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Introduction

In this era of globalisation, trade is an indispensable tool for economic growth by providing opportunities and access to world markets. To facilitate trade, seamless and efficient transport and logistics systems are indispensable. Quality logistics have an important role in facilitating the transport of goods while inefficient logistics services impose extra costs.

Asia, especially East Asia, has become one of the most economically vibrant regions in the world. Asia's GDP share amounts to 26% of the world GDP and it is projected to increase to over 35% by 2050. However, East Asia is also a region with huge heterogeneity in both economically and socially. This region has also shared a turbulent history as well as similar cultural values. Despite geographic proximity and cultural affinity, East Asia is a region where there is as yet no strong formal regional institutional framework, such as the European Union which has facilitated regional transport, trade and other economic exchanges.

This paper addresses the issue of transport and trade in a globalized world with a focus on Eurasia. It tries to understand the potential of surface transport on such a wide continent, and also the difficulties faced by road and multimodal transport in this context. Because most difficulties in Eurasia surface transport arise in Asia, particular emphasis is put on case studies from this continent.

The paper is organized as follows. The first section looks at the strategic importance of a surface transport link connecting Asia to Europe and at the prospect for freight volumes for this link. The second section explains what the main barriers to trade and cross border logistics are in East Asia, and examines several potential solutions, with their drawbacks. The third and final section is a case study of transport and trade corridors in East-Asia, looking more closely at the practical issues that arise on the corridor.

Surface transport in the Eurasian area

Economic and strategic importance

The Eurasian area covers 40% of the globe and concentrates 70% of the world population. Comprising fast growing economies in East Asia and huge consumption zones in Europe, intra-Eurasian trade represent around 70% of global international trade. The main traditional trade routes are organised by sea from ports in East Asia to Europe: in 2010, around 90% of trade between Asia and Europe used these maritime routes.

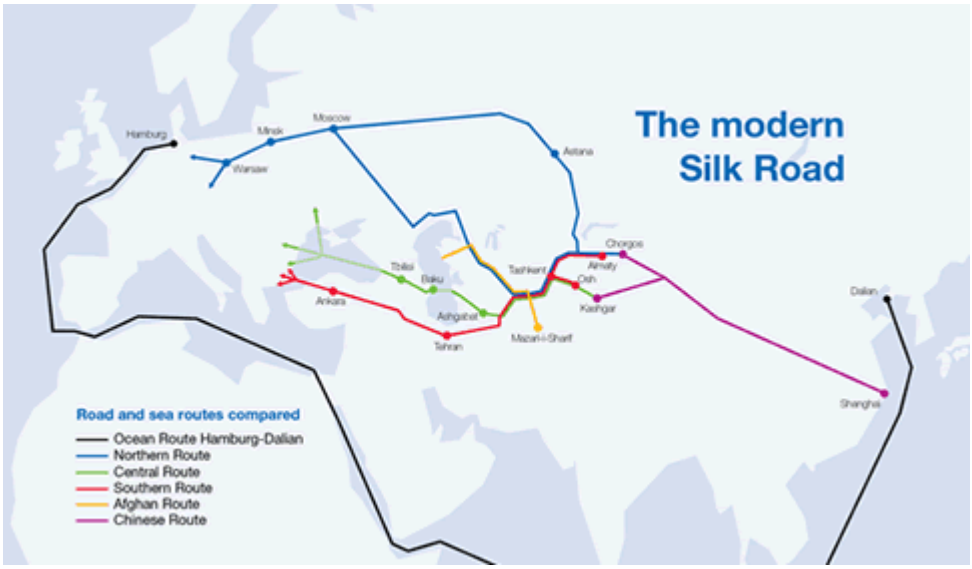
However, new surface transport routes are now emerging, echoing two main changes in trade patterns:

- Shipping time via the traditional maritime route is becoming uncompetitive for some categories of product, such as high-tech goods. This effect is exacerbated by factories in China and elsewhere moving inland, further increasing the shipping time to Europe through increased road haulage. New road and rail routes through Kazakhstan, Russia and then Europe have been developed to answer these issues and they have proved popular with intermediate countries such as Kazakhstan which are willing to benefit from Eurasian trade.

- Because of increased consumer spending and ever more complex supply chains, Asian intra-regional trade is developing, and is predicted to dramatically increase in the next decades (see also Figure 2 below). For geographical reasons, this new trade is often dependent on surface transport or innovative multimodal solutions.

To answer this new demand, many initiatives have been set up. The current initiatives can be divided between a) trade or transport agreements (see the ASEAN economic cooperation or the agreements between China, Korea and Japan below), b) global initiatives, such as the New Silk Road (see the map in Figure 1) which tries to revive surface transport in Eurasia, or 3) more punctual offers such as direct rail freight links between China and Europe offered by DB Schenker, Russian and Chinese railways.

Figure 1: **The modern Silk Road as promoted by the IRU**



Source: IRU.

Outlook for global freight volumes and the Eurasian link

The global and regional increases in population and economic activity translate into major shifts in international trade patterns. As a result, a significant increase in international freight volumes and changes in main trading corridors is to be expected. This paragraph summarises the main findings from the study carried out by the ITF on future freight volumes and explains the potential of the Eurasian rail link in this context. For more details on the methodology of this study, see Martinez et al (2014).

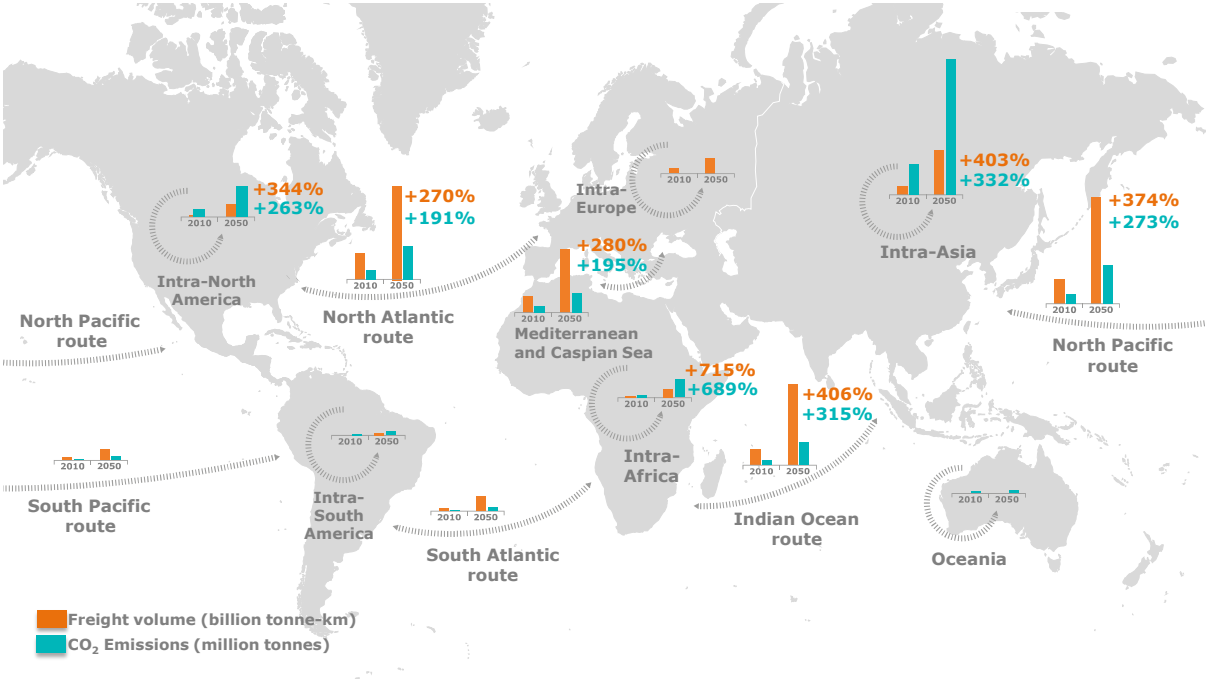
At the global level, maritime transport is expected to exceed 250 trillion tonne-km by 2050. This increase is driven by the changes in the product composition but also by the growth in the average hauling resulting from changes in the geographical composition of trade. The expected growth of international freight transport by 2050 will set unprecedented challenges to the transport system and lead to increasing capacity constraints and CO2 emissions.

The traditional trade routes between developed economies will grow relatively slowly, whereas the growth of the trade corridors connecting emerging economies will average 17% annually. By 2050, the transportation corridor between the United States and Asia will be subject to the highest flow of goods in both directions. By 2050, the North Pacific corridor will surpass the North Atlantic as the main freight corridor. A significant growth will also take place in the Indian Ocean and Mediterranean and Caspian Sea corridors. This reflects the shift of the economic centre of gravity towards Asia resulting from the greater trade between Asia and the rest of the world, especially North America, Africa and Europe. Despite the slow growth of the intra-European corridor (1.5% annually), it will still remain, in absolute terms, as one of the most active freight transport corridors in the world.

Increasing road share in international freight is attributed to growth in intra-regional trade. Significant growth will especially take place in intra-Asian freight volumes which are projected to grow by over 400% by 2050. Intra-African freight volumes are projected to grow even more significantly (over 700%), although from low initial levels. The share of air transport in landlocked countries will increase close to 2% on the average while the share of air transport for coastal countries

will stay around 0.3%. Similarly, the share of road transport in coastal countries is expected to remain constant around 4% while road freight transport will constitute almost 12% of the international freight transport in landlocked countries. These results mirror the trade increase within the Asia and Africa, and also the increasing traffic from/to ports from/to the consumption and production centres. Due to the lack of efficient rail network, these movements are mostly carried out by trucks, setting significant pressure on increasing CO2 emissions.

Figure 2**: Surface freight volumes and CO2 emissions by route**



Source: ITF/OECD (2015)

The domestic transport linked to international freight represents around 10% of the total trade related freight globally. While accounting for 10% of the total tonne-kilometres, domestic freight transport related to international trade accounts for around 30% of the total trade related CO2 emissions. Increasing international trade will set unprecedented challenges also to port volumes and related capacities. Globally, tonnes of goods loaded and unloaded at ports will grow by a factor of 3.8 by 2050 from their 2010 levels. For East Asia, these figures show the double challenge ahead in terms of infrastructure and trade facilitation: improvements need to come both at ports and for hinterland connections.

The ITF model was used to make suggestive calculations on the impact of improving the interoperability and border crossings, combined with improvement in physical infrastructure on the two main rail routes between Europe and Asia. Two main routes were tested with potential transfer links in Uzbekistan and Kazakhstan. In the alternative scenario, it was assumed that the interoperability issues and border crossing would be improved, resulting in 50% reduction in the time lost at border crossings. In addition, the average speed of the network was assumed to be increased to 60 km/h. Under such conditions, rail freight volumes would significantly increase between Europe and Asia: around 10% globally and over 150% in the rail links themselves compared with the baseline by 2050, highlighting the potential of the rail link (Kauppila, 2015).

Barriers to better connectivity in East-Asia

New transport options, such as the New Silk Road and direct rail links for freight between China and Europe, respond to increased demand with large potential for future growth. However, for this potential to be realised, several obstacles faced by shippers need to be addressed. Surface transport between Asia and Europe remains the exception rather than the norm and much of this is related to the difficulties shippers can encounter in Asia. Indeed, many countries in the regions score low in the World Bank's Logistics Performance Index (LPI). This results not only from a lack of infrastructure, but also from very deficient customs procedure and logistics regulations.

Infrastructure is deficient but "soft" barriers are the most challenging

Quality of transport infrastructure is one of the main preconditions for trade. It remains an issue in Asia, and particularly in South-East Asia, where roads are often unpaved (less than 50% of roads are paved in Myanmar for instance) and some ports or rail links have major bottlenecks because of insufficient capacity. The journey between Asia and Europe is still far from seamless: the high number of gauge and technical changes during the rail journey means containers need to be trans-shipped often during the two to three weeks journey.

However, non-physical barriers related to the absence of harmonized law or inefficient or corrupt customs procedures pose an even greater challenge to trade and cross-border logistics. In the case of port operations, it was for instance found by the World Bank (2008) that, in South-East Asia, "*while the container terminals have international levels of handling productivity, the overall port systems are still not up to international quality*." The non-physical barriers come in all forms and shapes. They can relate to complex and non-harmonised customs procedures, the necessity to resort to bribery to obtain some services, incoherent technical requirements or national legislation discriminating between domestic and foreign operators.

The role of better information is crucial. . Only 20% of actors in the supply chain today have the necessary information available to run their businesses effectively. This information can relate to logistics infrastructure and costs, customs procedures or other national regulations affecting the transport of goods. Information can also help fight corruption through making data transparent for all actors involved.

In the past years, there has been much effort towards the removal of these non-physical barriers. Bilateral and multilateral trade agreements are in negotiation, many countries are modernising their customs procedures and upgrading the workflows of their ports. While these measures may in many cases be successful, large umbrella agreements often fail to address practical issues preventing the full benefits of the trade facilitation measures.

Next two case studies of inter-regional cooperation illustrate how non-physical barriers often remain despite large efforts by policy makers. The first one is based on Banomyong (2015) on the ASEAN Economic Community. It shows that the full implementation of the agreement would provoke

significant trade increases for most countries in the region but that some bilateral issues remain unsolved and potentially hinder economic benefits. The second case is based on Lee and Ro (2015) on trade and transport corridors in North-East Asia where the full benefits of bilateral agreements exist but the lack of strong political commitment limit the full potential.

The economic integration of the ASEAN region

The Association of Southeast Asian Nations (ASEAN) is a regional grouping that was established in 1967 with five original founding members. Today ASEAN has ten member states, namely Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The regional grouping is now embarking upon a new adventure with the establishment of the ASEAN Economic Community (AEC) on December 31st, 2015. The objective of the AEC is for the region to become a single market and single production base characterized by free flow of goods, services, and investments, as well as freer flow of capital and skilled labor.

ASEAN, through the establishment of the AEC, is committed to enable businesses to fully tap on the potential of the region as an integrated and single investment destination. In order to realise this objective, ASEAN require higher level of logistics connectivity between its member countries in order to accelerate regional economic integration. To facilitate cross-border logistics, a Master Plan on ASEAN connectivity (MPAC) has been designed.

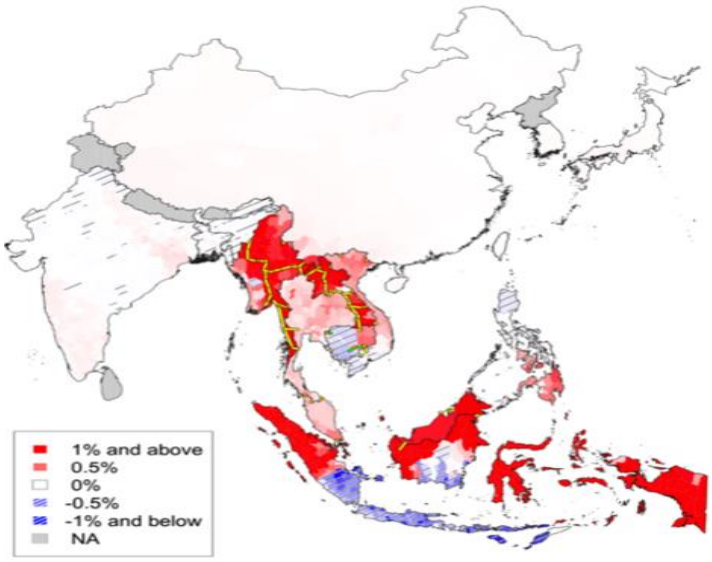
To assess the potential impact of the AEC, Thiengburanathum et al (2014) used a Geographical Simulation Model (GSM) which was originally developed by the Institute of Developing Economies (IDE) in Japan. The GSM can be used to simulate the impact of connectivity improvement, particularly in reducing the direct/indirect cost due to physical and non-physical barriers. The simulation results are given for year 2030, under two contrasting scenarios related to the implementation of the MPAC:

- In the first scenario, no further development to the conditions of ASEAN roads is made. By the year 2020, there will be congestion at borders between neighbouring countries. The time dedicated to border crossing was assumed to double in 2020. Tariff and non-tariff barriers among ASEAN countries were assumed to be at the same level as in 2005.

- In the second scenario, the MPAC was considered to be fully implemented. The roads conditions are improved in 2010 and 2015, reflecting infrastructure development and the implementation of ASEAN trade and transport facilitation agreements. In 2020, the estimated time for border crossing in the region is reduced. Tariff and non-tariff barriers are updated according to various trade agreements including the AEC.

The simulation results show the impact to economic growth due to MPAC implementation. Figure 3 highlights the positive impacts on overall GDP growth around the region particularly in Myanmar, Lao PDR, western part of Indonesia, the eastern side of Malaysia, and southern of Vietnam. Economic growth levels are of course not equal between different geographical locations and some areas benefit more from the AEC than others. There are also differences within countries as certain provinces in a country can benefit more from AEC integration.

Figure 3: **GDP growth difference between no AEC and AEC in the year 2030**



Source: Thammasat & IDE GSM.

However, despite the potential benefits and the clear political ambition, a closer look at individual pairs of countries show the extent of the hurdles to be overcome before ASEAN can be considered an individual market. First, the full implementation of the Master Plan before 2015 will prove difficult considering the starting points, with most countries not having bilateral agreements for cross-border transport for instance. Second, many difficulties reside in the implementation details of the Master Plan and the potential conflicts with national, and sometimes regional regulations. To illustrate these points, the presentation looks more closely at the relations between Thailand and two of its neighbours, Malaysia and Thailand.

Connectivity with Malaysia

Between Thailand and Malaysia, the problem is mostly focused on the institutional framework while the physical connectivity is not problematic. There are no bilateral agreements between Thailand and Malaysia. The only existing agreement relates to transit via Malaysia to Singapore which is subject to limited volume and vehicle quotas. The truck technical standards are also different.

This creates challenges for service providers wanting to link both countries as Thai trucks are not allowed into Malaysia while Malaysian trucks are in theory only allowed to travel up to the Thai border province. Trucks at the border have double nationality in order to bypass institutional constraints to the movement of trucks across borders.

Connectivity with Myanmar

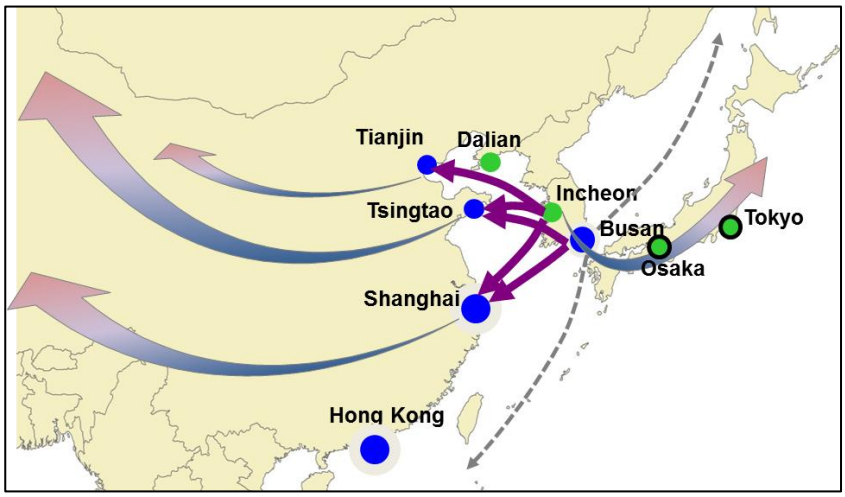
Myanmar is considered as a logistics unfriendly nation which suffers from numerous connectivity impediments. Infrastructure is problematic, with weak road infrastructure in the country combined with difficult terrain. From an institutional perspective, there are overlaps between national and provincial regulations, regional facilitation agreements have been ratified into national laws but there is a lack of implementation capability. There is also no bilateral agreement with Thailand for cross border traffic.

In Myanmar there are challenges related to the lack of legal status of logistics service providers, no liability or cargo insurance as well as truck conditions that are not "roadworthy" but providing service in the country. This makes connectivity with Thailand even more difficult as Thai providers have difficulties in finding Myanmar partners.

Information sharing and harmonisation of regulation at the top of the list to improve trade corridors in North-East Asia

Because of the presence of North-Korea, international surface transport links cannot reach South-Korea yet. To increase the connectivity of the peninsula with the rest of Asia and Eurasia, Korea is looking to improve multimodal transport through China. Lee and Roh (2015) look at the trade and transport corridors in North-East Asia, between Korea, Japan and China. Figure 2 shows the corridors under investigation.

Figure 4**: Main trade corridors between China, Korea and Japan**



Source: Lee et al. (2013)

Study at the corridor level allows a systemic approach to the trade facilitation process. The scope of trade corridor management covers trade and transit agreement, infrastructure and facilities, transport and logistics services, procedures and regulations, security, and overall corridor performance management. Trade corridor management aims at improving utilization, speed, reliability, and effectiveness of international trade logistics.

The three countries have recognised the importance of trade facilitation in order to foster economic growth and are currently at the negotiation stage of a trilateral trade agreement (Zhang, 2012). There also exist a number of transport and logistics cooperation agreements between Korea, China and Japan, covering all modes (Lee and Roh, 2015).

Despite the deep political understanding, the study of the main trade corridors sheds light on a number of problems:

- long and unreliable lead time in shipping and trans-shipment;

- high operation costs of logistics and warehousing facilities;
- absence of cooperation on safety and security issues (no strategy to minimise cargo damage and loss and to deal with hazardous goods); and
- no systematic sharing of logistics-related information between the trade partners.

These problems stem from the poor enforcement of agreements and regulations and from the application of very high regulatory practices.

In order to improve logistics performance in the North-East Asia, Lee and Roh (2015) provide three recommendations. First, logistics information sharing needs to be improved. In 2010, China, Korea and Japan created an international program to promote and organize logistics information exchange, NEAL-NET (Northeast Asia Logistics Information Service). However, national databases have not yet been integrated into a centralized information system: practical and technical details have hindered the deployment of a potentially powerful tool.

Secondly, logistics and trade legislation need to be rationalised and harmonised. Active discussion between logistics stakeholders are needed to fully implement trade cooperation, through one-stop customs and cargo inspection, standardized equipment (containers and loading/unloading facilities), common insurance, international truck driver's license, etc.

Thirdly, keeping the balance between security and efficiency in international trade of logistics is important.

Faced with these difficulties in logistics operations, innovative solutions are designed by countries, companies or international organisations. The next section introduces two such initiatives, at different scales. The first one relates to the difficulties in trans-shipping between Korea and China. The second one concerns the extension of the TIR system, promoted by IRU to countries in East Asia.

Initiatives for trade facilitation and their potential in East Asia

RoRo and towed trailer operations between China and Korea

The main sea-land intermodal freight transportation method between Korea and China is a RoRo (roll-on, roll-off) system (Lee, 2015). RoRo ships are vessels designed to carry wheeled cargo such as cars, trucks, or trailers that are driven on and off a ship on their own wheels. The towed trailers that are used in RoRo ships are not used on general roadways, but exclusively as equipment for delivering containers to and from RoRo ships in the port yard. These unloading and loading processes generate time and cost both in the departing and arriving port yards.

To reduce the time and costs generated from the unloading and loading processes, a new type of sea-land multimodal transport scheme was tested to reinforce physical connections between Korean and Chinese distribution markets and expand bilateral trade activities. This system allows the operation of towed trailers of the exporting country not only in bounded areas but in inland areas of the importing nation.

Towed trailer operation reduces the number of stages in loading and unloading processes for freight and containers, ensuring safe handling of freight and making it easier to gain the trust of consignors who expect inexpensive, fast and stable transportation services. By using regular car ferries, regularity and flexibility are also increased are a mode of passenger-oriented transport: the towed trailer operation system using car ferries could appeal to shippers who want to send damage-sensitive precision products as well as those who have an urgent need to dispatch cargo in a faster mode than traditional container ships.

To identify benefits of the newly introduced intermodal freight transport system compared to the existing conventional container shipping and RoRo system, the Korea transport institute (KOTI) surveyed time and cost requirements for maritime transport and loading and unloading at Incheon Port in Korea and Qingdao Port in China among five car ferry companies in 2009. RoRo would make it possible to cut the time spent at the port by about 3.5 hours and lower the expense by $49.5 per TEU compared to the existing RoRo system (KOTI, 2009). Table 1 compares time and costs of LoLo, RoRo, and towed trailer system generated from Incheon Port in Korea and Qingdao Port in China.

Up to now, the demand for towed trailer operations has been mostly artificial. It is necessary to promote this new operational mode to shippers by explaining its advantages. However, the results also highlight the importance of improving customs procedures, as most of the time in port is spent dealing with them. Both for Roro and towed trailer operations, most of the time is spent clearing customs.

Table 1. **Time and cost components of several shipping methods between Incheon and Qingdao**

		LoLo	RoRo	Towed trailers
Hours	Required time in Incheon Port	12	10.5	8.75
	Shipping	22	15	15
	Required time in Qingdao Port	24	12	10.25
	Subtotal	58	37.5	34
Cost ($/TEU)	Required cost in Incheon Port	210	221	199
	Shipping	350	600	600
	Required cost in Qingdao Port	116	114	86.5
	Subtotal	676	935	885.5

The TIR system for customs simplification

In non-integrated economic areas, such as East-Asia, the shipping of goods by road across more than one country and intermodal transfers often requires lengthy custom declaration and tax payment at each of the borders crossed. In order to reduce this burden on shippers, the International Road Union is promoting a new customs status, the TIR System.

The TIR System is an international Customs transit system to facilitate trade and transport while implementing an international harmonised system of Customs control. In practice, it allows goods to transit from a country of origin to a country of destination in sealed load compartments with Customs control recognition along the supply chain. The Customs duties and taxes that may become due are covered by an international guarantee.

According to IRU, the main features of the TIR system are the following (Qu, 2015):

- Security in the supply chain: only approved hauliers and vehicles – sealed by customs - have access to the TIR procedure;
- Free of charge IT support which allows cargo pre-declaration to customs and provides risk management tools;
- Possibility to implement dedicated “Green Lanes” for all TIR trucks as these fulfil all security requirements;
- Expedite international trade: goods move across international borders with minimum interference thanks to streamlined border crossing procedures;
- Customs formalities are carried out at origin and destination rather than at the border;
- Reduced delays and costs for the international transit of goods; and

- Guaranteed payment of Customs duties and taxes thanks to a credible international guarantee chain.

Currently, the TIR Convention has 68 Contracting Parties on four continents and is operational in 58 countries, most of which are in the Eurasia continent. Many Asian countries, such as Kazakhstan, Mongolia or Russia already use the TIR system; China and Pakistan are currently in the process of joining the TIR Convention as well. Covering most of Asia, it could be a facilitator of intra-regional trade and, eventually of Eurasian trade. Indeed, road traffic with such long distances (see the map in Figure 1 of the intended new Silk Road) can only be conceived if customs procedures are streamlined and not repeated at each border.

Another potential application of the TIR system lies in the Article 2 of the TIR Convention, 1975 which accounts for intermodal transport. This includes RO/RO (towed truck) transports through ferry services (in the Mediterranean and between UK and continental Europe) and by block trains. This could help develop the potential of road transport in East Asia, with ferry links between the Korea, Japan and the rest of Asia using ferries as a first leg to China or South-East Asia.

Conclusion

Economic growth in emerging regions increases the need to improve freight infrastructure to meet growing trade demands. Significant port and road infrastructure developments are taking place in and between several East Asian countries, but trade facilitation does not always require investments in hard infrastructure. Soft measures for harmonised technical and market conditions are crucial for linking countries and regions so that infrastructure can serve its trade purpose to the full. For instance, the International Road Transport (TIR) convention provides common customs and border procedures.

Standardisation of procedures across the supply chains can reduce trade costs as effectively as investments in infrastructure. For example, the development of a Single Window customs system enables easier movement of goods across borders. It combines all customs information, increasing also the transparency and accountability of the customs clearance process and facilitates trade.

The logistics industry relies on highly trained workers and skilled labour is an essential element for the success of future supply chains. Trade unions, governments and companies need to work together to train a new workforce in logistics. The industry is rapidly changing and the skill set required needs to be adapted to meet future challenges.

For sustainable development, carbon savings are needed in the logistics sector. The industry has a vested interest in improving the efficiency of operations as this will result in savings, improving the profitability of the industry. Collaboration, for example to optimise loads and reduce empty running of trucks, can have significant impact on the carbon footprint from the logistics sector. More broadly, collaboration is needed not only between companies but also between all stakeholders, different jurisdictions and governments to share best practices for sustainable solutions across continents.

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