CAREC Corridors Performance Measurement and Monitoring: *Annual Report (April 2009 to March 2010)*

9th Ministerial Conference on
Central Asia Regional Economic Cooperation
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ABBREVIATIONS

AAFFCO	–	Association of Afghanistan Freight Forwarders Companies
ABADA	–	Azerbaijan International Road Carriers Association
ABBAT	–	Association of International Automobile Carriers of Tajikistan
ADB	–	Asian Development Bank
ADBL	–	Business Development Logistics Association of Uzbekistan
AIRCUZ	–	Association of International Road Carriers of Uzbekistan
BCP	–	border crossing point
CAREC	–	Central Asia Regional Economic Cooperation
CIFA	–	China International Freight Forwarders Association
CIQ	–	Customs, Immigration and Quarantine
CPMM	–	Corridor Performance Measurement and Monitoring
CV	–	coefficient of variation
EU	–	European Union
FOA	–	Freight Operators Association of Kyrgyz Republic
GAI	–	State Automobile Inspectorate
IMAR	–	Inner Mongolia Autonomous Region
IMLA		Inner Mongolia Autonomous Region Logistics Association
IRU	–	International Road Transport Union
KFFA	–	Kazakhstan Freight Forwarders Association
kph	–	kilometer per hour
MNCCI	–	Mongolia National Chamber of Commerce and Industry
NARTAM	–	National Road Transport Association of Mongolia
PRC	–	People’s Republic of China
QR	–	Quarterly Report
SWD	–	Speed with delay
SWOD	–	Speed without delay
TCD	–	time-cost-distance
TEU	–	twenty-foot equivalent unit
TIR	–	Transports Internationaux Routiers
XUAR	–	Xinjiang Uygur Autonomous Region

NOTE

In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

The report summarizes method of data collection, aggregation and analysis for road and rail transport in eight Central Asian Regional Economic Cooperation (CAREC) program member countries through six priority CAREC corridors. This report covers the data collected from April 2009 to March 2010. The highlights of the report are:

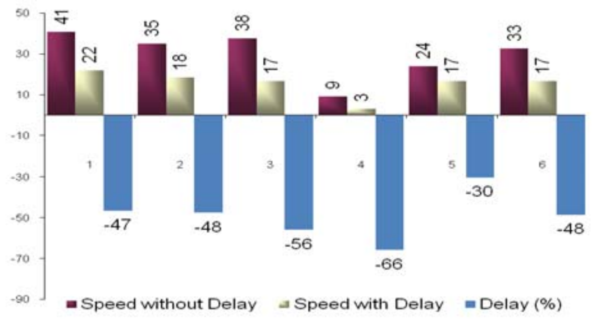
Findings	Technical explanation
For road transport, traveling on Corridor 1 is fastest while traveling on Corridor 4 is the slowest.	For the six CAREC corridors, SWOD[1] is between 9 kph to 41 kph. SWD is between 3 kph to 22 kph. For both SWOD and SWD, Corridor 1 has the highest values while Corridor 4 has the lowest values.
Transport time on Corridors 2 and 4 are volatile, making it hard to predict actual time of arrival.	For SWD, CV[2] for Corridor 2 is 144 and Corridor 4 is 197. These are relatively high compared to the CVs for other corridors.
Border crossing activities tend to reduce speed by half in most corridors.	This is measured by comparing the difference between SWOD and SWD per corridor. This difference is about 50% in Corridors 1, 2, 3 and 6. Corridor 4 has a drop of 66% while Corridor 5 has a drop of only 30%.
When transporting a 20–ton cargo over 500km, a significant part of transport cost is spent on border crossing activities.	It costs $700 to $1,750 to move a 20 tons cargo over 500km in Central Asia, of which border crossing activities occupy 40% to 70% of the total transport costs.
For road transport, the three most time-consuming activities are waiting time in queue, loading/unloading, and customs clearance. The three most costly activities are customs clearance, loading/unloading and GAI.	Waiting time in queue and loading/unloading each takes 13 hours, and customs clearance requires 7 hours for every 500km. Customs clearance costs $285, Loading/unloading costs $122, and GAI costs $96 for every 500km.
For rail transport, the three most time-consuming activities are railways security, waiting time in queue, and change of railways gauge. The three most costly activities are change of railways gauge, railways security and loading/unloading.	Railways security needs 50 hours, waiting time in queue takes 35 hours and change of railways gauge requires 15 hours for every 500km. Change of railways gauge costs $163, railways security costs $117 and loading/unloading costs $100 for every 500km.
Unofficial payments are common. The top five activities involving unofficial payments are GAI, police checkpoints, border security control, customs clearance and phyto-sanitary inspections.	In terms of frequency and the probability of unofficial payment, the five activities mentioned on the left are consistently cited.

[1] SWOD refers to speed without delay, while SWD refers to speed with delay. Introduced in this report, SWOD and SWD are two ways to measure speed (and therefore transport efficiency) along CAREC corridors. More details can be found on page 11 of this report.

[2] The coefficient of variation (CV) is used to measure the reliability of speed along a corridor. This is calculated by dividing the standard deviation by the mean for SWD and SWOD.

CPMM Senior Executive Dash Board

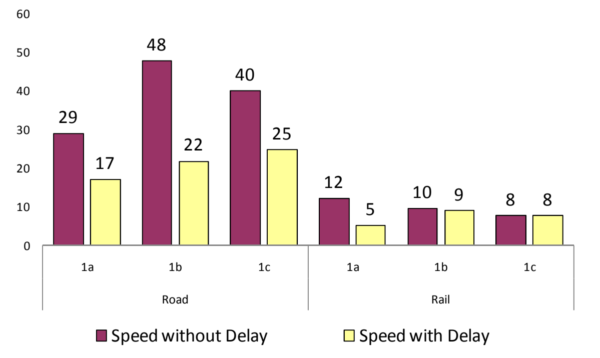
CAREC Corridors



Data Description

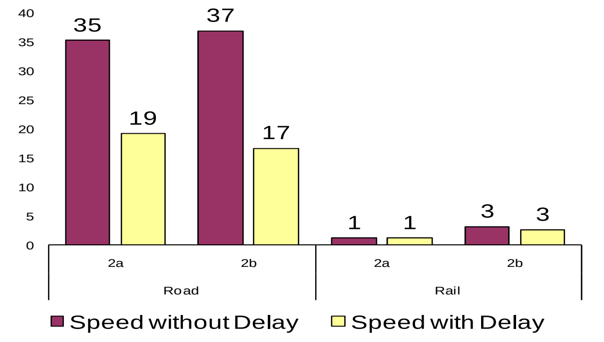
- 2,603 time/cost distance (TCD) observations received
- Speed in kph, and delay in %
- 75% travel by road; 20% by rail and 5% by multi-modal transport
- 21% of cargo are perishables, 79% are non-perishables
- Commonly transported goods are: consumer goods, fruits and vegetables, textile and clothing, building and construction, food items

CAREC Corridor 1



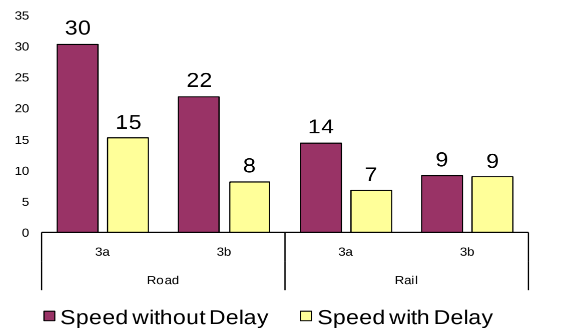
- Customs clearance, waiting time and loading/unloading reduce speeds at all three sub-corridors.
- Corridor 1b is costly due to customs clearance and police checkpoints.

CAREC Corridor 2



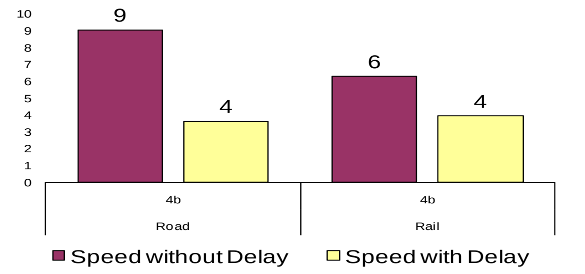
- Customs clearance, waiting time and loading/unloading reduce speeds at all two sub-corridors.
- Customs clearance and loading/unloading increase cost, and Chinese customs impose a special armed escort fee.

CAREC Corridor 3



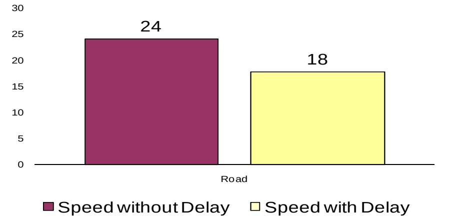
- Customs clearance, waiting time and loading/unloading reduce speeds at all two sub-corridors, and Corridor 3b is more severely affected.

CAREC Corridor 4



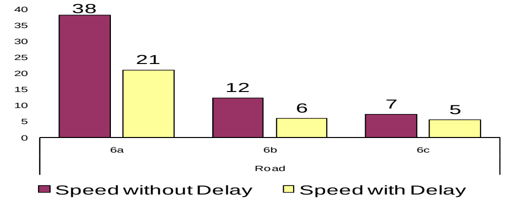
- Customs clearance, waiting time and loading/unloading reduce speeds for Corridor 4b
- Weight inspection is a costly activity for road transport, while change of railways gauge at Zamyn-Uud is a major cost activity.

CAREC Corridor 5



- Corridor 5 has no substantial delay.

CAREC Corridor 6



- While Corridor 6a has higher traveling speed, it is delayed by customs clearance, GAI, waiting time and veterinary.

I. BACKGROUND

1. CAREC countries face several challenges to integrate into the global value chain. Poor infrastructure, burdensome policies and procedures, and geographical factors (such as being landlocked) are natural and man-made barriers to global trade. Improving trade facilitation and increasing transport connectivity are important determinants of economic success and sustained growth in CAREC countries. Efficient and effective transport and logistics services can allow these countries not only to stimulate economic activity and engender social and political cohesion within their respective territories, but also to take full advantage of their geographical position as land bridges between the dynamic economies of Europe and Asia.

2. Recognizing the pivotal roles which trade facilitation and transport connectivity play in molding the future of the region, the CAREC Transport and Trade Facilitation Strategy (TTFS) and its Action Plan[3] focus on the development of six priority CAREC transport corridors. Development of these corridors is expected to facilitate transport and trade within the CAREC region and link the region to world markets. The six priority corridors are:

CAREC 1:	Europe–East Asia (KAZ, KGZ, and XUAR)
CAREC 2:	Mediterranean–East Asia (AZE, KAZ, KGZ, TAJ, UZB, and XUAR)
CAREC 3:	Russian Federation–Middle East and South Asia (AFG, KAZ, KGZ, TAJ, and UZB)
CAREC 4:	Russian Federation–East Asia (MON, IMAR, and XUAR)
CAREC 5:	East Asia–Middle East and South Asia- (AFG, KGZ, TAJ, and XUAR)
CAREC 6:	Europe–Middle East and South Asia (AFG, KAZ, TAJ, and UZB)

AFG-Afghanistan; AZE-Azerbaijan; KAZ-Kazakhstan; KGZ-Kyrgyz Republic; MON-Mongolia; TAJ-Tajikistan; UZB-Uzbekistan; IMAR-Inner Mongolia Autonomous Region of the People's Republic of China (PRC); XUAR-Xinjiang Uygur Autonomous Region of the PRC.

3. The TTFS and its Action Plan mandate that corridor performance be measured and monitored periodically to ascertain the current situation along the links and nodes of each CAREC corridor, identify bottlenecks, and determine courses of action to address these bottlenecks. The CAREC Corridors Performance Measurement and Monitoring (CPMM) program adopted the Time/Cost Distance (TCD) methodology to gather time and cost data associated with transit transport processes to identify constraints along a particular route by looking at a detailed breakdown of cost and time involved along every section of the route. The main purpose of the study is to identify key cargo transport routes and bottlenecks, so that decision-makers can make informed investment decisions and optimize returns on investments.

4. CPMM has three unique features that differentiate it from other transport studies. Firstly, even though it is based on a known methodology, it has been refined and expanded over a period of 18 months to encompass more metrics. For instance, CPMM defines a comprehensive list of possible stop activities (common reasons for delays at border posts) and seeks to quantify the time delays and costs of each of these activities. In addition, CPMM also includes data collection to gauge the extent of unofficial payments. Unlike other methods where perceptions of respondents are measured which could be subjective, CPMM collects well-defined data to quantify each metric. Besides distance, time and cost of a shipment, data such as tonnage carried, use of TIR, time and cost of each stop activities are also collected. When collected over

[3] The Joint Transport and Trade Facilitation Strategy (TTFS) was endorsed by the CAREC Ministerial Conference (MC), in November 2007 in Dushanbe, Tajikistan and the corresponding Action Plan endorsed by the MC in 2008.

a period of time, time series studies can then be done to track for seasonal and cyclical patterns.

5. The second important differentiating factor is the involvement of key private sector transport organizations in this sizeable exercise. National associations representing carriers and freight forwarders have been engaged as CPMM partners to collect data. These organizations train the drivers to collect field data, gather the completed drivers' forms and input them into time-cost-distance templates (TCDs) customized by CAREC. Each month, participating associations are requested to send 30 completed TCDs to ADB headquarters for aggregation. Thus, few other studies are comparable in terms of amount of data collected and time period covered.

6. The third key feature of CPMM is that data are collected along six key routes, defined as CAREC priority corridors. These six corridors were determined to be key transport corridors and endorsed by the CAREC Ministerial Conference. In addition, CPMM partners also provide data on non-CAREC corridors routes if these routes are frequently used. At this point, data collected are mostly road transport data, but rail and multimodal transit data are expected to increase with the addition of more CPMM partners.

7. This CPMM annual report summarizes key findings based on the data collected from April 2009 to March 2010.

II. DATA DESCRIPTION

8. Between April 2009 to March 2010, a total of 2,545 samples were collected (Table 1). CPMM meetings and training sessions were conducted from November 2008 to March 2009 to train the partner associations on how to collect the data and fill up the TCD excel sheets. Responses were slow in the beginning because the associations needed some time to get familiar with the CPMM methodology and organize the drivers. By the start of the Q3 2009, several associations were able to submit 30 samples per month.

Table 1: Number of TCD Submissions by Associations by Month

COUNTRY	Name of Association	2009									2010			Total
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Afghanistan	AAFFCO		6	30	30	30	30	30	30	30	30	30	30	**306**
Azerbaijan	ABADA		6		9			10			2	5	8	**40**
Kazakhstan	KFFA	15	20	30	30	30	20	30	30	30	30	30	30	**325**
Kyrgyz Republic	FOA	13			18	8	2	30						**71**
	ASMAP												21	**21**
Mongolia	MNCCI / NTTFC	30	33	30	30	30	30	30	30	30	30	30	30	**363**
	NARTAM		10	10		15	15	22	27	30	20	20	30	**199**
PRC	CIFA	3	3	27	30	30	30	10	30	30	10	30	30	**263**
	IMAR	17			6	5	5				30	30	30	**123**
	XUAR / XULA / CFXU	5		15									2	**22**
Tajikistan	ABBAT		4	20	30	20	30	30	30	15	30	30	30	**269**
Uzbekistan	AIRCUZ	30	30	30	30	30	30	30	30	30	30	30	30	**360**
	ADBL			20	30	11		30	30	30	30	30	30	**241**
	TOTAL	**113**	**112**	**212**	**243**	**209**	**192**	**252**	**237**	**225**	**242**	**265**	**301**	**2603**

9. Road is the dominant mode of transport, accounting for 75% of the samples. Rail constitutes 20% of the traffic, mainly found in Corridor 4, while multi-modal transport accounts for only 5% of the total sample size (Fig.1a). A key product category transported in CAREC is perishables, accounting for 22% of the samples (Figure 1b).

Figure 1a : Mode of Transport

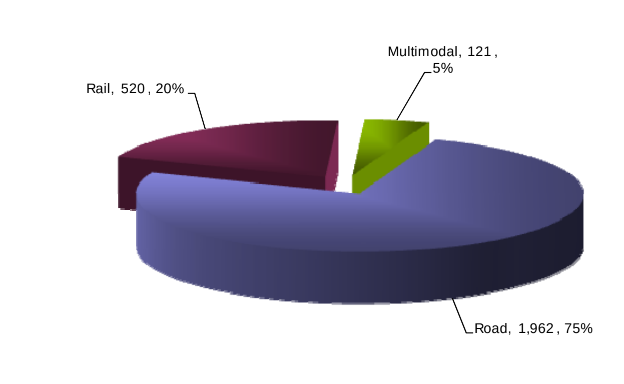


Figure 1b : Perishable Goods

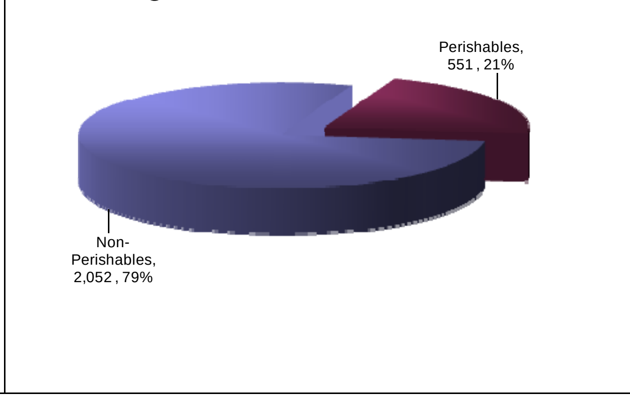
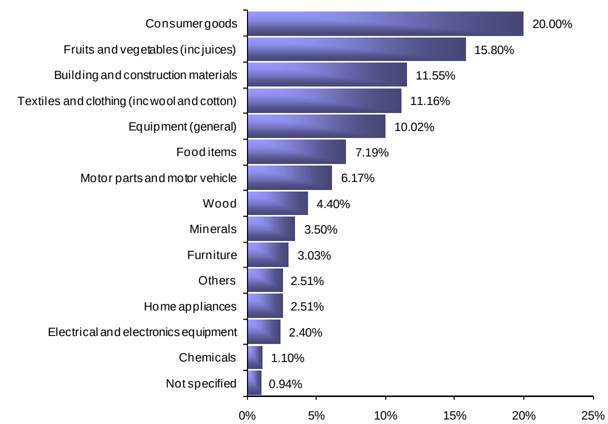


Figure 2: Types of Goods Carried (Sample Size = 2,545)

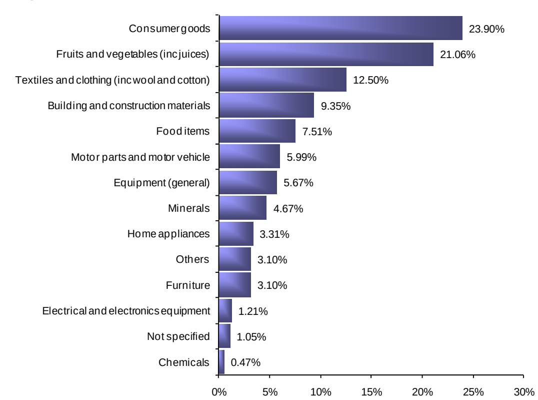
Figure 2a : Types of Goods Carried (Road and Rail Transport)



10. For each sample file, the type of goods carried is counted. From the tabulation, it is possible to determine the mode of transport for each major category of goods.

11. The top five categories of goods transported along CAREC corridors are consumer goods, fruits and vegetables, building and construction, textile and clothing and general equipment.

Figure 2b : Types of Goods Carried (Road)

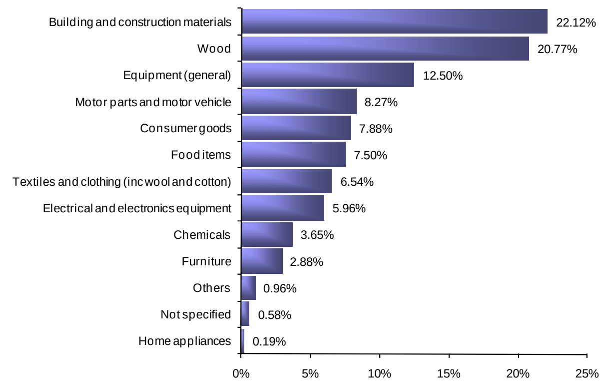


12. Figure 2b shows that fruits and vegetables, consumer goods, textile and clothing are the top three categories of items transported by road vehicles. This result is consistent with the quarterly findings.

13. The reason why road transport is popular for these goods is because of the time sensitive nature of these items. Road transport tends to be more flexible in delivery schedule and is a favorite choice when there is a need to send perishables quickly.

14. Rail transport is a more cost effective mode of transport for bulky goods over long distances. Figure 2c shows that the most common types of goods transported over rail are building and construction materials, wood, equipment, motors and motor parts.

Figure 2c :Types of Goods Carried (Rail)



15. In the 2,545 samples, 79% of the transport crosses borders while 21% are intended for domestic distribution.

Figure 3 : Cross-Border Movement

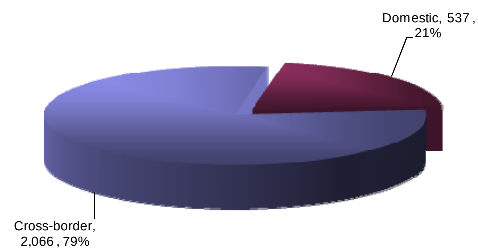
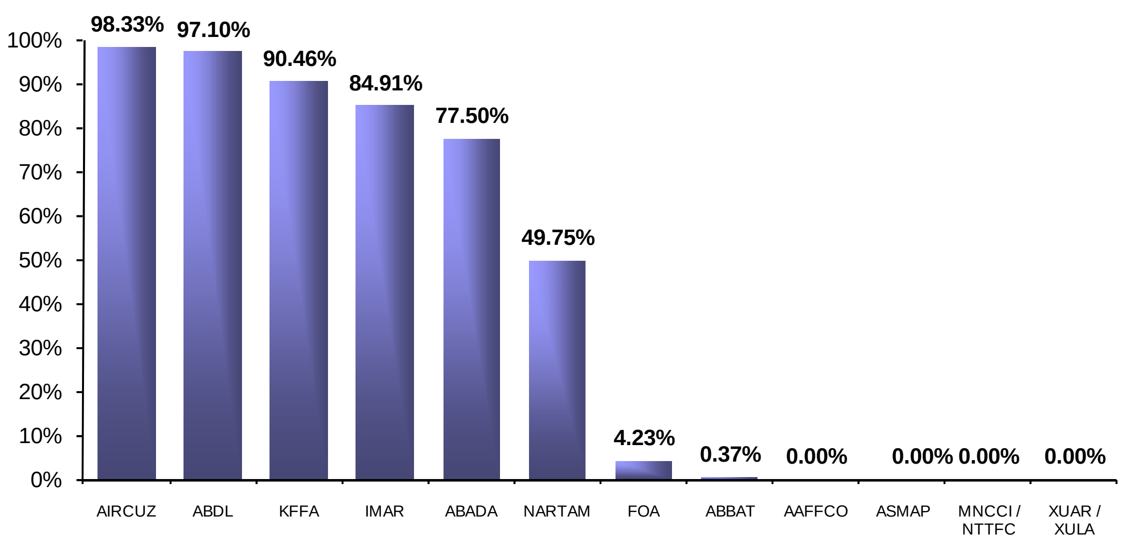


Figure 4: Use of TIR



The CPMM study includes information on the use and effectiveness of the international road transit system or Transport Internationaux Routiers (TIR). Figure 4 shows that TIR is heavily used in Uzbekistan and Kazakhstan. Nearly all their data indicate the use of TIR. On the other hand, Afghanistan has not effectively used TIR since the outbreak of the war in 1970s while PRC is not a signatory of TIR.

III. CPMM RESULTS (ANNUAL)

A. Speed / Travel Time

16. To measure speed, two indicators are used in the CPMM. The first indicator is **'Speed without delay' (SWOD)**. This measures the average vehicle speed on the road or tracks (i.e. when the vehicle is moving). This speed **does not include the time when the vehicle is stationary**, such as waiting for customs clearance. Calculated by dividing the total distance over the driving time, this indicator is expressed in kilometers per hour (kph).

17. The second indicator is **'Speed with delay' (SWD)**. This indicator measures how fast the truck or train travels over the entire journey, including the time consumed by all activities such as border-crossings and police stops. This is calculated by dividing the total distance by the total time taken from origin to destination, also expressed in kph. SWOD is always higher or equal to SWD, since SWD is affected by various activities such as customs clearance, loading/unloading, and waiting time to cross borders.

18. The coefficient of variation (CV) is used to measure the reliability of speed along a corridor. This is calculated by dividing the standard deviation by the mean for SWD and SWOD[4]. A higher CV implies more uncertainty in the arrival time of the shipment.

19. Referring to Figure 5a for road transport, the range of SWOD is between 9 kph to 41 kph. Corridors 1, 2, 3 and 6 have relatively higher SWOD values between 33 kph and 41 kph. Corridor 5 has SWOD of 24 kph while Corridor 4 has the slowest speed at 9 kph.

20. For SWD, the range of values is between 3 kph to 22 kph. In absolute terms, the values for corridors 1, 2, 3 and 6 are still relatively high. However, the speed along these corridors

Figure 5a : Road Speed Along Corridors

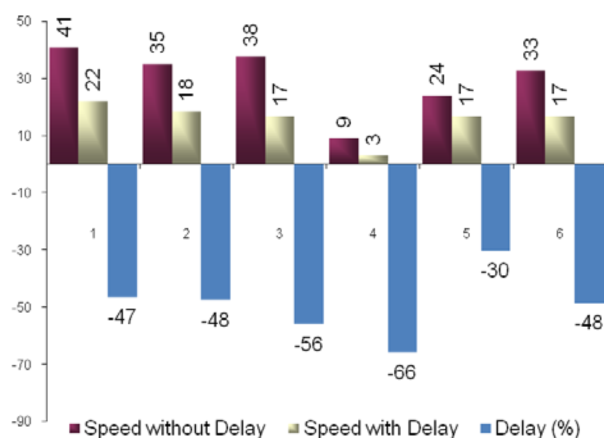
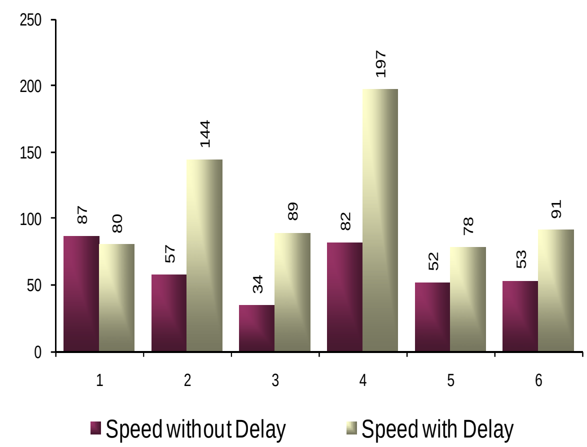


Figure 5b : Coefficient of Variation % (Road)



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4 In statistics, 'standard deviation' is normally used to measure volatility in data. However, as each CAREC corridor can have different delay activities, the sole use of standard deviation without considering the size of the speed mean can be misleading. Consider this example : Route A and B have an average of speed at 25 kph and 50kph, but the same standard deviation at 20. It can be inferred then that route A has lower transport reliability relative to route B.

Figure 5c : Rail Speed Along Corridors

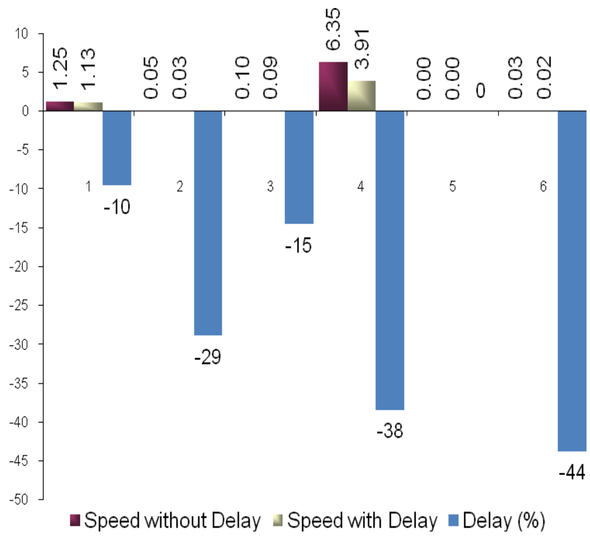
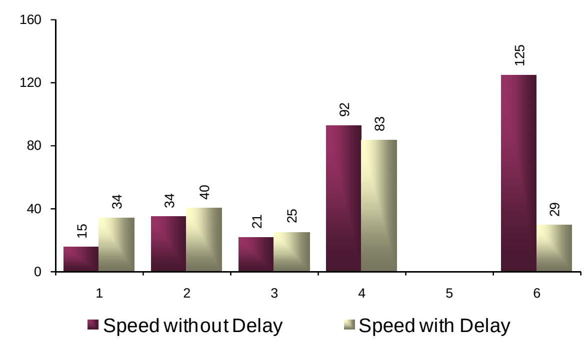


Figure 5d : Coefficient of Variation % (Rail)



suffer a drop of about 50% when time for border crossing activities are taken into account. For instance, a driver can cruise at 41 kph on the road along Corridor 1 (SWOD). but he needs to stop and spend time completing border crossing activities. These stops increase the total time taken to travel along the same distance, causing a drop in the speed (SWD). In summary, the stops along the CAREC corridors reduce speed by 50%.

21. Corridor 5 has the lowest difference between SWOD to SWD, implying that the stops in this corridor do not significantly reduce speed. Corridor 4 has the largest difference between SWOD to SWD – the worst performer here – because the transit speed is already low and further slowed down by border crossing activities.

22. The CVs in Figure 5b show several interesting observations. First, most CVs of SWD are larger than SWOD, except Corridor 1. This means that the uncertainty created by stop activities such as border crossing, waiting time and loading/unloading is significant. In corridors 2 and 4, the CV of SWD is **more than double** that of the CV for SWOD. This means that a shipper will have greater difficulty in predicting the Estimated Time of Arrival (ETA) for shipments going through corridors 2 and 4.

23. For rail transport, Corridor 4 has an SWOD of 6.35 kph while SWD is 3.91 kph. The data suggest that the waiting time for locomotives and rail wagons add significantly to the delays, explaining why there is a 38% difference between SWOD and SWD.

24. Figure 5d illustrates the fact that rail transport is usually more reliable, although they can be slower in absolute speed. The CVs, as well as the change between the CV of SWOD and SWD are lower compared to road transport.

25. In conclusion, this section suggests drivers on the road travel at an average of 33 kph to 41 kph in CAREC countries, except Corridors 4 and 5 where the SWOD are slower. Generally, the speed drops by 50% due to border crossing delays. In addition, travel time by road in CAREC countries can be highly unpredictable. Traveling by rail is significantly slower but the

travel time is more predictable. Finally, this section identifies Corridor 4 as the worst performing corridor that deserves further examination.

B. Delays and Time Factors in CAREC Corridors

26. In the previous section, the speed of travel along the six corridors encounter a drop of about 50% (from SWOD to SWD) due to border crossing delays. This section analyzes why there is such a sizeable reduction in speed when the vehicles cross a border. To investigate the reasons, the methodology below is described.

27. At the beginning of the CPMM exercise, CAREC and the international consultants identified several possible factors in Central Asia that can delay a vehicle during border-crossing. A list of border crossing activities was selected after consultation with the CPMM partners. The activities and the time delays are indicated in Figure 6.

Figure 6: Average duration of road activities (hours per 500 km)

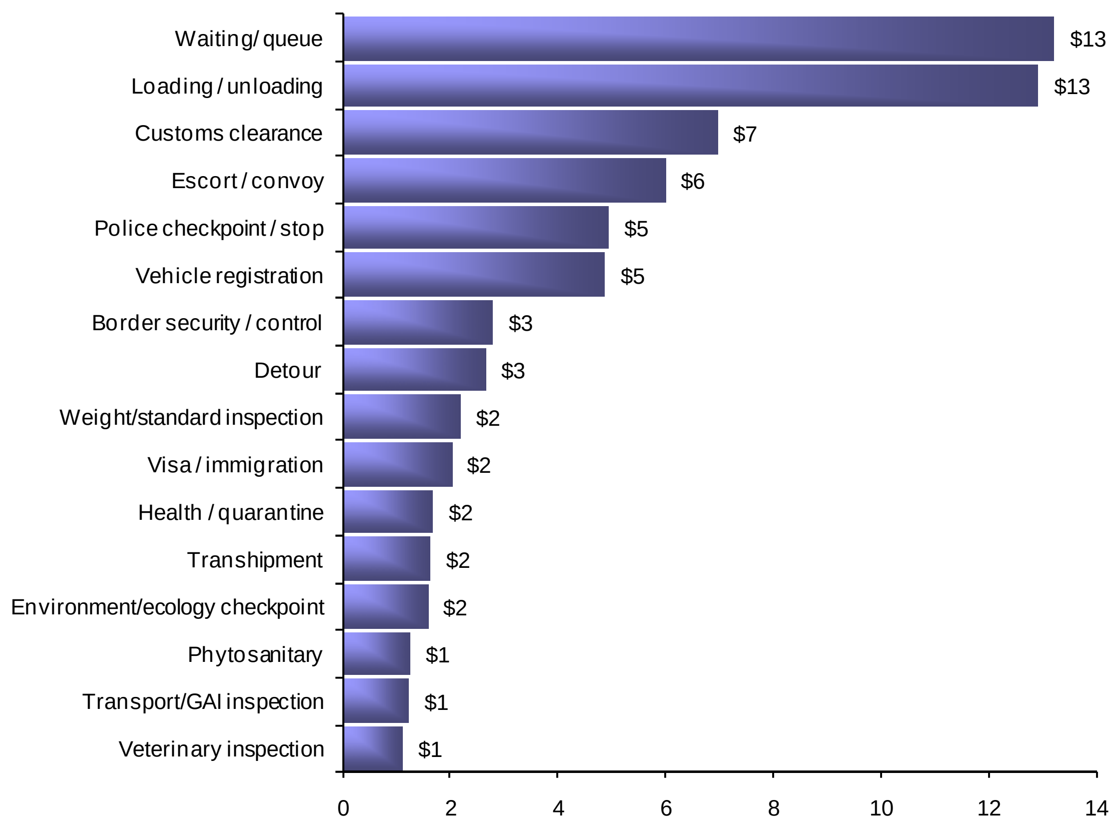
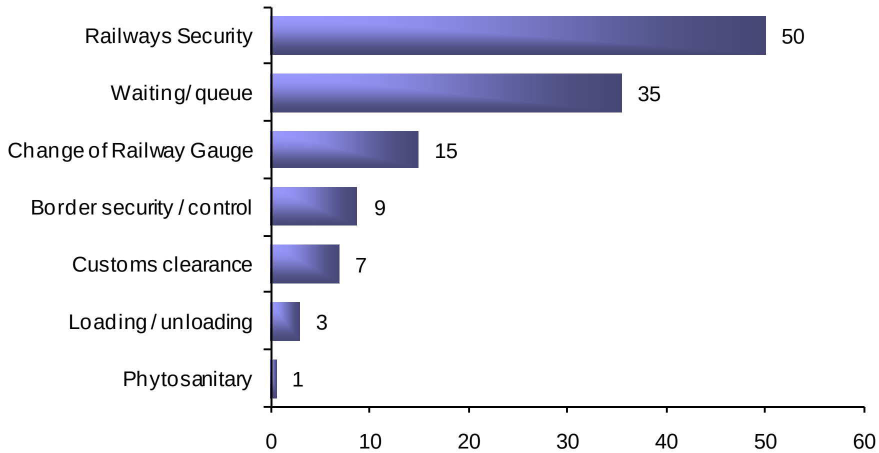


Figure 7: Average duration of rail activities (hours per 500 km)



28. As each of the shipment may cover different distance, there is a need to normalize all the data so that the impact of each activity can be compared meaningfully. A distance of 500km[5] was selected as a basis of unit, and all the time delays of activities are scaled to this distance. This normalization is needed because data sent by different associations cover different distances. For instance, a driver that drives from Khorgos to Aktobe in Kazakhstan (Corridor 1) can travel close to 2,000 km, while a driver that drives from Karamik to Dushanbe in Tajikistan (Corridor 5) covers only 300 km. Many activities such as meals, police checkpoints and GAI correlate with distance and if not normalized, can skew the results.

29. Two activities (rest/overnight stay and meals) are recorded in the study. In CAREC countries, there are regulations on how long the driver can work. These activities are also displayed but will not be the focus of the CPMM studies since these activities cannot be improved by investment or process change.

30. Figure 6 ranks the relative impact of each activity. Over a standard distance of 500 km, the average duration of each activity is calculated. The three major activities that cause delays are **waiting in queue, loading/unloading** and **customs clearance**.

31. Waiting time in queue is the non-value added activity when a driver needs to spend time in the truck waiting for its turn to enter the BCP. Regulations of traffic hours, limited lanes, seasonal peak periods, and inefficient operations can contribute to long waiting time. This factor is also a direct function of the other two activities (loading/unloading and customs clearance), because the slow throughput at these two activities means that drivers who arrive later will have to wait longer.

32. Secondly, loading and unloading cause delays due to lack of facilities and material handling equipment (MHE). Most of the warehouses do not have proper loading docks, and the lack of MHE such as forklifts and pallet jacks mean that most movements are done manually. For instance, one freight forwarder in Afghanistan had to ship a forklift from Dubai to Kabul to move a project cargo. To address this deficiency, private financing, hire-purchase schemes, availability of distributors to carry and sell the goods as well as provide after sales service and maintenance, and training on how to use the equipment are needed.

[5] The value of 500 km is selected as it represents the median of all the distances collected.

33. Customs clearance is the third cause of delay. Uncoordinated operating hours between the customs offices at the borders, sometimes 100% full physical inspection that require unloading and loading of the cargo, as well as the numerous customs forms that need to be filled up result in long waiting time. The lack of one-stop clearance facilities further aggravates the problem. After completing customs formalities, drivers need to queue separately in another location for phyto-sanitary and veterinary controls. This means that the same driver needs to queue multiple times to go through a single border point. It is pertinent to harmonize customs procedures between CAREC countries, streamline internal efficiency, increase the productivity of the customs officials (such as providing better information system and adoption of risk based management instead of full physical inspection of cargoes).

34. Unlike road transport, rail transport encounters fewer delay activities. Figure 7 identifies the top three delays as **railways security, waiting in queue and change of railways gauge**. Railways security is a mandatory service provided by Chinese Railways that stations an armed officer on the train. Freight trains are assembled in the marshalling area and await traction. The train can only continue, however, once a security officer has boarded.

35. The waiting time in queue for rail transport is caused by the lack of rolling stocks such as locomotives and rail wagons. For instance, Mongolia has 50 locomotives but the lack of maintenance and the condition of the locomotives only allow 30 to be used. These useable locomotives are also ageing and need replacement.

36. Six of eight CAREC countries use 1,520mm broad gauge; the People's Republic of China and Afghanistan use 1,435mm standard gauge. Thus, there is always a need for cargo transfer at "break of gauge" rail interchange points near the border with China. The time spent to change gauges cause significant delays. The situation worsens when there are not enough tracks for cargo transfer or when there is a long queue of trains during peak periods. Containerization is a good way to minimize cost and time delay due to gauge differences.

C. Cost Factors in CAREC Corridors

37. This section focuses on the analysis of transport and activities costs. Transport cost is the total cost involved in moving the goods[6] plus paying for all the activities involved at stops or border crossing. Figures 8a and 8b show the differences between the transport and activities costs for road and rail.

38. Cost of shipping a cargo depends on two primary variables, namely weight of cargo and the distance traveled. Since each shipment carry different cargoes and travel different distances, all the data are normalized to carry 20 tons of cargo over a distance of 500 km for road transport. Likewise, all rail data are normalized to carry one TEU and over a distance of 500 km.

39. As shown in Figure 8a, the data collected suggests that traveling on Corridor 5 is the most cost effective while traveling on Corridor 4 is the most costly, for road transport. It is also notable that in several corridors, activities cost constitute 50% or more of the total transport cost.

[6] Costs of moving goods refer to the freight cost. This includes the operating costs (such as petrol and driver's salary, as well as money to cover overhead expenses such as insurance, vehicle license, road taxes and asset depreciation.

Figure 8a : Road Cost per 20 tons / 500km

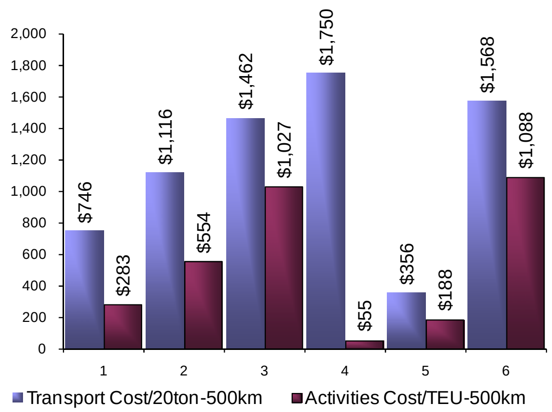
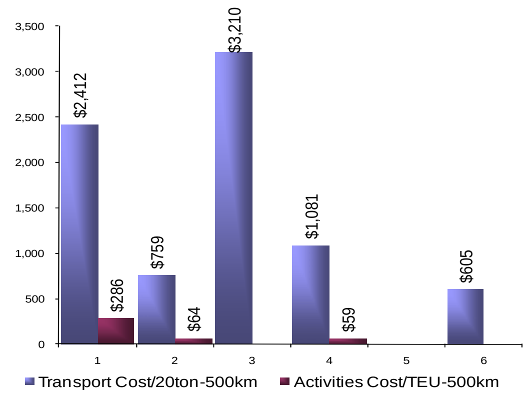


Figure 8b : Rail Cost per TEU / 500km



40. Figure 8b illustrates the fact that rail transport tends to be more economical. In general, this is true for bulky cargoes over long distance. The fee structure for railways is also more standardized compared to road and there is less exposure to unofficial payments. In addition, the shipper is less likely to suffer damages to the goods in-transit using railways. All these factors result in railways transport being more economical.

41. Figure 9 illustrates the impact of different cost items over a 500 km for road transport. Loading/unloading, police checkpoints and customs clearance rank as the three most costly activities. Loading/unloading and customs clearance activities have been explained in the previous section. In Central Asia, it is common for drivers to encounter several police checkpoints along the road. The checkpoints are there for security reasons, as well as to ensure the vehicles comply with national regulations on transport and carriage. Sometimes the police stop vehicles that violate the laws or regulations and unofficial payments are made instead of paying penalty fees and the vehicles are allowed to continue. More often the vehicles are stopped for no apparent reason and unofficial payments usually need to be made so the vehicles can proceed with their journey.

42. Figure 10 indicates an important cost activity for rail transport. Wagon Detention charge is a dominant cost item for Corridor 4. This is a charge by railway terminals when the rail wagon stays in the terminal for too long[7]. This fee happens frequently at border posts (i.e. Zamyn Uud), as well as cities (mainly in Choyr and Sainshand in Corridor 4) because of (a) lack of rolling stock, and (b) uncoordinated movement between cargo and empty or loaded rail wagons.

[7] This is similar to the demurrage fee charged by seaports when a container stays in the port beyond the allowable complimentary period.

Figure 9: Average Road Transport Cost ($ per 500km) by Activity

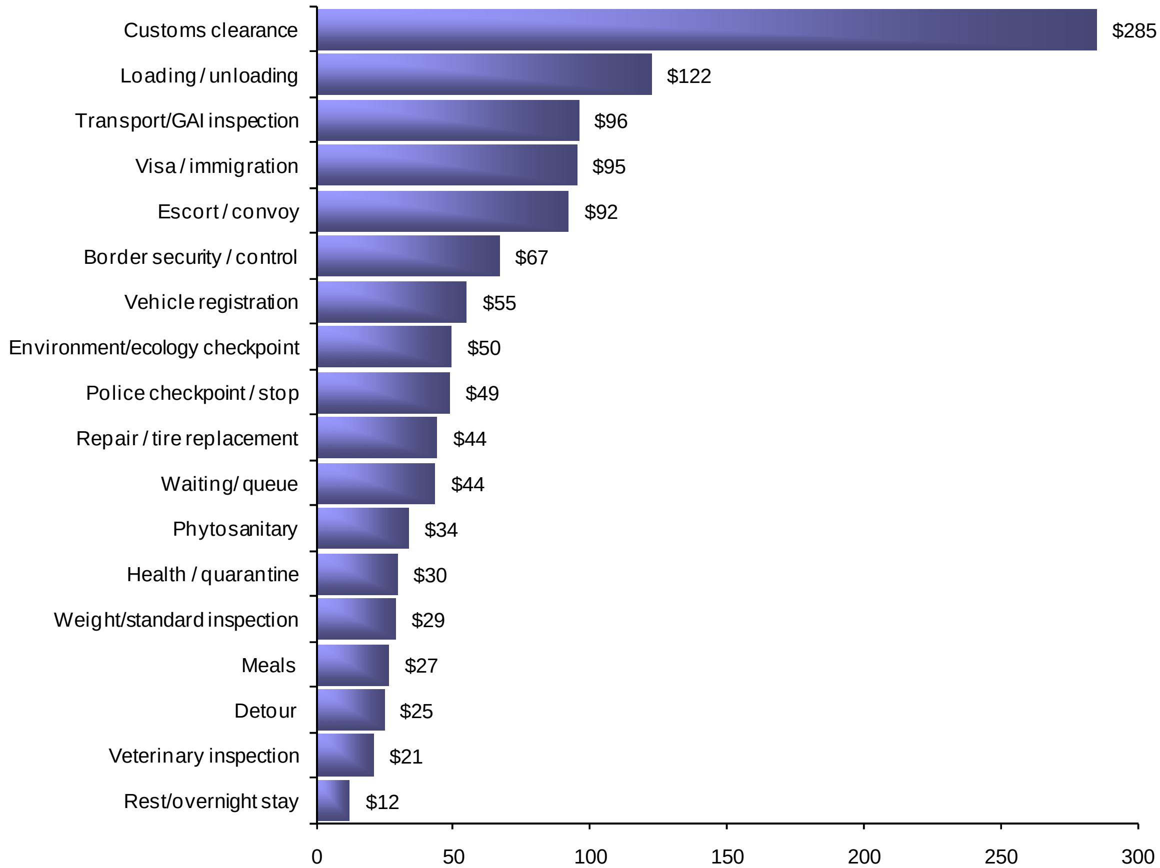
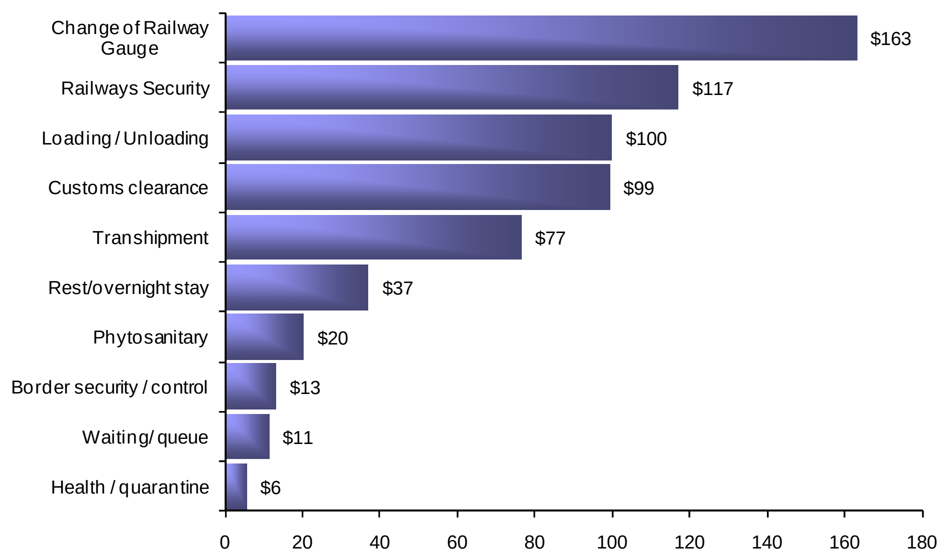


Figure 10: Average Rail Transport Cost ($ per 500km) by Activity



43. Railways security is a service offered by China Railways. This is required when the goods transported are of high value or require watch against load shift due to the nature of the cargo (e.g. heavy machinery). This fee is reported by transport associations from PRC and is

commonly applied for rail transit across Corridors 1 and 2. An armed officer accompanied trains to ensure security.

44. Table 2 highlights the extent of unofficial payments along CAREC corridors. An exchange of money in return for a favor, which is usually faster processing for an application or cargo clearance, is recorded as unofficial. Besides being unlawful, this form of corruption increases cost for businesses and stifle innovations that improve efficiency.

Table 2: Analysis of Unofficial Payments in Road Transport

Activity	Official		Unofficial	
	Count	Percent	Count	Percent
Health / quarantine	1,154	55.94%	909	44.06%
Phytosanitary	983	45.30%	1,187	54.70%
Veterinary inspection	660	64.14%	369	35.86%
Border security / control	1,120	32.95%	2,279	67.05%
Visa / immigration	269	94.72%	15	5.28%
Customs clearance	1,910	44.10%	2,421	55.90%
Detour	47	94.00%	3	6.00%
Waiting/ queue	2,178	99.05%	21	0.95%
Loading / unloading	1,751	93.94%	113	6.06%
Escort / convoy	305	95.61%	14	4.39%
Weight/standard inspection	1,041	58.19%	748	41.81%
Police checkpoint / stop	2,710	33.94%	5,275	66.06%
Transport/GAI inspection	301	19.67%	1,229	80.33%
Environment/ecology checkpoint	459	46.50%	528	53.50%
Vehicle registration	771	53.80%	662	46.20%
Repair / tire replacement	490	93.69%	33	6.31%
Transhipment	55	53.40%	48	46.60%
Meals	7,733	97.25%	219	2.75%
Rest/overnight stay	2,084	99.05%	20	0.95%
Other activities	1,232	75.26%	405	24.74%
All	13,029	61.57%	8,132	38.43%

45. Unofficial payments can take several forms. This arises in three distinct situation:

- To yield to extortion by officials
- To avoid paying a fine
- To expedite a process

46. The first situation is common when drivers encounter police checkpoints. The police threatens to inspect the vehicle but the vehicle can pass if the driver gives a token sum of money. The second situation can occur at GAI or weight inspection. The driver carries a payload that exceeds the maximum weight allowed by law. To avoid paying a hefty fine, the driver pays the officer a small sum of money so that the vehicle can continue the journey. In the last example, the driver may apply for a visa to enter another country. Knowing that the application process takes 2 months and costs $20, the company pays an addition $40 to the officer to expedite the process, so that the visa can be given in five days.

47. The most serious problem is found in transport/GAI inspection, police checkpoints and border security and control. Inspection activities such as customs clearance, phyto-sanitary and ecological control also offer good opportunities for extracting unofficial payments.

D. CAREC Results Framework

48. The CAREC Senior Officials Meeting in May 2009 in Ulaanbaatar, Mongolia considered a proposal to develop a CAREC Program Results Framework that will serve as basis for annual comprehensive development effectiveness review, tracking progress and achievements. The indicators for trade facilitation were discussed and approved at the Regional Joint Transport and Trade Facilitation Meeting held in Tashkent, Uzbekistan in February 2010. CPMM results for the four indicators based on April 2009 – March 2010 data are the following:

Table 3: CAREC Results Framework: Trade Facilitation Indicators

Time taken to clear a border crossing point	Median 8.7 hours
	Average 21.3 hours
Costs incurred at a border crossing clearance	Median US $196.9
	Average US $398.6
Speed to travel 500 km on CAREC Corridor section for a 20 ton truck or a TEU container	w/o delay 30 kph
	w/ delay 16 kph
Cost incurred to travel corridor section	US $1,166

E. Seasonality

49. CPMM reports are prepared on the quarterly and annual basis supported by monthly collected data. The availability of data from months in a year allows analysis of seasonal variations of corridor performance. Figures 11a-d show charts of quarterly variations for the above four result framework indicators.

50. Figure 11a on time taken to clear border crossings shows a markedly longer average time for the 2nd quarter of 2009. This could be due to a few data samples with high border crossing times. Generally the 3rd and 4th quarters are the most productive quarters with shorter border crossing times and lower costs, as well as faster transit speed.

51. Figure 11b on costs incurred at border crossings shows a relatively higher median for the 1st quarter of 2010 that could be accounted for higher unofficial payments as officials of border control agencies try to prepare for start of the year holiday expenses. The relatively higher median time to clear the border for the same period (Fig. 11a) correlates with the higher median for costs for clearing borders. Slower border crossing time and higher cost also correlates slower speed on corridors as shown by Figure 11c.

Figure 11a : Time (hr) Taken to Clear Border Crossings

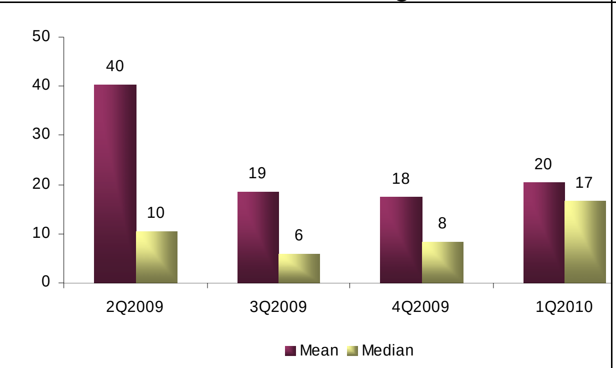


Figure 11b : Cost (US$) Incurred for Border Crossing Clearances

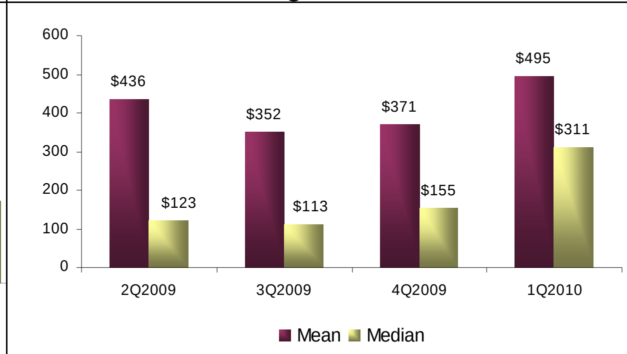


Figure 11c : Speed (kph) Taken to Travel Corridor Sections

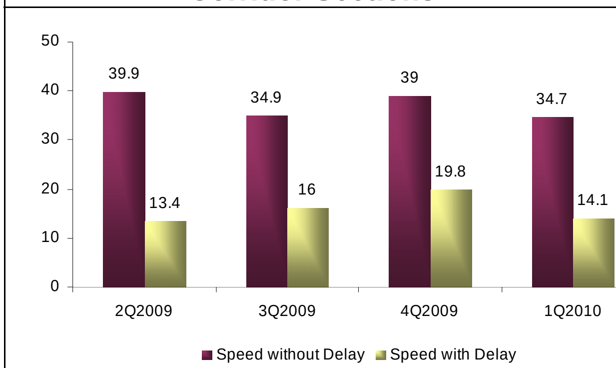
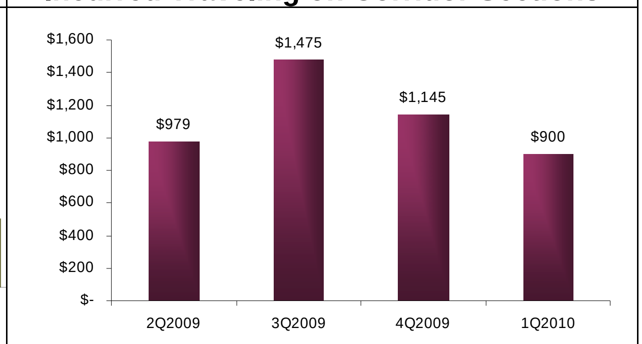


Figure 11d : Cost (US$/20ton/500km) Incurred Traveling on Corridor Sections



IV. PERFORMANCE OF CAREC CORRIDORS

Corridor 1: Europe – East Asia

52. For Corridor 1 the following results are based on 1,047 samples submitted over the course of one year. Corridor 1 has 3 sub-corridors - sub-corridor 1a had 443 observations; Corridor 1b 299 and Corridor 1c 305.

A. Speed Indicators

53. Corridor 1b[8] offers the fastest speed at 48 kph, with Corridor 1c not far behind at 40 kph and the slowest speed is on Corridor 1a at 29 kph. After considering the time spent on activities to cross the borders, the SWD for Corridor 1a, b and c are 17 kph, 22 kph and 25 kph respectively (Fig 12a).

54. Further analysis on the CV reveals that Corridor 1b may not be as reliable. Although vehicles can travel faster on this section, border crossing activities cause average speed to drop from 48 kph to 22 kph. Furthermore, border crossing activities can add a high element of uncertainty, as shown in Figure 12b.

Figure 12a : Road Speed (per 20 ton)

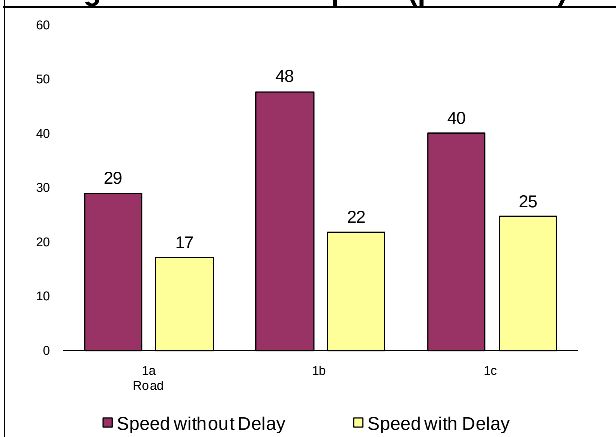
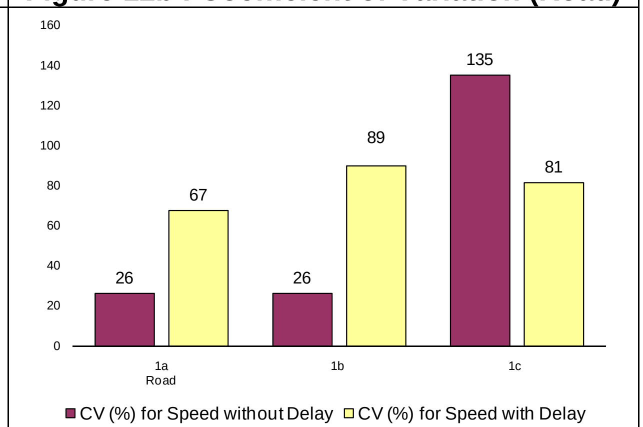


Figure 12b : Coefficient of Variation (Road)



8 The eastern section of Corridor 1b is a popular road for goods moving from PRC to Central Asia. This section of the road is relatively in better condition, and it takes about 4 to 5 hours for a truck to move from Khorgos to Almaty. However, there is little traffic in the western section of Corridor 1b, as there is a lack of good roads. Construction is ongoing under the 'Western Europe – Western China' project, where more than 2,000 km of road will be built or upgraded.

Figure 12c : Rail Speed (per 20 ton)

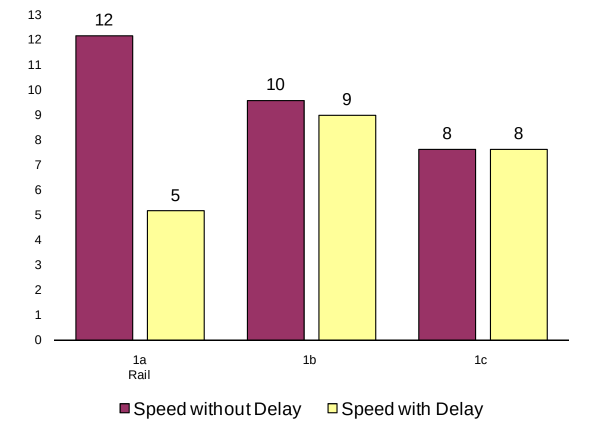
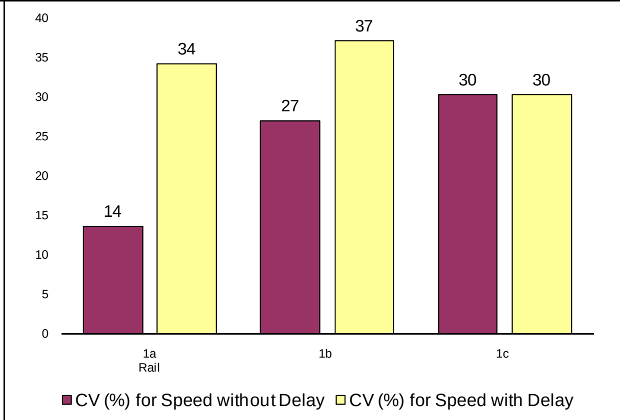


Figure 12d : Coefficient of Variation (Rail)



55. Drivers prefer to use the highway from Almaty – Balkhash – Karagandy – Astana. This is a slight modification from the official CAREC Corridor 1a and 1c. The road quality here is good and is another trunk road for cargoes moving from Central Asia to Europe via Russia. The challenge here is the northwestern section of Corridor 1a/c where there is a lack of good physical infrastructure, especially in the Aktobe region.

B. Cost and Time Spent on Delays

56. In road transport, escort/convoy, police checkpoint, waiting time and loading/unloading are major delay factors. Loading and unloading time can be as long as 28 hours in Corridor 1c. Besides the mentioned reasons for delay, Corridor 1c also suffers from a longer time to clear customs at 6.6 hours. Escort/convoy, loading/unloading and customs clearance are relatively expensive activities.

57. Escort (in the form of load protection fee for rail moves) is the activity that produces significant delay and cost for rail transport in Corridor 1. To overcome the limited sample size for rail transport in Corridor 1 in 2009, Kazakhstan Freight Forwarding Association has been engaged to focus on rail transport data collection beginning April 2010.

Table 4: Average Duration and Cost of Activities by Mode of Transport (Corridor 1)

Activity	Duration (hours per 500 km)						Cost ($ per 500 km)					
	Road			Rail			Road			Rail		
	1a	1b	1c	1a	1b	1c	1a	1b	1c	1a	1b	1c
Health / quarantine	0.1	0.0	0.1				12.8	1.5	2.0	5.6		
Phytosanitary	0.1	0.1	0.1				3.1	1.8	7.8			
Veterinary inspection	0.1	0.5	0.1				4.5	17.0	2.4			
Border security / control	0.2	0.0	0.2	0.0			9.7	2.6	5.0	0.0		
Visa / immigration	1.5		0.1				8.6	13.2				
Customs clearance	0.4	0.6	6.6	0.0			33.4	44.8	46.4	0.3		
Detour												
Waiting/ queue	1.7	4.1	19.4	0.0			8.3		2.4			
Loading / unloading	2.6	3.6	28.1	0.0				69.9	82.0	0.1		
Escort / convoy	4.6	16.5	3.1	0.1	52.6		96.1	22.2	89.3	4.5	127.4	

Activity	Duration (hours per 500 km)						Cost ($ per 500 km)					
	Road			Rail			Road			Rail		
	1a	1b	1c	1a	1b	1c	1a	1b	1c	1a	1b	1c
Weight/standard inspection	0.7	1.6	0.5				20.3	17.7	11.7			
Police checkpoint / stop	1.3	8.2	4.6				14.0	26.7	17.6			
Transport/GAI inspection	0.2	0.5	0.4				16.5	47.0	26.8			
Environment/ecology checkpoint	0.2	0.5	2.1				16.8	52.8	15.1			
Vehicle registration	2.0	1.9	0.3				44.4	46.8	33.1			
Repair / tire replacement	1.8	12.1	3.6				13.3	60.8	5.8			
Transshipment	0.9	0.1	0.0				88.2	16.1	1.9	99.0		
Meals	3.5	20.1	4.2				9.5	31.5	20.2	0.2		
Rest/overnight stay	14.0	41.9	12.6				6.3	24.6	9.2	0.0	53.8	
Other activities	0.2	0.4	0.5				11.1	43.8	80.2	0.3		335.3

C. BCPs and Bottlenecks

58. The major BCPs include **Alataw Shankou-Dostyk (PRC-KAZ), Khorgos-Korgas (PRC-KAZ)**, **Zhaisan-Ozinki (KAZ-RUS)** and **Kairak-Troitsk (KAZ-RUS)**.

59. Dostyk is the gateway for Chinese exports into Kazakhstan, where goods are transported using railways. The annual volume of freight handled is 15 million tons. The research highlighted waiting time at Dostyk to be 25.5 hours, one of the longest waiting times of all BCPs. This is due to the limited number of tracks available to support rail gauge change in Dostyk station. The situation at Alataw Shankou is better, with waiting time at 5.5 hours. Customs clearance takes 3 to 4 hours at each of the BCPs.

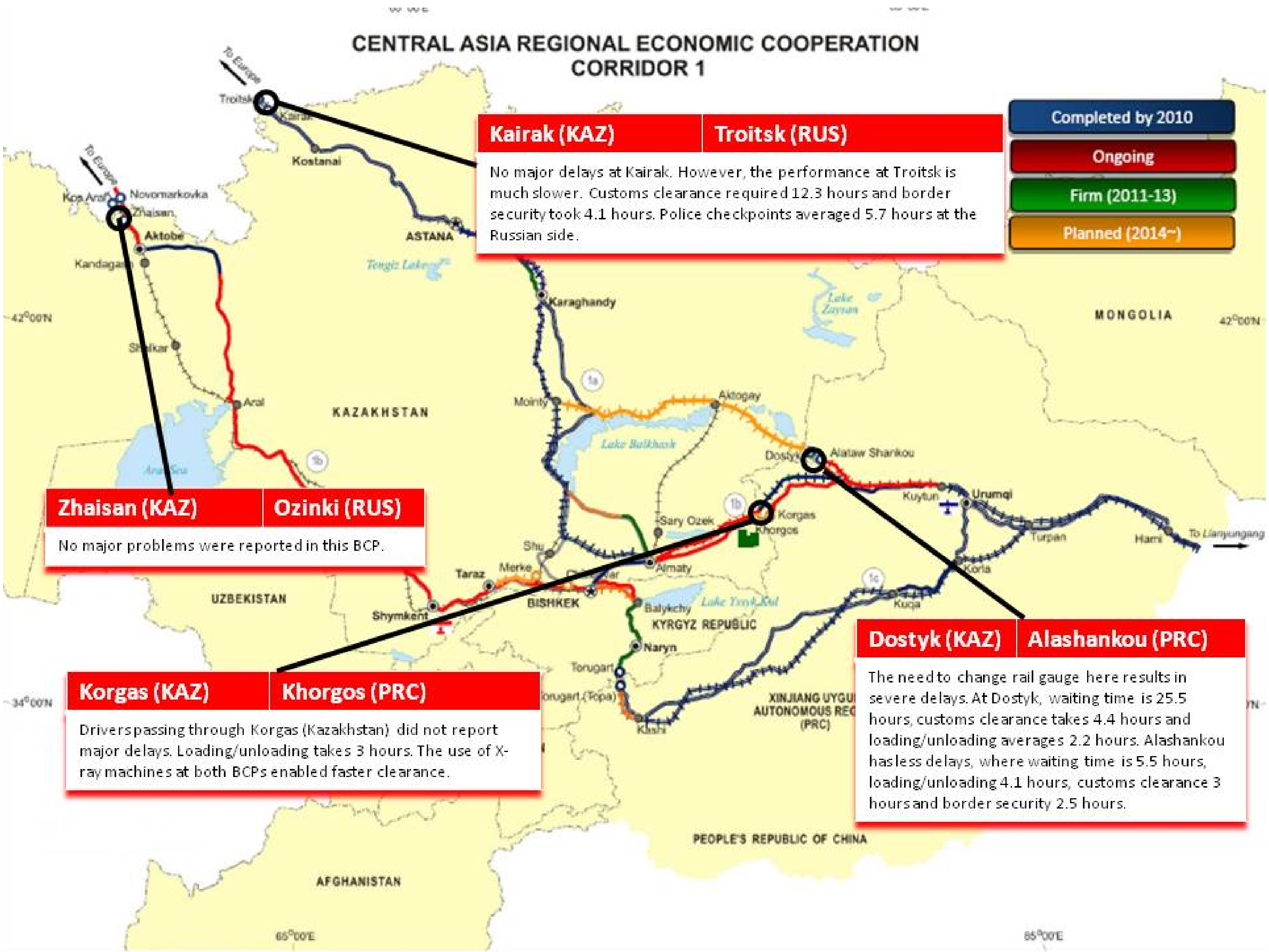
60. Korgas is the major BCP for cargo movement by road in this corridor. In 2009, 70,000 trucks and 700,000 tons of goods passed through Korgas, a number far significant than other BCPs for road transport. Drivers reported little problems here, although loading/unloading averaged 3 hours. The Kazakhstan government is exploring an integrated approach to border management here because transport, phyto-sanitary and veterinary inspections are currently conducted by different parties. A single entity responsible for all the inspections can further improve the time performance in Korgas.

61. For goods entering Russia, shippers can select to send by rail through Zhaisan or by road through Kairak. Data reflected little problems in border crossing at Zhaisan. This BCP would be further monitored in the period 2010-11, with more railway data compiled by the Kazakhstan Freight Forwarders Association.

62. The situation in Kairak is similarly efficient, although drivers reported concerns going through Troitsk. At this Russian BCP, customs clearance is a time-consuming activity which requires about 12.3 hours to complete, a relatively long time in the region. Police checkpoints averaged 5.7 hours of non-value added time, and border security checks required another 4.3 hours. Drivers still opt to use this BCP because Kairak is one of the largest in the northern part of Kazakhstan, and smaller BCPs would be more congested.

63. The study also showed that the direction of goods traveled from east to west. All the samples displayed Urumqi or Korgas as the origin, reflecting the actual trade situation. For instance at Korgas, 92% to 95% of the tonnage handled are Chinese exports, and only 5% to 8% are Kazakh exports into PRC. There is little data at present to suggest the popularity of the

eastern section of Corridor 1c, as most Chinese goods transit Dostyk or Korgas, not the Kyrgyz Republic. Within Kazakhstan, the route from Almaty to Kostanai via Karagandy and Astana tends to be heavily utilized. At Astana, drivers move to Kairak via Kostanai, or to Kostanai and then turn to Aktobe. Lack of good road networks tend to slow down the speed in Aktobe, although this section is also commonly used by drivers. Thus, a Class I road linking Aktobe to Astana will be beneficial to improve Corridor 1a/c. There is relatively less road traffic using the Shymkent-Aral-Aktobe route.



CENTRAL ASIA REGIONAL ECONOMIC COOPERATION CORRIDOR 1
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
Kairak (KAZ)
Troitsk (RUS)
No major delays at Kairak. However, the performance at Troitsk is much slower. Customs clearance required 12.3 hours and border security took 4.1 hours. Police checkpoints averaged 5.7 hours at the Russian side.
Zhaisan (KAZ)
Ozinki (RUS)
No major problems were reported in this BCP.
Korgas (KAZ)
Khorgos (PRC)
Drivers passing through Korgas (Kazakhstan) did not report major delays. Loading/unloading takes 3 hours. The use of X-ray machines at both BCPs enabled faster clearance.
Dostyk (KAZ)
Alashankou (PRC)
The need to change rail gauge here results in severe delays. At Dostyk, waiting time is 25.5 hours, customs clearance takes 4.4 hours and loading/unloading averages 2.2 hours. Alashankou has less delays, where waiting time is 5.5 hours, loading/unloading 4.1 hours, customs clearance 3 hours and border security 2.5 hours.
To Europe
Troitsk
Kostanai
Novomarkovka
Zhaisan
Aktobe
Kandagash
ASTANA
Karaghandy
KAZAKHSTAN
MONGOLIA
Aral
Mointy
Aktogay
Dostyk
Alataw Shankou
Lake Balkhash
Lake Zaysan
Sary Ozek
Korgas
Khorgos
Kuytun
Urumqi
Turpan
Hami
To Lianyungang
Korla
Kuqa
Almaty
Shu
Taraz
Merke
BISHKEK
Shymkent
UZBEKISTAN
Balykchy
KYRGYZ REPUBLIC
Naryn
Torugart
Kashi
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
PEOPLE'S REPUBLIC OF CHINA
AFGHANISTAN
42°00'N
34°00'N
65°00'E
85°00'E

Corridor 2: Mediterranean – East Asia

64. For Corridor 2 the following results are based on 549 samples submitted over the course of one year. Corridor 2 has a long stretch before it branches off to 2 sub-corridors – the common stretch had 15 observations, sub-corridor 2a had 420 observations; Corridor 2b 114.

A. Speed Indicators

65. Road vehicles moving on Corridor 2a and 2b have slower speeds compared to Corridor 1, and suffer from high variability. There is a 50% change from SWOD to SWD, suggesting that serious impediments delay the border crossing. Rail transport moves at a slow speed, although it has relatively lower variability.

Figure 13a : Road Speed (per 20 ton)

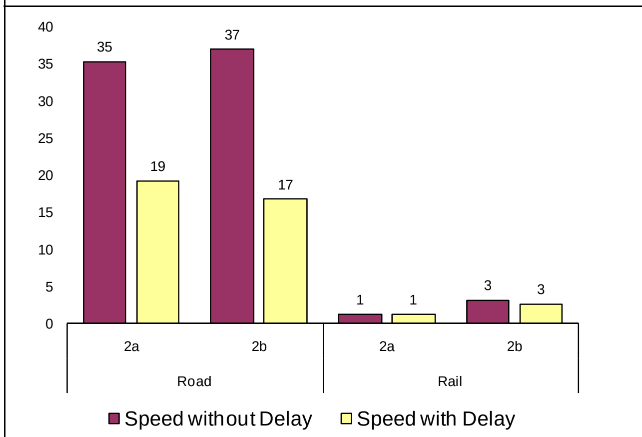
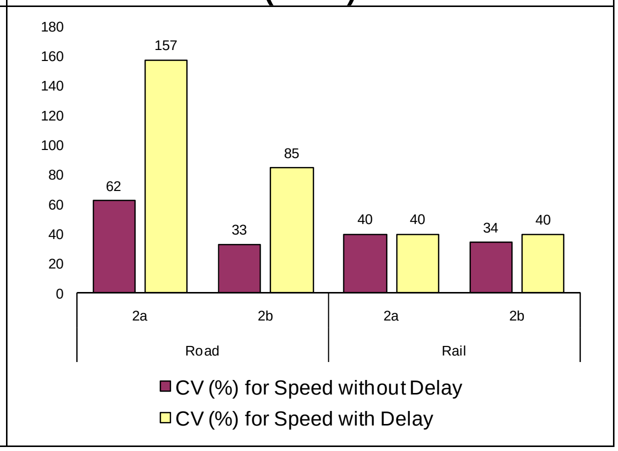


Figure 13b : Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

66. For road transport, delays are primarily caused by loading/unloading, waiting time, customs clearance, police checkpoints and environmental/ecological checkpoints. Loading/unloading is the most severe delay reason, which accounts for 13.6 hours for Corridor 2a and 12.8 hours in Corridor 2b, per 500 km of road travel.

67. Likewise in Corridor 1, railway security (escort/convoy) continues to be a time-consuming and expensive endeavor for rail transport in Corridor 2.

Table 5: Average Duration and Cost of Activities by Mode of Transport (Corridor 2)

Activity	Duration (hours per 500 km)			Cost ($ per 500 km)		
	Road		Rail	Road		Rail
	2a	2b	2b	2a	2b	2b
Health / quarantine	0.0	0.1		0.4	4.3	
Phytosanitary	0.0	0.1		0.3	1.5	
Veterinary inspection	0.0	0.1		1.8	1.0	
Border security / control	0.5	0.2		4.3	5.2	
Visa / immigration	0.3	0.2		23.1	8.7	
Customs clearance	3.3	2.4		12.7	12.0	
Detour	0.0					

Activity	Duration (hours per 500 km)			Cost ($ per 500 km)		
	Road		Rail	Road		Rail
	2a	2b	2b	2a	2b	2b
Waiting/ queue	3.5	1.9		12.8		
Loading / unloading	13.6	12.8		51.9	35.2	
Escort / convoy	0.0		47.4	0.8		86.2
Weight/standard inspection	0.5	0.1		1.3	1.4	
Police checkpoint / stop	4.8	1.5		9.7	8.0	
Transport/GAI inspection	0.1	1.2		3.9	5.2	
Environment/ecology checkpoint	3.2	12.6		1.1		
Vehicle registration	2.6	3.0		3.6	2.0	
Repair / tire replacement	7.9	5.8		28.1	16.5	
Transshipment	0.2			1.8		
Meals	4.3	9.5		17.3	12.1	
Rest/overnight stay	10.4	13.5		3.8	5.0	
Other activities	0.6	1.0		120.3	4.8	57.0

C. BCPs and Bottlenecks

68. Research has identified three BCP pairs that raise some concerns for border crossing. They are **Yierkeshitan-Erkechtam (PRC-KGZ)**, **Alat-Farap (UZB-TKM)** and **Daut Ota-Tazhen (UZB-KAZ)**. This corridor is arguably one of the most complicated because of the number of countries involved and the inefficiencies reported at the BCPs.

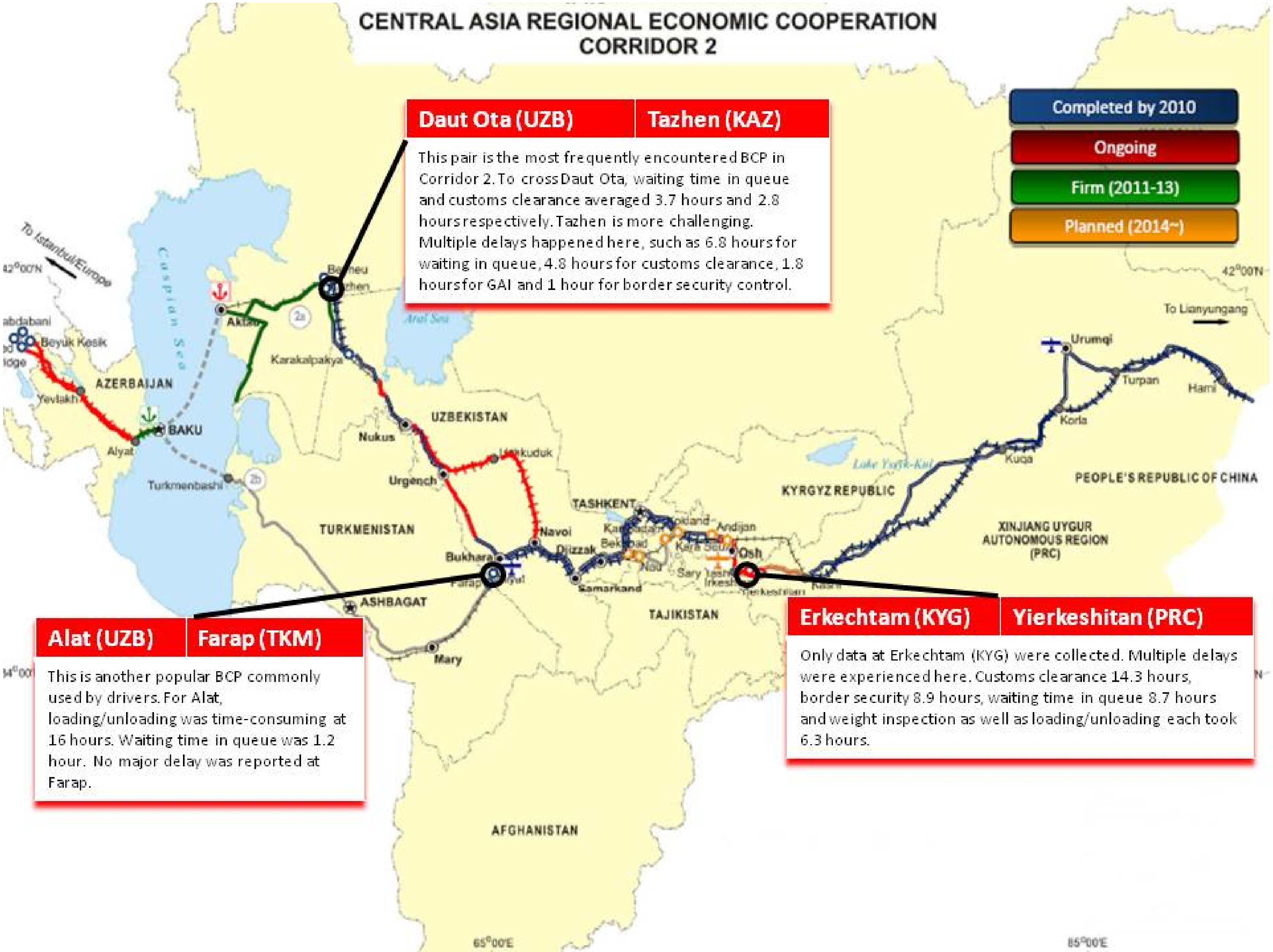
69. At Yierkeshitan-Erkechtam, significant delays were reported by road drivers at the latter. Customs clearance is one of the longest, requiring 14.3 hours. In addition, border security, waiting time and weight inspection each took 6 to 9 hours to complete. These multiple delays resulted in a low SWD despite a relatively high SWOD for Corridor 2.

70. In Corridor 2a, the Daut Ota-Tazhen BCP showed another problem. Tazhen is often cited as the bottleneck in this section. Drivers waited 6.8 hours in queue to cross the border, 4.8 hours for customs clearance and 1.8 hours for GAI. Daut Ota is comparatively more efficient, but drivers still required 3.7 hours for waiting in queue and 2.8 hours for customs clearance.

71. Alat-Farap is a popular corridor used by drivers from Uzbekistan, Turkmenistan and Iran. Farap posed some challenges as loading/unloading took 16 hours, suggesting a lack of proper and effective storage and material handling equipment.

72. Present samples indicated that the bulk of the movement in Corridor 2 occurred in a south to north direction where cargoes from Uzbekistan transit the Daut Ota-Tazhen BCP. Thus, it is relevant to monitor and improve further the performance of this BCP in facilitating the shipment of goods from CAREC countries to Russia and Europe.[9]

[9] KAZ, UZB, and AZE carriers report that there is virtually no Cross-Caspian RO-RO or container traffic. The principal reasons are the uncertain schedules and the high cost and lack of AZE trade with KAZ and UZB. It is much simpler to just go by road and rail and bypass the Caspian: this simpler process yields better results. The only traffic is KAZ crude oil moving in rail tank wagons to Poti and Batumi for export.



CENTRAL ASIA REGIONAL ECONOMIC COOPERATION CORRIDOR 2
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
Daut Ota (UZB)
Tazhen (KAZ)
This pair is the most frequently encountered BCP in Corridor 2. To cross Daut Ota, waiting time in queue and customs clearance averaged 3.7 hours and 2.8 hours respectively. Tazhen is more challenging. Multiple delays happened here, such as 6.8 hours for waiting in queue, 4.8 hours for customs clearance, 1.8 hours for GAI and 1 hour for border security control.
Alat (UZB)
Farap (TKM)
This is another popular BCP commonly used by drivers. For Alat, loading/unloading was time-consuming at 16 hours. Waiting time in queue was 1.2 hour. No major delay was reported at Farap.
Erkechtam (KYG)
Yierkeshitan (PRC)
Only data at Erkechtam (KYG) were collected. Multiple delays were experienced here. Customs clearance 14.3 hours, border security 8.9 hours, waiting time in queue 8.7 hours and weight inspection as well as loading/unloading each took 6.3 hours.
To Istanbul/Europe
To Lianyungang
Caspian Sea
Aral Sea
AZERBAIJAN
BAKU
Alyat
Yevlakh
Beyuk Kesik
Turkmenbashi
Aktau
Karakalpakya
Nukus
Urgench
UZBEKISTAN
TURKMENISTAN
ASHBAGAT
Mary
Bukhara
Navoi
Samarkand
TASHKENT
Andijan
Osh
TAJIKISTAN
KYRGYZ REPUBLIC
AFGHANISTAN
Urumqi
Turpan
Hami
Korla
Kuqa
PEOPLE'S REPUBLIC OF CHINA
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
42°00'N
65°00'E
85°00'E

Corridor 3: Russian Federation – Middle East and South Asia

73. For Corridor 3 the following results are based on 474 samples submitted over the course of one year. Corridor 3 has 2 sub-corridors - sub-corridor 3a had 386 observations; Corridor 3b only had 88 observations.

A. Speed Indicators

74. Road vehicles using Corridor 3 travel at a slightly lower speed compared to the first two corridors. Within Corridor 3, it is notable that Corridor 3a appears to perform better compared to Corridor 3b. Trucks using the former route travel at SWOD of 30 kph while the latter is 22 kph. Furthermore, it is striking that SWD in Corridor 3b drops from 22 kph to 8 kph after considering stop activities. Finally, Corridor 3a has lower variability compared to Corridor 3b, making it a more reliable route.

75. Rail transport offers a SWOD of 14 kph on Corridor 3a and 9 on Corridor 3b, with relatively lower variability compared to road transport.

Figure 14a : Road Speed (per 20 ton)

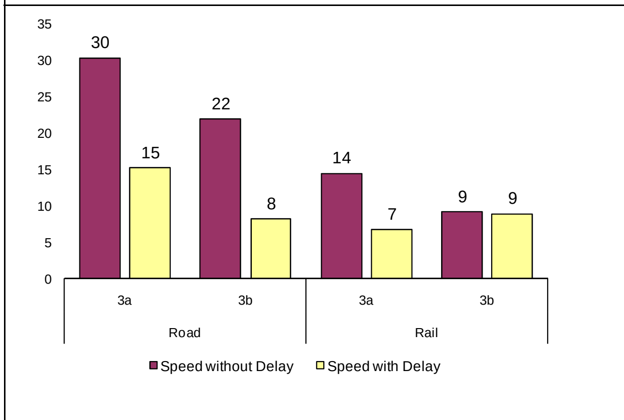
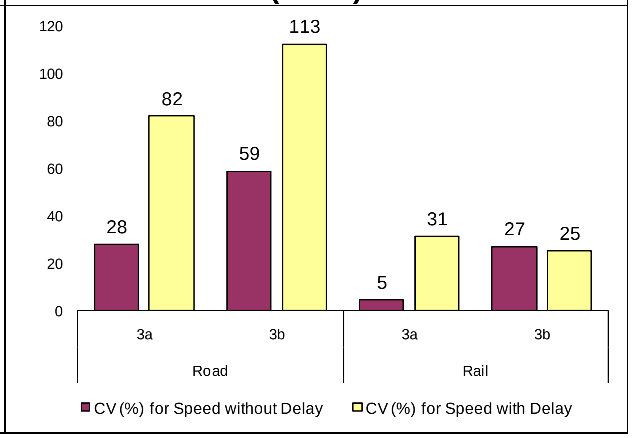


Figure 14b : Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

76. Customs clearance, waiting time, loading/unloading are key factors that add to the time and cost of travel. Customs clearance in 3b can be as long as 25 hours, which explains the sizeable difference between the SWOD and SWD in that corridor.

77. Table 6 reveals why Corridor 3b has a much lower SWD. There is a myriad of delay factors, namely, customs clearance, waiting time, loading/unloading, weight inspection and police checkpoints. Loading/unloading and waiting time cause very significant delays, adding an average of 107 hours and 60 hours of idle time to the entire journey.

Table 6: Average Duration and Cost of Activities by Mode of Transport (Corridor 3)

Activity	Duration (hours per 500 km)				Cost ($ per 500 km)	
	Road		Rail		Road	
	3a	3b	3a	3b	3a	3b
Health / quarantine	0.0	5.9			1.1	130.4
Phytosanitary	0.1	8.1			3.2	142.9

Activity	Duration (hours per 500 km)				Cost ($ per 500 km)	
	Road		Rail		Road	
	3a	3b	3a	3b	3a	3b
Veterinary inspection	0.0	0.0			0.2	
Border security / control	0.2	4.1	0.0	0.0	10.2	75.9
Visa / immigration	0.1	0.0			0.1	
Customs clearance	1.0	25.7			27.6	333.2
Detour						
Waiting/ queue	1.9	60.8				33.3
Loading / unloading	5.0	107.1			29.5	266.2
Escort / convoy	12.9	5.7			11.1	3.9
Weight/standard inspection	0.5	4.0			4.9	140.9
Police checkpoint / stop	5.9	9.8			17.7	63.8
Transport/GAI inspection	0.6				27.6	
Environment/ecology checkpoint	0.6	0.5			54.8	22.8
Vehicle registration	0.1	3.5			4.2	144.3
Repair / tire replacement	4.6	6.3			18.5	189.2
Transshipment	0.0				1.0	
Meals	5.0	11.8			19.6	31.5
Rest/overnight stay	9.4	42.7			6.8	8.0
Other activities	1.0	0.2			32.2	273.9

C. BCPs and Bottlenecks

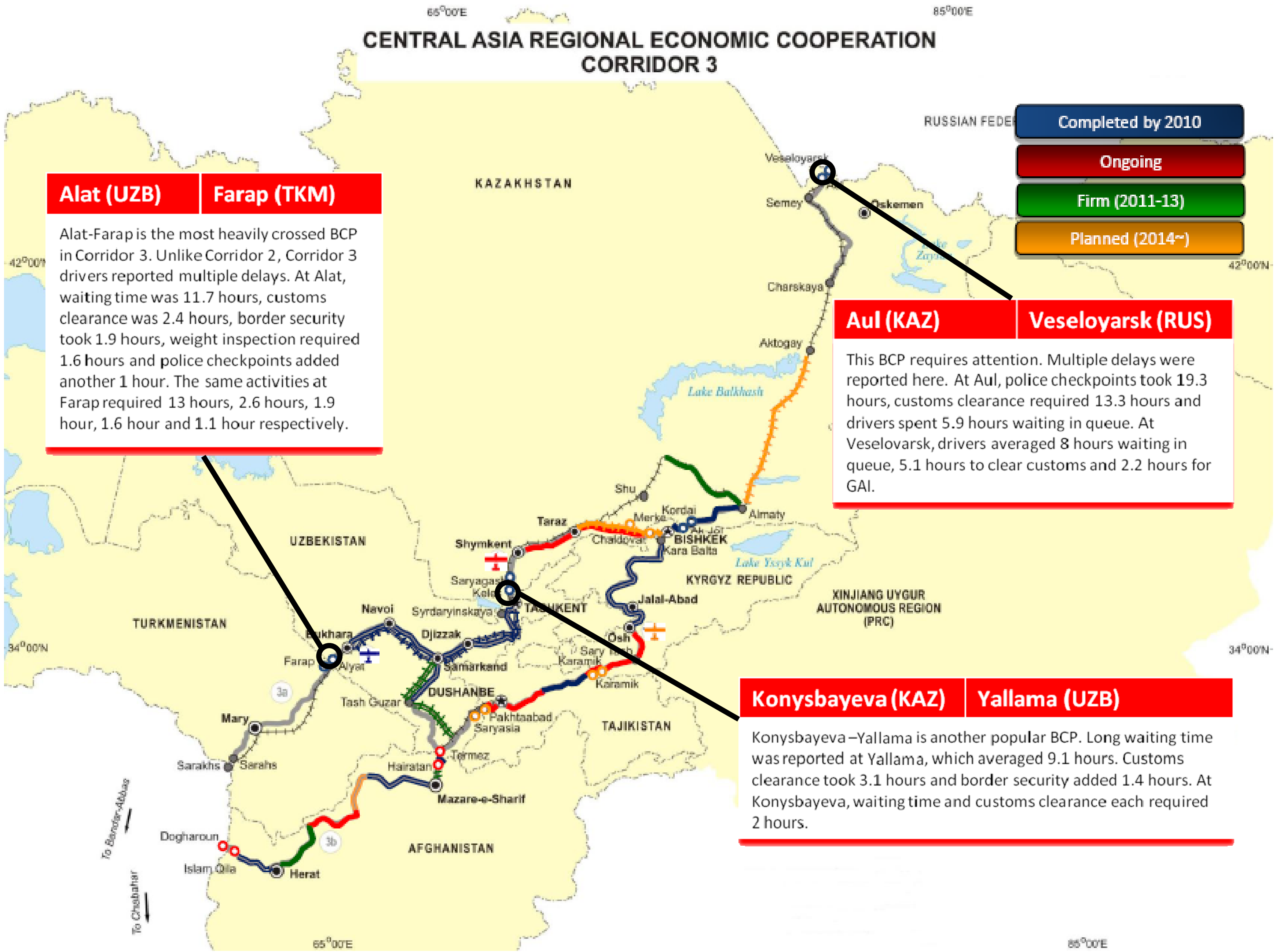
78. Three BCPs are critical in Corridor 3, namely **Alat-Farap (UZB-TKM)**, **Konysbayeva-Yallama (KAZ-UZB)** and **Aul-Veseloyarsk (KAZ-RUS).**

79. After Corridor 2, **Alat-Farap (UZB-TKM)** re-surfaced in Corridor 3 with one difference. The cargoes move from Central Asia southwards into Turkmenistan and Iran. Waiting time is **a major hurdle**: it averaged 11.7 hours at Alat and 13 hours in Farap. Other activities such as customs clearance, border security and weight inspection needed 1 to 3 hours to complete. As Alat-Farap is the most heavily utilized BCP in Corridor 3, improvements in this pair could increase the level of trade between Central Asia and Middle East as well as provide a strategic access to seaports at Bandar Abbas and Chabahar in Iran.

80. **Aul-Veseloyarsk (KAZ-RUS)** handled mainly cargoes moving from Kazakhstan northwards into Russia. Multiple delays reduced the transport efficiency. At Aul, several police checkpoints resulted in 19.3 hours of delays. Customs clearance averaged 13.3 hours and drivers spent close to 6 hours waiting to cross the border. Over at Veseloyarsk, drivers waited 8 hours in queue, spent 5 hours to clear customs and 2.2 hours for GAI. This BCP pair created large inefficiencies in Corridor 3.

81. **Konysbayeva-Yallama (KAZ-UZB)** is a popular BCP for road drivers. Earlier in 2010, drivers could only use Yallama because the Uzbek government unilaterally closed a few BCPs in the surrounding vicinity. This resulted in a long waiting time of 9.1 hours. Customs clearance took 3.1 hours. At Konysbayeva, waiting time and customs clearance each took 2 hours to complete.

82. The southern portion of Corridor 3b is currently not utilized as three sections in the ring road in Afghanistan are still being constructed. Thus, there is little traffic using the section from Mazare-e-Sharif to Herat to Islam Qila.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION CORRIDOR 3
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
Alat (UZB)
Farap (TKM)
Alat-Farap is the most heavily crossed BCP in Corridor 3. Unlike Corridor 2, Corridor 3 drivers reported multiple delays. At Alat, waiting time was 11.7 hours, customs clearance was 2.4 hours, border security took 1.9 hours, weight inspection required 1.6 hours and police checkpoints added another 1 hour. The same activities at Farap required 13 hours, 2.6 hours, 1.9 hour, 1.6 hour and 1.1 hour respectively.
Aul (KAZ)
Veseloyarsk (RUS)
This BCP requires attention. Multiple delays were reported here. At Aul, police checkpoints took 19.3 hours, customs clearance required 13.3 hours and drivers spent 5.9 hours waiting in queue. At Veselovarsk, drivers averaged 8 hours waiting in queue, 5.1 hours to clear customs and 2.2 hours for GAI.
Konysbayeva (KAZ)
Yallama (UZB)
Konysbayeva–Yallama is another popular BCP. Long waiting time was reported at Yallama, which averaged 9.1 hours. Customs clearance took 3.1 hours and border security added 1.4 hours. At Konysbayeva, waiting time and customs clearance each required 2 hours.
KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
KYRGYZ REPUBLIC
TAJIKISTAN
AFGHANISTAN
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
Veseloyarsk
Semey
Oskemen
Charskaya
Aktogay
Lake Balkhash
Shu
Almaty
Kordai
Merke
Taraz
Chaldovar
BISHKEK
Kara Balta
Lake Yssyk Kul
Shymkent
TASHKENT
Jalal-Abad
Osh
Navoi
Syrdaryinskaya
Djizzak
Bukhara
Farap
Alyat
Samarkand
Karamik
DUSHANBE
Tash Guzar
Pakhtaabad
Saryasia
Termez
Hairatan
Mazare-e-Sharif
Mary
Sarakhs
Sarahs
Dogharoun
Islam Qila
Herat
To Bandar-Abbas
To Chabahar
65°00'E
85°00'E
42°00'N
34°00'N

Corridor 4: Russian Federation – East Asia

83. For Corridor 4 the following results are based on 685 samples submitted over the course of one year. Corridor 4 also has 2 sub-corridors; however all observations cover only corridor 4a from Erlian going through Zamyn Uud through to Sukhbaatar. No observations are reported for corridor 4b covering the route from Urumqi to Ulaanbaishint-Tashanta BCPs.

A. Speed Indicators

84. Corridor 4 highlights the difficult situations faced by Mongolian transporters. The SWOD and SWD are significantly lower than that of other corridors. The CVs of road and rail transport are also comparatively high, which makes Corridor 4 an inefficient and unreliable corridor for cargo movement.

85. Drivers using Corridor 4 can drive on a dual carriageway from Altanbulag to Ulaan Baatar to Choyr. A road is being constructed from Choyr to Zamyn-Uud. During winter, the speed is especially slow as heavy snow makes navigation difficult. In addition, grazing herds frequently wander into the roads and vehicles need to wait for the entire herd to clear before driving on.

86. The very slow speed observed in rail transport can be attributed to several reasons. There is only one rail line operating in Corridor 4.[10] With only a single line, priority is given to passenger trains, while freight trains move mainly at night. Thus, freight trains wait for a long period in the rail marshalling yard. Sometimes, the wagons also wait for old, obsolete locomotives to be substituted or repaired to form a train.

Figure 15a : Speed (per 20 ton) (Road and Rail)

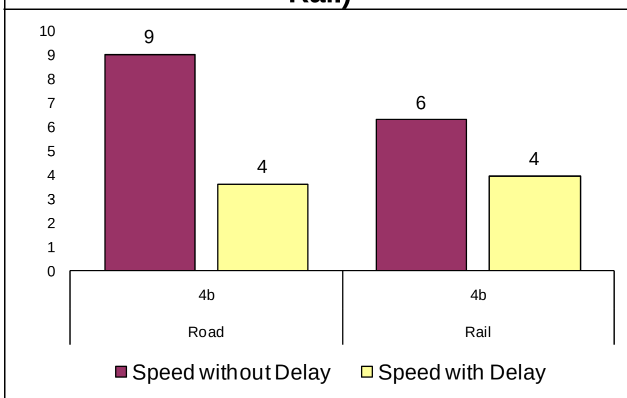
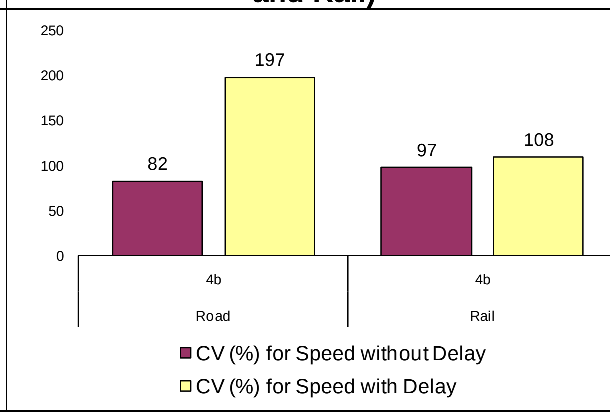


Figure 15b : Coefficient of Variation (Road and Rail)



B. Cost and Time Spent on Delays

87. Loading/unloading and waiting time are important delay factors. These usually occur in major cities such as Ulaanbaatar (a key consolidation and deconsolidation center), Sukhbaatar, Sainshand, Choyr and the BCP Zamyn-Uud. Similarly, the waiting time for rolling stocks delays the speed for rail transport. Cargo at the train terminals in Ulaanbaatar, Sainshand and Choyr could wait 10-20 hours for locomotives or empty wagons.

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[10] MON track formation is not heavy-duty enough for double stack application, and MON lacks sufficient funding to build a second line.

Table 7: Average Duration and Cost of Activities by Mode of Transport (Corridor 4)

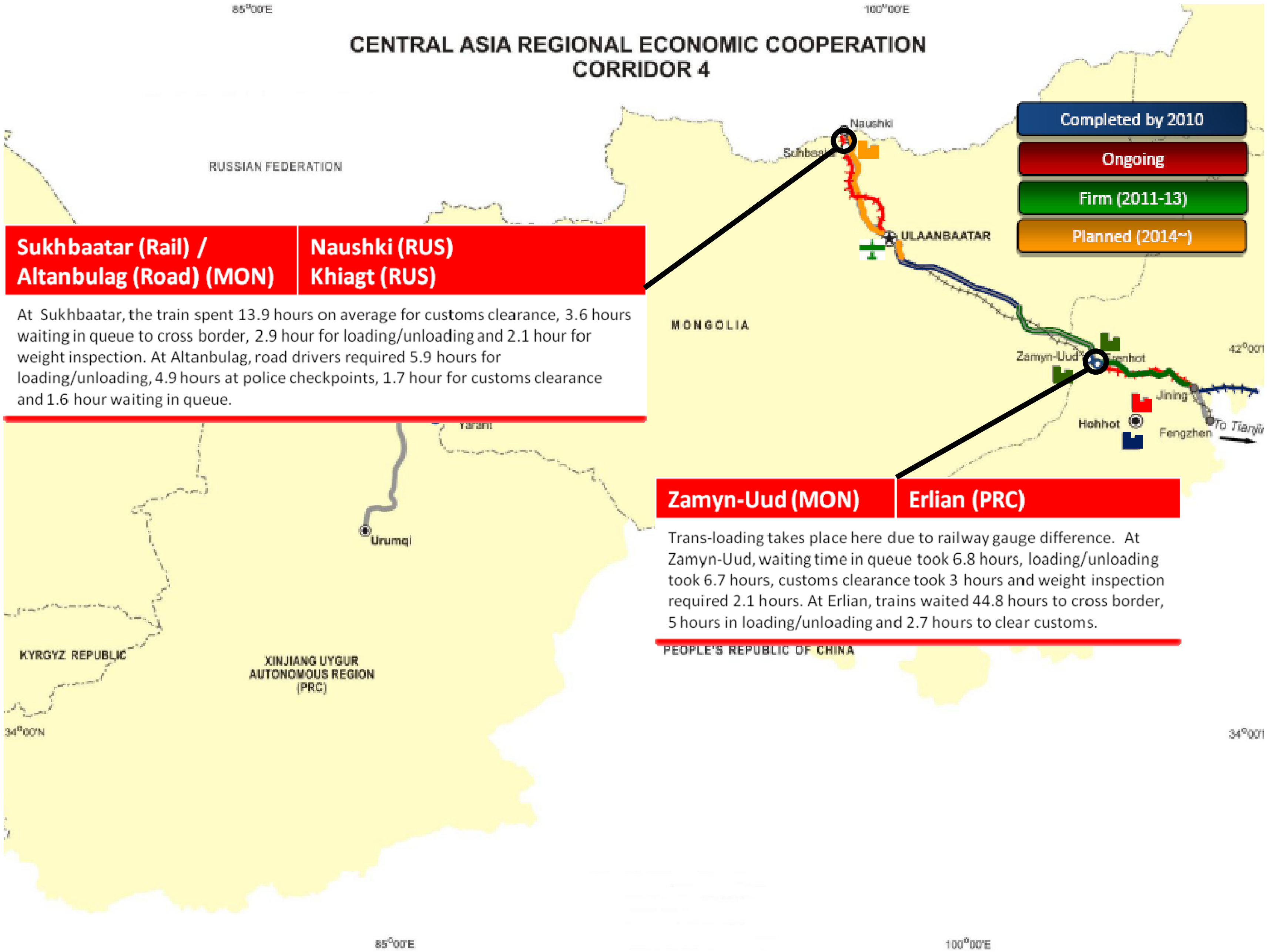
Activity	Duration (hours per 500 km)		Cost ($ per 500 km)	
	Road	Rail	Road	Rail
	4b	4b	4b	4b
Health / quarantine	4.9		29.4	
Phytosanitary	0.9	0.5	39.6	20.4
Veterinary inspection	2.2		13.3	
Border security / control	5.6	23.2		
Visa / immigration	1.0		166.0	
Customs clearance	3.2	13.9	636.1	
Detour	10.7			
Waiting/ queue	4.0	39.6	869.6	11.4
Loading / unloading	5.4		41.7	110.6
Escort / convoy	0.6		351.4	
Weight/standard inspection	0.7		14.5	
Police checkpoint / stop	1.8		58.5	
Transport/GAI inspection	0.8		9.8	
Environment/ecology checkpoint	0.6		9.5	
Vehicle registration	17.5		8.9	
Repair / tire replacement	5.5		17.2	
Transshipment				52.6
Meals	9.2		24.2	
Rest/overnight stay	7.5			
Other activities	59.3	18.3	21.3	163.1

C. BCPs and Bottlenecks

88. In the north, **Khiagt-Altanbulag (RUS-MON)** and **Naushki-Sukhbaatar (RUS-MON)** handle the cargoes by road and rail respectively. In the south, Zamyn-Uud-Erlian (MON-PRC) handles mainly cargoes by railways, due to the absence of good roads from Choyr to Zamyn-Uud in Corridor 4.

89. At Altanbulag, drivers required close to 6 hours for loading/unloading, 5 hours at police checkpoints, 1.7 hours for customs clearance and 1.6 hours for waiting in queue. Altanbulag has the capacity to process 500 vehicles a day, but the current daily utilization averaged only 150 trucks. Most traffic is conducted by rail through Sukhbaatar. For instance, timber (the main item coming from Russia into Mongolia) can come by trucks from Russia, go to Sukhbaatar which is 24 km away from Altanbulag, and are trans-loaded onto railways to reduce transport cost. At Sukhbaatar, one worrisome fact is customs clearance took close to 14 hours, and trains waited another 3.6 hours in queue, as well as close to 3 hours for loading/unloading.

90. The situation at Zamyn-Uud – Erlian is quite challenging. The necessary rail gauge change meant that trains waited 44.8 hours at Erlian and 6.8 hours at Zamyn-Uud. In Erlian, loading/unloading took 5 hours and customs clearance required 2.7 hours. In Zamyn-Uud, the same activities took 6.7 hours and 3 hours respectively.


85°00'E
100°00'E
CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 4
RUSSIAN FEDERATION
Naushki
Sühbaatar
ULAANBAATAR
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
Sukhbaatar (Rail) / Altanbulag (Road) (MON)
Naushki (RUS) Khiagt (RUS)
At Sukhbaatar, the train spent 13.9 hours on average for customs clearance, 3.6 hours waiting in queue to cross border, 2.9 hour for loading/unloading and 2.1 hour for weight inspection. At Altanbulag, road drivers required 5.9 hours for loading/unloading, 4.9 hours at police checkpoints, 1.7 hour for customs clearance and 1.6 hour waiting in queue.
MONGOLIA
Zamyn-Uud
Erenhot
42°00'N
Jining
Hohhot
Fengzhen
To Tianjin
Urumqi
Zamyn-Uud (MON)
Erlian (PRC)
Trans-loading takes place here due to railway gauge difference. At Zamyn-Uud, waiting time in queue took 6.8 hours, loading/unloading took 6.7 hours, customs clearance took 3 hours and weight inspection required 2.1 hours. At Erlian, trains waited 44.8 hours to cross border, 5 hours in loading/unloading and 2.7 hours to clear customs.
PEOPLE'S REPUBLIC OF CHINA
KYRGYZ REPUBLIC
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
34°00'N
34°00'N
85°00'E
100°00'E

Corridor 5: Europe – East Asia – Middle East and South Asia

91. For Corridor 5 the following results are based on 544 samples submitted over the course of one year. Corridor 5 has no sub-corridors

A. Speed Indicators

92. Corridor 5 is exclusively a road transit corridor. Drivers reported SWOD and SWD of 24 kph and 18 kph, respectively. These speeds have comparatively low CVs compared to other corridors, and they are also consistent throughout the year. Examining the difference between the SWOD and SWD, two conclusions can be made. First, the physical infrastructure needs to be enhanced as the SWOD is lower than those in other corridors. Second, since SWOD and SWD are not significantly different, it is suspected that stop activities are not as severe as those in other corridors. This observation is further supported by data presented below.

93. Seasonal factors do not appear to impact the speeds along Corridor 5. However, as a road-only corridor, the potential for multi-modal transport is limited.

Figure 16a : Road Speed (per 20 ton)

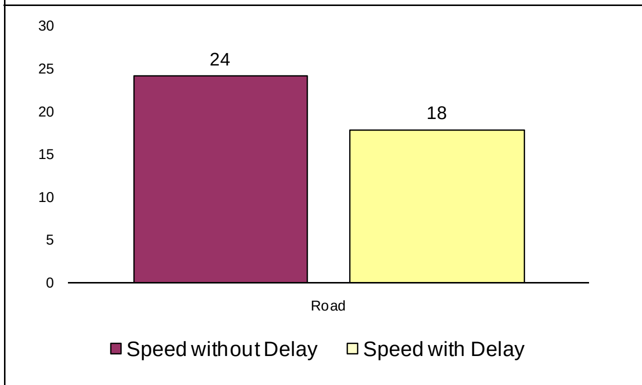
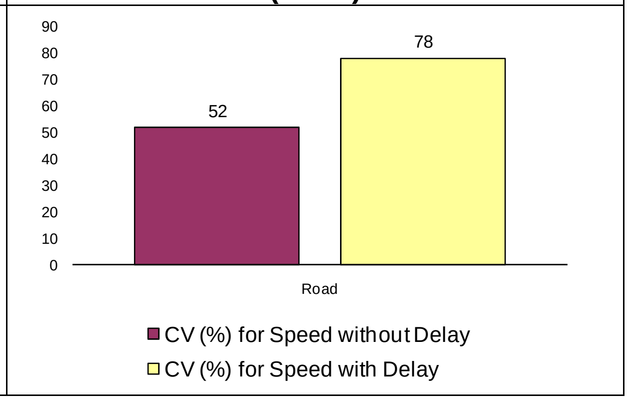


Figure 16b : Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

94. The delay activities in Corridor 5 are caused primarily by waiting time in queue, escort/convoy, weight inspection and police checkpoints. Waiting time in queue is most severe, which averages 6.3 hours. Nonetheless, the values here are lower than the values of stop activities in other corridors.

Table 8: Average Duration and Cost of Activities by Mode of Transport (Corridor 5)

Activity	Duration (hours per 500 km)	Cost ($ per 500 km)
	Road	Road
Health / quarantine	0.1	1.7
Phytosanitary	0.1	1.6
Veterinary inspection	0.1	2.1
Border security / control	0.1	1.5
Visa / immigration	1.7	2.8
Customs clearance	0.4	4.2
Detour	1.0	24.8
Waiting/ queue	6.3	40.0

Activity	Duration (hours per 500 km)	Cost ($ per 500 km)
	Road	Road
Loading / unloading	0.3	18.7
Escort / convoy	6.3	13.2
Weight/standard inspection	3.7	12.0
Police checkpoint / stop	2.0	22.8
Transport/GAI inspection	0.1	2.0
Environment/ecology checkpoint	1.8	18.3
Vehicle registration	0.1	5.6
Repair / tire replacement	1.6	21.9
Transshipment	0.7	43.0
Meals	3.1	15.0
Rest/overnight stay	14.3	12.3
Other activities	0.3	43.8

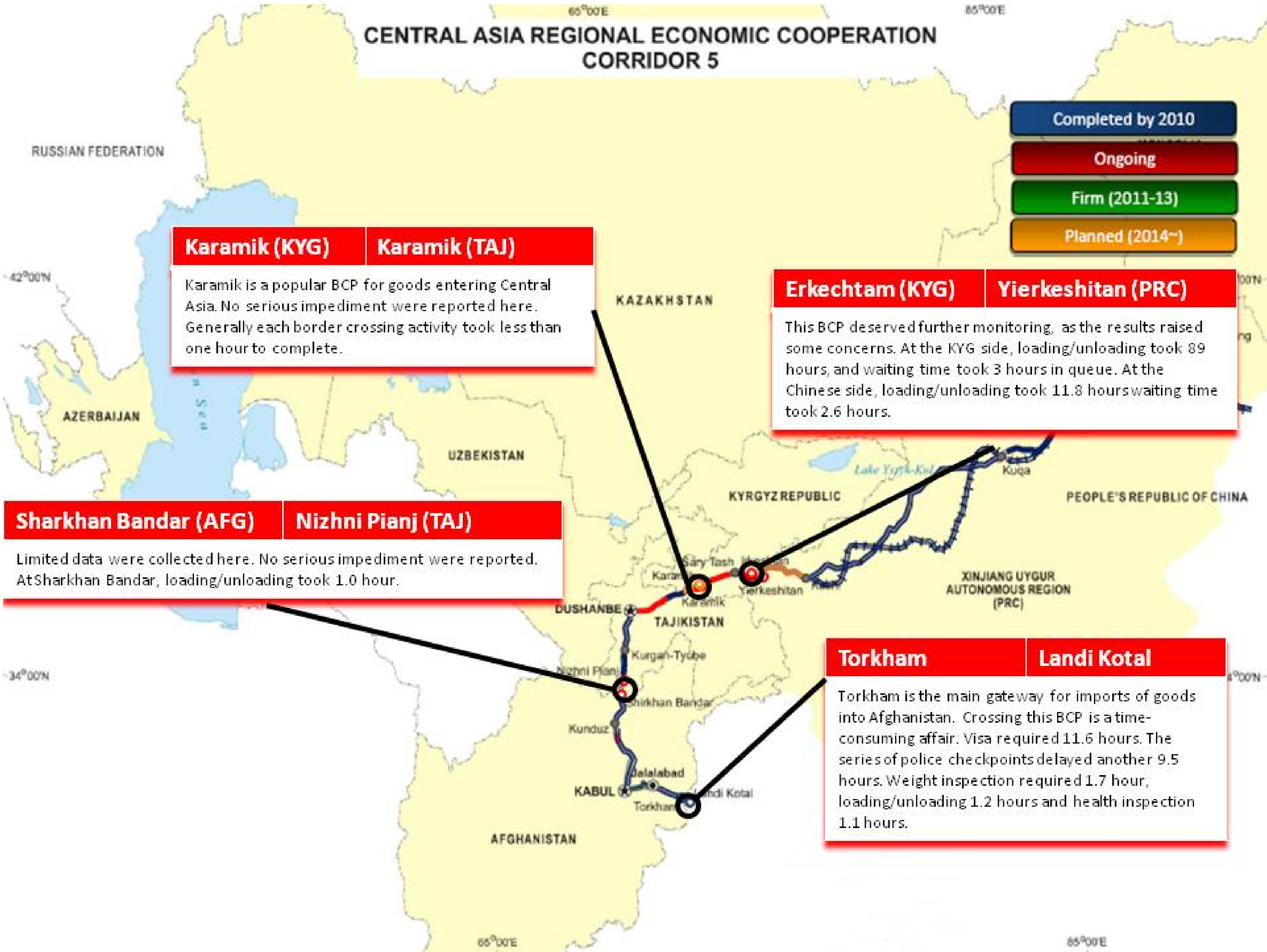
C. BCPs and Bottlenecks

95. Corridor 5 transits a few key BCPs, namely **Yierkeshitan-Erkechtam (PRC-KGZ)**, **Karamik (KGZ-TAJ)**, **Shirkhan Bandar-Nizhni Pianj (TAJ-AFG)** and **Landi Kotal – Torkham (PAK-AFG)**. Data raised some concerns on two BCPs.

96. At Erkechtam, loading/unloading is unusually lengthy at 11.8 hours, and waiting time in queue took 2.6 hours. This mirrored the delays reported in Corridor 2.

97. The other BCP that is challenging is Torkham in Afghanistan. Due to security concerns, visa application required 11.6 hours. The stretch of roads from Peshawar to Landi Kotal to Torkham is dotted with police checkpoints, which added significantly to the delay and consumed 9.5 hours of delays. Weight inspection took 1.7 hour, loading/unloading at 1.2 hour and health inspection at 1.1 hour.

98. No significant delays were reported at Karamik-Karamik and Sharkhan Bandar-Nizhni Pianj.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 5
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
RUSSIAN FEDERATION
AZERBAIJAN
KAZAKHSTAN
UZBEKISTAN
KYRGYZ REPUBLIC
TAJIKISTAN
AFGHANISTAN
PEOPLE'S REPUBLIC OF CHINA
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
DUSHANBE
Kurgan-Tyube
Kunduz
KABUL
Jalalabad
Sary Tash
Yierkeshitan
Kuqa
Karamik (KYG)
Karamik (TAJ)
Karamik is a popular BCP for goods entering Central Asia. No serious impediment were reported here. Generally each border crossing activity took less than one hour to complete.
Erkechtam (KYG)
Yierkeshitan (PRC)
This BCP deserved further monitoring, as the results raised some concerns. At the KYG side, loading/unloading took 89 hours, and waiting time took 3 hours in queue. At the Chinese side, loading/unloading took 11.8 hours waiting time took 2.6 hours.
Sharkhan Bandar (AFG)
Nizhni Pianj (TAJ)
Limited data were collected here. No serious impediment were reported. At Sharkhan Bandar, loading/unloading took 1.0 hour.
Torkham
Landi Kotal
Torkham is the main gateway for imports of goods into Afghanistan. Crossing this BCP is a time-consuming affair. Visa required 11.6 hours. The series of police checkpoints delayed another 9.5 hours. Weight inspection required 1.7 hour, loading/unloading 1.2 hours and health inspection 1.1 hours.

Corridor 6 : Europe – Middle East and South Asia

99. For Corridor 6 the following results are based on 393 samples submitted over the course of one year. Corridor 6 has 3 sub-corridors - sub-corridor 6a had 281 observations; Corridor 6b only 43 observations and Corridor 6c 89.

A. Speed Indicators

100. Corridor 6 demonstrates a contrasting situation within the three sub-corridors. Drivers favored the use of Corridor 6a, which has good roads, resulting in a high SWOD of 38 kph. Slow speeds are evident in Corridor 6b and 6c. Coupled with high CVs in these two sub-corridors, shippers need to be careful when using these two routes for freight transit. The slow and unreliable performance of these sub-corridors is due to two key factors. Firstly, there is a lack of good roads in western Kazakhstan. The section traversing Tajikistan goes through mountainous terrain and in winter cannot be used.

Figure 17a : Road Speed (per 20 ton)

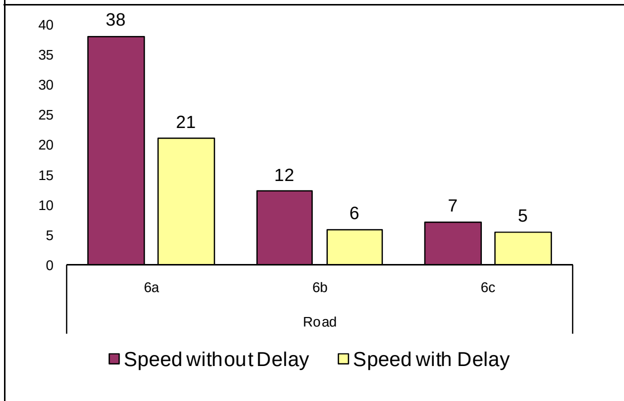
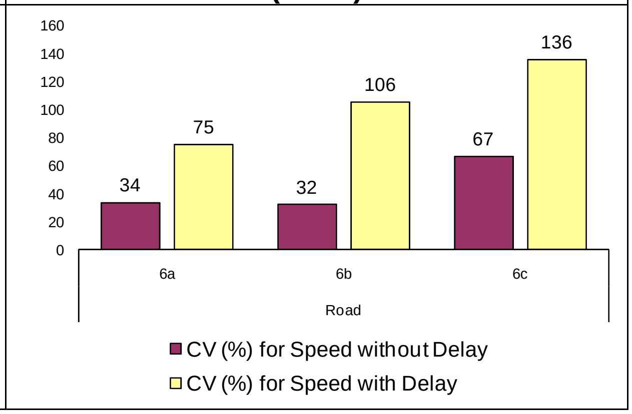


Figure 17b : Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

101. Key activities that delay drivers in Corridor 6 are customs clearance, loading/unloading, escort/convoy and police checkpoints. In addition, customs clearance forms a big portion of the overall cost to cross the borders.

Table 9 : Average Duration and Cost of Activities by Mode of Transport (Corridor 6)

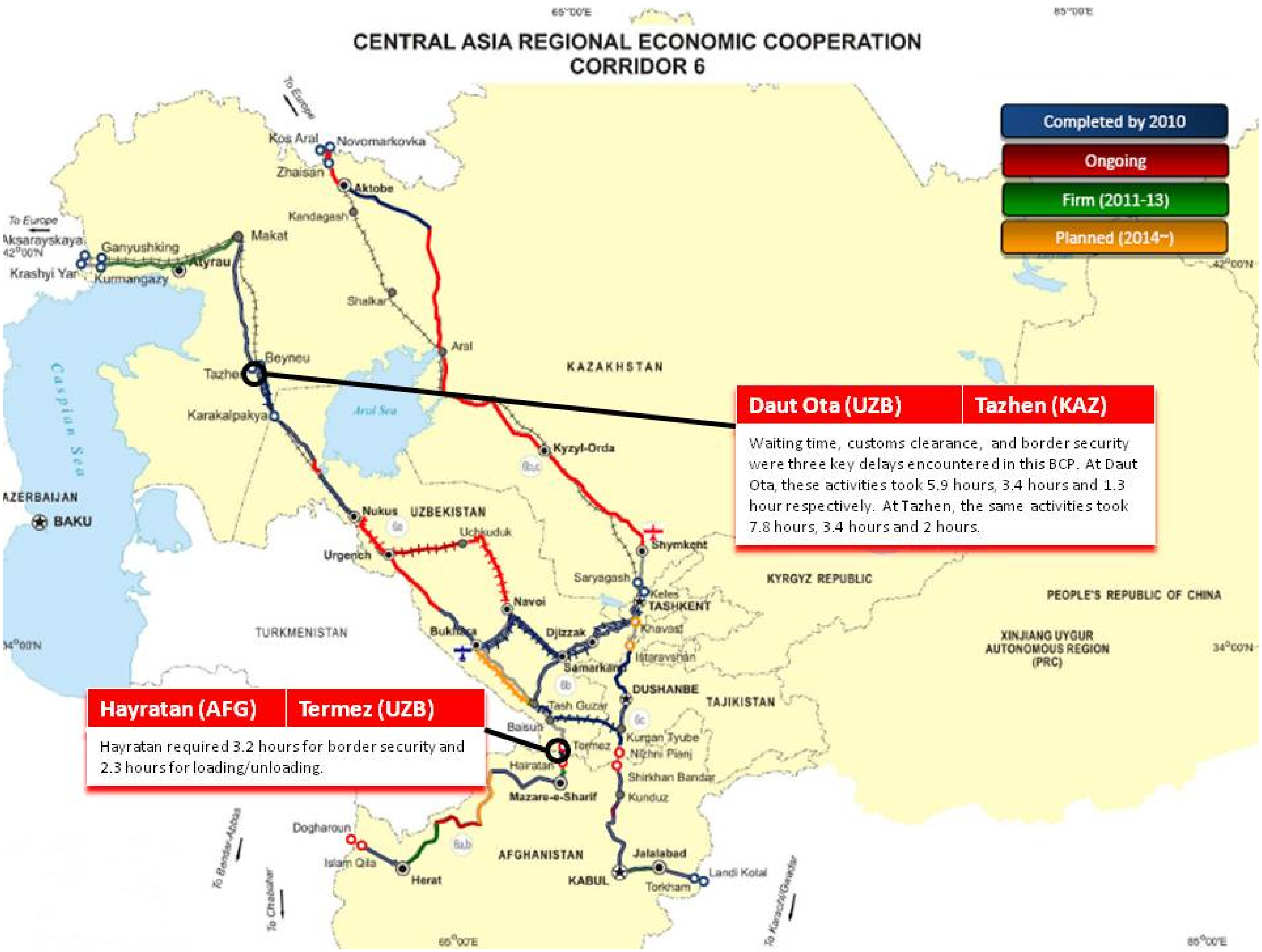
Activity	Duration (hours per 500 km)				Cost ($ per 500 km)			
	Road			Rail	Road			Rail
	6a	6b	6c	6a	6a	6b	6c	6a
Health / quarantine	0.1	0.0	0.0		1.7	0.3	0.4	
Phytosanitary	0.0	0.0	0.0		2.5	0.5	0.1	
Veterinary inspection	0.0	0.0			0.4	0.6		
Border security / control	0.1	0.4	0.0		8.2	0.9	0.4	
Visa / immigration	0.0				0.3			
Customs clearance	0.3	0.2	3.5	0.1	56.0	1.0	3.2	4.6
Detour								
Waiting/ queue	0.2	0.1	5.8			10.2		
Loading / unloading	3.6	4.4	61.7		0.7	43.1		

Activity	Duration (hours per 500 km)				Cost ($ per 500 km)			
	Road			Rail	Road			Rail
	6a	6b	6c	6a	6a	6b	6c	6a
Escort / convoy	6.1				9.1			
Weight/standard inspection	0.2	0.3	2.2		2.9			
Police checkpoint / stop	1.1	24.0	1.2		38.6		26.2	
Transport/GAI inspection	0.2		0.4		11.8		10.1	
Environment/ecology checkpoint	0.2		1.9		10.7			
Vehicle registration	0.0		0.0		1.1		1.0	
Repair / tire replacement	2.0	37.2	0.2		23.8			
Transshipment	0.0				1.4			
Meals	2.7	34.0	7.0		15.9	15.3	35.3	
Rest/overnight stay	8.6	14.9	3.9		13.0	10.6	6.7	
Other activities	0.5	1.4	20.3		99.6		46.8	

C. BCPs and Bottlenecks

102. At **Hayratan-Termez (AFG-UZB),** a 165 km railway is planned to link Hayratan to Mazare-e-Sharif, which will reduce the cost of transport. Presently, only data on Hayratan is collected. Drivers reported 3.2 hours for border security and 2.3 hours for loading/unloading.

103. **Daut Ota-Tazhen (UZB-KAZ)** surfaced again in Corridor 6. As with Corridor 2, Tazhen continues to be a BCP that requires improvement. Long waiting time (7.8 hours), burdensome customs clearance (3.4 hours) and border security (2 hours) resulted in multiple delays experienced by drivers at Tazhen. The same activities at Daut Ota took 5.9 hours, 3.4 hours, and 1.3 hours, respectively.



CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 6
Completed by 2010
Ongoing
Firm (2011-13)
Planned (2014~)
Daut Ota (UZB)
Tazhen (KAZ)
Waiting time, customs clearance, and border security were three key delays encountered in this BCP. At Daut Ota, these activities took 5.9 hours, 3.4 hours and 1.3 hour respectively. At Tazhen, the same activities took 7.8 hours, 3.4 hours and 2 hours.
Hayratan (AFG)
Termez (UZB)
Hayratan required 3.2 hours for border security and 2.3 hours for loading/unloading.
KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
KYRGYZ REPUBLIC
TAJIKISTAN
AFGHANISTAN
PEOPLE'S REPUBLIC OF CHINA
XINJIANG UYGUR AUTONOMOUS REGION (PRC)
AZERBAIJAN
BAKU
TASHKENT
DUSHANBE
KABUL
Caspian Sea
Aral Sea

V. CONCLUSION

104. It is well established that transportation in CAREC countries can be improved. Earlier studies have identified poor physical infrastructure, unharmonized polices and regulations, and operational challenges as major barriers to the smooth flow of trade across the region. CPMM is the first large scale study commissioning multiple transport and logistics associations in the 8 CAREC countries to collect substantial empirical data to quantify time and cost factors. ADB currently has a database of metrics to support decision making.

105. How can these data be utilized for decision making? Firstly, the data show that SWOD in most corridors are significantly below the speeds achieved in Europe or the U.S. Under-investment in the transport networks as well as the inability to construct Class I and II roads, maintain and add facilities, and replace aging rolling stocks in railways systems depress the SWOD along CAREC corridors. Only when better roads and railways are constructed can improvement be made to the SWOD. The CPMM results can indicate to decision makers which sections of roads or railways can be prioritized.

106. Secondly, transport friction caused by regulatory barriers and burdensome procedures at the BCPs need to be reviewed and minimized or eliminated. It is apparent that most corridors encounter a sharp reduction from SWOD to SWD, primarily caused by cumbersome border-crossing activities. Long queues of vehicles waiting to cross the borders, serial processing of border crossing applications due to the lack of integrated border management systems and lack of material handling equipment to expedite loading/unloading result in non-value added time. Thus, the Time-Cost-Distance charts display 'vertical lines', indicating time and costs are being spent but the vehicle is not moving. In the corridor analyses, several BCPs and the associated activities that cause the most delays have been identified. Policy makers can prioritize to improve operations at those BCPs so that border crossing can be an efficient process, simultaneously driving the time and cost down considerably.

107. The third way to use information is to review the coefficient of variation in each corridor. For shippers, freight arrival reliability is a major factor in deciding which routes and mode of transport to use. It involves additional cost if the goods arrive too early or too late. Better information, synchronized operating hours at BCPs, and track-and-trace technologies can be used to reduce the unpredictability factor. This will directly reduce the safety inventory level at warehouses and depots, which helps to reduce the cost of doing business.

108. Cost analysis is trickier than analyzing speeds. Due to confidentiality, associations are reluctant to release actual cost information and profit margins. Also, the transport costs are tied to the classification of the products and the commercial value declared. Nonetheless, CPMM provides an estimate of the total transport cost in each corridor for the road and rail mode of transport. In addition, the costs of border crossing have been decomposed. A very important work of CPMM is to address the issue of unofficial payments which can then drive down the overall cost of transport. A related CAREC initiative is establishment of the RJC (Regional Joint Committee), which involves senior transport, trade and customs officials from each CAREC member countries. At RJC conferences, differences are being discussed and decisions made to streamline the border crossing procedures as well as review the unofficial payments in each corridor. Such regional cooperation will be instrumental in addressing those problems.

109. In 2010-11, the CPMM project team will continue to support the data collection and analysis process. The methodology is continuously being refined and improved. There are plans to develop capacities of partner associations and NJCs to perform analysis and prepare reports

at the country level. Time Release Studies are also planned to be conducted in selected BCPs early next year. Customs staff will be trained to conduct the studies in coordination with the World Customs Organization, a development partner. The TRS results will complement the time-cost distance data of the CPMM. Over time, with improvements to infrastructure and the treatment of goods in transit, CAREC corridors will provide more timely, cost-effective, reliable and secure transit routes, becoming economic corridors that drive the growth of the CAREC region.

VI. APPENDIX

APPENDIX 1 : CPMM Partner Associations

CPMM partners are essential to the success of CPMM. These organizations are the local associations which represent the transport and logistics industry. They are specially selected to carry out data collection. The key responsibilities of the CPMM partners are:

- Act as a local point of contact for ADB to conduct the CPMM exercise
- Understand the CPMM methodology
- Organize drivers to use customized drivers' forms for data collection
- Review the completed drivers' forms to ensure data completeness and correctness
- Input the raw data from the drivers' forms into a specially designed CAREC CPMM file (created using Microsoft Office Excel)
- Send the completed CPMM files to CAREC

At present, there are 14 CPMM partners working closely with CAREC.

List of CPMM Partners

	Country	Official Names	Abbreviated Names
1	AFG	Afghanistan Association of Freight Forwarders Companies	AAFFCO
2	AZE	Azerbaijan International Road Carriers Association	ABADA
3	KAZ	Union of International Road Carriers of the Republic of Kazakhstan	KAZATO
4	KAZ	Kazakhstan Freight Forwarders Association	KFFA
5	KGZ	Freight Operators Association of Kyrgyzstan	FOA
6	KGZ	Association of International Road Carriers of the Kyrgyz Republic	ASMAP
7	MON	Mongolia National Chamber of Commerce and Industry	MNCCI
8	MON	National Road Transport Association of Mongolia	NARTAM
9	PRC	China International Freight Forwarders Association	CIFA
10	PRC	Inner Mongolia Autonomous Region Logistics Association	IMLA
11	PRC	Xinjiang Uighur Logistics Association People's Republic of China	XULA
12	TAJ	Association of International Automobile Carriers of the Republic of Tajikistan	ABBAT
13	UZB	Business Logistics Development Association	ADBL
14	UZB	Association of International Road Carriers of Uzbekistan	AIRCUZ

APPENDIX 2 : CPMM Methodology

The CPMM methodology is based on Time-Cost-Distance framework and involves four major stakeholders, namely the drivers, CPMM partners/coordinators, field consultants and ADB as CAREC secretary.

Time-Cost-Distance Framework

This framework seeks to track the changes in time (measured in hours or days) and cost (measured in US Dollars) over distance (measured in kilometers). Common transport corridors are selected and data on the three metrics are collected by the driver or a consultant along the route. When the data are entered in a Microsoft Excel spreadsheet, a chart will display the changes of time or cost over distance. Distance occupies the horizontal axis, while time or cost occupies the vertical axis.

Drivers

CAREC believes that the raw data should be collected as close to the source as possible. As such, drivers are the ones targeted to record how long (time) or how much (cost) for them to move from origin to destination. The drivers use a localized driver's form to record the data and submit to the CPMM partners.

CPMM Partners/Coordinators

CPMM partners are the organizations selected to carry out the study. In each partner, specific person is assigned to lean about the CPMM, train the drivers, customize the driver's form and enter the data into a customized Microsoft Office Excel spreadsheet.

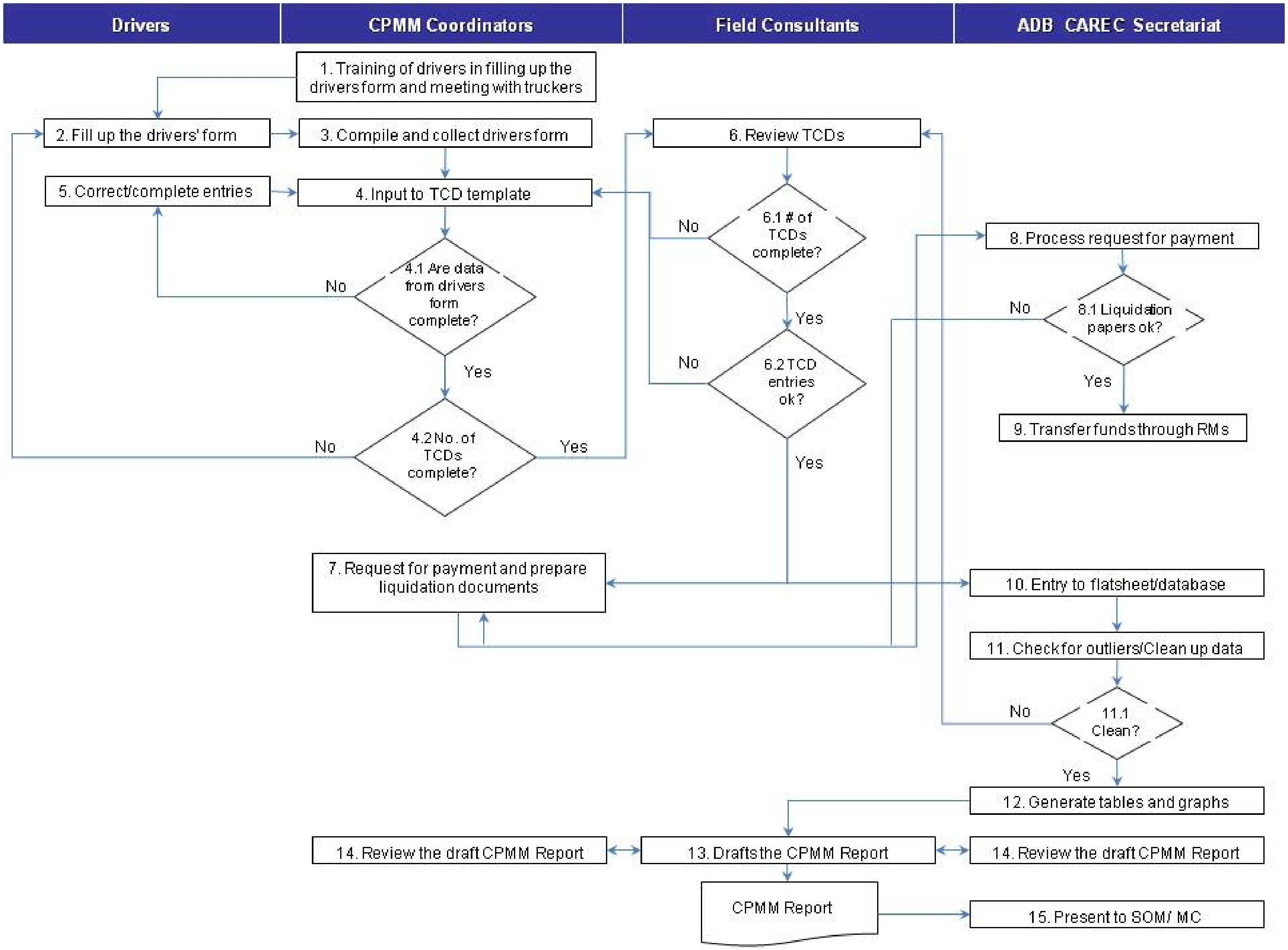
Field Consultants

Two international consultants are involved in the CPMM exercise. They work with ADB CAREC to develop the CPMM methodology, and then travel to the eight CAREC member countries to standardize the implementation. They also analyze the aggregated data and draft the quarterly reports.

ADB CAREC Secretariat

Residing in Manila, the ADB CAREC is responsible for collecting all the completed Excel files, and aggregates them. Using specialized statistical software, the team constructs the charts and tables for the field consultants to analyze.

Appendix Figure 1 : Overview of CPMM Methodology



Appendix Table 1a: Major routes in CAREC Corridor 1

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Aktobe-Astana	KAZ-KAZ	Road	386.0	8.8	42.6	34.5	771.4		771.4
Almaty-Astana	KAZ-KAZ	Road	416.5	6.5	63.9	55.0	1,019.6	32.3	995.4
Almaty-Karaghandy	KAZ-KAZ	Road	342.0	7.9	51.6	38.6	715.9	11.9	710.0
Almaty-Kostanay	KAZ-KAZ	Road	965.0	18.2	74.2	53.1	1,105.6	58.2	1,047.4
Almaty-Uralsk	KAZ-KAZ	Road	739.0	12.1	62.1	56.3	1,366.8	50.1	1,316.7
Astana-Aktau	KAZ-KAZ	Road	609.0	11.5	63.3	48.5	488.0	8.0	480.0
Konysbayeva-Kairak	KAZ-KAZ	Road	698.7	99.2	64.3	12.1	2,280.4	1,593.8	1,749.2
Kostanai-Almaty	KAZ-KAZ	Road	642.7	13.3	63.1	50.3	1,045.0	42.0	1,010.0
Kostanai-Korgas	KAZ-KAZ	Road	940.0	27.7	62.4	33.8	1,210.1	20.7	1,199.7
Konysbayeva-Novosibirsk	KAZ-RUS	Road	771.3	14.4	55.6	54.0	1,938.5	80.6	1,857.9

Appendix Table 1b : Average Duration and Cost of Activities in CAREC Corridor 1

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Aktobe-Astana																1.3														0.4		
Almaty-Astana																0.9								0.1	12.7							
Almaty-Karaghandy														1.7		2.3								0.2	8.9							
Almaty-Kostanay																0.9		2.0	1.1	0.6	6.4					0.1	7.2					
Almaty-Uralsk																3.0								0.2	17.3							
Astana-Aktau																4.3								0.1	6.2							
Konysbayeva-Kairak						46.2	66.0			66.0	66.0											31.5	80.5							15.0		
Kostanai-Almaty		0.4														3.3								0.2	13.5							
Kostanai-Korgas														8.2		2.7								0.1	10.3							
Konysbayeva-Novosibirsk																								0.2	10.6					0.2	16.6	

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement

Appendix Table 1c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 1

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Dostky	KAZ	227	0.2	8.1	0.3				0.4	66.0			4.4	136.7			25.5		2.2	13.2			0.2		0.3	70.4	0.7	79.2	0.2	327.0				
Alashankou	PRC	220							2.5	13.2			3.0	34.4			5.5		4.1	238.2		137.9												
Troitsk	RUS	50	0.2	9.6	0.1	8.1	0.4	13.2	4.1	34.6	66.0	94.6	12.1	136.9			0.4						0.3	11.6	5.7	54.8	0.3	36.9	0.4	66.0	0.4	27.7		
Korgas	KAZ	45	0.2	6.2					0.3	52.4			0.7	213.4			0.7		3.0				0.2	5.7	0.3	58.2	0.3	29.2						
Zhaisan	KAZ	42	0.2	8.1	0.3	9.4			0.3	37.7			0.6	220.6			0.4								0.3	51.3	0.3	52.3	0.4	69.7	0.6	56.0		
Torugart	KGZ	41	6.8	15.2	0.1	2.9	0.1	2.3	7.2	3.3			7.9	9.7			30.1	2.2	3.2		0.4		2.4	13.4	0.4	3.5					0.4		0.8	4.4
Kairak	KAZ	38	0.2	9.1	0.2	9.5			0.3	21.3			0.8	291.0			0.5						0.2	8.8	0.2	62.7	0.2	22.5			0.8	79.0		
Kordai	KAZ	33	0.3	13.9	0.3	6.6	0.4	23.7	0.4	34.7	0.1		8.2	228.0			1.2				4.5	5.6	0.4	3.6	4.2	34.9	0.2	21.1	0.3	40.7				
Konysbayeva	KAZ	31	0.4	15.3	0.4	10.0	0.4	9.4	0.6	28.7	0.7	13.2	1.8	228.0			9.0					451.5	0.6	58.9	0.2	9.9					0.8	70.1		
Merke	KAZ	31	0.5	15.9	0.5	9.8	0.7	13.4	0.8	28.4			2.3	181.7			2.6					325.9	0.7	60.6	0.1	15.7	1.0	80.3	0.1	15.3	0.5	37.5		
Topa	PRC	28							0.2	1.0	0.2		0.2	23.1			2.4		2.5				0.2	11.0	0.2	1.6							1.1	5.3
Chaldovar	KGZ	25	0.5	12.0	0.5	12.4	0.5	14.4	0.7	29.2			1.7	134.3			4.1					375.3	0.5	17.8			0.7	27.7			0.4	23.7		
Pavlodar	KAZ	12	0.4	9.9	0.4	10.1	0.4	7.1	0.5	13.7			1.9	281.8									0.3	19.8	0.2	7.9								

Appendix Table 2a : Major routes in CAREC Corridor 2

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Aktau-Atyrau	KAZ-KAZ	Road	425.3	9.4	58.3	43.9	1,981.6	432.3	1,549.3
Irkeshtam-Kara Suu	KGZ-KGZ	Road	275.4	184.9	18.9	5.2	995.7	745.6	1,083.7
Irkeshtam-Jalal abad	PRC-KGZ	Road	375.0	20.2	27.6	18.6	4,930.4	2,537.6	2,392.9
Irkeshtam-Osh	PRC-KGZ	Road	273.0	15.3	22.7	17.8	9,509.8	4,827.1	6,632.4
Tianjin-Bukhara	PRC-UZB	Rail	1,545.0	171.2	9.0	9.0	1,009.9	48.4	961.5
St.Petersburg-Samarkand	RUS-UZB	Road	2,000.5	69.5	54.4	31.0	3,386.6	2,646.8	1,479.7
Samarkand-Moscow	UZB-RUS	Road	1,651.5	69.0	46.9	23.7	8,340.9	4,619.3	3,721.6

Appendix Table 2b : Average Duration and Cost of Activities in CAREC Corridor 2

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Aktau-Atyrau	0.2					0.5	183.7			1.5	290.0			1.2		4.1						0.2	96.7	0.4	21.8							
Irkeshtam-Kara Suu						12.8	4.5			14.8	23.8			9.7	12.8	11.6	12.5			2.5	4.2	27.9	17.7	0.6	5.6			0.5		2.9	4.6	
Irkeshtam-Jalal abad										0.4	40.5					8.6						0.2	3.7									
Irkeshtam-Osh										1.5	2.2					3.6	94.5					0.4	8.6								158.8	
Tianjin-Bukhara																																
St.Petersburg-Samarkand		1.5	60.9			1.5	68.2			11.6	91.4					7.8						0.1	10.3					1.6	85.7			
Samarkand-Moscow	1.3	1.3	24.7	1.3	24.7	2.1	103.0			9.0	304.5			7.9		4.6				0.1	13.0			1.9	311.0			0.7	50.8			

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement

Appendix Table 2c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 2

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Daut Ata	UZB	175	0.5	7.3	0.5		0.5		0.9	27.2	0.7		2.8	22.6			3.7		1.5				0.7		1.1	4.4					0.5		27.9	10.9
Tazhen	KAZ	171	1.0	27.8	1.0	30.8	0.9	22.3	1.4	71.8	0.6	27.9	4.8	287.1			6.8					761.3	0.9	82.5	0.9	31.6	1.8	150.1			1.2	101.8	1.5	75.4
Beyneu	KAZ	90																			8.2	15.4	1.3	17.7	2.8	26.1	0.3	16.8	0.2	14.5	1.1	13.1	11.1	16.2
Farap	TKM	73	0.2	2.0	0.3	5.2	0.2	4.9	0.6	9.4	0.3	5.6	0.6	12.9			0.9						0.3	2.1	0.2	1.5	0.2	0.4			0.2	2.0	1.1	8.6
Alat	UZB	68	0.1	4.7	0.3	5.4			0.5	8.7	0.2		0.8	10.7			1.2		16.0				0.4	2.6	0.2	1.3	0.2	0.9			0.2	1.4	1.5	14.8
Artik	TKM	43	0.2	4.6	0.4	6.1			0.5	10.9			0.5	16.9			1.4						0.4	3.0	0.2	1.6	0.2	0.5			0.2	2.4	1.3	12.9
Baku	AZE	34											0.7						2.9						0.7								2.9	36.3
Irkeshtam	KGZ	34		3.5	0.3	4.1			8.9	2.5			14.3	19.7			8.7		6.3	89.3			6.3	4.9			0.4	2.4					2.9	4.6
Krasny Most	AZE	31											3.4	58.9			45.4																	
Krasny Most	GEO	28											0.6	60.2																				
Samur	AZE	28											0.9	63.4	0.7		19.0																	
Sirim	KAZ	24	1.1	31.1	1.1	21.0	1.1	46.0	1.4	66.1			3.7	332.9			9.4					290.0	1.5	177.4	0.6	37.1					1.6	100.7		
Dustlik	UZB	19	0.6	32.6	0.8		0.5		1.0	56.6			1.6	47.1			5.3						0.7	4.4	0.7	4.4								
Dustuk	KGZ	19	0.6	40.7	0.9	43.5	0.6	60.9	1.0	49.3			2.4	159.9			108.0						0.8	9.2	0.6	6.5	1.2	46.4			0.7	12.6		
Kara Suu	KGZ	18												0.7			8.7		5.2	8.7					7.3	3.8	0.2	2.4						
Akzhigit	KAZ	16	0.8	19.5	1.6	19.3			0.7	74.9			1.5	454.6			0.6						0.6	8.7	0.8	122.4	1.0	138.6	1.1	241.7				
Aktau	KAZ	15	1.5	9.7					1.0	141.8			13.4	494.6			6.2		11.5	67.7					0.8	183.7			3.7	290.0				
Kanibadam	TAJ	10																							3.8	2.4	0.5	4.1						

Appendix Table 3a : Major routes in CAREC Corridor 3

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Chaldovar-Jalal Abad	KGZ-AFG	Road	745.0	51.3	33.4	14.5	2,535.4	350.4	2,185.0
Osh-Bishkek	KGZ-KGZ	Road	686.0	18.7	38.5	36.7	6,088.4	6,088.4	
Irkeshtam-Jirgatol	PRC-TAJ	Road	266.0	253.5	33.7	1.6	1,129.3	589.1	540.2
Tashkent-Bandar Abbas	UZB-IRN	Road	1,361.5	75.6	45.9	17.6	5,748.9	955.5	6,270.7
Tashkent-Almaty	UZB-KAZ	Road	831.3	45.3	48.3	19.3	6,895.5	3,881.8	3,992.0
Namangan-St.Petersburg	UZB-RUS	Road	925.0	34.0	40.2	27.2	3,032.4	405.4	2,627.0
Tashkent-Dushanbe	UZB-TAJ	Road	500.4	43.2	46.1	16.5	5,474.2	5,638.0	5,731.5

Appendix Table 3b : Average Duration and Cost of Activities in CAREC Corridor 3

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Chaldovar-Jalal Abad																					28.1	20.5	6.9									
Osh-Bishkek																				0.1	39.4	0.3	9.1									
Irkeshtam-Jirgatol						38.3	5.1			479.1	49.7									21.5	4.0	72.2	13.7									
Tashkent-Bandar Abbas	1.5	1.1	9.1	1.1	42.7	2.4	56.2	1.9		8.3	81.1			61.7		1.7				1.2	34.6	1.5	10.5					0.5				
Tashkent-Almaty	2.1	2.6	21.8			2.9	48.5			5.5	395.9			10.7		7.4	40.3			2.0	24.2	3.8	32.0	1.7	115.5			1.9	59.5	5.8	253.4	
Namangan-St.Petersburg										1.4						1.9						1.6								0.8	40.5	
Tashkent-Dushanbe	2.3	2.1		3.4		5.1	26.9	0.8		25.3	59.5			82.1		163.4	297.7					3.4	30.6					2.2	34.6			

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement

Appendix Table 3c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 3

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Alat	UZB	100	0.6		1.3		0.5		1.9				2.4				11.7						1.6		1.0								5.1	170.4
Farap	TKM	94	0.7	11.6	0.9	19.2	0.5	15.1	1.9	45.0	1.7		2.6	53.1			13.0						1.6	10.8	1.1	3.9	1.0	9.6			1.8	23.3	4.4	138.5
Konysbayeva	KAZ	60	0.6	29.1	0.6	32.0			1.0	144.0			2.0	830.8			2.0						0.8	22.0	1.0	197.9	1.2	140.2	1.4	298.6	1.4	91.2	1.2	627.2
Aul	KAZ	57	0.8	30.9	1.0	35.5	1.3	37.6	1.4	137.9	1.9		13.3	588.1			5.9					576.0	1.6	140.5	19.3	143.9	1.8	231.9	1.0	94.9	1.9	211.2	1.8	332.8
Yallama	UZB	38	0.9	38.4	0.9	28.8	0.7	28.8	1.4	54.4			3.1	64.0			9.1						0.8	8.3	0.7	5.8					1.0			
Merke	KAZ	29							1.3	40.8			7.7	40.8			3.8								0.8	9.3	0.8	48.0			1.3	20.4	3.1	130.6
Kaplanbek	KAZ	28	1.9	26.6	2.0	22.9			1.9	60.0			4.0	93.4			5.1						0.8	22.5	0.8	8.1	1.0	40.9			1.0	47.1	2.9	158.4
Navoi	UZB	28	1.1		1.6				1.9				3.1				6.7						1.1		0.9						1.0		3.8	115.2
Sariasiya	UZB	25	1.1		0.9		0.9		2.8		0.8		5.1				4.3						1.0		1.2						1.2			
Pakhtaabad	TAJ	24	2.6	17.9	2.6		2.6		2.8	26.7			4.9	58.4			8.4								2.6	30.6					1.8	34.6		
Veseloyarsk	RUS	23	1.2	54.5	1.2	53.1	1.2	51.0	1.7	103.0			5.1	372.6			8.0						1.2	71.3	1.0	20.0	2.2	289.3			0.6	9.6		
Sarahs	TKM	18	0.5	4.3	0.5	4.5	0.5	4.2	1.8	20.8	1.2	25.0	2.6	46.9			10.1						1.0	28.8	0.7	10.4	0.6	11.5			0.5	7.7		
Sarakhs	IRN	17	0.5	11.1	15.8	9.6	0.4		1.3	3.8	0.7		3.1	20.8			55.8						0.5	12.7	0.5	3.2					0.6	134.4		
Sariagash	KAZ	17							38.4				30.6																					

Appendix Table 4a : Major routes in CAREC Corridor 4

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost (US$ per 20 tons per 500 km)	Cost of Activities (US$ per 20 tons per 500 km)	Transport Cost (US$ per 20 tons per 500 km)
Altanbulag-Ulaanbaatar	MON-MON	Road	336.0	165.7	20.0	9.4	3,791.7	877.2	2,914.5
Ulaanbaatar -Zamiin Uud	MON-MON	Road	736.4	37.5	30.5	20.1	3,134.3	21.4	3,113.0
Beejin/Tianjin-Ulaanbaatar	PRC-MON	Rail	1,277.0	185.7	8.3	7.0	7,527.4	302.9	7,408.2
Erlian-Ulaanbaatar	PRC-MON	Road	720.9	39.2	35.1	18.8	4,213.4	59.9	4,299.1
Naushki-Tianjin	RUS-PRC	Rail	1,205.8	194.6	12.7	7.2	4,148.8	580.6	4,253.0
Naushki-Tianjin	RUS-PRC	Road	337.0	26.0	12.9	10.1	7,358.7	18.8	7,349.3

Appendix Table 4b : Average Duration and Cost of Activities in CAREC Corridor 4

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Altanbulag-Ulaanbaatar	75.1			58.1		215.5										10.9	924.8		19.3			36.2	15.5	0.8	8.0	0.4		2.1	10.7	4.8	16.1	
Ulaanbaatar -Zamiin Uud												1.0				7.5		4.1		1.7	6.7	2.5	7.8	0.4	3.9	0.2	3.8	0.2		2.6	4.6	
Beejin/Tianjin-Ulaanbaatar						26.3								24.0																		
Erlian-Ulaanbaatar	0.5	0.5		0.5		1.0				2.1		2.7		2.3		5.1		10.7		1.5	13.8	0.7		0.8	7.3	0.7	7.2	0.5	7.8	2.6	9.0	
Naushki-Tianjin	0.9	1.0		0.9						20.0				37.6		6.4	216.8							0.9	9.0			1.0				

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement

Appendix Table 4c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 4

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Erlen	PRC	484	0.6	13.2	0.7	16.9	0.6	13.3	0.8	3.6	0.2		2.7	149.5	2.7		44.8	35.8	5.0	56.1			0.3	14.2	0.4	26.9					0.4	7.2	0.5	47.8
Zamiin Uud	MON	360	0.6	16.1	0.6		0.6		6.7		0.2		3.0	1,006.3			6.8		6.7	421.0	10.7		2.1	12.5	0.5		0.5	9.0	0.9	7.2	0.4		3.2	
Sukhbaatar	MON	215											13.9				3.6		2.9		6.2		2.1	16.0	0.5	9.0	0.5	9.0	0.6	9.0	0.4		3.2	23.0
Altanbulag	MON	119	2.8	9.0	0.5		2.3		6.3				1.7		0.6		1.6		5.9	924.8	7.2				4.9	9.7	0.5				0.5	9.5	1.5	17.9
Khiyagt	MON	32	0.5		0.4		0.4		0.9				1.6				1.2								0.4		0.5	10.7			0.5			
Naushki	RUS	28															43.0																	

Appendix Table 5a : Major routes in CAREC Corridor 5

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Torkham-Sharkhan bandar	AFG-AFG	Road	631.0	40.6	28.7	20.7	2,011.1	1,001.9	1,009.2
Karamik-Dusti	KGZ-TAJ	Road	527.6	23.0	31.6	23.4	4,752.3	3,043.6	3,832.0
Urumqi-Irkeshtam	PRC-KGZ	Road	1,598.6	208.5	42.5	17.2	1,477.4	1,408.4	253.1
Urumqi-Irkeshtam	PRC-PRC	Road	1,681.5	50.6	7.6	5.9	1,692.4	1,558.4	268.1
Dushanbe-Jirgatol	TAJ-TAJ	Road	546.0	103.1	23.6	5.3	221.1	221.1	

Appendix Table 5b : Average Duration and Cost of Activities in CAREC Corridor 5

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Torkham-Sharkhan bandar	0.3	0.4	20.2			4.1	20.9	19.3	74.3	0.9	23.0	0.9	38.3	2.5	31.2	2.6	135.4	5.5	9.8	2.3	19.6	4.4	22.8	0.4	28.7	0.5	19.0	16.3	17.6	1.2	20.8	0.4
Karamik-Dusti	0.1	0.2	8.8	0.2	4.0	0.2	7.4			0.4	27.1							6.0	8.6	2.4	14.3					0.8	23.1	0.2	7.0	1.2	12.4	1.1
Urumqi-Irkeshtam	0.4							0.2	0.6	21.9	63.8			12.2	25.3	69.0				0.3	11.9	0.2	23.0							17.5	30.7	
Dushanbe-Jirgatol		8.6	1.7			17.2	2.6			25.8	8.6															17.2						

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement, **Q**. Trans-shipment

Appendix Table 5c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 5

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Torkham	AFG	280	1.1	17.8	0.5	22.5	0.8	32.7	0.8	20.7	11.6	68.4	0.8	22.6					1.2	82.4			1.7	11.5	9.5	9.5	0.4	28.7	0.2	7.5	13.2	17.8	0.3	12.6
Jirgatol	TAJ	196			8.6	1.7			14.2	2.6			29.2	6.7							6.0	8.6	0.9	7.2	0.2	3.1			0.5	3.0			0.9	11.9
Karamik	KGZ	125	0.1	3.1	0.1	4.0	0.1	3.1	0.1	4.1			0.3	15.0											0.5	4.4			0.1	4.1	0.1	4.2		
Sharkhan bandar	AFG	25																	1.0	102.8														
Nijhniy Paynj	TAJ	14	0.1	2.9	0.1	3.7	0.1	3.6	0.1	3.4			0.3	14.6																	0.1	2.5		
Dusti	TAJ	12	0.1	3.7	0.1	5.4	0.1	3.7	0.1	4.3			0.2	17.6																	0.1	4.0		
Irkeshtam	KGZ	11	0.6		0.2	2.0	0.1	2.1	0.5	2.0	0.3		0.9	31.9			2.6		11.8				0.2											
Topa	PRC	11											118.3	79.7					4.0				0.1										52.0	41.7

Appendix Table 6a : Major routes in CAREC Corridor 6

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost (US$ per 20 tons per 500 km)	Cost of Activities (US$ per 20 tons per 500 km)	Transport Cost (US$ per 20 tons per 500 km)
Torkham-Hayratan	AFG-AFG	Road	160.1	5.0	35.5	39.0	256.1	172.8	83.2
Bandar Abbas-Osh	IRN-KGZ	Road	1,000.0	18.5	55.6	54.1	1,372.5		1,372.5
Aktau-Atyrau	KAZ-KAZ	Road	558.3	12.0	68.4	45.6	3,590.7	1,899.1	1,691.7
Akzhigit-St.Petersburg	KAZ-RUS	Road	850.0	17.8	69.9	47.9	8,573.5	4,087.0	4,486.5
Bukhara-Minsk	UZB-RUS	Road	542.0	21.4	52.5	25.4	5,509.6	2,956.0	2,553.6
Tashkent-Ozinki	UZB-RUS	Road	1,522.8	60.5	46.3	25.2	9,472.4	3,136.5	6,320.9
Tashkent-Dushanbe	UZB-TAJ	Road	432.9	11.8	54.9	41.8	6.3		6.3

Appendix Table 6b : Average Duration and Cost of Activities in CAREC Corridor 6

Route	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Torkham-Hayratan																2.3	217.3															
Bandar Abbas-Osh																						0.3										
Aktau-Atyrau	1.0					1.5	375.1			1.1	439.7			0.6		1.7						0.8		0.1	7.5							
Akzhigit-St.Petersburg	0.5	1.3	129.3			2.1	362.1							1.0						1.0	10.3	2.3	219.9	0.2	29.8							
Bukhara-Minsk						0.6	42.7			1.8	556.2							13.6	7.8	1.5	14.2					1.7	194.0					2.3
Tashkent-Ozinki	4.8					3.1	56.9			7.3	206.4			11.8						2.3	49.8	3.6	31.7	2.6	194.7			0.5	35.6	0.5	19.5	
Tashkent-Dushanbe										2.5						11.8																

A. Health/Quarantine, **B**. Phytosanitary, **C**. Veterinary Inspection, **D**. Border Security/Control, **E**. Visa/Immigration, **F**. Custom clearance, **G**. Detour, **H**. Waiting/Queue, **I**. Loading/Unloading, **J**. Escort/Convoy, **K**. Weight/Standard Inspection, **L**. Police checkpoint, **M**. Transport/GAI Inspection, **N**. Environment/Ecology Checkpoint, **O**. Vehicle Registration, **P**. Repair/Tire Replacement, **Q**. Trans-shipment

Appendix Table 6c : Average Duration and Cost of Activities of BCPs in CAREC Corridor 6

BCP	Country	Count	A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P	
			D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
Hayratan	AFG	164	0.4	17.6	0.3	19.4	0.6	28.4	3.2	20.9			1.4	23.2					2.3	83.2			0.7	12.6	0.2	8.4	0.4	15.1	0.2	6.2	3.4	21.5	0.3	14.8
Krasny Yar	RUS	88	1.3	57.9	1.2	71.8	1.1	52.9	1.9	104.2		33.0	7.4	431.5			6.2						1.1	44.0	1.4	41.0	1.8	204.5			2.2	235.6		
Kurmangazy	KAZ	79	1.4	43.0	1.3	53.1	1.2	34.9	1.8	152.2	0.6	67.9	5.9	420.0			17.4						1.5	105.7	1.2	54.9	2.0	202.8			1.8	159.9		
Beyneu	KAZ	71							45.3	68.9				663.9							13.6	9.1	1.3	17.7	4.0	24.5	0.7	29.1	0.4	23.4			1.0	
Daut Ata	UZB	65	1.6	38.8	1.3	23.3			1.3	53.4			3.4	48.5			5.9						1.1	11.0	0.7	6.1	0.8				0.8		4.0	179.5
Tazhen	KAZ	49	1.5	40.7	1.7	48.8			2.0	87.7			3.4	292.5			7.8						1.5	76.2	1.1	24.1	2.4	143.4			0.9	79.9	1.9	197.2
Kotyayevka	KAZ	39	0.8	48.3	0.9	39.9			1.1	111.0			2.0	616.9			4.2						1.2	22.1	0.9	89.0	1.0	63.0	1.1	147.2	0.8	21.6		
Akzhigit	KAZ	20	0.6	42.0	0.7				0.9	90.6			2.1	691.6			1.3						0.3		1.0	189.9	1.8	206.9	1.0	176.2				
Tedjen	TKM	12	1.9	35.2	0.9	35.6			2.5	72.8			3.2	211.0			9.3						1.4	51.2	1.1	10.5	2.6	126.1			0.6	59.1	1.9	97.0