by the mere virtue of their function, the forwarders often form a screen between the shippers and the transport provider (ocean carrier or railways).
- if the quality of the logistics services delivered by the forwarders is seen as insufficient, the shipper may eventually decide to move to another forwarder using another mode of transport even if the railways were performing well on their part of the service.

Pluses

- by relying on freight forwarders for traffic the railways can concentrate on their main core activities, i.e. train marshalling and main line operation, and leave to qualified professionals those tasks for which they lack experience or are perceived as such by shippers.
- forwarder will have greater responsiveness to shippers' requests and will be more geared up to face market pressure than national rail companies which have traditionally been protected from normal competitive forces and still operate under carriage conventions or liability conditions which are outdated.

The risks are, however, limited for the railways as freight forwarders also have a corporate interest to deliver good quality. If risks exist, they should not scare the railways away from freight forwarders but only encourage them to associate with well-established freight forwarders.

The slow pace of change and the perceived failure of the railways to interact with customers, understand their needs and tailor commercially attractive packages has frustrated existing and potential customers and, consequently, freight forwarders can contribute greatly to restore the credibility of the railways in the eyes of shippers. A shipper once told that the only time he had received the visit from a representative of the local railway company was a few days before the representative was due for retirement and another lamented about the lack of proactive relationship from the railways saying that the *"only way to get a response is to go to their offices and pound their desk"*. Interacting with freight forwarders to increase traffic will help the railways develop an image of a credible and customer-oriented mode of transport in the eyes of the major companies engaged in global trade by putting together the elements that need to be in place in order to attract more shippers to make better use of rail. These are:

- cost-effective services that respect the competitive market place,

- reliability that reflects the importance of meeting delivery deadlines in industry,
- speed that can match or improve on existing journey times by road,
- priority that reflects the economic importance of freight traffic,
- service that respects that the customer often has a choice of modes.

Performing railways, i.e. railways which deliver the goods *on-time*, *all of the time*, can offer significant benefits to shippers and freight forwarders such as:

- better utilisation of road based assets when rail is used for "trunking" as close as possible to the shippers' and consignees' premises,
- in some cases there may be related safety benefits,
- the ability for a shipper to be seen as more environmentally-friendly by making use of environmentally-friendly mode of transport,
- in theory more reliable pick-up and delivery services than are available on Europe's and Asia's increasingly congested highways,
- lower supply chain costs with high volume movements.

When all the elements are finally put together, they ultimately add up to competitive advantage for the shippers and if all the barriers to efficiency are removed, international movements that people feel instinctively should work by rail, could become a real and practical success for the railways concerned.

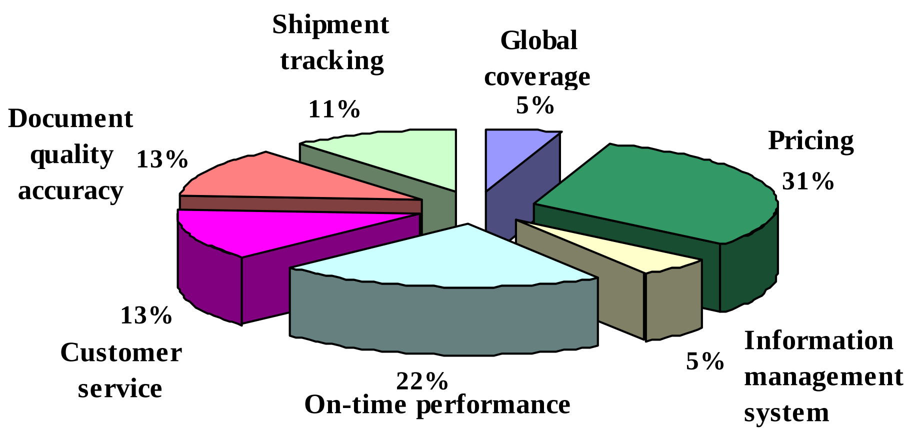
4.3. Selecting a Transport Mode / Choosing a Route

With an increasing number of medium and large companies engaged in global trading concentrating on their core business activities, the freight forwarder/logistics provider has become *the* man at the centre of door-to-door freight movements, standing as he is at the point of convergence of all the constituents of the transport chain, e.g. main transport, pick-up/distribution, logistics, insurance and finance. Such are the financial implications of moving cargo timely and safely, and of putting rightly together the constituents of the transport chain that it is difficult to envisage trans-continental movements of goods without using the services of freight forwarder/logistics provider. Indeed, such has become their importance and responsibility that shippers now often delegate to them all matters not relating directly to their manufacturing process and the delegation now extends to the final choice of transport mode(s).

In this context, it is therefore important to have a clear understanding of what the elements are that a freight forwarder will weigh before committing the goods to one transport mode or another and, for a given mode, direct it through a particular route. Posting these elements against each other, the freight forwarder will decide what the "best route" is for a particular type of cargo knowing that different types of cargo may be routed via different routes depending on whether they are more sensitive to rates, or time, or other services.

Three major elements traditionally make up the package by which the customer will or will not feel attracted. These are (i) the cost/tariffs, (ii) transit times, and (iii) the level of services. Figures 1 below which is the result of a survey of American shippers constitute a good reflection of the weight given to each of the above elements by those actors in transport who select transportation modes.

Figure 1 : Elements considered by shippers when selecting a transport mode[5]



Source: BDP International - Nov.

Understanding these elements are essential for any company seeking to gain, keep or develop a market share as shippers are growing more sophisticated and short of time, want more convenience, have high service expectations and have decreasing supplier loyalty. This chapter reviews the above elements, assesses how they impact on shippers' performances and, whenever possible, benchmarks services offered by ocean carriers.

4.3.1. Cost / Tariffs

As shown in figure 1, the rate that a shipper will be offered weighs for nearly one third, i.e. 31%, in his selection of a transport mode. Understanding the principle of modern railway pricing is therefore essential if the railways involved in the definition and operation of TAR-NC services are to position themselves adequately in respect with competition while being able to cover costs and maximise the net revenue earned for each individual shipment.

In many instances, the railways freight tariffs are those devised in a monopoly-era or in an era where the railways were not subjected to competitive forces and the related rate-making procedures apply very often to groups of commodities for which single freight rates are set in relation to the length of haul. Such systems do not have the flexibility needed to quickly adjust to the competitive environment on the market segment of Asia-Europe container traffic which is paced by sea transport.

[5] This pie chart gives a different distribution from the one given by the quoted Containerisation International survey of November 1999 (point 4.2). However, it is found to give such elements as internet booking, document accuracy and shipment tracking their rightful place. As indicated in point 4.2, in times of financial straits, shippers tend to lose focus of elements which have no bearing on strategy-definition such as have reliability and rates. Yet, no shipper would commit cargo to operators who would be seen missing on these elements.

The application of a modern railway pricing mechanism to TAR-NC services must take into account the following elements:

- railway's revenue needs,
- analysis of a shipment's point-to-point characteristics,
- assessment of the value of the package put together by the railways, i.e. equipment, facilities, ancillary services, etc, within the shipper's total distribution system,
- package on offer by competing modes,
- railway's costs of providing the service,
- package on offer by competing modes,
- railway's costs of providing the service,
- need to finance replacement of the equipment.

In practice, the pricing department of a railway would first arrange for the shipment's variable costs to be calculated given the specifics of route, wagon type, turnaround times, terminal and main line train operation. In a second step the shipper's needs and the competitive environment would be analysed and a negotiation strategy would be developed. Then negotiations would take place and the rate would be fixed. The difference between the rate and the calculated variable costs, i.e. the contribution, constitutes the amount that the specific shipment "contributes" to railway overhead costs. It is this net amount that should be maximised.

So far as TAR-NC services and operation are concerned, the application of these principles to the defined network for one specific type of traffic, i.e. containerised traffic, calls for a joint marketing unit to ensure a consistency in the methodology used for pricing services. This, however, does not mean that prices per TEU on all routes should be equivalent as each shipment should be priced on a point-to-point basis reflecting the actual routing, terminals and facilities used. In practical terms, this also means that different shippers or forwarders may pay different prices for similar services as set policies should reward volumes, premium services, performance contract with early booking, as well as the value of the service provided in the overall distribution cost of shippers. This last point is particularly important as it means that the entity(ies) responsible for marketing TAR-NC services will have to be aware not only of the transport market but also of the market situation for the goods committed to their care.

Transport operators must keep in mind that the only price that is of any relevance to the shipper is the global price paid to have the cargo delivered on his doorstep once all costs have been defrayed. Typically, freight rates will be made up of the following elements:

	Sea transport	Railways
- Pick-up journey from shipper's premises to port of origin or main rail terminal at origin:	yes	yes
- Handling charge at the port / rail terminal of origin:	yes	yes
- Main ocean or rail journey:	yes	yes
- Handling charge at the port of destination or main rail terminal of destination :	yes	yes
- Stuffing and destuffing of containers in the case of Less than Container Load (LCL) shipments:	yes	yes
- Additional handling charge at break-of-gauge points:	no	yes
- Customs duties/taxes:	yes	yes
- Delivery journey to consignee's premises:	yes	yes

In addition to the above, charges will be billed for other logistics services provided to the shipper such as warehousing or inventory control, etc. The above table shows that, by and large, transport tariffs are made up of the same elements irrespective of the mode considered. Consequently, the difference in the value given to each of these elements will depend on the cost associated for each mode with the "production" of each element and its importance in the logistics chain of the shipper.

Using, as an example, movements between Pusan (ROK) and selected European ports, port-to-port ocean freight rates for movements between Asia and Europe are US$ 1,300 to Rotterdam, US$ 1,406 to Hamburg and US$ 1,262 to Le Havre. When terminal and handling charges as well as pick-up and delivery charges have been added, the total door-to-door freight rates are respectively of US$ 2,220 with Brussels as final destination (from Rotterdam), US$ 2,613 with Berlin as final destination (from Hamburg) and US$ 2,266 with Paris as final destination (from Le Havre).

In general for the purpose of benchmarking rates offered by ocean carriers, the following elements of costs are useful:

- ocean rates are in the US$ 1,300-US$ 1,500 per TEU,
- handling charges are in the order of US$ 145 in European ports and in the order of US$ 120 in ports in the Republic of Korea and Japan, and US$ 85 in Chinese ports,
- final delivery by road in Europe is in the order of US$ 2.2 per km.

At this stage, juxtaposing existing TAR-NC rail tariffs to ocean rates is an awkward exercise as no through rail tariffs are currently available other than on the Trans-Siberian route from the Russian port of Vostochny to Brest at the border between Belarus and Poland. On that particular route tariffs are quoted at an average US$ 239 per TEU.

With the exception of Hungary, the Islamic Republic of Iran and Romania, all OSShD countries[6] use two tariff scales:

- the ETT[7] tariff, which is intended to be applied to rail freight traffic between two OSShD member countries, which must transit through the territory of a third, or more, member countries; and
- the MTT[7] tariff, which is intended to be applied to rail freight traffic between two OSShD member countries, but which is not required to transit through the territory of any other member country.

It is understood that the two tariffs have overlapping areas in their respective sphere of application and that they were not established in the first place with due attention given to cost recovery. Both the ways they are structured and applied are the subject of a review by OSShD member countries.

The main point in the context of TAR-NC development is that for a long time the rates are established by each country individually and that, as a result of this, the idea of an integrated approach to setting through tariffs for international movements is fairly novel to the railways concerned although efforts are being made by them to introduce a measure of through tariffs. However, the underlying idea behind efforts to introduce through tariffs is that rates are established on the basis of national tariffs averages weighted by traffic distances. This makes the approach satisfactory to the participating railways only when distances through each country along a particular route are relatively equal. As soon as distances vary by approximately more than 250 km, i.e. an insignificant distance likely to be topped by all movements on all routes of TAR-NC, difficulties arise with the establishment of a degress factor. It is reported that on rates fixed for recently-developed international services, a degree of attention to tariffs by competing modes on the routes considered has been introduced. However, it is not clear to what extent and whether the measure has been sufficient to attract traffic. It is also not clear whether the set tariffs cover actual operating cost. Indeed, the low rate of US$ 222 to 370 per TEU quoted for container movements between the Russian Far Eastern port of Vostochny and Brest, is reported to be a dumping rate. A more detailed account of tariffs setting practices and tendencies among OSShD countries is given in Annex 1.

The ESCAP feasibility study of 1996 had suggested that a possible step to re-engineer tariff-setting practices in the railways concerned could be the creation of a jointly-run entity with full authority to develop and negotiate price/service packages on behalf of all railway systems participating in the traffic, including those systems which are not OSShD members[8].

Whatever the form and mandate of the body(ies) that will eventually be responsible for tackling the issue, the urgency of the task of defining through tariffs applying the above-

[6] TAR-NC OSShD countries are Belarus, China, the DPRK, Mongolia, Poland and the Russian Federation.
[7] Abbreviation from the Russian title.
[8] United Nations ESCAP, Trans-Asian Railway Route Requirements : Feasibility Study on Connecting the Rail Networks of China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula, 1996, chapter 6, pp. 121-122.

listed principles cannot be delayed. This is all the more important as there is a need to substantiate the feeling that overall Asia-Europe door-to-door rates for movements using rail for the main leg of the journey could be cheaper than their shipping equivalent due to the ability of rail to provide services to major inland terminals or hubs, thereby minimising the distance and cost of delivery to final destinations.

4.3.2. Transit Times

The above-mentioned ESCAP study on connecting the rail networks of China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula clearly indicated that the primary operational requirement for TAR-NC is that it should provide a competitive edge over sea transport in terms of transit times between North-East Asia and Europe.

This implies that container block-trains operating along TAR-NC routes must consistently be able to achieve average transit, or schedule, speeds (see box for definitions) corresponding with the delivery of shorter transit times than those delivered by sea transport. Benchmarking performances by ocean carriers in this respect is useful to determine the target that TAR-NC services should reach.

> ***Average Transit, or Schedule, Speeds*** : total distance between origin and ultimate destination divided by transit times (see below). In a railway context these are usually referred to as « schedule speeds ».
>
> ***Transit Times*** : Wether the journey is by sea or rail, transit time is the elapsed time between departure from an origin (i.e. where the consignor delivers his container for linehaul movement) and arrival at an ultimate destination (i.e. at the consignee's premises or a location where the container is made available for collection by the consignee).
>
> Source : United Nations, ESCAP, « Feasibility sudy on connecting the rail networks of China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula », chapter 4, p50).

From the main ports of China, the ROK and Japan to the main ports of Europe, shipping times are in the order of 28 to 33 days as illustrated below for shipping routes between Japan (port of Osaka) and the ROK (port of Pusan), and northern Europe.

From	To	Eastbound	Westbound
Pusan	Hamburg	28 to 30 days	28 to 29 days
	Rotterdam	28 to 31 days	28 to 30 days
	Antwerp	23 to 27 days	22 to 26 days
Osaka	Hamburg	30 to 32 days	31 to 33 days
	Rotterdam	31 to 35 days	32 to 34 days

Since to these times must still be added an average one-day dwell time at each port of origin and destination as well as the time for pick-up and delivery by road and/or rail from the place of origin and to final destination, i.e. an average 1.5 days, it can be said that door-to-door transit times for movements using ocean carriers for the main leg of the journey, is in the order of an average 29 days for ports in France or Belgium and an average 34 days for ports in Germany and the Netherlands.

Meanwhile, it is expected that rail would achieve significantly shorter transit times on all TAR routes with some routes faring better than others due to a reduced number of border-crossings and break-of-gauge points. Previous studies have established that rail transit times would have to offer a saving of at least seven days - preferably longer - by comparison with shipping transit times in order for shippers to contemplate shifting their business to rail. In other words, door-to-door transit times of between 22 and 27 days or less should be the target for the railways. On the basis of an average 2 days at origin and destination for pick-up and delivery between shipper's/consignee's premises and rail terminals, and an average 1 day dwell time on the terminals at both origin and destination, this means a transit times bracket of 16 to 21 days for the rail-only leg of the service inclusive of the time spent for border crossing procedures and transfer of the containers at break-of-gauge points. Preferably, figures close to the lower end of the bracket should be met, especially when port operation is involved at one end of the journey, i.e. for traffic to/from Japan and possibly to/from the ROK. Indeed, when port operation is involved, two unknown factors are the dwell time to be expected in ports and more importantly whether on-dock rail installations are provided or not. In case they are not, a precise assessment will be needed of the time required to move containers from ship side to rail terminal.

Table 4.1 below gives an idea of the desirable running speeds to be achieved in order to offer transit times significantly shorter than shipping. Columns 4, 5 and 6 show that average running speeds of 35 to 45 km/h are sufficient to meet the desired target on all routes (shaded areas in table 4.1) for the rail-only terminal-to-terminal leg of the journey. However, speeds in the 40-45 km/h band, i.e. to cover a daily distance of 1,000 km, would give greater competitiveness to rail.

While this is a medium or long-term target, it is important, in the name of reliability, that realistic schedules be built. Recognising the fact that in recent years some of the railways concerned have faced declining traffic volumes and revenues and have accumulated a backlog of track work resulting in speed restrictions, simulations have also been made with different speeds over different sections of the routes (columns 7 to 9). The lowest speed indicated has been applied over 35% of the distance and the highest over the remaining 65%. An average speed of 20 km/h over 35% of the distance would still allow the railways to meet the above-specified target on routes originating in ports of China, the DPRK and the Russian Federation if an average speed of 40 km/h is applied over the rest of the distance. Meanwhile, only increasing the lowest speed to 25 km/h and/or the highest speed to 45 km/h would allow the routes through the Korean Peninsula to fall within the desired bracket. It must also be stressed that these data were computed with one full day ascribed at each border points for customs procedures. This is to be regarded as a conservative figure in view that the cargo to be carried on the Asia-Europe TAR-NC routes will be *transit* and *containerised* traffic.

These early simulations show that the railways along the TAR-NC routes can have a distinctive transit time advantage over ocean carriers if coordinated scheduling is applied between the railways and adequate cooperative agreements are developed between the railways and the customs administrations.

In the area of transit times, the railways must, however, be aware than the advantage enjoyed on all TAR-NC routes may not remain unchallenged. Indeed, for many years, shippers never really had a chance to question door-to-door transit times. Shipping was the favoured and unchallenged mode of transport for transcontinental movements between Asia and Europe and shipping operators were, by and large, all offering similar port-to-port transit times of around 25-33 days. Lately, however, after years of exercising pressure on rates and demanding enhanced services, shippers have come full circle and, again, are putting improved transit times among their main requirements.

This tendency is heightened by the fact that in order to increase revenue in a situation of dwindling rates, ocean carriers have put emphasis on reducing operating costs. One way of achieving this aim has been to reduce the number of calls, thus allowing for optimised utilisation of assets, an all important factor at a time when vessels are getting bigger. From Hong Kong to Rotterdam, port-to-port transit times are now between 19 to 22 days, down from 26 days six years earlier, while from Singapore to Rotterdam, 15 to 19 days have become the norm compared to 22 days six years earlier. Although this downward trend has not reached the ports of north and north-east Asia, it does signal a warning that shipping transit times may be further reduced in the near future and that, in this area too, shipping lines will put pressure to bear in the one area where TAR-NC has its most distinctive competitive edge.

For the railways along the TAR-NC corridor, putting together competitive schedules will result not so much on speed during main line operation as on the organisation of operations between terminals at both ends of the routes. This translates into a reduction of stops and a reduction in the length of the stops that are unavoidable. The number of stops will be reduced only if:

(i) container block trains receive the same priority as “flagship” passenger trains in the scheduling of services as well as in the daily running of operation, and

(ii) only transit traffic is handled in order to define a simplified train service as trains of too many different blocks will require intermediate stops with an obvious lower chance of executing the delivery process perfectly.

For those stops which are unavoidable, i.e. at border points, agreement must be reached between the railways and the other administrations concerned (e.g. customs, border police, etc.) to define the absolutely necessary time frame needed for these administrations to discharge their duties. A similar agreement must be reached at break-of-gauge points were transfer of the containers is necessary. In both cases, priority treatment must be given to container block trains. In addition, at break-of-gauge points, both transfer of the containers as well as other administrative inspections should ideally take place simultaneously.

The mobilisation of staff and equipment, and the related costs, needed for both operations is another compelling reason why trains must knock on-time on the doors of terminals as missing the normal "appointment" may mean going back at the end of the queue.

4.3.3. Level of Services

Reliability / Punctuality / Frequency

Many elements make up the level of services that shippers expect from transport operators. While some of these elements are not always within the core competence of the railways and must be outsourced to freight forwarders, three of them at least are under their direct control, namely: reliability, punctuality and frequency.

The pressure for continuous cost-reduction in industries and the development of modern management methods favouring limited stock and just-in-time deliveries makes it compelling for shippers to turn to transport operators with near-perfect records in terms of reliability, punctuality and frequency.

A client of intermodal services in North-America once described the quality of a *"perfect shipment"* as being founded on four elements, three of which were time-related, i.e. "*one, the shipment on time; two, a stated delivery time; three, delivery without exception"*.

Reliability means that the services promised in a contractual agreement between two parties (e.g. shippers and freight forwarders, shippers/ freight forwarders and transport operators) are actually delivered as stipulated, i.e. at the right place, at the promised time on the promised day, in the expected conditions regarding the integrity of the goods.

Punctuality is that part of the reliability concept relating to time and means that the advertised schedule, i.e. day/hour of departure/arrival, is always implemented.

Frequency means that the intervals between two consecutive services of a certain type are of a duration that meets a shipper's production pace and matches his needs to evacuate production towards consuming centres without having to create stocks.

Reliability and punctuality are important for shippers in terms of inventory and activity planning. Shippers have a strong interest in knowing (i) when the cargo will be reaching their premises and (ii) whether the announced date of delivery is reliable.

Point (i) is an essential input in the planning of the customer's own industrial activities while point (ii) will have repercussions on their operating costs. As a result, if all the elements in the transport chain are not properly organised and controlled, and delays result thereof in the delivery of the goods, customers stand to lose in two ways.

(a) if goods are late, they may be unable to meet their own deadlines and lose their own customers and in the process damage their credibility (e.g. spare parts, raw materials), a risk that is substantial for those industries implementing the just-in-time concept,

(b) at the same time they face soaring operating costs as they may have mobilised staff and equipment who will remain idle until the goods arrive.

The aim of moving cargo is very often to replenish stocks which, depending on the customer's field of activity, will disappear more or less fast. This means that the absence of reliability will have at least two negative effects on a customer's business. Either the customer will adopt a conservative attitude leading to having a greater stock than he would otherwise contemplate to cover the risk of being out of stock; or he will indeed run out of stock and at the same time run the risk of losing competitiveness.

Frequency is important in the just-in-time concept aiming at reducing stock-keeping to a mere minimum. Transport operators must keep in mind that for a customer, stock keeping is unproductive and very costly in terms of:

- immobilised goods,
- additional resources required (warehouse, lifting equipment, staff, etc.)
- commercial risk linked to the fact that stocked products may become obsolete and result in the customer being unable to adapt quickly to qualitative changes in demand.

This induces in customers an attitude by which they are permanently searching to cut down on their operating costs by reducing stocks. One way is therefore to turn to what they perceive as the most reliable transport operators, i.e. one who will always abide by the announced delivery date and time. They will also turn to the operator(s) who will be able to replenish their stock at short notice, which means moving small quantities frequently.

For shippers transport modes are no longer seen as doing their jobs when they just physically carry cargo to its destination. This task is now only perceived as no more than the minimum basis on which can be built the range of services that they expect. While this basis is essential, it is no longer sufficient in itself to attract shippers who increasingly request transport operators to become fully-fledged "service-provider" and want them to assume an active and innovative role.

Customer service has evolved to such an extent as to become an integrated activity with the consequence that, along with competitive rates and reliable services, shippers expect the door-to-door package to include such elements as time-defined delivery, user-friendly tariffs and terminology, global tracking facilities with discrepancy reporting, integrated logistics incorporating mutually supportive Information Technology systems and quality measurements. In other words, at a time when freight rates are becoming more and more uniform, the quality of service provided to the customer is becoming the difference between securing and not securing business.

Security of cargo

The conditions in which the main haul part of a transportation contract is carried out will have an impact on the customers' company image and that of their products. Wrong choices in the field of transport and logistics can also lead to missing or damaged goods and, as is widely acknowledged, the best insurance that customers may subscribe to will only compensate direct financial consequences. Seldom will commercial prejudices and the loss of confidence in the customers by their own clients be compensated and these will have in the long term unquantifiable pernicious effects on the customers' businesses. As a result, shippers will turn to transport operators who will be perceived as offering the best guarantee of *en-route* protection for their cargo.

While the use of containers and operation in block trains with minimum number of stops offers adequate guarantees against en-route damage, the railways still share with other modes of transport the concern over cargo protection against theft.

In that respect, while the use of containers also seem to offer adequate protection, extra vigilance is of the order if only because the sense of security offered by sealed containers may have lulled the attention of the authorities towards demobilisation. An attitude further encouraged by the need to be competitive by reducing overall door-to-door costs by cutting down on an element of cost which, when applied successfully, often leads to a perception that the expenses may not be necessary.

Yet, theft by organised crime against cargo is very much alive. National Cargo Security Council (of the US) figures indicate that US companies alone are losing more than US$10 billion annually from cargo theft and, according to Pinkerton Consulting and Investigations, world-wide total losses could be as high as US$30 to 50 billion each year[9]. While separate estimates for container-related crime are not available, it would be unreasonable to deny the potential threat against container traffic in view of the fact that (i) as traffic keeps developing it is bound to attract increasing attention by organised crime, (ii) the high value of containerised cargo (e.g., fashion merchandises, cosmetics, high-tech products, etc.) understandably increases temptation, and (iii) logistics chains are becoming more extended with ever more "soft-target" points. The problem for all concerned (shippers, freight forwarders and transport modes operators) is that while pilferage from conventional shipments is likely to lead to comparatively small losses in financial terms, the theft of a single containerload of high value products can be measured in hundreds of thousands of dollars. For example, a single 20ft container of computer hard drives can be worth US$16 million.

The potential threat to cargo has an incidence on the choice of transport modes by shippers (or their instructions to forwarders) and they will naturally inform themselves as to how goods will be handled, and who will handle and carry them throughout all the stages of a door-to-door logistics movement. Acknowledging the threat, shipper's traffic or logistics managers are increasingly selecting freight operators who are aware of the need to monitor all security requirements and have and can keep an unblotted record in this area.

In designing services, the railways along TAR-NC will have to take all measures to meet shippers' and forwarders' requirements in this area. The use of 20ft containers sealed with internationally-recognised devices and loaded door-to-door should offer adequate guarantee as long as the arrangements is acceptable to customs authorities. In addition, the operational pattern of the railways with stops at dedicated railway premises with usually a lot of staff around, makes it difficult for trespassers to venture onto railway premises without attracting attention. During main-line operation, the high priority given to container block trains will reduce the number of stops and consequently limit the risk of en-route pilferage.

[9] Containerisation International, « Crimewave », March 1999.

However, the railways concerned may wish to consider adding some specialised staff to monitor security during main line operation.

Information to customers

In the field of long-distance transportation, the main area of recent development has been brought about by the customers' requirement for more detailed information accessible at will at the push of a button. Access to information is seen as essential by shippers who need to adapt themselves quickly to changing patterns in demand sometimes requiring a re-routing of cargo already under way, mobilise resources and plan their activities.

Arguably, the need for information has always been there, but the time spent to collect and transmit it have been considerably reduced and have become independent of distances between origin and destination. At the same time the development of modern technology is allowing shippers *free-of-charge* and *direct* access *at all times* to information which they feel is rightfully theirs. While in the past shippers were virtually "dispossessed" of their goods during transportation, they now can and want to claim ownership of them at any time between origin and destination. The product development director of a forwarder recently described the attitude of shippers logistics saying that *"what has happened is that especially during the past two or three years our customers want to become more involved in being informed as to what is happening in all phases of the transport chains of their goods, and this process is accelerating […] they want to know what we are doing, and why, and how it will affect what happens to their products […] shippers expect us to plan movements to conform to their transit times requirements, within their cost parameters. They want us to feed this information to them constantly, so that they can input the data into their production programmes"*[10].

At the same time, shippers no longer accept to waste time and money filling, signing and sending papers through mail or fax when Information Technology (IT) in the transport sector is making paperless trading a reality.

A group of transportation industry experts has shown that paper costs of carrier pricing, booking requests, booking confirmations, B/L preparation, B/L rating, B/L distribution, export declaration preparation and filing, and freight arrival notice dispatch can come to US$150 per shipment. However, portions of that cost can be cut by up to 80% with the right technical solution. Tightly-integrated E-commerce can reduce these carrier expenditures to under $15. For the ocean shipping industry, that would translate into savings of $2 billion a year[11].

In the field of IT, it is again important to benchmark the distance covered by the shipping industry as well as to listen to customers' wishes either expressed directly or through forwarders/logistics providers.

When it comes to electronic communications, few industries have matched the pace at which ocean carriers have embraced Electronic Data Interchange (EDI) to exchange information internationally. Ships manifests and bay plans or stowage plans, for example,

[10] Containerisation International, « Integrated forwarding arrives », October 1999.
[11] Containerisation International, « Getting satisfaction from EDI », June 1999.

have been electronically transmitted around the world for over 20 years. Because successful EDI remains transparent it is easy to forget that, when ships arrive for discharge, behind the scenes, a complete manifest from all overseas loading ports has beforehand been lodged with customs. The business days of a line missing a part from one particular port would be numbered. In terms of operation, as container ships have increased in size to the mega 6000 TEU ocean carriers of today, so has the problem of identifying cargo on board. Without the modern electronic bay plan, which pinpoints the location of every container on board a vessel at the press of a button, overseas container terminals would not know where to begin cargo operations.

Although operational problems of tracking containers on trains will never be as daunting, the problem is already bigger at terminals and the need of reliable EDI is of paramount importance for advanced communication to customs authorities of the required data so as to facilitate border-crossing. On a commercial level, the implementation of IT is needed if only because shippers will view with the greatest suspicion transport operators who do not implement IT as a matter of fact. More and more transportation companies are finding that they have no choice but to offer shippers information about shipments, schedules and rates on demand. That requires implementing an integrated "Electronic commerce" solution for each and every shipper enabling them to reduce their process steps. Major retailers do not want merely to just replace faxes and paper documents. They aim to radically reduce their inventory levels, dramatically cut the incidence of out of stock products, and offload a significant share of their business efforts and expenses. Sending data back and forth does not do this. Creating 'integrated Electronic-commerce' does.

In the field of freight transport, freight forwarders/logistics providers, who increasingly are the entities selecting carriers on behalf of shippers, are increasingly pushing for IT implementation as they themselves depend for their business on being seen as *"1000% IT-fit"*[12]. The end result for the railways concerned is that attracting business to TAR-NC imply becoming more and more part of global supply chains with the related requirement to provide the best electronic product as possible with two important basic features, namely: cargo booking capabilities and cargo tracking facilities. An example of an ocean carrier's website[13] (American President Lines) with schedule selection and instant booking against that selection is shown in Annex 2.

The message itself comes from the shippers. In a questionnaire sent to 30 major shippers the following questions were asked and answers obtained about IT-related facilities:

1. Are your cargo booking staff connected to the internet?	***Yes 61% - No 39%***
2. If you are not communicating electronically with ocean carriers because you are not ready for it, when do you expect to be so?	***This year 20% Next year 60% After 2001 20%.***
3. Apart from the ocean carrier's electronic documentation facilities, and assuming that you have internet connection, are you interested in using their Websites for the following services:	

[12] Containerisation International, « Global shippers want the earth », April 1998.
[13] Website of American President Lines (APL) which also operates trains. Website address : www.apl.com.

- Container track and trace information:	***Yes 61% - No 39%***
- Up to date schedule information:	***Yes 62% - No 38%.***

The conclusion is that the shippers' working processes have become so dependent on IT that they have set a trend in the transportation industry that no transport operator hoping to attract traffic can ignore. No shipper will want to revert to pencil, paper, fax machines and clerical staff to have access to information that they expect to find at the tip of their fingers. TAR-NC railways will therefore only compete if they too can be seen as *"1000% IT-fit"*.

For the railways concerned, this development means that there is a need to develop quickly an awareness of the importance of IT by shippers as well as their needs and see how their IT systems meet those needs. While the adaptation of existing systems should be studied, the history of grafting 'old' systems onto new ones is not a happy one. Adaptation are often lengthy, costly and without the guarantee that the final product will deliver all the information needed. More specifically, the cost of adaptation should be compared with the low cost of buying computers and setting-up internet sites.

Important is to identify the parties involved in the transportation process and identify their needs.

Interested parties. The IT system will typically function at four levels, namely:

- public level (shippers, consignees, etc.)
- freight forwarders,
- railways along each route,
- public administrations other than railways.

The needs of each party.

The ***shipper*** will want to access info *at will* via the Internet to:

(a) control the service (direct info to monitor routing, reliability and timeliness, security, etc.);

(b) be informed of incidents/delays so as to be able to take internal remedial measures (e.g. modification to production planning, rerouting of other consignments, etc.);

(c) change routing/destination orders to the freight forwarder/operator; flexibility for internal reasons; one or more B/L;

(d) be able to influence later decisions by freight forwarder;

(e) give direct orders to freight forwarders or transport operators by EDI messages.

The ***freight forwarder*** will want to access info *at will* via the Internet to:

(a) control the service (direct info to monitor routing, reliability and timeliness, security, etc.);

(b) be informed of incidents/delays so as to be able to take internal remedial measures (e.g. modification to production planning, rerouting of other consignments, etc.);

(c) change routing/destination orders to the freight forwarder/operator; flexibility for internal reasons; one or more B/L; email or EDI message;

(d) put pressure on transport operator(s) based on information at disposal for spot problems (e.g. one B/L seen not moving) or bottlenecks (several B/L delayed over a long period;

(e) plan future shipments on the basis of actual performances and events monitored;

(f) place EDI orders to transport operator(s), customs, border police, etc.

The ***railways*** will need to invest in IT to:

(a) boost internal operations to make them more efficient and to make them more predictable;

(b) provide information on actual position of cargo/technical status/events/problems along its part of the corridor, with required level of confidentiality for each freight forwarder or shipper;

(c) exchange information with other railways / other administrations, especially with regards to border-crossing movements (e.g. wagon interchange including technical visits, B/L "interchange" to facilitate border control operations, advance "notice" to facilitate operations planning (train consists, etc.);

(d) control the movements of its assets outside its the borders of its national rail system (i.e. wagons, locomotives, etc.) for better fleet planning (e.g. wagon distribution);

(e) keep accurate statistics on commercial / financial aspects of services (volumes per shippers/freight forwarder, full vs. Empty TEUs, tonnages, etc.;

(f) keep accurate records of operational performances to review and upgrade services (punctuality, cause and location of delays, etc.)

Other public administrations will want IT to:

(a) have early notification of cargo to prepare their work and make checkings more efficient by being more focussed;

(b) have early notification of cargo to have greater flexibility in the planning of staff utilisation;

(c) keep easy and accurate data on cargo by type, quantity and origin/destination.

From an organisational point of view the definition of IT requirements will necessitate (i) a thorough and detailed analysis of the documents needed by each of the above interested party so far as their format and the nature of the required information is concerned, (ii) the flow of information needed between two or more of the interested parties and (iii) the deadline for transmitting the information.

From a technical point of view, developing efficient IT will first and foremost require good telecommunication coverage of each route along the corridor. In this regard, given the current availability of related facilities in the countries concerned, IT development on TAR-NC railways is more likely to be a problem of policy than one of technology. In this field, like in the field of tariffs, it is felt that the organisation of a joint task force under the guidance of United Nations bodies (ESCAP, ECE) and international railway organisations (OSShD, UIC) would help towards quick definition of the needs, how they can be best addressed, the investment needed as well as the amount of training involved.

General conclusion

Having discussed the « transit times/price/level of service » package likely to attract shippers stress should be put on one crucial aspect that transport operators, i.e. TAR-NC railways, wanting to enter the Asia-Europe trade cannot emphasise enough, namely : the overcapacity in the shipping world. Containerisation International, the top watch-body for world-wide container business, reported that on the basis of shipboard slots in service and on order, total containership capacity was projected to grow by 7% in 1999 and 4% in 2000. This followed a jump of 12% in 1998[14]. In other words, overall shipboard capacity is growing at a faster rate than global container volumes.

This is not a happy situation for carriers who will have to restructure and consolidate through further mergers, takeovers and alliances. For TAR-NC railways, this puts increased pressure to get things organised efficiently and successfully right from the very beginning. Shippers are only too aware of this overcapacity problem and are set to take advantage of it by pushing for more services at always lower rates. In 1998, the Managing Director of forwarding at Philips International put the size of his company's logistics function into impressive perspective. *« When you are spending US$ 4 billion per year, you are careful. […] Global door-to-door networks, lower costs, better service, faster transit times, higher frequencies and improved reliability is what we seek »* His list of wants went further : deregulation, transparent door-to-door costing based on one-party contact, shared efficiencies with sound partners, pipeline visibility with no uncertainties, rapid advice on schedule changes, performance measurement to ensure service-level compliance, fewer suppliers offering more, simpler transport instructions and enhanced IT »[15].

Although spelling out an impressive task for TAR-NC railways, the good side to the situation is that shippers are permanently looking for new offers likely to improve their bottom line and that, consequently, careful planning, intelligent marketing and professional monitoring of services by TAR-NC railways may give them a chance to carve a niche on the Asia-Europe container market.

Carving a niche will require good marketing and, upstream from the marketing activities, proper service-definition. Because services are performances or actions, rather than objects, they cannot be seen, felt or touched by customers in the same way as a product. And even experiencing a good service once does not mean that it will be as good the following time. In addition, while it is easy and non-committing to pick a product off a shelf, for

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[14] Containerisation International Yearbook, 1999.
[15] Containerisation International, « Global shippers want the earth », April 1998, p.59.

customers of services, i.e. shippers/freight forwarders, the act of “purchasing services” means getting involved with a world they know little about and, as a result, they feel out of control and vulnerable. The consequence of this for TAR-NC railways is that “brand-building” and a common approach to issues relating to service definition and service monitoring are essential to success. These can best be secured through the establishment of special Working Groups and demonstration runs to assess the viability of the organisation that will be suggested and identify remaining bottlenecks and, if any, take remedial actions. The Terms of Reference for the Working Groups are defined in Chapter 5 (point 5.8).

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- Chapter 5 -

Proposed Guidelines for the Implementation of Actual Demonstration Runs of Container Block-Trains

Taken individually, the railways are very often perceived by shippers as entities whose technical competence is well recognised but which are lacking the ability to adapt quickly to economic changes and to the changing needs of customers. In addition, in the minds of shippers, the opacity of rail operation seems to clash with their request for transparency and when several railways are concerned by one shipment, shippers are scared away by the prospect of disjointed operations following different practices.

In short, the railways along TAR-NC must reassure shippers (or freight forwarders) by building up credibility and advertising themselves as an integrated, motivated and customer-oriented system united to produce, market and deliver services on a par with customers' expectations. This action in the direction of shippers will only succeed if it is based on concrete actions rather than on commercial slogans. A step in this direction is to put together all the technical, commercial and operational requirements in the form of demonstration runs of container block-trains aimed at:

- testing all the constituents of each requirement,
- defining their interfaces,
- identifying bottlenecks and implementing remedial measures,
- integrating the operations of the various railways together as well as those of the railways with those of other administrations,
- defining common practices.

The likeliness of TAR-NC attracting shippers is heightened by the fact that shippers are always in an innovative mood and are increasingly choosing service providers on the basis of their perceived long-term value rather than on their long-term history. This means that TAR-NC services will be judged on their own merits and the success of its development will depend on rail being able to deliver cost effective and reliable services. This is the beginning and the end of it. In this respect, it is essential that any operational or organisational obstacles to the realisation of these goals be removed. Achieving the desired result necessitates the establishment of operational and organisational standards aimed at ensuring as much compatibility as possible between neighbouring railways so as to give the TAR network in the northern corridor the appearance of a "borderless railway land" operated under one unique set of rules. To these effects it is suggested that in preparing TAR-NC services, the railways concerned follow to the extent possible a set of proposed guidelines and formalise operational criteria in “Working (bi- or multi-lateral) Agreements”. The present chapter reviews the points on which the necessary level of integration and definition of common practices is needed to ensure success.

5.1. Compatibility of train assembly

An agreement should be reached between the railways concerned as to the number of 20ft-containers in transit and the number of wagons that one train should haul. This compatibility of train assembly and load scheduling practices between neighbouring railway systems will be essential in order to avoid the necessity of having to re-adjust train loads at borders. The desirability of operating fixed formation unit trains across borders, where track gauge continuity permits, should be recognized and acted upon by the responsible systems.

The ultimate number of wagons to be operated in one single train depend on a number of factors influencing each other. These are: the TEU capacity of the wagons utilised, the available length of passing loops on line, the available length of sidings at terminals, and the hauling capabilities of locomotives.

5.1.1. Number of wagons - Train length

The main principle guiding decisions about train lengths is that wagons should be added up until the point at which either (i) the maximum length of loops for crossing/passing purposes or sidings at terminals, or (ii) the maximum trailing tonnage for single locomotives (of types in predominant use), is reached. Again the reasoning behind this principle is economics because long run marginal costs (i.e. operating costs plus wagon and locomotive amortisation) will decline with increasing train size up until the point at which another locomotive must be added. If one takes, as an example, a minimum useful length of loops and sidings of 850 m between the fouling points, the number of wagons hauled in one train is equal to:

3-TEU wagons:

$$\frac{850 - 32 - 30}{19.80} = \textbf{39 wagons}$$

2-TEU wagons:

$$\frac{850 - 32 - 30}{13.70} = \textbf{57 wagons}$$

where:
- 32 m is the length of the locomotive,
- 30 m is the distance margin for stoppage precision,
- 19.80 and 13.70 are the lengths between buffers or coupling gears of 3-TEU and 2-TEU wagons respectively.

Deciding on the maximum number of wagons that one train will haul ought to be done on a *"whole route"* basis. Indeed, as trains will be hauling containers in transit, the limiting loop distance to be taken into consideration for the <u>*whole*</u> route will be the most limiting loop distances when <u>*all the railways along the particular route are considered together*</u>. In this evaluation, due attention should also be paid to the length of sidings in terminals at origin and destination as well as at border points, especially those border points where break-of-gauge occurs and container transhipment must take place.

While the length of loops along main lines will influence overall operations, in the case of terminals, however, the length of sidings in itself may not be binding on overall operations practices if all loops along the main lines are found to be longer. Indeed, since shunting will in any case take place, loops may be shorter <u>*provided*</u> that the short length is compensated by adequate resources allowing overall shunting operations to be performed fast and efficiently. A detailed review of facilities at all break-of-gauge points is necessary to ascertain their technical capabilities.

5.1.2 Wagon capacity

The wagons used to carry containers on the TAR-NC corridor are of either the 3-TEU, or the 2-TEU capacity wagon.

A 3-TEU wagon of approximately 19.80 m in length offers considerably more operational flexibility than does a 13.70 m container wagon. This is because it can carry: three 20 ft containers; ***or*** a single 45 ft, 48 ft or 53 ft container; ***or*** a single 40 ft and a single 20 ft container. A 13.70 m wagon, on the other hand, has the capacity to carry only: a single 45 ft or 40 ft container; ***or*** two 20 ft containers. The disadvantage associated with the 3-TEU wagon is that it will impose an axle load of nearly 25 tonnes if it is to carry three 20 ft containers at a full gross weight each of 24 tonnes, but this is scarcely a disadvantage when it is recognised that only very rarely do 20 ft containers (even when loaded with dense commodities) exceed an overall mass of 18 tonnes (i.e. 2.5 tonne tare plus 15.5 tonne load).

Additionally, for a given length of loops the number of 3-TEU wagons required to convey a given quantity of containers will be substantially smaller than the number of 2-TEU wagons. Using the above figures (point 5.1.1), for example, 39 x 3-TEU wagons will carry 117 TEUs while 57 is the maximum number of 2-TEU wagons falling within the loop limitation and will only carry 114 TEUs.

As compared with 3-TEU wagons the use of 2-TEU wagons will also dramatically increase the cost of operating the services by raising maintenance cost. This is because on container wagons, maintenance really only deals with running gears and braking system with the length of the frame having virtually no incidence on the process. Consequently, to carry an equal number of containers, the number of 2-TEU wagons will be 1.5 times higher than the number of 3-TEU wagons and maintenance cost will roughly increase by the same factor, i.e. 50%. In addition, for a given number of TEU, the choice should always, to the extent possible, go to the reduced number of wagons as more wagons is also a factor of increased risk of hot axle-box during mainline operation and, therefore, weakens the operational set-up.

5.1.3. Maximum gross weight of trains

The result of the above calculations has to be checked against the hauling capabilities of locomotives (of the types of predominant use) also paying due attention to the gradient on the various line sections to ensure that no locomotive banking or doubling-up of motive power assigned to trains is required. Using the above wagon number, the critical figure is:

(39 x 3 x 18) + (39 x 22) = **2,964 tonnes**,

where:
- 39 is the number of wagons,
- 3 the number of TEU that can be accommodated on one wagon,
- 18 the average maximum gross weight (in tonnes) of 20ft container,
- 22 the tare weight (in tonnes) of 3-TEU container wagons.

The above demonstrates that the efficiency of international train operations in the corridor will in large part depend upon there being reasonable consistency in the operating practices of neighbouring railway systems. For example, in situations where there is continuity of track gauge but no consistency in the length of trains operated either side of the border, transit delay and cost penalties will result from the necessity to re-marshal or adjust loading at the border. The two main influences on train lengths are the hauling capacities of locomotives and the available length of crossing/passing, station and terminal sidings. While it may not be possible to achieve compatibility in the former, due mainly to topographical differences between the neighbouring route networks, it should be possible to achieve some degree of compatibility with the latter.

The problems associated with differing train lengths can be overcome by specifying standard train configurations based on unit or block train operation of international container services. Unit trains are trains comprising a fixed number of wagons of a single type, operating between a single origin and destination, with intermediate stops limited for train crossing purposes or for operational reasons such as crew or locomotive changes. Block trains are similar, except that they may comprise more than one type of wagon, but nevertheless operate to fixed formation, single origin/destination principles. In container haulage service, both types of trains should comprise wagons which may be run at or near passenger train speeds to avoid being held in passing loops for faster opposing or passing passenger trains. The main advantages of such trains are that by avoiding marshalling yards and intermediate stops for loading/ unloading both transit times and operating costs can be very low.

The operational parameters relating to train configuration will have to be agreed to for each route by all the railways concerned in a bi- or multi-lateral agreement.

5.2. The break-of-gauge issue

There are two different track gauges on the routes making up the TAR northern corridor. The standard gauge of 1,435 mm which is to be found on the railways of China, the DPRK, Germany, Poland and the ROK. The broad gauge of 1,520 mm on the railways of Belarus, Kazakhstan, Mongolia and the Russian Federation.

Table 5.1 shows the break-of-gauge points on TAR-NC, i.e. the border points between countries operating on different track-gauges.

Table 5.1. Break-of-gauge points on TAR Northern Corridor.

Routes	Origin	Countries concerned	Stations concerned
Route i (through Russian Fed., Belarus, Poland)	Russian port of Vostochny	Belarus - Poland	Brest - Terespol
Route ii (through China, Kazakhstan, Russian Fed., Belarus, Poland)	Ports in China	China - Kazakhstan Belarus - Poland	Alataw Pass - Drujba Brest - Terespol
Route iii (through China, Mongolia, Russian Fed., Belarus, Poland)	Ports in China	China - Mongolia Belarus - Poland	Erenhot - Zamyn Uud Brest – Terespol
Route iv (through ROK, DPRK, China, Russian Fed., Belarus, Poland),	Places in Korean Peninsula	China - Russian Fed. (or China - Mongolia) Belarus - Poland	Manzhouli - Zabaikalsk (or Erenhot - Zamyn Uud)[1] Brest - Terespol
Route iv (through ROK, DPRK, Russian Fed., Belarus, Poland)	Places in Korean Peninsula	DPRK - Russian Fed. Belarus - Poland	Tumangan - Khasan Brest - Terespol
Route v (through ports in China or DPRK or Russian Fed.)	Ports in ROK	(similar to routes i, ii, iii or iv depending on port of entry)	

1. Depending on point of entry into China from the DPRK. If the entry point is Namyang, cargo is likely to be routed through North-East China to the Russian Federation. If the entry point is Dandong, cargo is likely to be routed through China to Mongolia and then the Russian Federation.

In the case of container traffic, solving the break-of-gauge issue involves either operating with only one set of wagons and changing the bogies at the break-of-gauge points or operating with two sets of wagons of different gauges and transferring the containers from one set to the other. At this stage, however, bogie-changing is not applied to freight traffic at any of the above-mentioned break-of-gauge stations. In addition, the technique presents two operational difficulties. One difficulty associated with bogie-changing is the logistical problem (and associated cost) of maintaining an adequate inventory of bogies especially when there is a large imbalance in the directional flows of wagons. Another difficulty is that bogie-changing facilities are very often equipped with tracks of small capacity. Consequently, bogie-changing a whole train would necessitate numerous shunting and would require a longer stopping time than a transhipment operation. The recent development of wagons with adjustable wheel-sets is now presented as an alternative to bogie-changing. However, such wagons have not been produced in big numbers and to date have not been used in sustained commercial operation over long distances.

The result is therefore, that for the foreseeable future, the favoured solution to break-of-gauge along TAR-NC is likely to be the transfer of containers between two sets of wagons. Implementing this solution is also the safest in economic terms as, in a first stage, it does not require massive investment from the railways concerned in yards and handling equipment. Also, in the long term, the solution allows the railways to use the existing wagons until the end of their technical life-cycle while resorting to bogie-changing or to the use of wagons of adjustable wheel-sets would necessitate, in the worst case, writing-off or, at best, under-using existing assets. Gantry cranes, straddle-carriers and reach-stackers are a common feature on all sea, rail and road terminals around the world and have proved reliable for the easy, safe and economical movements of containers of all types between different systems.

Whatever the technology used, break-of-gauge operations require shunting the wagons from the receiving sidings to a dedicated yard and back again to the departure yard. Clearly, both shunting and actual bogie-changing or container transhipment operations represent a non-negligible risk to lose time and, consequently, could erode any competitive advantage which rail might otherwise have for freight movements within the corridor. This situation emphasizes the need for adoption of fast and cost-effective transfer methods and sound operational principles. Most specifically, guarantees must be obtained that the dedicated yards will be working at the time of arrival of the trains and, in the case of container transhipment, that the sets of empty wagons will already have been positioned in advance.

In the period running up to the actual demonstration runs of container block trains, the status of facilities at each break-of-gauge points will have to be assessed.

For each break-of-gauge point, the operational target will have to be fixed in an operating agreement. Depending on the technology used, e.g. gantry cranes, reach-stackers, etc., the number of moves per hour will have to be determined. This information, together with the number of containers hauled by one train, is crucial to build realistic and reliable schedules. The working agreement should stipulate such points as:

- technology used,
- performance criteria, i.e. number of moves per hour,
- railway administration responsible for the acceptance of trains for each direction of traffic,
- type of information to be specified in the acceptance register,
- procedures for registering wagon or container damage,

- criterion for refusing a wagon or container,
- treatment of documents and information.

Since all break-of-gauge points on TAR-NC are also border-crossing points, the interaction between railways and customs / security administrations will also have to be defined and stipulated in the working agreement.

5.3. Container handling capacity in ports and terminals

The reliability of the services or, in other words, the perception by shippers / freight forwarders of the container transport capability of the TAR-NC will depend crucially on linkages with container handling and distribution systems in ports and in the hinterland areas. These handling and distribution systems must be (i) sufficiently comprehensive in terms of their coverage of container trade generating industries and locations with easy road access and (ii) sufficiently well equipped to allow rapid loading and discharge of container wagons (point 5.5.2 below addresses the issue of the importance of proper work organisation to ensure reliability and punctuality).

5.4. Composition of a container block-train

The composition of a container block-train running services on TAR-NC must be optimised technically so as to allow as much as possible the coverage of a daily distance of 1,000 km.

So far as container wagons are concerned, this means using wagons, or fitting future wagons, with features such as passenger train bogie type with composite brake-shoe and electro-pneumatic brake with auto-mode device.

While this type of wagons may not be available at this stage on all the railways concerned, those requirements should be adopted for future generation of wagons. Meanwhile, the railways should select for TAR services those wagons with the highest possible operational speed.

Apart from the need to meet the basic commercial requirement to cover a distance as quickly as possible at a reasonable cost to reduce overall transit times, adopting for container block-trains speed criteria normally used for passenger trains will give TAR-NC services a greater chance to receive the same priority as passenger trains at the conceptual stage of train scheduling and train-path allocation. This is essential as the current general trend on the railways along TAR-NC is to give priority to passenger services and in view that this is likely to continue. In addition, adequate operational performances (in terms of block section occupancy, speed upon start, braking distances, etc.) will ensure that traffic controllers do not stable container trains matter-of-factly each time there is traffic disruption with the need to get passengers moving. Here again, sensitivities and habits may have to be reviewed in the face of economics as there is more revenue in one block-train than in many passenger trains.

So far as locomotives are concerned, both freight and passenger locomotives can normally be used for container trains which are normally "light" trains but the final choice of what motive power to use will depend on operating costs tied in to the consideration exposed in point 5.1. above regarding train assembly, i.e. number of TEUs and number of wagons to be hauled in one single train.

In terms of overall operation, the railways concerned should optimize the roster of locomotives to let locomotives and crews carry on for as long as is technically possible and allowed by staff working hours regulation. As traffic develops, it might be envisaged to dedicate a number of locomotives and staff to TAR-NC services only if it is proven acceptable to do so in economic terms.

When crew and locomotive have to be changed, a time target should be fixed for the operation. Typically, considering the time for uncoupling and moving the off-duty locomotive, switching the points and signals, moving the relief locomotive, coupling it to the train and carrying out the brake test, a locomotive change should not take more than between 20 and 40 minutes. The same principle should also be implemented when stoppages are due to train inspection. Such inspection can be thought to be quicker for container trains than conventional freight trains given that containers will not pose the same risk of load displacement. In addition, if and when a fleet of container wagons is dedicated to block-train operation only, these wagons will not be subject to hump operations in marshalling yards and the wear and tear of to their constitutive parts as well as the risk of dislodging these parts will be reduced. Whenever possible the distance between two consecutive stoppages for wagon inspection should be optimised to what is technically reasonable from the safety point of view.

5.5. Train schedule

Scheduling the container block-trains will mean reaching a compromise between the fastest transit times that can possibly be achieved on each of the TAR-NC routes and the need to offer reliable services, i.e. build schedules which are realistic and can be enforced 95% of the time.

The scheduling stage will be a crucial one in the preparation of TAR-NC services. Consequently, it is essential that all the elements entering into the building of schedules for the main rail journey between terminals of origin and terminal of destination, be analysed and that operational documents be issued. On the operational side of TAR-NC services, two main areas are time-related, namely: main-line operation and yard operations.

5.5.1. Main-line operations

Scheduling main-line operations requires the two main following inputs:

(a) the "basic schedule", which is based on the fastest transit time over a line or line-section given:

- hauling capabilities of the locomotive of the type of predominant use,
- mass of the train,

- type of rolling-stock hauled,
- design characteristics of the line (gradients, maximum speed)
- time necessary upon start after planned stops,
- time necessary for braking from running speed to full stop.

(b) a so-called “punctuality margin”, whose purpose is to palliate such operational elements as:

- lack of precision in speed reading instruments,
- occasional greater gross weight than usual,
- late opening of signals by station staff,
- longer than expected stopping time,
- temporary speed restrictions unforeseen at planning stage,
- track work,
- weather conditions on some line sections during certain periods of the year,
- etc.

Aggregating these elements lead to the following outputs:

(a) a train path indicating:

- arrival and departure times for scheduled stops at stations and yards,
- passage time through stations and specific spots along the line,

(b) a traction diagram showing the speed of trains along the whole route with reflection of all speed restrictions on any section,

(c) a table showing per line section the serial numbers of locomotive with equivalent hauling capabilities as the one used to define the above-mentioned “basic schedule”. Other locomotives with reduced capabilities may also be indicated with mention of the loss of time to be expected,

The defined train paths must fit in the overall operation train graph, i.e. be compatible with other scheduled trains such as long distance inter-city passenger trains. How the resulting “draft” schedules for TAR-NC container block-trains integrate at national level will be studied by each of the railways concerned and, in a second stage, national schedules will be aggregated and refined into international schedule for each route along the entire route.

5.5.2. Yard operations

At terminals of origin and destination

While container block trains by-pass marshalling yards, they still require terminals at both ends of the routes and at break-of-gauge points. To avoid delayed start at the very beginning of the journey or delayed delivery of the cargo at destination, the terminals must be ***well-designed***, ***well-equipped*** and make provisions for possible expansion.

Well-designed means that the terminals must be located as close as possible to the main trunk line so that no time is lost entering and exiting the terminal by running at low speed over a number of switches and secondary tracks. Also, terminals should, whenever possible, be set aside from other yards so that their operations are not hampered by other shunting movements. At the same time, terminals at both end of the routes should offer easy access to road vehicles so as to guarantee reliability of the road↔rail interface.

On the site itself shunting movements must be minimized so far as wagons are concerned. This can be best achieved by having a track of sufficient length under the crane-way. So far as trucks are concerned, conflicting situations between trucks entering and leaving the site must be avoided.

At the design stage, when building new terminals or upgrading old ones, every effort must be made to minimize the risk of delayed operations which could result in bottlenecks/delays.

In ports the same principles will guide the organisation of the rail-ship interface. The crucial aspect will be the distance between the stacking yard and the rail sidings and the potential conflicts between the movements of all the equipment plying between different yards.

Well-equipped means that adequate handling equipment must be made available to guarantee that containers are moved swiftly from truck/ship to wagon, wagon to truck/ship and wagon to wagon. This does not mean that gantry cranes are to be provided everywhere but that a case-by-case study must be made on the basis of expected traffic. The criteria for deciding what equipment to install must be the number of trains to be handled during typical peak periods, the necessity not to immobilize equipment unduly, i.e. wagons and trucks, and the knowledge of how the market will shape up over the years ahead. Equipment in excess of actual needs will result in high unit operating and maintenance costs, and equipment which is insufficient will require premature replacement or upgrading with possible disruption to services resulting from its replacement or upgrading.

Modern handling equipment available on the market includes: gantry cranes, straddle-carriers, top-lifters and reach-stackers. Although output depends on the design of the equipment itself and on the layout of the terminal, it can be said that on average the number of containers transferred per hour is 20 to 30 for a gantry crane, 15 to 20 for a straddle-carrier and 20 to 25 for a reach-stacker.

At break-of-gauge points

For overall punctuality and reliability of the TAR-NC services proper scheduling of yard operations is particularly crucial at break-of-gauge points. This requires inputs regarding the technical and non-technical operations taking place at the break-of-gauge points. Non-technical inputs are addressed in point 5.6 below. Regarding the technical inputs, on the principle that for the foreseeable future, transhipment of containers will be the solution applied to solve the break-of-gauge issue, the following inputs are to be taken into account in the scheduling of yard operation:

(a) working hours of yards,
(b) number of staff,
(c) number of shunting locomotives,
(d) number, length and condition of tracks on receiving yard,
(e) number, length and condition of tracks on departure yard,
(f) number and useful length of sidings under rail-mounted gantries or otherwise accessible by handling equipment,
(g) conditions of sidings and of driving areas for rubber-mounted gantry if and where such equipment is used,
(h) overall configuration of yard, i.e. location of 1,520 mm gauge sidings in relation with 1,435 mm gauge sidings and location of transhipment yards in relation with other yards,
(i) ease of access of receiving yard from main line (distance, curves, number of switches/secondary tracks to be crossed, etc.),
(j) ease of shunting movements from receiving yard to transhipment sidings if direct access is not possible,
(k) ease of shunting from transhipment sidings to departure yard,
(l) ease of train formation,
(m) type and capacity of handling equipment,
(n) adequacy of lightning of yard for night-time operation,
(o) telecommunication facilities (telephone, radio, walky-talky sets, etc.)

The output should be an operating manual aimed at securing as much as possible a predictable and routine type of operations. The manual will lay down the conditions in which container block-trains are to be handled and stipulate *inter alia*:

(a) tracks where trains are to be received and from where they are to be dispatched under normal circumstances,
(b) tracks where containers are to be transhipped if several possibilities exist,
(c) procedure for immobilising the wagons before transhipment starts,
(d) number of staff,
(e) number and type of resources put at the disposal of staff, i.e. shunting locomotives, telecommunications facilities, handling equipment, telecom-munication facilities, etc.
(f) function and responsibilities of staff (job description for each position),
(g) interaction (who, where and when) with staff from other administrations.

In addition to the above, the operating manual should also indicate the line of reporting of operation in order to monitor performances.

Once all the elements in points 5.5.1 and 5.5.2 are assessed, they will be aggregated into national schedules which will then be coordinated and fixed at international level by the railways concerned along each individual route.

5.6. Border-crossing issues

As outlined above (point 4.3.2) transit times as well as the time-related notions of reliability and punctuality (point 4.3.3) play an important role in the selection of a particular transport mode by shippers. The development of TAR-NC into an integrated high quality network for container traffic implies that impediments to the quick and smooth movement of goods that characterises modern-day economic exchanges be removed.

This is particularly essential given the range of operations and checks which can take place at one single border-point. Those operations and checks are of two types, namely: those relating to railway regulations and those relating to regulations imposed by other administrations. Table 5.2 gives a non-exhaustive list of those operations and checks for both cases.

Table 5.2: Border-point operations

Railway operations (each item may not be applicable between all railways)	**Operations by other administrations**
Change of locomotive	Customs inspection
Change of crew	Sanitary inspection
Braking sheet	Security checks (border police)
Technical inspection for acceptance of wagons	
Safety inspection for dangerous goods	
Train consist	
Labeling of wagons	
Change of rear light	

Considering that each operation is in itself a source of delays, one can easily understand that moving cargo between two points through several border-points is fraught with potential risk to reliability. If anything, the number of operations listed in Table 5.2 highlights the need for cooperation between the railways to reduce the risk by securing agreements fixing standard times for each operation and laying down quality measurement principles.

Regarding TAR-NC services, greater efficiency should easily be secured as:

- the commodity unit will be the 'container',
- the operating unit will be the 'block-train', and
- the commercial unit will be the '*transit*' container.

In terms of ***railway operation***, the practical implications are that operating block trains by-passing marshalling yard, i.e. skipping hump operation, with the related risk of damage to wagons and displacement of cargo are very limited and that, consequently, wagon exchange procedures could be quickly expedited.

Regarding the drawing-up of documents based on train information, the computerised exchange of the required data between railway administrations in advance of the arrival of the train at stations where specific operations are scheduled, will help the railways optimise their resources and streamline their working practices. As soon as a train leave a major station, the information should be sent forthwith to the next border / transhipment station. This would help early preparation of the documents and actual work after arrival of the train would in most cases only consists in checking conformity of the information received with real situation. Such information would, for example, regard such items as wagon numbers, container numbers, weight of containers, train length, mass of train, etc. Optimising the use of resources and streamlining operational practices connected to TAR-NC, should not be a formidable challenge to the railway concerned in view of their experience and also given the facts that the long distances between stations will give time for preparedness and most information needed will not vary during transportation.

Two major conventions regulate the movements of cargo by rail in the countries along TAR-NC. They are: the *Convention Concerning the International Transport of Goods by Rail*, referred to as the COTIF convention, which establishes uniform rules concerning the contract for international carriage of goods by rail - the so-called CIM consignment note; and the *Agreement on International Goods Transport by Rail* referred to as the SMGS agreement. The COTIF convention is in force in most of Europe (with the exception of former Soviet republics) as well as in countries in the Middle-East or Africa linked to the European railway network by either rail or ferry services. The Islamic Republic of Iran is also a party to the COTIF conventions. Meanwhile, the SMGS agreement is in force in Belarus, Ukraine, the Russian Federation, Central Asian Republics, China, the Democratic People’s Republic of Korea, Mongolia and Viet Nam, etc. Transcription of documents from one system into the other system takes place at the border stations of the countries, which is some cases also happen to be break-of-gauge stations. The necessity of harmonising the two systems is recognised by the Organisation of Railway Cooperation (OSShD) which coordinates SMGS-related matters and the Intergovernmental Organisation for International Carriage by Rail (OTIF) which conducts similar activities for COTIF.

The United Nations Economic Commission for Europe has taken a major initiative in this field by preparing a Draft UN ECE Convention on International Customs Transit Procedures for the Carriage of Goods by Rail with the objective of establishing a homogeneous international customs transit system replacing the traditional national customs documents with the CIM consignment note. In addition, ECE member countries are also studying the possibility of making the convention applicable in other countries not using the CIM consignment note. Meanwhile, in cooperation with OSShD work is being intensified to incorporate into the ECE draft convention provisions allowing the use of the SMGS consignment note as a customs document.

In terms of ***operations to be performed by administrations other than railways,*** the practical implications are that operating block trains carrying transit cargo only, in the form of containers sealed with internationally-recognised devices, facilitates the work of customs and border police officials.

To ensure that block-trains are flagged on quickly, the railways will have to define with the relevant administrations the information that each of them need and the format in which it should be delivered. In this regard too, standard times should be established for each operation at each border point (ports as well as stations) where such work takes place.

5.7. Customs and border formalities

As previously stressed, an essential condition for improved transit times is the speed at which customs and other border-crossing formalities can be discharged. To this effect the preparation and approval of an International Customs Agreement for all countries is recommended with stipulations of all tasks to be performed and the conditions in which they should be performed. Where this is the case, the agreement should extend to include customs operation in ports.

Given the "in-transit" nature of the cargo, it is important that the customs authorities of the countries transited allow customs clearances to take place at stations of origin and destination.

To all intent and purposes at stations where there is no change of waybill, the approved time-frame for customs procedures should fall within the time frame allocated for the most time-consuming operation due to take place. Usually, this should be the locomotive change when no transhipment is needed, i.e. from 20 to 40 minutes, or the transhipment operation at break-of-gauge points whose time-frame will depend on the configuration of the yard and the equipment available.

Joint customs operations by the officials of two neighbouring countries should be encouraged. The relaxation of customs procedures between European countries has allowed time reduction of up to 30%.

The United Nations has long recognised that various border-crossing procedures in different countries could be an obstacle to efficient transport and prevent the countries concerned from reaping the full economic advantages of their infrastructure. In view of this, the United Nations Economic Commission for Europe (ECE) and ESCAP have developed efforts to promote a set of international conventions aimed at facilitating cross-border movements of goods and people. More specifically ESCAP adopted resolution 48/11 *"Road and rail transport modes in relation to facilitation measures"* (reproduced in Annex 3). The purpose of the conventions reflected in resolution 48/11 is neither to legiferate in lieu of national legislative bodies, nor to supersede existing national legislation. Their aim is to increase efficiency in the field of transportation by performing the necessary operations as rationally as possible. Whenever they cannot be adopted as such because of conflict with national laws and regulations which cannot be amended right away, they can be used as a framework for bi- or multi-lateral agreements between countries for the facilitation of border crossing.

In addition to the conventions listed in ESCAP resolution 48/11, two conventions are of particular importance to landlocked countries, such as Kazakhstan and Mongolia. They are the *Convention on Statute of Freedom of Transit* of 1921, known as the Barcelona transit convention, and the *Convention on Transit Trade of Landlocked States* of 1965, known as the New York transit convention. These conventions have been developed keeping in view the geographical handicaps of landlocked countries and establish their right to have free access to the sea to "*enjoy the freedom of the seas on equal terms with coastal States*". However, at this stage, of all the TAR-NC countries, none has acceded to the Barcelona transit convention and only Mongolia and the Russian Federation are party to the New York transit convention.

5.8. Working Groups for operationalisation and monitoring of TAR-NC services

The above elements clearly highlights that for any given route of TAR-NC to be competitive, a joint and well-coordinated operation of all the railways/countries concerned is essential.

To secure the required high-level coordination, it is important to set up dedicated Working Groups for each route along the corridor consisting of senior professionals taken from within the railways (railway operation) or from outside the railways (marketing, public-relation, Information Technology). The tasks of the Working Groups will be to plan, organise and monitor demonstration runs aimed at identifying remaining obstacles along the routes. Before performing the necessary tasks, it is important that as a matter of priority, *the Working Groups define policies as regards the framework under which implementation progress has to be reported and milestone decisions have to be approved*. Only when this has been done, will the Working Groups be able to turn their attention to concrete action through performing the following tasks:

Preparatory "technical" phase

(a) define a common calendar for the development of schedules for the purpose of demonstration runs (point h below);

(b) agree on the number of wagons/TEUs to be carried in one single train;

(c) review the relevance of the existing border crossing agreement for the exchanges of wagons and other operational matters;

(d) at break-of-gauge points review the operational framework for transhipment activities;

(e) work with representatives of other public administrations to address their needs and how they can be addressed while meeting operational and commercial requirements;

(f) review the existing organisation and equipment in place for collecting and transmitting information between railways and between railways and other entities (customers, other administrations);

(g) develop awareness among all staff and, define and carry out necessary training,

(h) test the relevance of the organisation suggested and identify possible bottlenecks through demonstration runs of block-trains;

(i) prepare, discuss and finalise the relevant agreements between railways including responsibility of each railway in case of delay and the definition of a penalty system;

Preparatory commercial phase

(j) define through tariffs;

(k) define the system for revenue allocation;

(l) define format of electronic international waybill;

(m) define adequate security plan for cargo (sign contract with sub-contractor if outsourcing is adopted) and define responsibility sharing scheme in case of damage or theft;

(n) assess the information requirements of shippers/freight forwarders/other administrations and define the scope and time-phased implementation of an interactive internet site with on-line space-booking capabilities and on-line tracking facilities;

(o) assess the shippers' needs in terms of transit times, service differentiation, frequency of service, time of delivery;

(p) identify the segment of customers interested in fast transit times and assess their needs in terms of service differentiation (e.g. premium service with "very fast", "fast" or "average" transit times, each to be defined);

(q) prepare the commercial schedules for container block-trains;

(r) devise a brand name and develop a marketing strategy;

(s) define performance indicators;

Service-running phase

(t) monitor operation and overall service delivery;

(u) monitor development of competing modes, i.e. shipping for the main leg of the intercontinental journey, road and inland water transport for pick-up and delivery, and plan new services or devise measures for the improvements of existing services;

(v) keep close contact with shippers/freight forwarders to understand their changing needs.

The Working Groups should be established on a route basis in order to pay due attention to:

- technical characteristics of each route,
- different readiness of individual countries to implement demonstration runs and services.

ESCAP will assist in the establishment and functioning of the Working Groups including cooperation with international organisations concerned (ECE, OSShD, UIC).

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- Chapter 6 -

Conclusion

Trade between Asia, North America and Western Europe has been growing steadily with, however, some impact due to the economic crisis that hit Asian economies in 1997.

The main consequences of the crisis on recent exchanges has been (i) a drop in the growth rate of container volumes exchanged - but growth there was - and (ii) an imbalance between the volumes of loaded and empty TEUs depending on the direction of trade considered.

The overall volume of containers traded between Asia and Europe stands at a current 3.5 million TEUs. This represents a sizeable market to encourage the railways along TAR-NC to coordinate efforts aimed at developing an efficient land-bridge offering shippers a guaranteed level of services at rates which are competitive with those of ocean carriers.

The high safety record of railway, its substantial possibilities for fast transit times and its potential for the improvement of level of services delivered, including the use of modern Information Technology, are inherent assets on which the railways along TAR-NC can capitalise to increase their market share of the Asia-Europe container transport. The fact that current container volumes moving by rail are marginal shows that these qualities are not readily perceived by shippers or freight forwarders.

One of the reasons might be that on international routes rail is not viewed as one transport mode but as a conglomerate of various systems without unity. The development of services along TAR-NC offers a vintage opportunity for the railways concerned to develop and promote the image of a unified, efficient and, above all, quality-conscious transport operator.

To achieve this goal, in addition to the development of an integrated network operated under common standards and jointly-defined operating principles, TAR-NC railways will want to develop efforts on the human issues of the proposed services. This will mean primarily (i) developing adequate staff awareness/training at all levels and (ii) developing and maintaining regular contact with shippers/freight forwarders. This is crucial in view that, because of all the elements, technical and human, which need to be aggregated to produce quality services, the possibilities to make up for something that has gone wrong are very limited. Hence the pressure for TAR-NC railways to get it right the first time and improve on each subsequent run. The key word in this respect will be reliability.

To secure reliability, one important step will be to ensure that all concerned (all staff in each railways and other administrations) are aware of their personal responsibilities and of how the performances of each of them fit into the global transport process and ultimately relate to the success of the enterprise. One of the main challenges in setting up TAR-NC services will be to define, create and maintain clear areas of personal accountability for every single part or function within the international transport chain. Keeping up service quality at the desired level in a complicated transport chain demands:

- full awareness of customer demands and the importance of total quality management systems among the entity in charge of developing and monitoring services,
- a great degree of personal accountability and constant motivation of all partners along the whole transport chain,
- care for all performance details defining the product purchased by the customer.

Delivering high quality services is all the more important for a given transport operator as he can only influence his company's quality without having any control on how the competing mode will enhance its own. In addition, in the field of transport, quality cannot be faked because delivery is instant and visible. Trains are on time or not; services match promises or do not; the final invoice has or does not have last-minute, unannounced add-ons; goods are delivered undamaged or not.

So visible is quality in transport that some freight forwarders or logistics providers have started to define their own rating system for ocean carriers. Not surprisingly, the evaluation centers around five main areas of interest, namely: general operational efficiency, administrative performance, people relationship/communications, route profiles and rates. A number of questions are spread over these five areas, each marked from 0 to 4. Results are then discussed with carriers and published world-wide to the freight forwarder's offices and partners.

The increasing pressure on industries to be ISO-certified to be anywhere near the top of their business sphere has led to renewed quality awareness and to a redefinition of quality management in industries. The result is that shippers who have gone through the process of improving their performances and for whom benchmarking is a question of survival, will not understand why transport operators would not submit themselves to the same process of adopting common standards and agreed best practices.

TAR-NC services will therefore only succeed if the railways espouse shippers' logic in the way they develop, market and operate services. In other words, if the railways along TAR-NC manage to "put themselves in the customer's shoes" and deliver services which capitalise on the quality of rail, then international movements that people feel instinctively should work by rail will stop being a distant dream and will become a reality.

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Annexes

Annex 1. **Railway tariff policy for international freight transit traffic between North-East Asia and Europe**

Annex 2. **Features of "American President Lines" interactive website**

Annex 3. **ESCAP Resolution 48/11 of 23 April 1992 – "Road and rail transport modes in relation to facilitation measures"**

Annex 1

Railway tariff policy for international freight transit traffic between North-East Asia and Europe

Annex 1

Railway tariff policy for international freight transit traffic between North-East Asia and Europe[1]

1. Tariffs structure

On railways of the world the internal and international tariffs are applied. The uniform railway rates used all over the world do not exist.

The internal tariff established and published by a state body or carrier is a list of the prices and conditions of transportation of internal freights as well as export and import freights within the country. The prices and conditions of transportation are applied to routes, where the origin and destination stations of the freight, or origin and destination stations of the passenger are located within the same country.

The internal railway tariffs are differentiated in accordance with the economic policy of the government. It also depends on transportation cost composition, competition conditions in the transport market and population living standards.

The exclusive tariffs in system of the internal tariffs with significant privileges are also used for large monopolies, economic groupings etc. for transportation of export and import freight. The losses of railways from such exclusive tariffs are usually covered by the state.

The international tariff is interrelation and application of tariff conditions, rates and fares for transportation, which is carried out as a minimum through the territory of two countries. The most widespread international railroad rates are union, direct and transit tariffs.

The union tariffs are tariff rates and rules for fare accounting for transportation in two and more countries.

The union tariffs, in which participate only two countries or two neighbor railways are called direct tariffs.

There are also two types of the transit tariffs: for transportation through land border and for transportation through sea or river ports. To attract transit transport each country, as a rule, allows the significant discounts and other privileges. The officially announced tariff level frequently considerably differs from a real level of rates, especially for transportation involving ports.

[1] This Appendix is published without formal revision or editing by ESCAP.

2. Tendencies of the international tariff policy

Past years reveal increasing tendencies of introduction of the direct through international tariffs from departure points to destination points without any tariffs change at state borders. In such cases the rate of the through tariff is established as national tariffs average weighted by traffic distances. However such an approach is possible with comparable distances in participating countries. With considerable different distances (exceeding 250 km) of transportation in the participating countries, difficulties arise with an establishment of degress factor, as its complete unification practically impossible. In these cases the contractual tariff is established which frequently does not cover all charges on transportation on the given direction, but promotes attraction of freight.

In case of the large freight transportation distances by rail, the contractual tariff frequently is defined based on the existing tariffs on other modes of transport - road, sea or alternative railway routes. Examples are: container transportation between Germany and CIS by “East wind” container block train (Berlin-Moscow and further) and road transport; links between Asia and Pacific countries and Europe in combined railway and sea connection and sea transport through the Suez channel; railway connection between Central Asian and Caucasian countries with the European countries TRACECA etc.

3. Existing tariff policy of the participating countries

The countries which are participants of transportation, considered in the given paper, use International transit tariff (MTT) and Common transit tariff (ETT).

The railways participating in ETT and MTT are listed hereafter:

MTT railways: Belarussian Railways, Bulgarian State Railways, Czech Railways, Lithuanian Railways, Mongolian Railway, Polish State Railways, Russian Railways, Slovenian Railways, Ukrainian National Rail Transport Administration.

ETT railways: Belarussian Railways, Bulgarian State Railways, Chinese Railways, Kazakhstan Railways, Korean State Railways, Kyrgyz Railways, Latvian Railway, Lithuanian Railways, Moldovan Railways, Mongolian Railway, Russian Railways, Tajik Railways, Ukrainian National Rail Transport Administration, Vietnam Railways

The comparison of the ETT and MTT tariff rates executed by the European experts, shows, that the tariff rates of MTT exceed the tariff rates of ETT (figure 1) and between them there are essential distinctions. First of all it concerns a level of the rates:

- The ETT has three tariff classes, and in MTT, one;
- In ETT the tariff rates for 1 tonne-km change directly and proportionally to transportation distance (linear dependence), and in MTT the tariff rate for 1 tonne-km is reduced with increase of transportation distance (degression of the rate);

- In ETT the fare is calculated not less, than for the minimal weight norm established depending on class of freight, and in MTT the tariff rate differs depending on weight category of freight, etc.

The transit tariff is established by the international contract or by bilateral and multilateral agreements and meets interests of transit railways, and also consignors and consignees. Thus the transit tariff reflects also economic interests of the original and destination countries. In this sense the transit tariff is function of many factors - not only transport, but also economic ones.

Therefore definition of the optimum transit tariff is a complex task, which has not the simple and unequivocal mathematical decision because of variety of the factors influencing it (and which are function of continuously changing conditions). However, the following strategies could be noted:

The first strategy: the high transit tariff

In this case profit of a transit railway can be high and the income for the transit country will be growing. On the other hand, the seller will sell his goods more expensive in destination country. Thus in the destination country the price of the goods will be also growing and the competitiveness will be reduced. The trade exchange between the countries could decrease and volume of a gross national product from export from the origin country will also decrease.

The second strategy: the low transit tariff

In this case profit of transit railway will be low and accordingly income of transit country will be decreasing. The price of the goods in the destination country can be reduced, its competitiveness will be accordingly raised. A trade exchange and gross national product from export will grow.

In cases with high transit tariff, the consignor will search a cheaper route for transportation (for example, sea). On the contrary, at the low tariff the transit railway will have the losses.

A characteristic example of the low tariff is the tariff of the Russian railways for transportation of transit containers from port Vostochny to western borders of the country. This tariff is a dumping one and equals 222-370 US dollars. On the other hand on China railways on a shorter line from Lyanyngang port to its western borders the tariff equal 900 US dollars and appears to be overestimated. In this connection adjustment of these tariffs in the long term is possible.

However the criteria in the coordination of the through rates in transportation between European and Asian countries with the use of Russia or China railways should be the rates of sea carriers.

4. Tariffs adopted by OSShD countries

According to the Organisation for Railway Cooperation (OSShD) data, all OSShD countries with the exception of Hungary, Romania and Islamic Republic of Iran, make use of ETT and MTT while establishing freight traffic rates related to cargo transportation from Europe to North-East Asia.

The rates are established by each country, considering market conditions and meaning, that these rates on the one hand should be attractive to the cargo owners, and on the another - not below the cost of transportation.

Since 1997, OSShD members have been carrying work on the unification of ETT and MTT.

The necessity for it stems from existing substantial difference between the two tariffs. Besides, in connection with intersection of application spheres of ETT and MTT and increase of number of countries using these tariffs, there are certain difficulties in application of that or other tariff in concrete transportation cases.

In this process the Russian and Ukrainian Railways support adjustment of the tariffs on the following parameters: on tariffs composition, titles of the chapters, sections, paragraphs, and also their texts in a part which is not concerning tariff rates levels and principles of their formation and rules of fares calculation.

Some other railways however suggest the development of the new common transit tariff instead of ETT and MTT. This tariff, according to their opinion, would create conditions for formation of a common tariff field, taking into account specific features and conditions of the separate countries and railways, and would facilitate transportation and work with clientele. The new tariff could establish an opportunity of flexible application of special tariff conditions and rates on separate directions.

The Polish Railways also suggested to invite Western Europe railways to participate in the new tariff development.

Recently OSShD countries started work on optimization of the ETT Agreement.

However, there are two various approaches to this question.

One of them is that the ETT Agreement and actually ETT is the legal international document applicable to the railways as well as the clients. Thus the text of the ETT Agreement should contain general and procedural rules and the tariff should be its integral part as the appendix.

The second approach reflects that ETT text is the appendix to the ETT Agreement, however only ETT text is necessary to publish, therefore it should contain all necessary information, including list of the ETT participants. The ETT Agreement regulating relations between railways including meetings and acceptance of the decisions should not be published.

5. Tariff policy of CIS countries relating to freight transit

Railway freight transit rates for North-East Asia-Europe transportation via CIS countries are established in line with CIS countries Tariff Policy. The Tariff Policy (TP) is established on the annual basis for each calendar year (from January 1 to December 31 inclusive) basing upon ETT and MTT.

Traffic rates for container transit via the Transsiberian mainline are calculated in US dollar.

TP based rates do not incorporate VAT and additional charges.

Tariff Policy ensures application of coefficients to ETT and MTT rates depending on cargo mode, shipment type and rolling stock used.

It could be noted however that traffic rate provisions for cargo transit from third countries to other third countries did not change since 1993.

To promote further transit traffic development the following rate reductions were used during the year 1998:

- 30% for single container shipment from Western Europe to Islamic Republic of Iran via the port of Astrakhan and by 40% - via the Far East ports;
- 33-43% for containerized cargo train transportation via the Far East ports in container trains to Islamic Republic of Iran and Afghanistan.

For the charter year 1998 reduction of tariffs and additional charges was adopted as 10 per cent on all the international freight transit routes via the Far East ports as well as on all the transit routes to Mongolia, Korean Peninsula, Viet Nam and China via Zabaikalsk, Khasan, Grodekovo and Naushki.

<u>Freight transit rates calculations</u>

Calculations of transit rates for transportation between North-East Asia and Europe in both directions, except for traffic to/from Viet Nam, China, DPRK and Mongolia are conducted according to MTT rules with the application in 1998 of the following coefficients:

- freight traffic rates (except for transportation of hazardous materials and oversized shipments as applied to all-purpose wagon loads, less-than-wagon loads and containerized cargo should be calculated using coefficients reflected in Table 1;
- traffic rates as applied to cargo transportation in special-purpose rolling stock, including tank and refrigerator wagons, should be determined according to MTT rules without applying coefficients identified in Table 1. If wagon load exceeds 25-t, a coefficient 0.9 should be applied to 25-t category rates;
- traffic rates for oversized cargo transportation in all-purpose wagons and trailers should be determined in accordance with MTT rules applying coefficient 2.0.

Transit rates calculations for cargo transportation to/from China, Viet Nam, DPRK and Mongolia from/to other third countries are conducted in accordance with the following rules:

- tariff rates (hazardous materials and oversized cargo exclusive) applied to all-purpose wagon loads as well as to cargo in middle-size containers should be calculated in accordance with ETT rules applying also coefficients reflected in Table 1;
- tariff rates used for high-cube container transportation (except for those containing hazardous materials) should be calculated in accordance with MTT rules applying also coefficients reflected in Table 1;
- tariff rates as related to cargo transportation in special-purpose rolling stock (tank and refrigerator wagons inclusive) should be determined in accordance with ETT rules without applying coefficients reflected in Table 1;
- tariff rates used for oversized cargo transportation in all-purpose wagons and trailers should be determined in accordance with related ETT rules applying also coefficient 2.0;
- hazardous materials tariff rates should be determined in accordance with ETT rules applying also coefficient 2.0 as related to transportation in wagon and less-than-wagon loads as well as in middle-size containers and in accordance with MTT rules applying also coefficient 2.0 as related to transportation in high-cube containers;
- with less-than-wagon loads transportation full-size ETT less-than-wagon load tariff rates should be applied.

Table 1: Tariff structures and coefficients applied in the calculation of freight transit rates

Transit to/from	Tariff structure	Coefficient
Afghanistan (except for traffic to/from China, Democratic People's Republic of Korea, Mongolia and Viet Nam) Traffic rates related to transit cargo transportation in wagon and less-than-wagon loads (in all-purpose rolling stock) as well as in containers.	MTT	0.4
Mongolia/Democratic People's Republic of Korea/Viet Nam Traffic rates related to transit cargo transportation in wagon loads (in all-purpose rolling stock),		
• with class 1 cargo minimum normal weight value to be used in calculations is assumed 20 t. Provided the load is above 30 t.	ETT	0.6
• with class 2 cargo minimum normal weight value to be used in calculations is assumed 40 t. Provided the load is above 30 t.	ETT	0.8
Traffic rates related to transit cargo transportation in high-cube containers.	MTT	0.5
China Traffic rates related to transit cargo transportation in wagon loads (in all-purpose rolling stock):	ETT	0.5

• via Zabaikalsk, Grodekovo, Naushki, • Drujba Traffic rates related to transit cargo transportation in high-cube containers should be established: • via Zabaikalsk, Grodekovo, Naushki, • via Druzhba	MTT	0.6 0.5 0.6
Finland (except for traffic to/from China, Democratic People's Republic of Korea, Mongolia and Viet Nam) Traffic rates related to transit cargo transportation to Western Europe, Baltic states and via Black Sea ports in wagon and less-than-wagon loads (in all-purpose rolling stock) as well as in containers.	MTT	0.5
Turkey via border-crossing points (except for traffic to/from China, Democratic People's Republic of Korea, Mongolia and Viet Nam) Traffic rates related to transit cargo transportation in wagon and less-than-wagon loads (in all-purpose rolling stock) as well as in containers.	MTT	
Lithuania/Latvia/Estonia/ Baltic Ports Traffic rates related to transit cargo transportation in wagon and less-than-wagon loads (in all-purpose rolling stock) as well as in containers via Black Sea ports and western border stations in both directions.	MTT	0.5
Via Far East Ports Traffic rates for transit cargo to/from Western Europe, Scandinavia and Baltic States via Black Sea and Baltic Sea ports: • in wagon and less-than-wagon loads (in all-purpose rolling stock), • in single container shipment.	MTT	0.7 0.5

6. The role of Trans-Siberian Railway Line in transportation between North-East Asia and Europe and applied tariff rates

Railways providing optimal routes of transit transportation, could be presented as follows:

As seen from the above figure the Trans-Siberian Railway provides a necessary link between transportation systems of North East Asia and Europe as a result of the Russia's geographical situation. Considering this the Russian Ministry of Railways (MPS) at the request by the Government of Russian Federation, developed in 1997 together with ministries and bodies concerned "Concept of the state support strategy for transit traffic along the Trans-Siberian Railway Trunk Line".

In line with the Concept special traffic rates were established related to container transportation along the Trans-Siberian Trunk Line from Asia & the Pacific Region countries to

Europe. Also sea charter rates and port charges as well as local tax rates were reduced for transit traffic participants.

According to expert estimates saving from 15 to 17 days due to the use of Trans-Siberian Trunk Line to deliver one 20-feet container with US$ 50,000 cargo from Asia and the Pacific Region countries to Europe results in cost saving of about US$ 300. Additional US$ 100 may be saved in terms of payments for leasehold containers as far as quicker cargo delivery may result in shorter leasing period.

The costs of in-container train transportation along the Trans-Siberian Trunk Line of one container between North-East Asia and Europe (railway tariff not including the cost of freight forwarder services) are characterized as follows (in US$ with reductions adopted for 1998) - table 2:

Table 2

Communications		Distance (km)	20-ft container		40-ft container	
			west bound route	east bound route	west bound route	east bound route
1	North-East Asia – center of Western Europe via Brest (between the stations of Nakhodka, Vostochny and Krasnoye)	9857	239	127	474	194
2	North-East Asia – port of Kotka (Finland) via Luzhaika (between the stations of Nakhodka, Vostochny and Luzhaika)	9913	276	149	552	227
3	North-East Asia – Budapest via Chop (between the stations of Nakhodka, Vostochny and Zernovo)	9835	266	158	480	284

Transit rates as related to container transportation along the sea sections of the Trans-Siberian route are the follows (Tables 3 and 4):

Table 3

Sections	West bound rate		East bound rate	
	20-ft container	40-ft container	20-ft container	40-ft container
Japanese ports – Vostochny port	263	526	226	275
Port of Pusan – Vostochny port	235	470	184	203

Since July 1, 1998 tariff rates were reduced by 10 per cent as related to transit container transportation along the sea part of indicated route, provided it is performed with ships belonging to the Far East Sea Shipping Company of Russia or to the Hyndai Merging Marine, joint Russian-Korean shipping company.

Transshipment rates applied to transit containers at sea ports may be characterized as follows:

Table 4

Sea ports	20-ft container	40-ft container
Yokohama / Kobe	250	350
Pusan	62	85
Vostochny	80	104

7. Methodology of tariffs distribution

At present the optimization of transportation routes on behalf of the client can be decided by the forwarding agent, addressing with the appropriate inquiries to railway administrations concerned. Such competition between railways is characterized, that the route of transportation is selected by the forwarding agent on the basis of the existing tariffs and discounts, recognized by a railway, and also other factors influencing cost and condition of transportation (additional taxes, rate of insurance etc.)

It is necessary to recognize however, that the above mentioned method of the rates coordination can produce only a partial result, though fast achievable. At the same time the selection of a transportation route in view of the tariffs rate, used on separate railways, cannot solve the problem of transit increase without adoption of some general principles for transcontinental transportation. Such joint policy by all participating countries appears to be a must for transit development. “The Common Tariff Policy for charter year” developed by CIS countries in 1994-1995 could be mentioned as an example. The specified document signed on behalf of all CIS railways contained the ready transit rates for container block trains via port of Nakhodka-Vostochnay.

Some railway administrations conduct preliminary negotiations about granting privileges for freight transcontinental transit traffic.

The attractive decision for the consignors, in opinion of the European experts, can be the development within the framework of OSShD of the new transit tariff with some additions to the existing transport law, in particular to SMGS. A part of necessary arrangements is possible to take from Tariff policy of CIS countries and a part from the internal tariffs of the countries participating in transportation, with a part to be developed by the OSShD special working group.

Main objective of additional arrangements would be simplification of long-term planning of transportation on the basis of prices invariance for transportation, reduction delivery time for cargoes, application of uniform accounts system for transit, the expansion of the tariff application to the origin and destination countries (as it is accepted in the tariffs issued in the Europe), simplification of the procedure of the claim presentation and time reduction for its consideration.

The above mentioned problems can be decided only by issuing the new international tariff. The reasons for this are:

- significant difference in length of transit transport routes (from 6 up to 12 thousand km);
- relatively small number of start and final stations with a number of intermediate border crossings on a transit route;
- different economic and legal relations both between the interested railways and between their clients than those anticipated in time of ETT development;
- the fact that cargo flows are formed outside the countries, which participate in the tariff, and not inside them as anticipated in time of ETT development.
- absence in ETT of tariff rates for transportation of high-cube containers;
- necessity of time reduction for cargo delivery;
- impossibility of using flexible tariff policy in competition with sea transport, when the established basic tariff rate is high and least acceptable to the client;
- necessity of inclusion in the tariff of the rates, accepted on origin and destination railways.

The main question however requiring the joint decision by all participants of transportation is how to define the base rate for transit transportation. Most attractive for clientele would be apparently the acceptance by railways of the following major principles of tariff composition:

a) Natural principle, that is definition of the rate without dependence on cost of the goods per wagon-kilometer. Thus, in case of a recognition of validity of the claim for cargo damage or loss and payment of the compensation sum for indemnification of the charges suffered by a road, all transported goods should be insured. Besides the rates of the tariff cannot considerably exceed cost of sea transportation. The rate on any cargo would be defined under the formula:

   RATE FOR THE WAGON = TYPE OF THE WAGON X
   DISTANCE (km) + INSURANCE

b) The constant charges of a railway should not be taken into account in cost of transit transportation. Thus variable charges only should be included in the rate which are directly relate to the increase of cargo flow and rate of return (the constant costs should be taken into account at definition of cost of internal and export-import transportation);

   - transit time of a cargo should not exceed the specified number of days. The specified time is maximal in view of a competition with sea transport as it is also necessary to add time of cargo delivery on arrival and departure railways. Thus it is necessary to pay attention, that there are reserves of railway transportation with a big difference (in comparison with other modes of transport) between average technical speed of trains and actual speed of cargoes transportation from the origin to destination. As an example, real average daily speed of cargo transportation reached on the Kazakhstan railways, of 500-700 kms per day. According to SMGS such transportation cannot be carried out slower, than 200 kms per day;

c) The payment for transit transportation should be made by the consignor or consignee on equal terms both on size of payments and on time of their realization.

8. Tariffs on the railway routes concerned and their comparison with tariffs on sea routes

Based on data of the largest European and Japanese operators and also on the rates of the International Coordination Council on Tariff Policy of the CIS countries as well as tariffs charter received from Chinese, Mongolian and ROK railways the existing tariffs on the researched routes were compared with the tariffs on related sea routes was chosen.

For identical comparison the port of Pusan in the Republic of Korea was chosen as a point of departure and Berlin in Europe as a destination point. The rates were defined for transportation of one 20-foot container in US dollars.

For definition of the tariffs the investigated routes were considered as follows:

1. Republic of Korea – DPRK – China – Russia – Europe (keeping in view the possibility of interconnection of railways on the Korean Peninsula)

Port of Pusan – railway – border crossing station of Dandun – railway – border crossing station of Manzhou – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin.

2. DPRK – China – Russia – Europe

Port of Pusan – sea – port of Radjin – railway – border crossing station of Tuman – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin.

3. China ports – China – Mongolia – Russia - Europe

Port of Pusan – sea – port of Tiantzin – railway – Beijing – railway – border crossing station of Erlyan – railway – border crossing station of Naushky – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin

4. China ports – China – Kazakhstan – Russia - Europe

Port of Pusan – sea – port of Lyanyngang – railway – border crossing station of Druzhba – railway – border crossing station of Kurgan – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin

Besides the following alternative route was also considered:

Port of Shenzen – railway – Chenzhou – railway – border crossing station of Druzhba – railway – border crossing station of Kurgan – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin

5. Ports of Russia - Europe

Port of Pusan – sea – port of Vostochny – railway – border crossing station of Krasnoe – railway – border crossing station of Brest – railway – Berlin

For comparison of railway routes with sea routes the accounts for sea routes on a section Republic of Korea – Europe were carried out for routes:

Port of Pusan – sea – port of Rotterdam – railway – Berlin

Port of Pusan – sea – port of Bender Abbas – railway – Berlin

The results are shown in table 5:

Table 5

	Routes	**Total rate**	
		current	**forecast**
Routes concerned			
1	ROK-DPRK-Russia-Europe	-	1270
2	DPRK-Russia-Europe	1420	1390
3	China ports-China-Mongolia-Russia-Europe	2028	1954
4.1	China ports-China-Kazakhstan-Russia-Europe	3119	2550
4.2	China ports-China-Kazakhstan-Russia-Europe	3187	2710
5	Russian ports-Europe	1214	1350
Sea routes between ROK and Europe			
1	Pusan-Rotterdam-Berlin	1487-1737	1340-1540
2	Pusan-Bender Abbas-Berlin	3502	3060

The tariffs because of insufficient information were calculated only for east – west direction and cannot characterize a return direction.

The data on the calculated tariffs with division on the route elements are reflected in point 9below.

As shown in the Table 5, most competitive with the sea routes are the rates on routes 1, 2 and 5 with use of DPRK and Russia railways.

Base tariff rates for a railway section of route 5 for 20-ft. container (in US$) are as follows:

• Railway rate Berlin - Brest	400
• Transshipment in Brest	27
• Customs fee in Brest	21
• Customs fee in Smolensk	14
• SVT Vostochny	26
• Sorting in Bekasovo (Moscow)	25
• Railway rate for section in Belarus	54
• Railway rate for section in Russia	127
• Operator or forwarding agent commission	30
• Maintenance of the wagon	45

However the above mentioned rates on the routes are minimal with the minimal compensation for the forwarding agent. With transportation by rail the given requirement not always meets a reality, as the real rates could be about 70% above the base rates which may render use of railways noncompetitive.

9. Container transportation costs related to alternative routes

The cost calculations for freight transportation in containers between the European and Asian countries on the investigated routes were made only for the future considering the following conditions:

- opportunity of use only of perspective tariffs, as some railway routes as whole do not yet exist (for example route 1, where there is no connection of railways of DPRK and Republic of Korea);
- lack of the coordinated through tariff rates on many railway routes, as there are no real transportation of containers in the transit connection;
- there are two alternatives of transportation on the route 4;
- adjustment of railway rates in the various countries, for example increases of the Russian and Byelorussian rate, reduction of the China, Mongolia, Kazakhstan rates;
- rates changing for the freight on sea routes, with constructed and introduction of sea vessels with capacity of 5 thousand of 20-foot containers and more.

The analysis of the cost shows, that in case of attraction of transit freights from sea to railway routes the clients (consignors or consignees) will have the additional charges of 20-60 mln. USD. as reflected in the following table 6.

Table 6

Routes	Cost of transportation at the alternative I, thsd. $	Cost of transportation at the alternative II, thsd. $
Railway routes	93,654-96,886	260,886-263,388
Sea routes	73,700-84,700	203,010-233,310

At present the use of routes 2 and 5 is possible. At the alternative I of volumes of container transportation in the connection with port Pusan and other ports of Republic of Korea cost of transportation on this direction could be compared with the cost on sea routes and could be of 74-76 mln. USD. For containers transportation from Japan ports the situation could be the same.

With the connection of the Korean peninsula railways the organization of freight transportation on route 1 appearing to be also effective.

The detailed analysis of the existing tariffs, their forecast, and also calculations of transportation cost on investigated railways and sea routes is shown in table 7.

Table 7. Cost estimate (US$ per TEU)

Routes	**Sea transport**		**Stevedore Services**		**Railway tariff**		**Total**		**Container traffic forecast Thousand/TEU**		**Cost of container transport (Thousand US$)**	
	Present	**Future**	**Present**	**Future**	**Present**	**Future**	**Present**	**Future**	**Alternative I**	**Alternative II**	**Alternative I**	**Alternative II**
1. ROK-DPRK-China-Russia-Europe:												
Pusan-Dandun												
Dandun-Manzhou						110			0.5	1		
Manzhou-Krasnoe						350			1	2.1		
Krasnoe-Brest						350			1.7	4.5		
Brest-Berlin						70			1.7	4.5		
						400			1.7	4.5		
Total								1280			1799	4535
2. DPRK-China-Russia-Europe:												
Pusan-Radjin												
Radjin-Tuman	261	250	62	60								
Tuman-Manzhou			80	80	30	34			1	2.1		
Manzhou-Krasnoe					190	170			1.3	2.7		
Krasnoe-Brest					330	350			1.3	2.7		
Brest-Berlin					67	70			1.3	2.7		
					400	400			1.3	2.7		
Total							1420	1400			1387	2883
3. China (Ports)-China-Mongolia-Russia-Europe:												
Pusan-Tiantzin	250	240	62	60					0	1		
Tiantzin-Beijing			80	80	39	34			2	1.3		
Beijing-Erlyan					210	180			5	2		
Erlyan-Naushki					550	500			7	18		
Naushki-Krasnoe					370	400			7	18		
Krasnoe-Brest					67	70			7	18		
Brest-Berlin					400	400			7	18		
Total							2028	1964			10558	25444
4. China (Ports)-China-Kazakhstan-Russia Europe:												
Pusan-Lyanyngang	250	250	62	60					0	1		
Lynyngang-Druzba			140	80	900	700			5	2		
Druzona-Kurgan					700	500			7	18		
Kurgan-Krasnoe					600	500			7	18		
Krasnoe-Brest					67	70			7	18		
Brest-Berlin					400	400			7	18		
							3119	2560			13790	28250
Total												
5. Russia (Ports)-Europe:												

Routes	Sea transport		Stevedore Services		Railway tariff		Total		Container traffic forecast Thousand/TEU		Cost of container transport (Thousand US$)	
	Present	Future	Present	Future	Present	Future	Present	Future	Alternative I	Alternative II	Alternative I	Alternative II
Pusan-Vostochny	235	250	62	60								
Vostochny-Krasnoe			80	80	370	500			28.3	76.5		
Krasnoe-Brest					67	70			28.3	76.5		
Brest-Berlin					400	400			28.3	76.5		
Total							1214	1360	28.3	76.5	38488	104040
Total cost (all routes)											93654 84700	260582 263388
6. Sea Routes ROK-Europe:												
Pusan	740 990	700 900	62	60								
Amsterdam			85	80					55	151.5		
Amsterdam-Berlin					600	500			55	151.5		
Total							1487 1737	1340 1540	55	151.5	73700 84700	203010 233310
Pusan	1200	1100	62	60					55	151.5		
Bandar Abbas			140	100					55	151.5		
Bandar Abbas-Berlin					2100	1800			55	151.5		
Total							3502	3060			168300	463590

Annex 2

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* Mention of firm names and commercial products does not imply the endorsement of the United Nations

Annex 3

ESCAP Resolution 48/11 of 23 April 1992

"Road and Rail Transport Modes in Relation to Facilitation Measures"
