CAREC Corridors for Seamless Connectivity

CAREC Transport and Trade Facilitation: Corridor Performance Measurement and Monitoring

2009 Fourth Quarter Report: October – December 2009

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 Regional 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
UNESCAP	–	United Nations Economic and Social Commission for Asia and the Pacific
XUAR	–	Xinjiang Uygur Autonomous Region

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OVERVIEW AND KEY FINDINGS

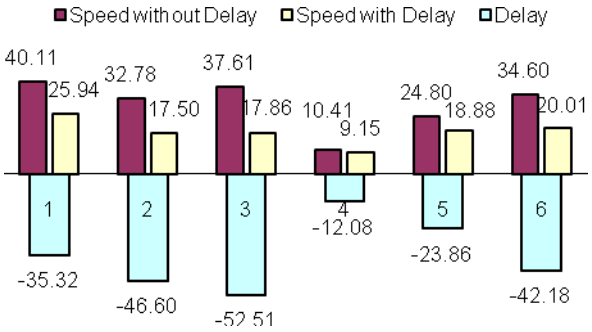
The study focuses on the data collection, aggregation and analysis for road and rail transport in eight CAREC member countries through six priority CAREC corridors. This report covers the data collected between October to December 2009. The highlights of the report are:

S/N	Findings	Technical explanation
1	For road transport, travelling is fastest on Corridor 1 while slowest in Corridor 4.	For the six CAREC corridors, SWOD[1] is between 10.41kph to 40.11 kph. SWD is between 9.15 kph to 25.94 kph. For both SWOD and SWD, Corridor 1 has the highest values while corridor 4 has the lowest values.
2	Transport time on Corridors 2 and 4 are volatile, making it hard to predict actual time of arrival.	For SWD, CV for Corridor 2 is 211.19 and Corridor 4 is 143. These are relatively high compared to the CVs for other corridors.
3	Activities at stops tend to reduce the speed if drivers use Corridor 1, 2, 3 and 6.	This is measured by comparing the difference between SWOD and SWD per corridor. This percentage drop is relatively high for Corridor 1, 2, 3 and 6, which ranges from -35.32% to -52.51%.
4	Transporting twenty tons of goods over 500km in most corridors will require US$1,000 of which US$500 is used to pay for various activities. Corridor 4 is most expensive while Corridor 5 is least expensive.	Transport and activities cost for Corridor 4 are US$2,479.56 and US$86.16 respectively, while they are US$323.83 and US$154.37 for Corridor 5.
5	The three most time-consuming activities are loading/unloading, waiting time in queue and customs clearance.	Loading/unloading takes 4.35 hours, waiting time in queue takes 4.00 hours and customs clearance takes1.93 hours for every 500km.
6	The three most costly activities are loading/unloading, customs clearance and GAI.	Loading/unloading costs US$101.73, customs clearance costs US$86.90 and GAI costs US$30.32 for every 500km.
7	For rail transport, the speed is drastically lower than road. The cost is also lower.	Using Corridor 4, the train moves at SWOD of 5.69 kph and SWD of 3.97 kph. Payment for transport is US$600.25 per 500km.
8	Unofficial payments are common. The top five activities involving unofficial payments are GAI, police checkpoints, phyto-sanitary, border security control and customs clearance.	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 12 of this report.

CPMM Senior Executive Dash Board

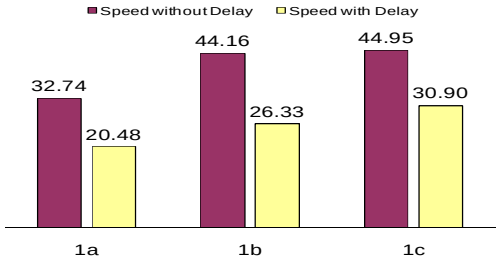
CAREC Corridors



Data Description

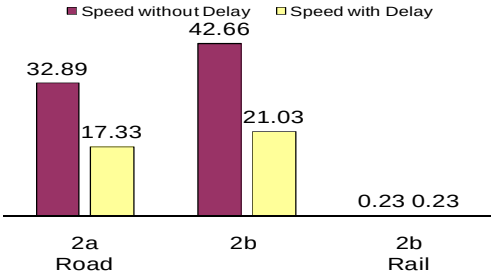
- 714 time/cost distance (TCD) observations received
- Speed in kph, and delay in %
- 78% travel by road; 18% by rail and 4% by multi-modal transport
- 21% transport perishables, 79% carry non-perishables
- Commonly transported goods are: consumer goods, fruits and vegetables, textile and clothing, building and construction, food items

CAREC Corridor 1



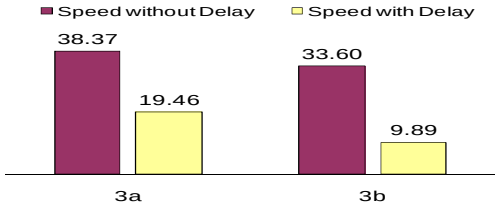
- Customs clearance, waiting time and loading/unloading reduce speeds at all three sub-corridors.
- Corridor 1b is costly due to customs clearance and police checkpoints.

CAREC Corridor 2



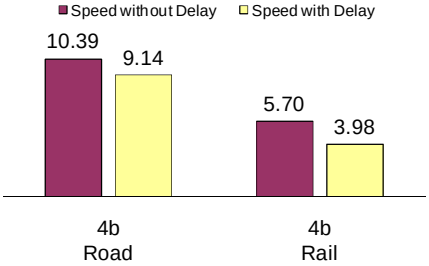
- Customs clearance, waiting time and loading/unloading reduce speeds at all two sub-corridors.
- Customs clearance and loading/unloading increase cost, and Chinese customs impose a special armed escort fee.

CAREC Corridor 3



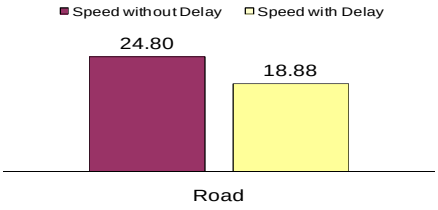
- Customs clearance, waiting time and loading/unloading reduce speeds at all two sub-corridors, and Corridor 3b is more severely affected.
- Customs clearance is the most costly activity. Corridor 3a is also affected by armed escort cost and GAI, while Corridor 3b is hit by high weight/standard inspection.

CAREC Corridor 4



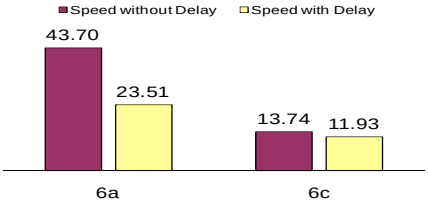
- Customs clearance, waiting time and loading/unloading reduce speeds for Corridor 4b
- Weight inspection is a costly activity for road transport, while change of railway gauge at Zamyn-Uud is a major cost activity.

CAREC Corridor 5



- Corridor 5 has no substantial delay. Loading/unloading and waiting time are the causes of slight delays.
- Loading/unloading contributes significantly to the cost of transport.

CAREC Corridor 6



- While Corridor 6a has higher travelling speed, it is delayed by customs clearance, GAI, waiting time and veterinary inspection. Customs clearance, border security control and GAI also make Corridor 6a to be more expensive.
- Corridor 6c is hampered by inferior road networks.

I. INTRODUCTION

1. This report summarizes the results for the CAREC Corridor Performance Measurement and Monitoring (CPMM) project for the fourth quarter of 2009..

II. DATA DESCRIPTION

2. Between October-December 2009, a total of 714 samples were collected (Table 1). This represents an increase of 24.4% compared to 574 samples in the third quarter.

3. Road continues to be the principal mode of transport measured, accounting for 78% of the samples. Rail constitutes 18% of the traffic, mainly found in Corridor 4, while multi-modal transport accounts for only 4% of the total sample size (Fig.1a). A key product category transported in CAREC is perishables, accounting for 21% of the samples. (Figure 1b)

Table 1: Number of TCD Submissions by Associations by Month

Country	Name of Association	2009 Oct	Nov	Dec	Total
Afghanistan	AAFFCO	30	30	30	90
Azerbaijan	ABADA	10			10
Kazakhstan	KFFA	30	30	30	90
Kyrgyz Republic	FOA	30			30
Mongolia	MNCCI / NTTFC	30	30	30	90
	NARTAM	22	27	30	79
PRC	CIFA	10	30	30	70
Tajikistan	ABBAT	30	30	15	75
Uzbekistan	AIRCUZ	30	30	30	90
	ADBL	30	30	30	90
	TOTAL	252	237	225	714

Figure 1a: Mode of Transport

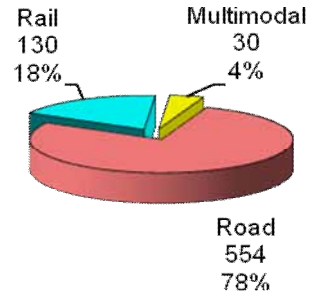
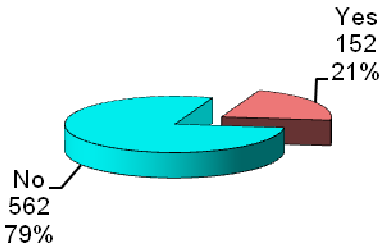
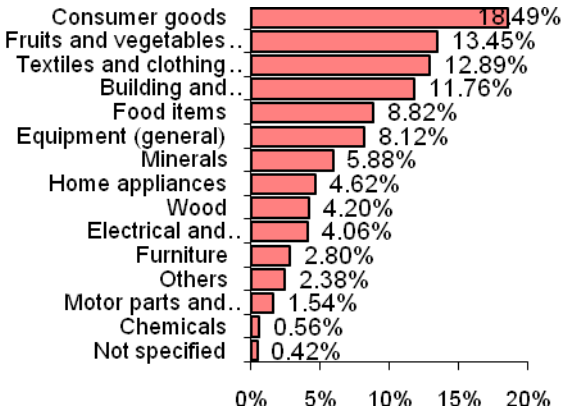


Figure 1b: Perishable Goods



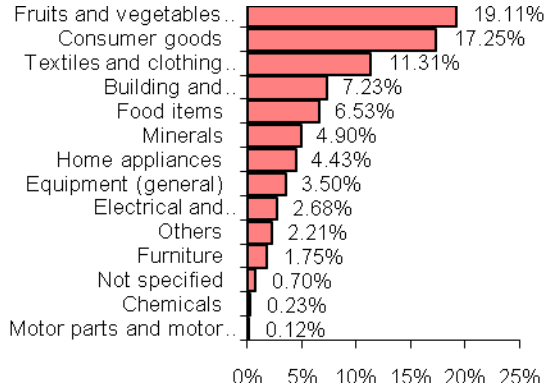
4. The types of goods transported along CAREC corridors show an interesting pattern (Figure 2a). Consumer goods, fruits and vegetables, and textiles continue to rank among the top three categories. However there are some notable changes. Building and Construction materials catapulted from position 9 in QR3 to position 4 in QR4. The weather transition from winter to spring signals an expected increase in construction activities, thus this pick up in the shipment of building and construction materials is consistent with the sector preparing to commence projects in summer.

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



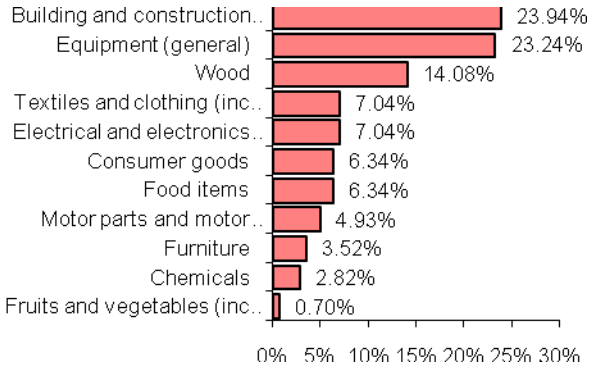
5. An analysis of the goods carried by mode of transport confirms road is a popular choice for shipping light manufactured goods. Figure 2b shows that fruits and vegetables, consumer goods, textiles and clothing are the top three categories of items transported by road vehicles.

Figure 2b: Types of Goods Carried (Road)



6. On the other hand, rail transport is chosen to send heavy and bulky industrial materials. This is evident in Figure 2c where building and construction materials, equipment and wood are the top three categories transported by rail wagons. It is not surprising to see that not much fruits and vegetables are transported by rail, as this mode of transport is not as flexible as road in delivering time sensitive items.

Figure 2c: Types of Goods Carried (Rail)



7. A separate analysis is conducted on the transport of perishables goods. The objective is to determine whether there are significant differences in the clearing time and cost for a delivery truck carrying perishables. The samples are categorized into two groups based on whether the goods carried are perishables or non-perishables. In this quarter, for road transport, there are 139 samples for perishables and 415 for non-perishables. The mean time and cost are also normalized at 500km, so that the impact of distance on these two variables is alleviated.

8. The methodology employed is to conduct a two-sample t-test to determine whether the mean time and cost for activities (such as customs clearance, immigration and quarantine) between the two groups are similar or different. The null hypotheses are that the mean activities time and cost between the perishables and non-perishables do not have significant difference. The results are shown in Tables 2a and 2b.

Table 2a: Mean Activities Time for Perishables and Non-Perishables (Road)

	Sample Size	Average Time, Hours	Standard Deviation	Upper Limit (95%)	Lower Limit (95%)	P-Value
Perishables	**139**	**15.22**	**9.97**	**13.55**	**16.89**	**0.0001**
Non-Perishables	**415**	**20.50**	**18.48**	**18.71**	**22.28**	

Table 2b: Mean Activities Cost for Perishables and Non-Perishables (Road)

	Sample Size	Average Cost, US$	Standard Deviation	Upper Limit (95%)	Lower Limit (95%)	P-Value
Perishables	**139**	**226.01**	**258.07**	**182.73**	**269.30**	**0.0270**
Non-Perishables	**415**	**172.01**	**212.23**	**151.53**	**192.49**	

9. From the tests conducted, two conclusions can be made. Delivery trucks carrying perishable goods clear in shorter time compared to those carrying non-perishables. However, the cost to clear the activities is about 32% higher than those carrying non-perishables.

10. For perishables, the time to go through all activities is 15.22 hours, which is shorter compared to non-perishables time of 20.50 hours.

11. For perishables, the cost to go through all activities is US$226.01, which is higher than the cost of non-perishables – US$172.01.

12. Another analysis is also conducted to assess the effectiveness of the Transports Internationaux Routiers (TIR) system. The objective is to appraise if the TIR system results in any changes when delivery trucks go through border points. The activity ‘customs clearance’ is used in this test. Using the 554 samples of road transport, the data are categorized into two groups, namely those deliveries where the trucks have a TIR carnet and those without TIR carnet. The mean time and cost for customs clearance is computed and normalized at 500km.

13. The results of the tests are shown in Tables 3a and 3b.

Table 3a: Mean Time of Customs Clearance with and without TIR

	Sample Size	Average Time, Hours	Standard Deviation	Upper Limit (95%)	Lower Limit (95%)	P-Value
TIR (Yes)	259	2.24	1.75	2.04	2.44	0.0001
TIR (No)	295	1.10	1.87	0.83	1.37	

Table 3b: Mean Cost of Customs Clearance With and Without TIR

	Sample Size	Average Cost, US$	Standard Deviation	Upper Limit (95%)	Lower Limit (95%)	P-Value
TIR (Yes)	259	123.43	162.06	103.60	143.26	0.0001
TIR (No)	295	21.61	39.21	15.70	27.51	

14. Table 3a shows an interesting result. The mean time for a truck with TIR actually takes longer (2.24 hours) to clear customs compared to a truck that has no TIR (1.10 hours). This is a surprise because the purpose of TIR is to expedite customs clearance process.

15. Conversations with drivers reveal an important fact. While vehicles with TIR may enjoy a shorter customs clearance time, the total turnaround time is not shortened because the vehicles with TIR still have to wait in line at the border post. There are no express lanes or dedicated lanes to serve TIR. Thus, the driver will still have to wait for his turn for customs clearance in the queue.

16. It must be noted that this quarterly result is not sufficient to claim that TIR is not effective. More data will be collected to construct a meaningful picture on whether TIR does cut down customs clearance time.

17. Table 3b shows that that the drivers pay more for TIR system when they go through customs clearance, compared to drivers not using TIR system. This is in line with interviews with transport operators who admitted that the TIR system can be quite costly to operate.

18. ADB will continue to monitor the transport time and cost related to perishables and the use of TIR system. These two areas are specially selected as focal topics because of their importance to Central Asia. Over a longer period of time, more data will enable better judgment on how to make transport of perishables as well as the use of TIR become more efficient and expeditious throughout the CAREC region.

III. OVERVIEW OF RESULTS ACROSS CORRIDORS

A. Speed/Travel Time

19. To measure speed, two new indicators are defined in this Quarterly Report. The first indicator is '**Speed without delay' or SWOD**. This speed 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).

20. The second indicator is **'Speed with delay' or 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 distance over the entire journey 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 the border.

21. Similar to the Q3 2009 report, the coefficient of variation (CV)[2] 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. A higher CV implies more uncertainty in the arrival time of the shipment.

22. Referring to Figure 3a for road transport, the range of SWOD is between 10.41 kph to 40.11 kph. Corridors 1, 2, 3 and 6 have a higher SWOD value, while Corridor 4 is the worst performing corridor in terms of SWOD. In Q4, the average time taken for a delivery truck to travel from one city to another in Corridor 4 (such as Choyr, Sainshand, Ulaanbaatar, Darhan and Sukhbaatar) is 7 to 8 hours each. The travel time at the southern section from Choyr to Erenhot is especially slow due to lack of good paved roads.

23. For SWD, the range of values is between 9.15 kph to 25.94 kph. Speed as measured by SWD is relatively high for Corridors 1, 2, 3 and 6. To measure the impact of activities that cause delays, the difference between SWOD and SWD is taken. Measured in percentage terms, this delay shows that Corridor 4 and 5 are less affected by activities. In corridor 3, the reduction in speed is remarkably drastic, where the speed drops from 42.19 kph to 17.64 kph. Further examination shows that two activities contributed greatly to the drop, namely waiting time and loading/unloading time. In some instances, the driver needs to wait 7 to 10 hours for products to be loaded.

[2] More information on the term 'coefficient of variation' can be found in Appendix 2.

Figure 3a: Road Speed Along Corridors

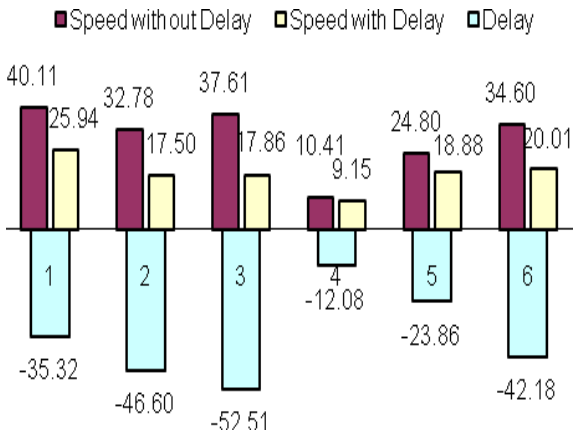


Figure 3b: Coefficient of Variation of Road Speed (%)

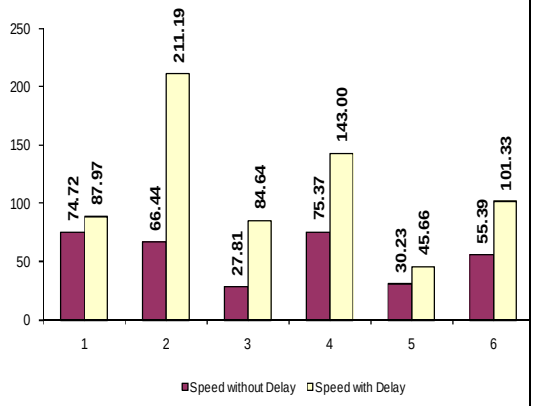


Figure 3c: Rail Speed Along Corridors

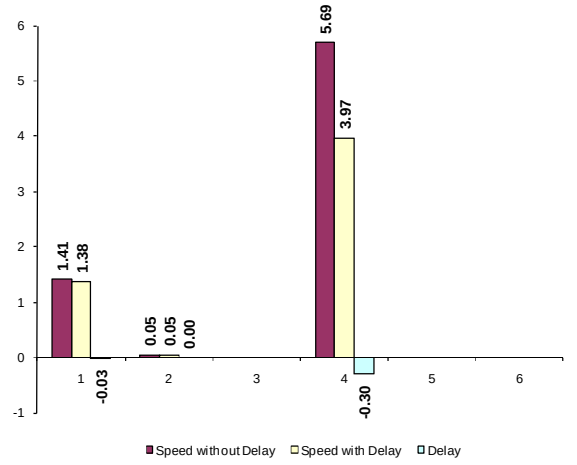
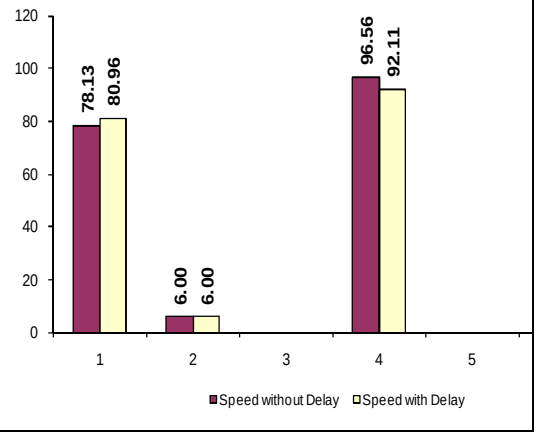


Figure 3d: Coefficient of Variation of Rail Speed (%)



24. The CV in Figure 3b shows an interesting observation. All CVs of SWD are larger than SWOD. This means the uncertainty created by stop activities such as border crossing, waiting time and loading/unloading is significant. In many corridors, the CV of SWD is double that of the CV for SWOD! This is especially severe for Corridor 2, where the SWD CV is 3.2 times the SWOD CV.

25. For rail transport, Corridor 4 has an SWOD of 5.69 kph while SWD is 3.97 kph. The data shows that the waiting time for locomotives and rail wagons add significantly to the delays, explaining why there is a 30% drop from 5.69 kph to 3.97 kph.

26. So far, this section has summarized the travel time performance in terms of speed and reliability. The key question is: **Which is the best route for a transporter to use?**

27. To answer this question, the definition of ‘best’ must be addressed. Three factors are proposed to be key evaluation parameters, namely

a. Speed
b. Efficient Border Crossing
c. Reliability

28. Speed is naturally important as a driver aims to complete jobs promptly, so that he can take on more deliveries to increase revenue. A shipper will select a route that has less lead time so that it will not affect production. The presence of good physical infrastructure affects this speed, which can be represented by SWOD. Hence, a route with high SWOD and SWD is preferred.

29. While physical infrastructure like good roads and rail connectivity are critical, man-made activities such as customs clearance and police checkpoints are influential factors that can cause delays, thus reducing SWOD. This report proposes a new indicator SWD as explained above. Thus the second criteria can be the difference between SWOD and SWD. A lower drop in percentage term is preferred here, meaning the border crossing is more likely to be efficient.

30. Finally, the reliability of transport can be measured by the coefficient of variation (CV). If a driver takes five hours to go from origin to destination, and takes twenty hours on another day over the same route, this route is highly unreliable. Inconsistent timings due to unpredictable factors on the road, such as construction, police checkpoints and border security control can affect the punctual delivery of a shipment. A route with a low CV is preferred.

31. Using the three parameters to assess the six CAREC corridors, no one corridor is outstanding. Corridors 1, 2, 3 and 6 have high SWOD and SWD, but the decrease from SWOD to SWD are drastic. Corridor 4 suffers from low SWOD and SWD as well as high CV. Corridor 5 has a low SWOD and SWD.

32. Thus, at this point in time, it is difficult to comment on the best effective route among the six CAREC corridors. Hopefully, a trend will emerge over the next few quarters to reveal the efficacy of each route and whether a given corridor offers high speed travel, hassle-free border crossing and reliable delivery time.

B. Delay Factors in CAREC Corridors

33. A principal aim of this study is to identify the impacts of different stop activities that lengthen the time of goods in transit. The list includes border-crossing activities (such as customs clearance, immigration and quarantine) as well as events during the journey (for instance, police checkpoints). The study makes an important assumption. It is assumed that the sum of all such stop activities correlate positively with the total distance travelled. A trip that spans Corridor 1b with a distance of over 2,200km from Khorgos to Zhaisan (both border crossing points in Kazakhstan) is more likely to contain more stop activities compared to a section of Corridor 5 that traverses from Karamik to Dushanbe (Tajikistan), with a distance of only 320km. As such, standardization is needed for all duration of activities by the same distance. The duration of stop activities are divided by the total distance travelled, multiplied by 500km. The value of 500km is selected as a unit for normalization because a typical road journey in Central Asia spans 500km.

34. Figure 4 shows the relative significance of each stop activity.[3] The top three factors that impede seamless connectivity are **loading/unloading, waiting time** and **customs clearance**.

35. As explained, loading and unloading consume a lot of time. In many parts of Central Asia, this is done manually, as shown in Photo 1. The use of material handling equipment (MHE) such as forklifts and pallet jacks is very rare.

Photo 1 : Manual Loading at Khorgos BCP

36. The second reason for delay is the long waiting time to cross the borders. The queues at the BCP are quite long, since most of the BCPs have no logistics facilities and only have single lane processing. Drivers need to wait for the long line of vehicles before them to complete the formalities at the border. It is common to see dozens or even over a hundred trucks clogging the roads leading to the BCPs.

37. The third significant delay is the long processing time for customs clearance. At the BCP, there are several clearance activities, such as border security control, GAI, phyto-sanitary and veterinary inspections. Among them, customs clearance time contributes significantly to the long delay. Some of the reasons cited for the delay are the need to fill up several forms, the differences in language and un-harmonized customs procedures.

38. Figure 5 illustrates the relative impact of specific activities on time in transit via rail transport. Waiting time is long due to the lack of rolling stock (such as locomotives and rail wagons). This situation is especially serious in Mongolia, where the waiting time can be 20 hours at a railway station.

[3] There are two activities (rest/overnight stay and meals) shown for which little can be done. These activities are not inefficiencies due to physical infrastructure or burdensome regulations. As such no discussion shall be devoted to these activities.

Figure 4: Average duration of road activities (hours per 500 km)

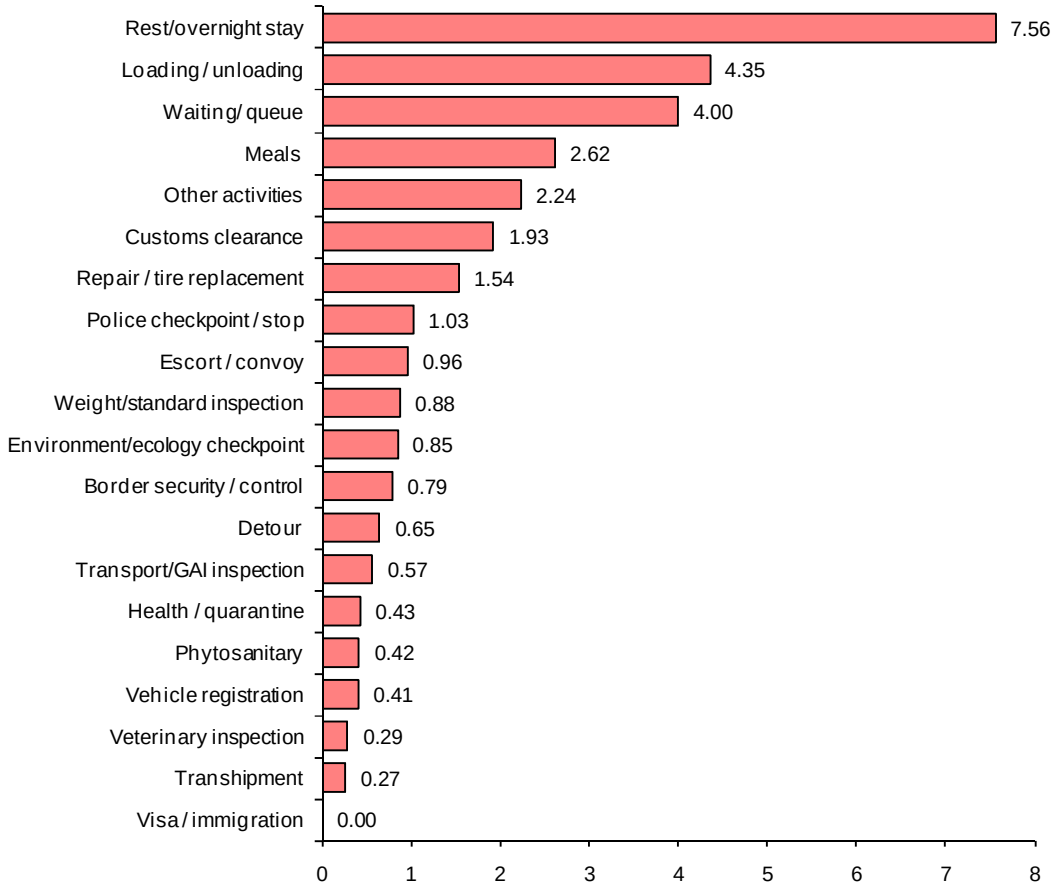
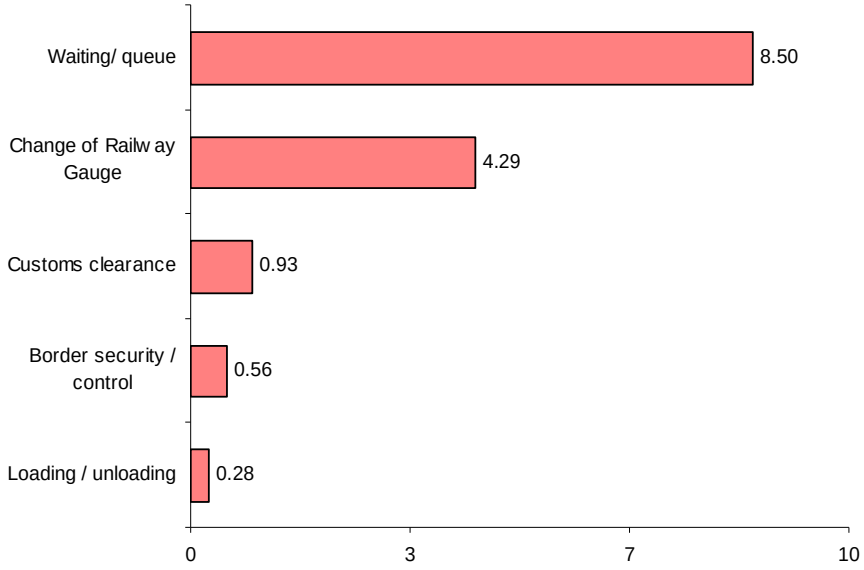


Figure 5: Average duration of rail activities (hours per 500 km)



39. Another cause of delay is the need to change railway gauge at Zamyn-Uud, so that Mongolian goods (or goods transiting Mongolia) can continue through Erenhot to Tianjin in Corridor 4.

40. Rail transport has significantly fewer activities that delay the transport of goods. Generally speaking, **customs procedures at railway terminals are simpler and more standardized** compared to BCP procedures for clearing goods transported on road. Many of the inspections are done at customs houses in city centers before the cargo is loaded onto rail wagons, and inspections are not repeated at the BCPs at rail stations.

C. Cost Factors in CAREC Corridors

41. This section focuses on the analysis of transport and activities costs. Transport cost is the total cost involved in moving the goods[4] and paying for all the activities involved at stops or border crossings. Figures 6a and 6b show the differences between the costs for road and rail transport respectively.

Figure 6a: Road Cost per 20 tons/500km

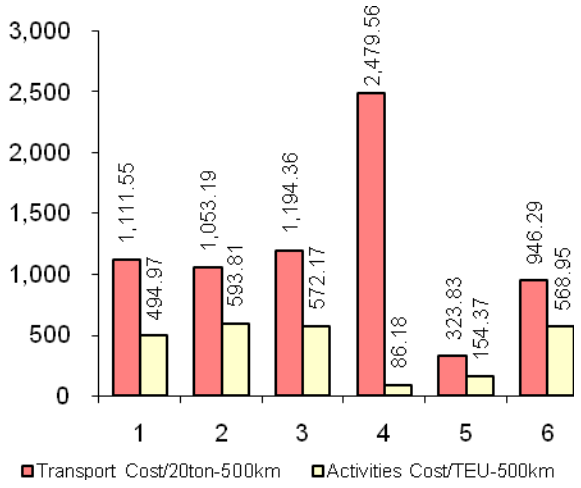
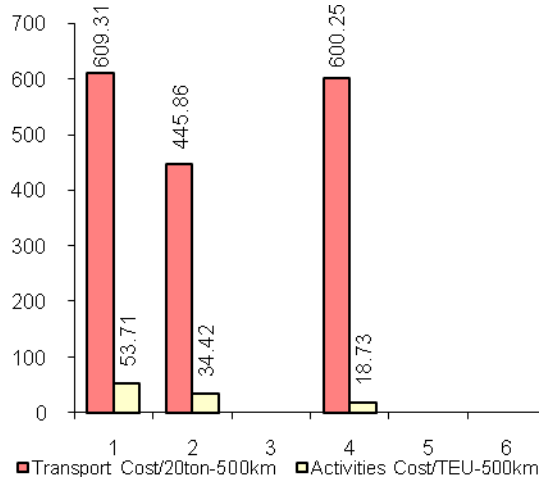


Figure 6b: Rail Cost per 20 tons/500km



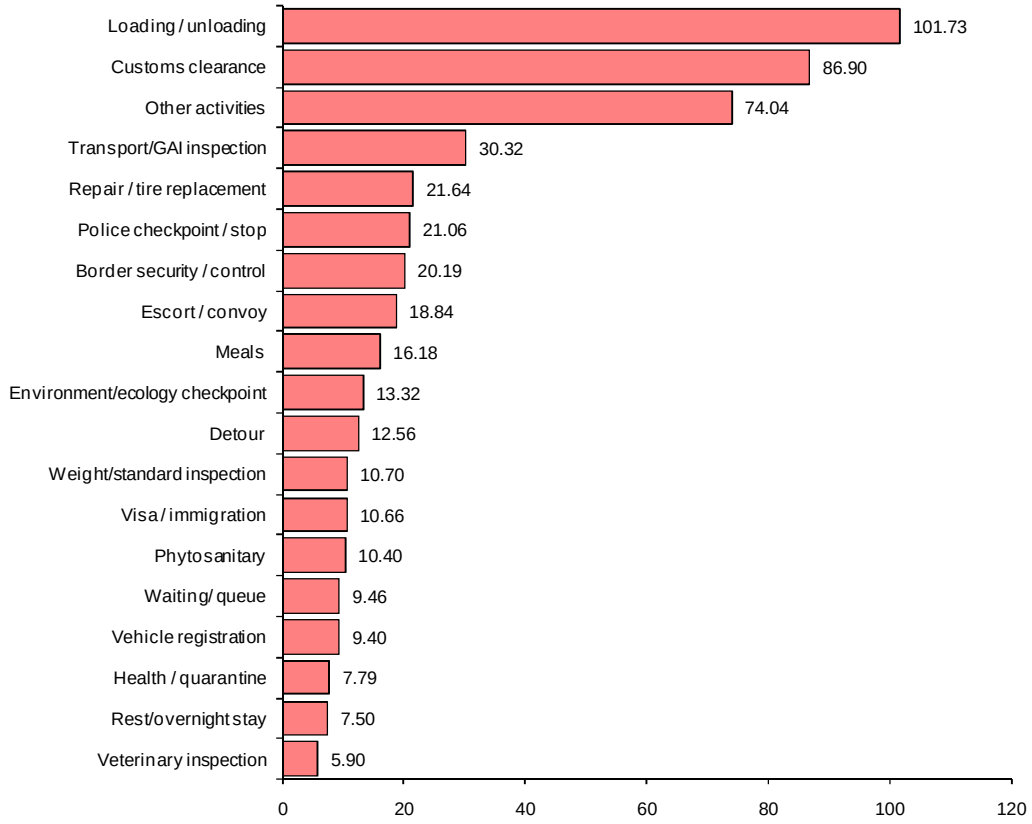
42. In this QR, data on road transport is also provided for Corridor 4. The transport cost for this corridor is especially high in this quarter due to the winter season as well as the uncompleted road from Choyr to Zamyn-Uud, which means that drivers have to navigate on dirt tracks. The activities cost is very low due to the absence of police checkpoints and the limited number of BCPs astride this corridor.

43. With the exception of Corridor 4, an interesting generalization can be made for the rest of the corridors. The cost of activities is approximately half of the transport cost. This means that the **costs associated with stops and border crossing activities are almost equal to the costs involved in moving the goods**!

[4] 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.

44. Figure 6b testifies to the transport economy of rail versus road. Rail transport generally costs much lower over a longer distance per ton, and the data support this fact. For Corridors 1 and 2, the total transport cost by rail is only 45% to 55% of the road cost, while the rail transport cost is only 25% of the road cost per ton per 500km for Corridor 4.

Figure 7: Average Road Activity Cost (US$) per 500 km



45. Figure 7 shows that loading/unloading ranks as the most expensive activity for road transport after normalizing the data by 500 km. As discussed in section B, this activity is also time-consuming, thus it should be raised as a major area of concern. Any improvement on loading and unloading practices should yield significant reductions in transport time and cost. Likewise, border crossing procedures contribute significantly to delays for road transport.

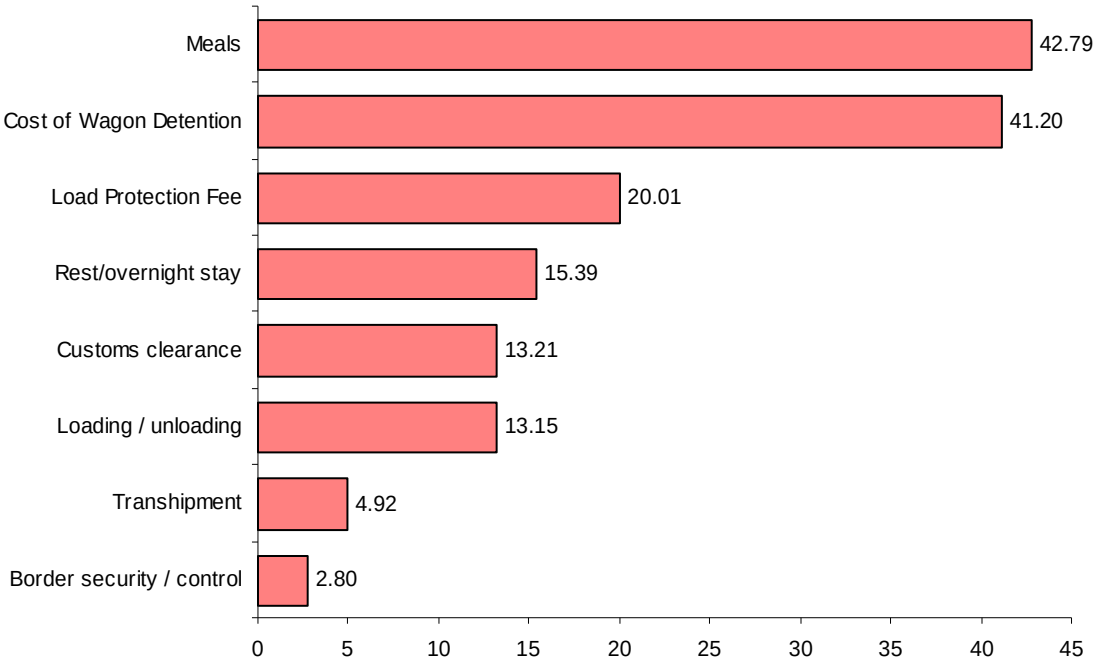
46. A transport inspection activity called GAI (State Automobile Inspection) is a costly activity. The main functions of GAI include:

- Control of traffic violations and compliance with traffic regulations
- Responsibility for road safety including technical inspection of vehicles
- Driver examinations and licensing as well as registration of vehicles
- Control of public order, common protection, heavy traffic enforcement, overload control
- Cases of vehicle thefts, search of stolen vehicles
  Reports of patrols
- Speed control, roadblocks
- Ecological matters, measurement of exhaust gas

- Stopping vehicles when needed

47. A key function of GAI is to monitor overloading, through the use of weighbridges. Since the type and use of weighbridges are not standardized across CAREC countries, the same vehicle and its load may have different weights when measured at the origin and at the destination. This inconsistency results in discrepancies over the actual weight and the value indicated in the cargo document. It provides an opportunity for the traffic police to extract unofficial payments. To minimize the incidence of extortion, one of the initiatives of Kyrgyz associations of roads carriers is to push for the standardization of weighbridges and the use of mutually recognized weight certificates. The rationale for this initiative is **to adopt a system of certifying weighbridges that is commonly recognized by different authorities in different countries**. This system will allow a truck to be weighed at the beginning of a trip, sealed and, if the seal is not broken, allowed through until the end of its journey without further weighing.

Figure 8: Average Rail Activity Cost (US$) per 500 km



48. Figure 8 indicates an important activity cost 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. 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.

49. The escort and convoy fee for rail is a load protection fee offered by China Railways. This is required when the goods transported are of high value or classified as hazardous (such as chemicals). This fee is reported by the transport associations from PRC and is commonly applied for rail transit across Corridors 1 and 2.

50. Table 4 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 taken as unofficial. Besides being unlawful, this form of corruption increases the cost of doing business and stifles innovations that improve efficiency.

51. The column under 'Official' represents the frequency where the sum paid is according to the stated amount by law. On the other hand, the figure reported under column 'Unofficial' does not necessarily mean it is an exclusively 'unofficial activity'. It reflects a component paid on top of what is official to expedite a certain process, such as customs clearance. Thus, it must be emphasized that 'unofficial' payment does not mean a separate payment. It is an additional payment on top of an official sum. For instance, if a driver pays US$10 for customs clearance to cross a border point, this is official. If the driver is requested to pay a total of US$15 (US$5 in addition to the sum of US$10), this becomes unofficial payments. An unofficial payment has neither receipt nor audit trail.

52. An examination of the percentage of unofficial payments reported this quarter shows a similar trend to the findings reported in previous quarters. The most serious problem is found in transport/GAI inspection, and the reasons are explained in the previous section. Inspection activities such as health/quarantine, phyto-sanitary, veterinary control as well as border control and customs clearance are subjected to high probability of unofficial payments.

Table 4: Analysis of Unofficial Payments in Road Transport

Activity	Official		Unofficial	
	Count	Percent	Count	Percent
Health/quarantine	243	48.60%	257	51.40%
Phytosanitary	179	32.49%	372	67.51%
Veterinary inspection	125	55.56%	100	44.44%
Border security/control	307	32.76%	630	67.24%
Visa/immigration	15	88.24%	2	11.76%
Customs clearance	468	41.97%	647	58.03%
Detour	10	100.00%	0	0.00%
Waiting/ queue	657	99.70%	2	0.30%
Loading/unloading	466	100.00%	0	0.00%
Escort/convoy	77	100.00%	0	0.00%
Weight/standard inspection	287	55.41%	231	44.59%
Police checkpoint/stop	633	31.70%	1364	68.30%
Transport/GAI inspection	82	9.76%	758	90.24%
Environment/ecology checkpoint	329	100.00%	0	0.00%
Vehicle registration	205	50.62%	200	49.38%
Repair/tire replacement	145	100.00%	0	0.00%
Trans-shipment	6	100.00%	0	0.00%
Meals	2114	99.86%	0	0.00%
Rest/overnight stay	560	99.64%	0	0.00%
Others	387	76.33%	120	23.67%
All	3321	59.73%	2239	40.27%

IV. PERFORMANCE OF CAREC CORRIDORS

Corridor 1: Europe – East Asia

53. Corridor 1 has three sub-corridors that traverse Kazakhstan and Kyrgyz Republic. At this point, there is data only for a partial section of Corridor 1b, from Khorgos-Almaty-Merke-Taraz-Shymkent. The western section of Corridor 1b is not popular due to poor physical infrastructure. Thus, drivers tend to use Corridor 1c.

54. Corridor 1b is of particular interest to Kazakhstan. Designated as a key section in the 'Western Europe – Western China' project, major road construction projects are taking place along Corridor 1b. The entire section from Khorgos in PRC to Orenburg in Russia is 2,624km, with 2,266km located in Kazakhstan's territory requiring improvements. The road passes through five oblasts in Kazakhstan.

S/N	Oblast	Length, km	%
1	Aktobe	632.19	27.90%
2	Kyzylorda	610.42	26.92%
3	South Kazakhstan	294.00	12.97%
4	Zhambyl	426.90	18.83%
5	Others	303.30	13.38%
	Total	**2,266.81**	**100%**

Source : Interviews with KazRoadProject Ltd

55. The new roads are mainly concrete and asphalt, of Class I and II quality, bringing the road network to international standards, good enough for higher volume of transit traffic. A highway with four lanes will be 27.5m wide, while a highway with two lanes will be 15m wide. The construction will occur in three phases. Phase one is from 2009 to 2012, phase two is from 2012 to 2015, and phase three is planned for 2016.

56. Based on data compiled, it appears that much traffic occurs on a hybrid/combination of the three sub-corridors. The most popular route starts from Khorgos-Almaty (Corridor 1b) – Shu – Balkhash (Corridor 1a) – Karaganda – Astana – Kostanai or from Astana (Corridor 1c) – Aktobe (Corridor 1b). This is interesting because this route does not lie in its entirety along any of the existing CAREC corridors but rather criss-crosses along the 3 sub-corridors.

57. For rail, the trunk line runs through the following locations, namely Dostyk, Aktogai, Yshtobe, Ozek, Sary, Almaty, Shu, Lugovoe, Taras, Tulkybas, Shymkent, Tyrkestan, Kyzylorda, Dzhusaly, Tuaratam, Kazalinsk, Saksaulskaya, Shalkar, Kandyagash and Aktobe. In summary, this rail line starts from Dostyk in Corridor 1a, and runs closely along Corridor 1b from Almaty to Aktobe.

A. Speed Indicators

58. For road transport, the speed indicators offer different results compared to the previous quarter. Drivers who use Corridors 1b and 1c reported SWOD of 44 kph and SWD between 26 to 30 kph with a high CV. On the other hand, Corridors 1a and 1b are more reliable routes (lower CV) compared to Corridor 1c. Considering both the speed and reliability, Corridor 1b currently offers the best result. This is mostly true because the eastern section of Corridor 1b (Khorgos to Almaty) has relatively better roads compared to other parts of the country. This is the key section used for moving goods to domestic and international destinations.

59. For rail transport, travelers on Corridor 1a enjoy high speed, but the CV is similarly high.

Figure 9a: Road Speed (per 20 ton)

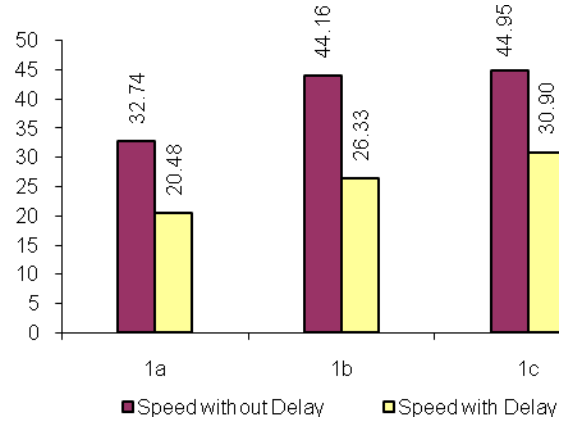


Figure 9b: Coefficient of Variation (Road)

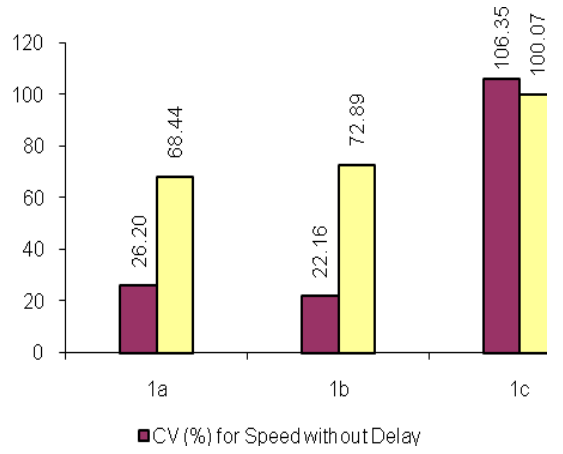


Figure 9c: Rail Speed (per 20 ton)

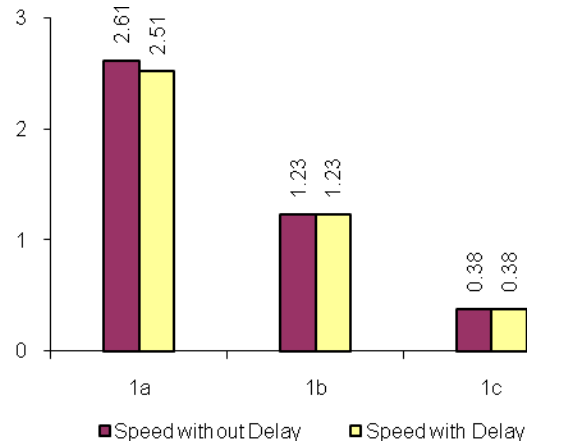
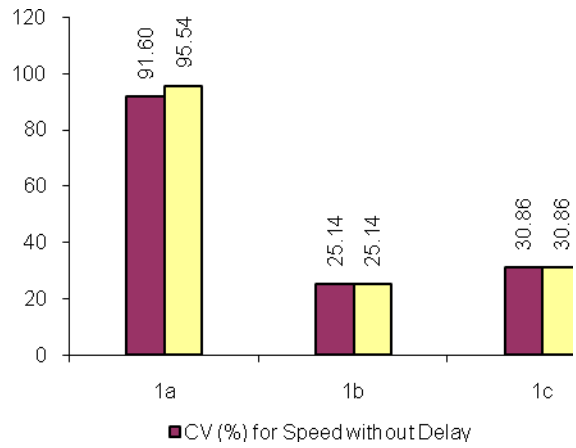


Figure 9d: Coefficient of Variation (Rail)



B. Cost and Time Spent on Delays

60. For road transport, loading/unloading, customs clearance and waiting time continue to be important delay factors. Loading and unloading time can be as long as 22 hours in Corridor 1c. The high cost of transport is due to a variety of fees paid during transit (police checkpoints, GAI, weight inspection) as well as the standard Customs, Immigration and Quarantine (CIQ) activities during border crossing. Corridor 1b is especially exposed to various high costs as indicated in Table 5.

61. Rail transport experiences long waiting time at border crossing due to change of rail gauge at Dostyk. Escort/convoy (in the form of load protection fee) as reported in previous reports continues to increase the overall cost of transport: it is as high as US$40.95 in Corridor 1b.

Table 5: Average Duration and Cost of Activities by Mode of Transport

Activity	Duration (Hours per 500 km)						Cost (US $)					
	Road			Rail			Road			Rail		
	1a	1b	1c	1a	1b	1c	1a	1b	1c	1a	1b	1c
Health / quarantine	0.44	1.01	0.44				28.56	28.50	10.35			
Phytosanitary	0.34	1.90	0.36				23.27	38.30	6.53			
Veterinary inspection			0.32						7.29			
Border security / control	0.57	1.05	1.46	0.64			21.54	88.25	17.16	3.20		
Visa / immigration			0.12									
Customs clearance	1.23	2.06	5.99	0.32			406.08	531.94	96.79	18.39		
Detour												
Waiting/ queue	2.55	1.85	7.94	7.82			4.22					
Loading / unloading	3.12	3.22	22.05	0.32					33.01	18.48		
Escort / convoy									148.59	5.93	40.95	
Weight/standard inspection	0.32	0.28	0.69				31.06	5.16	7.51			
Police checkpoint / stop	0.47	1.30	1.13				71.96	164.87	14.49			
Transport/GAI inspection	0.23	0.65	0.44				21.62	58.89	33.50			
Environment/ecology checkpoint			0.13									
Vehicle registration			0.34						15.81			
Repair / tire replacement	0.70	1.76	2.39				12.44	40.24	5.44			
Transhipment										6.96		
Meals	1.02	1.62	1.72				9.05	14.62	18.41	62.11		
Rest/overnight stay	5.50	8.04	5.33				5.84	12.96	5.46	5.61	40.95	
Other activities	0.86	1.36	0.57				102.69	235.99	68.73	83.02		

C. BCPs and Bottlenecks

62. The major BCPs include **Alataw Shankou-Dostyk (PRC-KAZ), Khorgos (PRC-KAZ)**, **Zhaisan-Ozinki (KAZ-RUS)** and **Kairak-Troitsk (KAZ-RUS)**. The annual throughput of **Alataw Shankou-Dostyk** is 15 million tons. This BCP handles the largest tonnage (primarily transported by trains) in Central Asia. Unfortunately, cargoes in Dostyk are also plagued by very long waiting time, which averages 47.72 hours according to the data. This waiting time is the longest in all six CAREC corridors. Customs clearance and border security control take 4 hours and 2 hours respectively. The need to trans-load cargoes due to differences in rail gauge is a primary reason for the long delay in border-crossing.

63. Conversely at Korgas (see Box 1), drivers reported little delays. Customs clearance takes only 1.26 hours. The Kazakhstan government is working on single window which, if

implemented, should reduce the border crossing time further. Time and cost data for border crossing at other BCPs (Zhaisan and Kairak) are indicated on the map below.

Box 1: Information on Khorgos Border Crossing Point

After a two-day CAREC workshop on Corridor Performance Measurement and Monitoring held in Almaty, Kazakhstan, ADB conducted a site visit to Khorgos on 3 March 2010, for all delegates from various transport associations in CAREC. Being a strategic border crossing point (BCP), the visit naturally attracted the interests of the participants.

Current Traffic through Khorgos

Located along the People's Republic of China (PRC) - Kazakhstan border, Khorgos only processes road transport at present. Khorgos is one of the busiest BCPs in the region, handling 70,000 trucks, 600,000 passengers and 700,000 tons of goods in 2009. Most of the goods (92% to 95%) come from PRC to Kazakhstan.

In view of its strategic significance, the governments of Kazakhstan and PRC signed an agreement on 4 July 2005 to develop Khorgos jointly, building the Khorgos International Cooperation Centre (KICC). The functions of KICC are to facilitate cross-border trade, provide modern facilities for exhibits, storage and distribution as well as provide commercial and financial services. The total area is 5.28km^2, of which 3.43 km^2 belongs to PRC and 1.85 km^2 belongs to Kazakhstan. A total sum of RMB 75 billion has been invested in Khorgos, mainly spent on construction of the physical infrastructure.

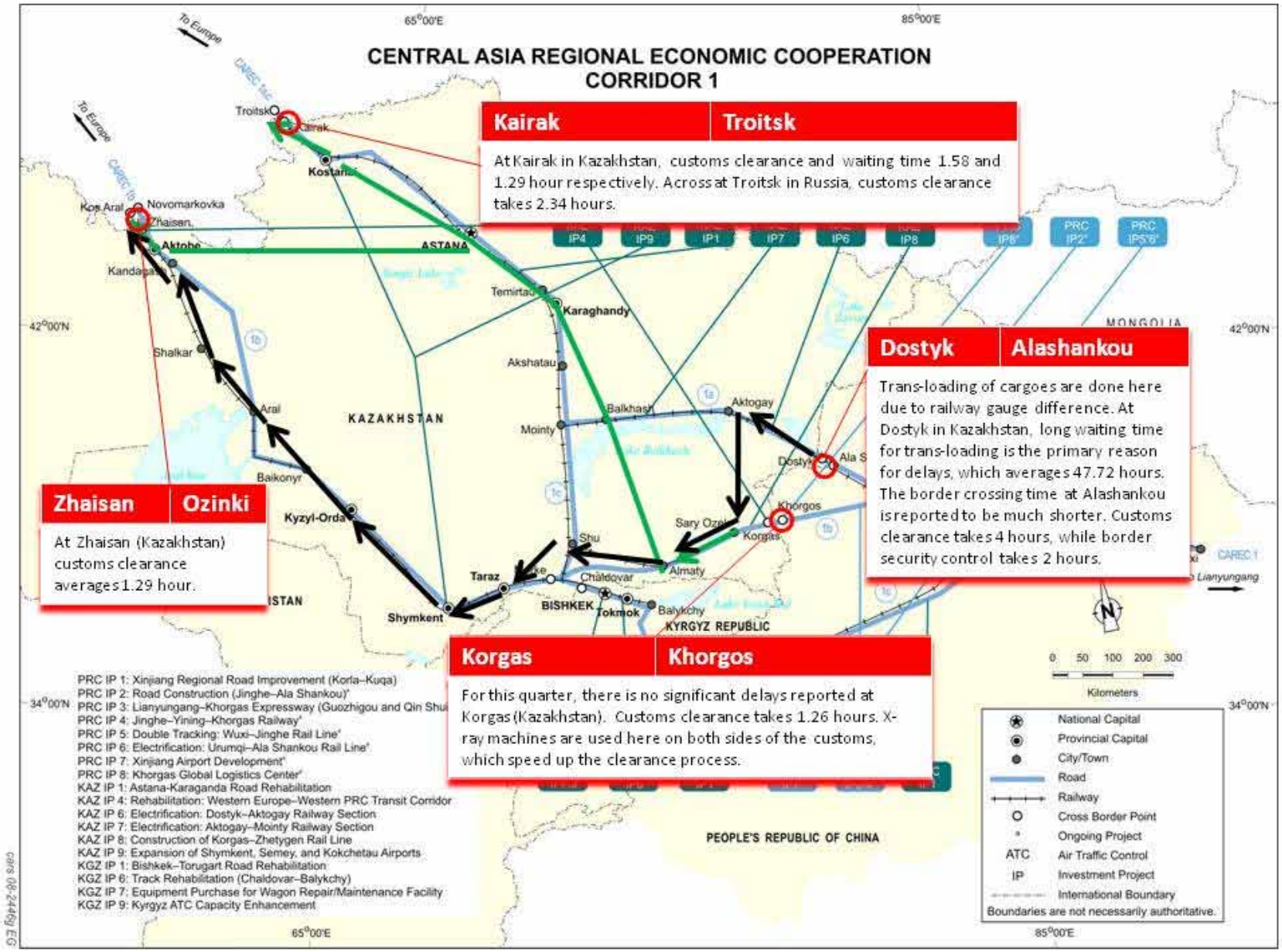
Operating Hours

The operating hours on the Kazakhstan side is 0830 to 1700, while PRC operates from 1030 to 1900. Since there is a two hour time difference between Kazakhstan and PRC, the above operating hours are actually synchronized. As most of the trucks enter in the afternoon, the Kazakh customs officers are usually very busy after lunch. The Khorgos BCP operates six days a week, and is closed on both sides on Sundays. In response to shippers and carriers, discussions are ongoing between the customs authorities from Kazakhstan and PRC to provide 24x7 service (24 hours a day, seven days a week). The customs clearance formalities take an average of 2-3 hours per vehicle.

Border Crossing Procedure

Kazakhstan instituted the use of electronic clearing in managing cargo flow. All delivery trucks need to enter the scanning centre, which takes an X-ray picture of the contents of the delivery vehicles, thus alleviating the need for unloading and re-loading. Radioactive materials and dangerous cargoes are detected through the pictures and the customs officers will take necessary actions (such as conducting full manual inspection) to apprehend any contraband. If no unauthorized goods are found, the trucks are allowed to go through the customs process unhindered. Drivers go through the following sequence of activities to clear their cargo (1) border control, (2) immigration, (3) customs clearance, (4) transport control (e.g. weight control).

The Kazakhstan customs authority is working on a single window concept. Once a separate activity, transport control is now conducted by the customs starting 27 January 2010. However, phyto-sanitary and veterinary controls are still under separate authorities.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 1
Kairak
Troitsk
At Kairak in Kazakhstan, customs clearance and waiting time 1.58 and 1.29 hour respectively. Across at Troitsk in Russia, customs clearance takes 2.34 hours.
Dostyk
Alashankou
Trans-loading of cargoes are done here due to railway gauge difference. At Dostyk in Kazakhstan, long waiting time for trans-loading is the primary reason for delays, which averages 47.72 hours. The border crossing time at Alashankou is reported to be much shorter. Customs clearance takes 4 hours, while border security control takes 2 hours.
Zhaisan
Ozinki
At Zhaisan (Kazakhstan) customs clearance averages 1.29 hour.
Korgas
Khorgos
For this quarter, there is no significant delays reported at Korgas (Kazakhstan). Customs clearance takes 1.26 hours. X-ray machines are used here on both sides of the customs, which speed up the clearance process.
KAZAKHSTAN
KYRGYZ REPUBLIC
PEOPLE'S REPUBLIC OF CHINA
MONGOLIA
ASTANA
BISHKEK
Troitsk
Kairak
Kostanay
Novomarkovka
Kos Aral
Zhaisan
Aktobe
Kandagash
Shalkar
Aral
Baikonyr
Kyzyl-Orda
Shymkent
Taraz
Temirtau
Karaghandy
Akshatau
Mointy
Balkhash
Aktogay
Dostyk
Ala S
Sary Ozek
Khorgos
Korgas
Shu
Chaldovar
Almaty
Tokmok
Balykchy
Lianyungang
CAREC 1
PRC IP 1: Xinjiang Regional Road Improvement (Korla–Kuqa)
PRC IP 2: Road Construction (Jinghe–Ala Shankou)*
PRC IP 3: Lianyungang–Khorgas Expressway (Guozhigou and Qin Shu
PRC IP 4: Jinghe–Yining–Khorgas Railway*
PRC IP 5: Double Tracking: Wuxi–Jinghe Rail Line*
PRC IP 6: Electrification: Urumqi–Ala Shankou Rail Line*
PRC IP 7: Xinjiang Airport Development*
PRC IP 8: Khorgas Global Logistics Center*
KAZ IP 1: Astana-Karaganda Road Rehabilitation
KAZ IP 4: Rehabilitation: Western Europe–Western PRC Transit Corridor
KAZ IP 6: Electrification: Dostyk–Aktogay Railway Section
KAZ IP 7: Electrification: Aktogay–Mointy Railway Section
KAZ IP 8: Construction of Korgas–Zhetygen Rail Line
KAZ IP 9: Expansion of Shymkent, Semey, and Kokchetau Airports
KGZ IP 1: Bishkek–Torugart Road Rehabilitation
KGZ IP 6: Track Rehabilitation (Chaldovar–Balykchy)
KGZ IP 7: Equipment Purchase for Wagon Repair/Maintenance Facility
KGZ IP 9: Kyrgyz ATC Capacity Enhancement
0 50 100 200 300
Kilometers
National Capital
Provincial Capital
City/Town
Road
Railway
Cross Border Point
Ongoing Project
ATC Air Traffic Control
IP Investment Project
International Boundary
Boundaries are not necessarily authoritative.
65°00'E
85°00'E
42°00'N
34°00'N

Corridor 2: Mediterranean – East Asia

64. Corridor 2 traverses through six countries, making it one of the most complicated corridors in CAREC. Corridor 2a is a popular route especially for Uzbek cargoes moving from Tashkent or Navoi northwards to Russia via Kazakhstan. In the Caspian area, no data have been submitted due to a lack of ferry service providers to send goods across the Caspian Sea. The cargoes move from Karakalpakya-Beineu-Aktyrau (Kazakhstan) to Orenburg (Russia).

Figure 10a: Road Speed (per 20 ton)

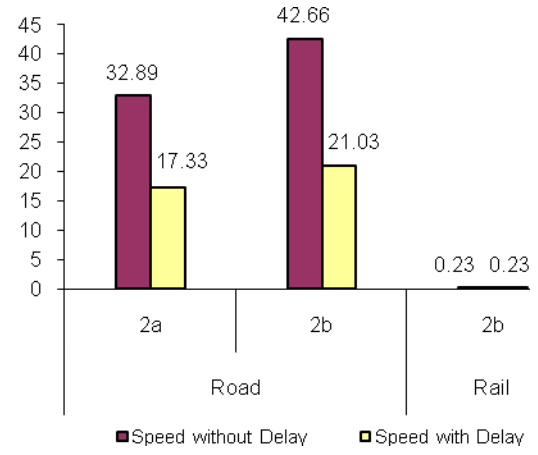
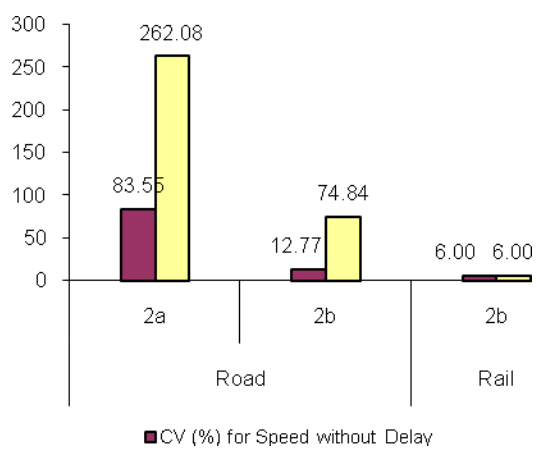


Figure 10b: Coefficient of Variation (Road)



A. Speed Indicators

65. Corridors 2a and 2b reported road speeds similar to those reported in Corridor 1. However, Corridor 2 exhibits a high CV, thus it may not be a very reliable route to use. Rail transport, while relatively reliable, is moving at a very slow speed.

B. Cost and Time Spent on Delays

66. The top three causes of delays in Corridor 1 are also the major reasons for transport inefficiencies in Corridor 2. Loading/unloading, customs clearance and waiting time are significant factors in adding delays to the overall transport time. Loading and unloading alone can lengthen time in transit by 13 hours in Corridor 2a. Customs clearance is the major cost factor for road transport, whereas loading/unloading and escort/convoy are other cost factors. Drivers in Corridor 2a reflected that escort and police checkpoints add significantly to the overall cost. Table 6 shows that payments involved in clearing police checkpoint are much higher than the same activity in Corridor 2b.

Table 6: Average Duration and Cost of Activities by Mode of Transport

Activity	Duration (hours per 500 km)			Cost (US$ per 500 km)		
	Road		Rail	Road		Rail
	2a	2b	2b	2a	2b	2b
Health / quarantine	0.26	0.19		4.39	6.15	
Phytosanitary	0.26	0.52		4.83	14.54	
Veterinary inspection	0.15	0.11		3.28		
Border security / control	0.86	1.22		45.79	27.74	
Visa / immigration	0.95			6.43		
Customs clearance	4.75	1.59		243.43	35.81	
Detour	0.12					
Waiting/ queue	6.97	3.81				
Loading / unloading	12.89	2.72		105.73		
Escort / convoy				143.20		70.50
Weight/standard inspection	0.22	0.88		7.73	6.50	
Police checkpoint / stop	0.85	1.89		113.19	7.27	
Transport/GAI inspection	0.35	1.32		30.13	5.20	
Environment/ecology checkpoint						
Vehicle registration	0.14	0.39		16.61	3.87	
Repair / tire replacement	9.40	1.97		31.54	22.34	
Transhipment						
Meals	2.16	2.19		19.01	12.68	
Rest/overnight stay	9.02	9.97		12.74	6.44	
Other activities	1.38	0.90		368.11	282.96	

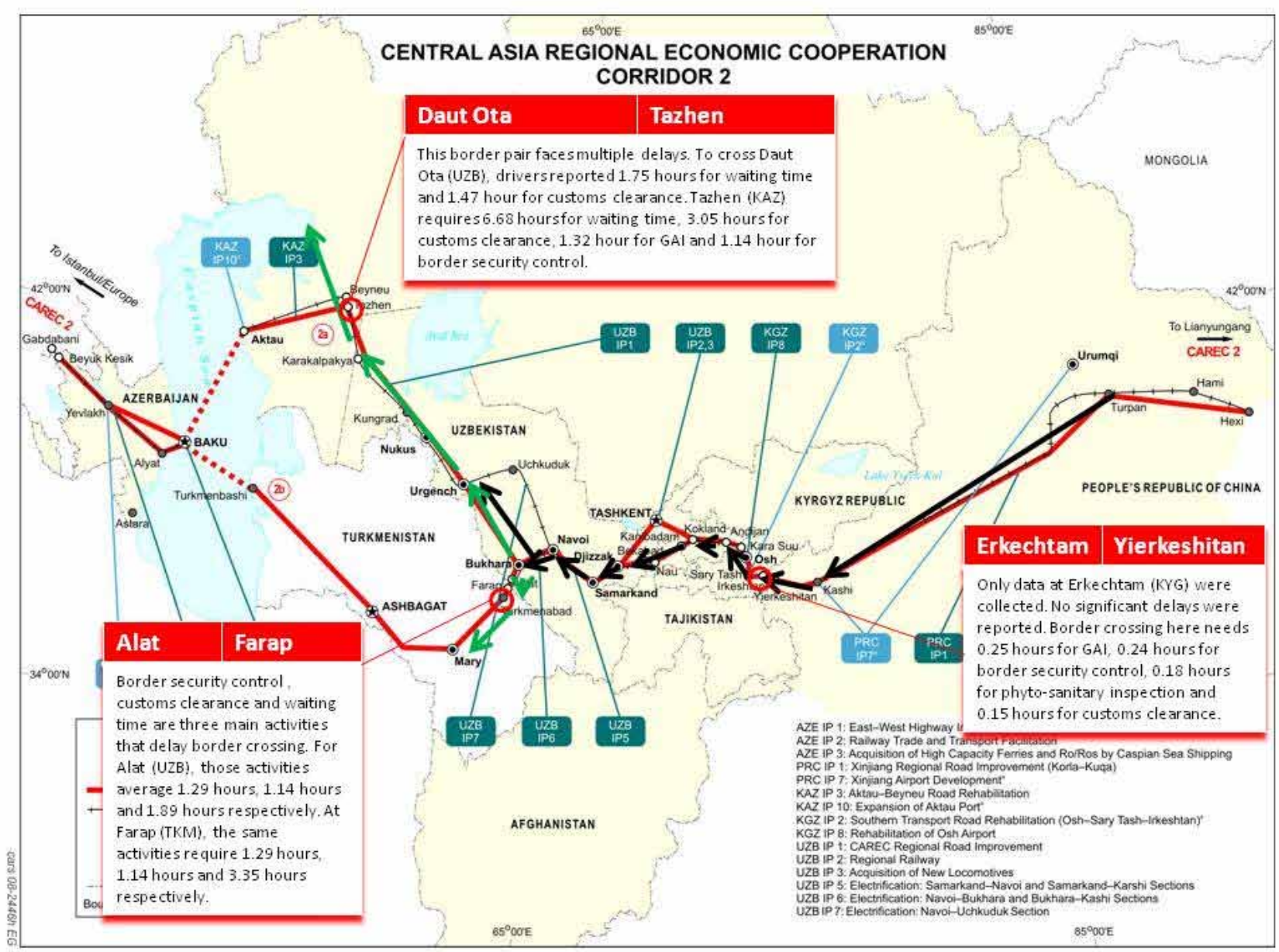
C. BCPs and Bottlenecks

67. The data report significant delays at the **Yierkeshitan-Erkechtam (PRC-KGZ)** BCP. On the western side, **Alat-Farap (UZB-TKM)** and **Daut Ota-Tazhen (UZB-KAZ)** are important BCPs; the latter is a popular BCP along Corridor 2a for goods bound for Russia.

68. Analyzing Corridor 2a data, it is apparent that the **Ota-Tazhen (UZB-KAZ)** route reveals Tazhen as a key bottleneck. To cross the border, drivers reported a waiting time of 6.68 hours, 3.05 hours for customs clearance, 1.32 hour for GAI and 1.14 hour for border security control. The waiting time is relatively long compared to other BCPs, and the reasons for delays are varied, highlighting a need to monitor Tazhen carefully. The delay at Daut Ota is less severe, with waiting time at 1.75 hours and customs clearance at 1.47 hours.

69. Under Corridor 2b, three activities at **Alat-Farap (UZB-TKM)** make up the dominant portion of delays. They are border security control, customs clearance and waiting time. Their values are illustrated in the map below.

70. At **Erkechtam**, in Kyrgyz Republic, which borders PRC, no significant delays are reported, and each activity takes less than one hour to complete.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 2
Daut Ota
Tazhen
This border pair faces multiple delays. To cross Daut Ota (UZB), drivers reported 1.75 hours for waiting time and 1.47 hour for customs clearance. Tazhen (KAZ) requires 6.68 hours for waiting time, 3.05 hours for customs clearance, 1.32 hour for GAI and 1.14 hour for border security control.
Alat
Farap
Border security control, customs clearance and waiting time are three main activities that delay border crossing. For Alat (UZB), those activities average 1.29 hours, 1.14 hours and 1.89 hours respectively. At Farap (TKM), the same activities require 1.29 hours, 1.14 hours and 3.35 hours respectively.
Erkechtam
Yierkeshitan
Only data at Erkechtam (KYG) were collected. No significant delays were reported. Border crossing here needs 0.25 hours for GAI, 0.24 hours for border security control, 0.18 hours for phyto-sanitary inspection and 0.15 hours for customs clearance.
MONGOLIA
AZERBAIJAN
UZBEKISTAN
TURKMENISTAN
KYRGYZ REPUBLIC
TAJIKISTAN
AFGHANISTAN
PEOPLE'S REPUBLIC OF CHINA
To Istanbul/Europe
CAREC 2
To Lianyungang
CAREC 2
BAKU
Gabdabani
Beyuk Kesik
Yevlakh
Alyat
Astara
Turkmenbashi
Aktau
Beyneu
Karakalpakya
Kungrad
Nukus
Uchkuduk
Urgench
Bukhara
Navoi
Djizzak
Samarkand
TASHKENT
Kokland
Andijan
Kara Suu
Osh
Sary Tash
Irkeshtan
Yierkeshitan
Kashi
Urumqi
Turpan
Hami
Hexi
ASHBAGAT
Farap
Turkmenabad
Mary
KAZ IP10*
KAZ IP3
UZB IP1
UZB IP2,3
KGZ IP8
KGZ IP2*
PRC IP7*
PRC IP1
UZB IP7
UZB IP6
UZB IP5
AZE IP 1: East–West Highway
AZE IP 2: Railway Trade and Transport Facilitation
AZE IP 3: Acquisition of High Capacity Ferries and Ro/Ros by Caspian Sea Shipping
PRC IP 1: Xinjiang Regional Road Improvement (Korla–Kuqa)
PRC IP 7: Xinjiang Airport Development*
KAZ IP 3: Aktau–Beyneu Road Rehabilitation
KAZ IP 10: Expansion of Aktau Port*
KGZ IP 2: Southern Transport Road Rehabilitation (Osh–Sary Tash–Irkeshtan)*
KGZ IP 8: Rehabilitation of Osh Airport
UZB IP 1: CAREC Regional Road Improvement
UZB IP 2: Regional Railway
UZB IP 3: Acquisition of New Locomotives
UZB IP 5: Electrification: Samarkand–Navoi and Samarkand–Karshi Sections
UZB IP 6: Electrification: Navoi–Bukhara and Bukhara–Kashi Sections
UZB IP 7: Electrification: Navoi–Uchkuduk Section
65°00'E
85°00'E
42°00'N
34°00'N

Corridor 3: Russian Federation – Middle East and South Asia

71. Corridor 3 has strategic significance because it provides a corridor for goods from Central Asia to access seaports in Iran, such as Bandar Abbas. Goods from Russia and Kazakhstan can travel southwards to Merke, where the corridor branches into 3a through Uzbekistan, or 3b through Kyrgyz Republic and Tajikistan and Afghanistan. Both routes end in Iran where the goods can continue to the Iranian seaports.

72. The busiest section lies along 3a. The section Almaty-Shu-Merke-Taraz-Shymkent-Saryagash-Konasbaeva (Kazakhstan)-Yallama (Uzbekistan)-Tashkent-Samarkand-Navoi-Bukhara-Alat-Farap (Turkmenistan) has significant road traffic. A complete study for Corridor 3b is not possible because there is no traffic in Afghanistan from Mazare-e-Sharif – Andkhouy-Herat-Islam Qila due to the lack of good roads. Construction is underway at three different sections along this part of the national ring road.

Figure 11a: Road Speed (per 20 ton)

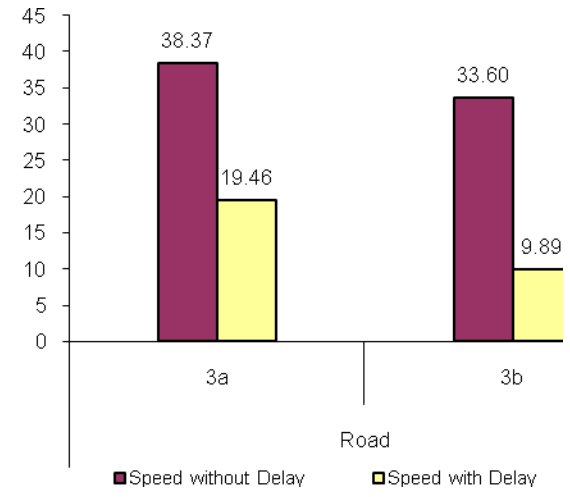
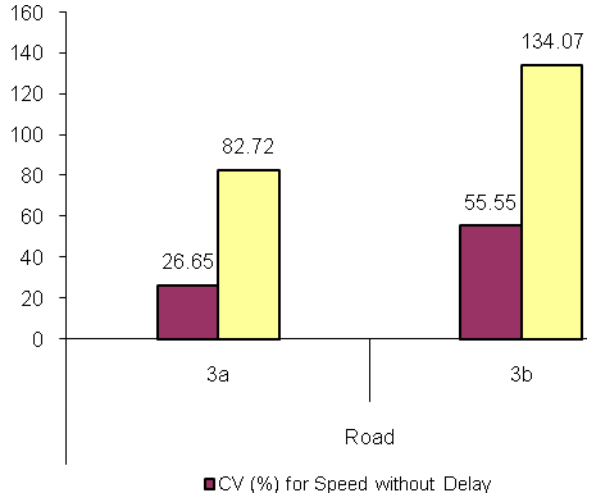


Figure 11b: Coefficient of Variation (Road)



A. Speed Indicators

73. For this quarter, only road data are collected. The SWODs indicate speeds that are comparable to Corridors 1 and 2, but the SWDs suffer a significant drop for both Corridors 3a and 3b. Corridor 3a is more reliable compared to Corridor 3b. This can be explained in part by the fact that there are less borders (Kazakhstan and Uzbekistan) astride the former compared to more borders (those between Kazakhstan, Kyrgyz Republic, Tajikistan and Afghanistan) along the latter.

B. Cost and Time Spent on Delays

74. Customs clearance, waiting time, and loading/unloading are key factors that add to the time and cost of travel. Customs clearance in 3b can be as long as 18 hours, which explains the sizeable difference between the SWOD and SWD in that corridor.

75. Customs clearance continues to be a major cost factor for Corridor 3. Escort/convoy is another expensive activity, as are weight inspection and GAI.

Table 7: Average Duration and Cost of Activities by Mode of Transport

Activity	Duration (hours per 500 km)		Cost (US$ per 500 km)	
	3a	3b	3a	3b
Health / quarantine	1.02	5.54	22.55	101.86
Phytosanitary	0.81	5.92	13.00	79.72
Veterinary inspection	0.64		16.45	
Border security / control	1.42	5.24	55.42	100.10
Visa / immigration	0.70			
Customs clearance	2.99	17.90	269.78	601.88
Detour				
Waiting/ queue	8.41	13.24		
Loading / unloading	4.41	8.49	34.50	24.92
Escort / convoy			243.90	
Weight/standard inspection	1.03	2.43	15.64	196.35
Police checkpoint / stop	1.57	6.27	32.47	113.28
Transport/GAI inspection	1.40		132.24	
Environment/ecology checkpoint				
Vehicle registration	0.54	3.20	10.07	145.90
Repair / tire replacement	1.11	10.63	43.40	371.94
Transhipment				
Meals	2.55	8.37	19.97	9.47
Rest/overnight stay	13.31	40.90	6.99	
Other activities	1.02		237.97	99.14

C. BCPs and Bottlenecks

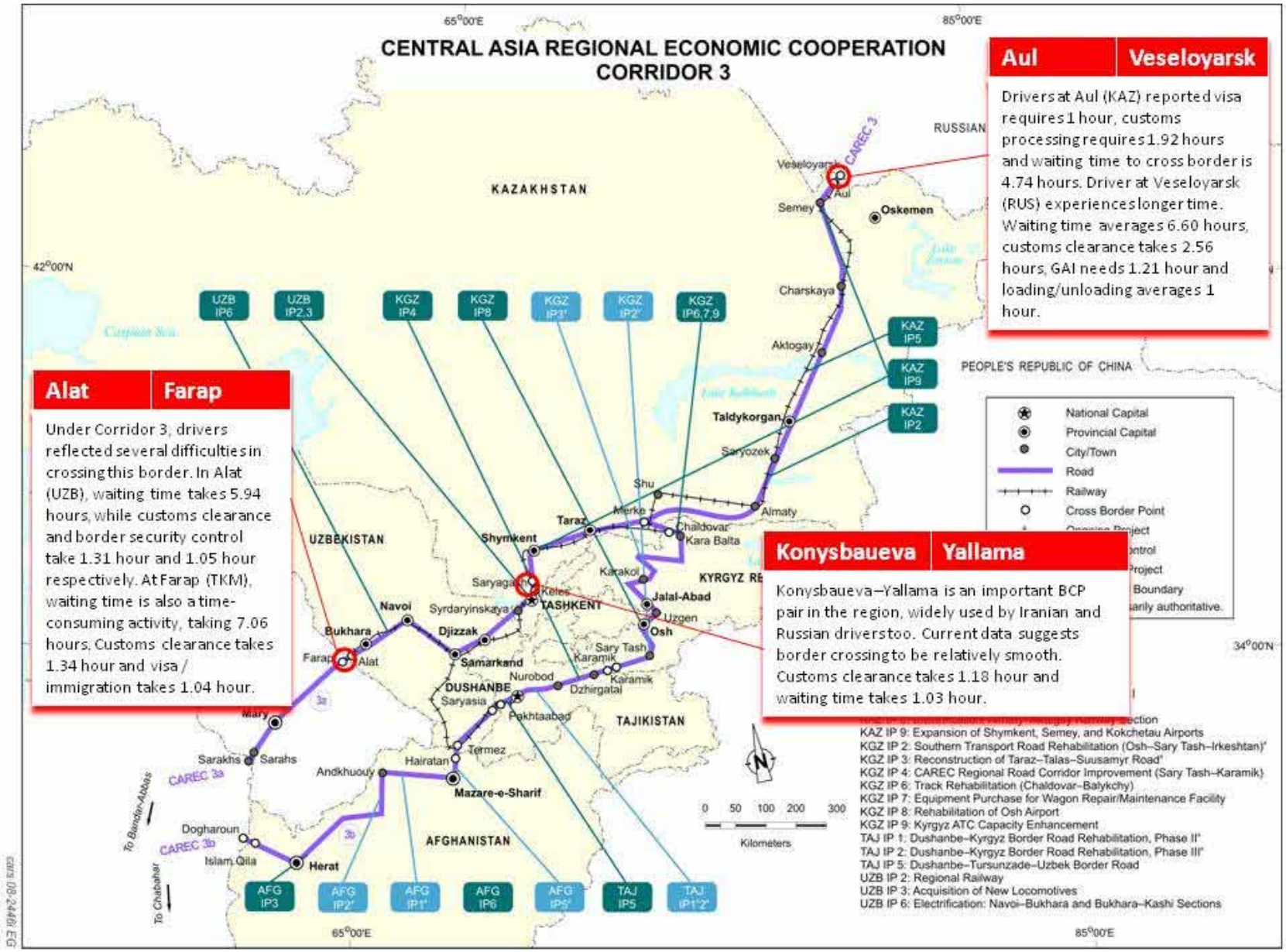
76. Data on Corridor 3 complement the analysis done on **Alat-Farap (UZB-TKM)** in Corridor 2. Drivers reported multiple reasons for delays when crossing into Turkmenistan. **Konysbaueva-Yallama (KAZ-UZB)** and **Aul-Veseloyarsk (KAZ-RUS)** are also important BCPs in Corridor 3, which face less impact from the delay factors.

77. Drivers using Corridor 3a that pass through **Alat-Farap (UZB-TKM)** indicate important challenges in crossing the border. Drivers have to wait 7.06 hours in queue to cross the border, a very high value relative to the other BCPs. Subsequent CPMM studies should include an investigation on the causes for such long waiting time. In addition, customs clearance, border security control, and visa/immigration add to the total time to cross the border.

78. Similarly, data from **Aul-Veseloyarsk (KAZ-RUS)** reflects the same problem. Waiting time to cross the border – 4.74 hours at Aul and 6.60 hours at Veseloyarsk – are significantly

higher than the waiting time at other BCPs. Customs clearance time is also slightly longer. In addition, GAI and loading/unloading contribute to the total time spent in border crossing.

79. Current data show that **Konysbaueva-Yallama (KAZ-UZB)** performs relatively better. Customs clearance takes 1.18 hour while waiting time in queue is only 1.03 hour. This BCP is one of the more popular ones supporting cargo movement between Kazakhstan and Uzbekistan.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 3
Aul
Veseloyarsk
Drivers at Aul (KAZ) reported visa requires 1 hour, customs processing requires 1.92 hours and waiting time to cross border is 4.74 hours. Driver at Veseloyarsk (RUS) experiences longer time. Waiting time averages 6.60 hours, customs clearance takes 2.56 hours, GAI needs 1.21 hour and loading/unloading averages 1 hour.
Alat
Farap
Under Corridor 3, drivers reflected several difficulties in crossing this border. In Alat (UZB), waiting time takes 5.94 hours, while customs clearance and border security control take 1.31 hour and 1.05 hour respectively. At Farap (TKM), waiting time is also a time-consuming activity, taking 7.06 hours. Customs clearance takes 1.34 hour and visa / immigration takes 1.04 hour.
Konysbaueva
Yallama
Konysbaueva–Yallama is an important BCP pair in the region, widely used by Iranian and Russian drivers too. Current data suggests border crossing to be relatively smooth. Customs clearance takes 1.18 hour and waiting time takes 1.03 hour.
KAZAKHSTAN
UZBEKISTAN
KYRGYZ RE
TAJIKISTAN
AFGHANISTAN
PEOPLE'S REPUBLIC OF CHINA
RUSSIAN
Caspian Sea
Aral Sea
Lake Balkhash
Lake Issyk-Kul
Veseloyarsk
Aul
Semey
Oskemen
Charskaya
Aktogay
Taldykorgan
Saryozek
Almaty
Shu
Merke
Chaldovar
Kara Balta
Taraz
Shymkent
Saryagash
Keles
TASHKENT
Karakol
Jalal-Abad
Uzgen
Osh
Sary Tash
Karamik
Nurobod
Dzhirgatal
Karamik
DUSHANBE
Saryasia
Pakhtaabad
Termez
Hairatan
Andkhuoy
Mazare-e-Sharif
Navoi
Syrdaryinskaya
Djizzak
Samarkand
Bukhara
Farap
Alat
Mary
Sarakhs
Sarahs
Dogharoun
Islam Qila
Herat
To Bandar-Abbas
To Chabahar
CAREC 3
CAREC 3a
CAREC 3b
3a
3b
UZB IP6
UZB IP2,3
KGZ IP4
KGZ IP8
KGZ IP3'
KGZ IP2'
KGZ IP6,7,9
KAZ IP5
KAZ IP9
KAZ IP2
AFG IP3
AFG IP2'
AFG IP1'
AFG IP6
AFG IP5'
TAJ IP5
TAJ IP1'2'
National Capital
Provincial Capital
City/Town
Road
Railway
Cross Border Point
Boundary
0 50 100 200 300
Kilometers
KAZ IP 9: Expansion of Shymkent, Semey, and Kokchetau Airports
KGZ IP 2: Southern Transport Road Rehabilitation (Osh–Sary Tash–Irkeshtan)*
KGZ IP 3: Reconstruction of Taraz–Talas–Suusamyr Road*
KGZ IP 4: CAREC Regional Road Corridor Improvement (Sary Tash–Karamik)
KGZ IP 6: Track Rehabilitation (Chaldovar–Balykchy)
KGZ IP 7: Equipment Purchase for Wagon Repair/Maintenance Facility
KGZ IP 8: Rehabilitation of Osh Airport
KGZ IP 9: Kyrgyz ATC Capacity Enhancement
TAJ IP 1: Dushanbe–Kyrgyz Border Road Rehabilitation, Phase II*
TAJ IP 2: Dushanbe–Kyrgyz Border Road Rehabilitation, Phase III*
TAJ IP 5: Dushanbe–Tursunzade–Uzbek Border Road
UZB IP 2: Regional Railway
UZB IP 3: Acquisition of New Locomotives
UZB IP 6: Electrification: Navoi–Bukhara and Bukhara–Kashi Sections
65°00'E
85°00'E
42°00'N
34°00'N
cars 08-2448i EG

Corridor 4: Russian Federation – East Asia

80. Corridor 4 is a Trans-Mongolian corridor that allows cargoes to move between Russia and China through Mongolia. The CPMM focus is Corridor 4b, which forms the backbone of transit and domestic transportation of goods in Mongolia.

A. Speed Indicators

81. For road transport, the data show an interesting contrast to the other corridors. Notably, the SWOD is only approximately one-third of those in Corridors 1, 2 and 3. This testifies to the poor physical infrastructure along 4b. This road is a dual carriageway where the northern section from Ulaanbaatar to Sukhbaatar has better road quality. Drivers can drive along Ulaanbaatar to Choyr, but no paved road exists thereafter in the section linking Choyr to Zamyn-Uud. The highway is also risky in winter when heavy snow covers the road.

82. Secondly, the SWD is not significantly lower than SWOD. This implies the impact of activities is not as drastic as those in other CAREC countries. An examination of Table 8 explains why. While police checkpoints, GAI, and weight inspection are common delay activities in CAREC countries, Mongolia faces less severe impact from these activities. Also, the major BCPs are Altanbulag-Naushki in the north and Zamyn-Uud-Erenhot in the south. Thanks in part to low traffic volumes, drivers do not need to wait a long time for border crossing. Investment to build better physical infrastructure and facilities can significantly reduce the delays in Corridor 4, unlike in other corridors where attention needs to be devoted to streamline customs procedures and simplify regulatory barriers. For rail transport, the speeds indicate even lower values compared with earlier CPMM reports. A perennial problem is the shortage of locomotives and rail wagons. This is compounded by the need for northbound and southbound traffic to share a single track, and the priority accorded passenger trains. This is an issue that concerns not only under-investment in physical infrastructure, but inefficient operating practices.

Figure 12a: Speed (per 20 ton) (Road and Rail)

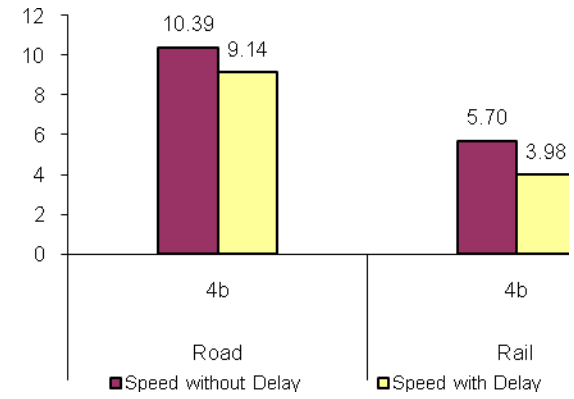
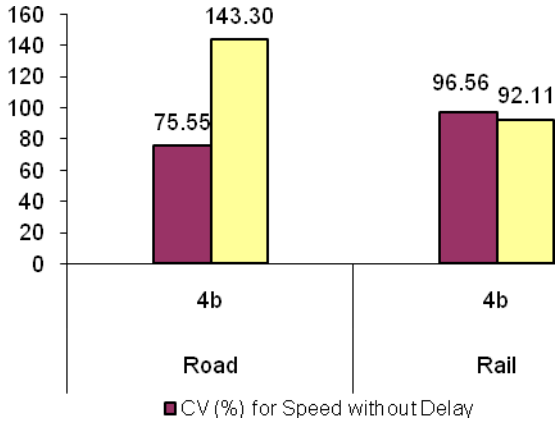


Figure 12b: Coefficient of Variation (Road and Rail)



B. Cost and Time Spent on Delays

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

84. A significant activity is the change of railway gauge at Zamyn-Uud and Erenhot BCPs which is a major cause of delay and high cost for rail transport. On the other hand, customs clearance is faster for rail transport and for some cases such as meat products, the Chinese customs demand such items to be transported solely by rail.

Table 8: Average Duration and Cost of Activities by Mode of Transport

Activity	Duration (hours per 500 km)		Cost (US$ per 500 km)	
	Road 4b	Rail 4b	Road 4b	Rail 4b
Health / quarantine	0.86		5.41	
Phytosanitary	0.59			
Veterinary inspection	0.60			
Border security / control	1.28		2.04	
Visa / immigration	0.30			
Customs clearance	3.56	2.24		
Detour	0.49			
Waiting/ queue	2.66	9.72		
Loading / unloading	7.66			
Escort / convoy				
Weight/standard inspection			34.12	
Police checkpoint / stop	0.53		8.10	
Transport/GAI inspection				
Environment/ecology checkpoint				
Vehicle registration	0.54		5.62	
Repair / tire replacement	2.49		15.85	
Transhipment				
Meals	4.46		29.67	
Rest/overnight stay	5.22		22.26	
Other activities	1.77	4.29	9.27	38.71

C. BCPs and Bottlenecks

85. The BCPs in Corridor 4 are the gateway for freight movement from and into Mongolia. They are Sukhbaatar and Altanbulag to Naushki (Russia), and Zamyn-Uud to Erenhot (PRC). Long waiting time is a primary cause of delays at border crossing. For instance, a train can wait for 24 hours in Erenhot and 2 hours in Sukhbaatar. The efficiency of Zamyn-Uud is compromised by **the need to change railway gauge, which takes an average of 12.5 hours**.

86. Drivers crossing Erenhot wait an average of 9 hours. Interestingly, drivers crossing Altanbulag reported only 0.96 hours, which is substantially lower than other BCPs in Mongolia.

87. Customs clearance is another activity that can be time-consuming. Sukhbaatar requires 5.80 hours, Zamyn-Uud requires 2.50 hours, and interestingly again, the same activity only takes close to 1 hour in Altanbulag, much faster compared to the other Mongolian BCPs.

88. One area that should be improved is the relatively long loading/unloading time. Notably, this activity takes 2.43 hours in Altanbulag, 1.90 hours in Sukhbaatar and 4 hours in Zamyn-Uud.

Box 2: Movement of Goods along Corridor 4b (Zamyn-Uud and Erenhot BCP)

PRC truck with cargo behind cab and near tire well MON jeep carrying parcel in engine compartment & roof

PRC is Mongolia's most important trading partner. According to recent trade statistics, 65% of Mongolia's exports and 28% of imports are with PRC. PRC is also Mongolia's largest investor, providing over 50% of total FDI. The recession of 2008 has marred the volume of Mongolia's exports and imports. In 2010, trade volume is coming back and this is reflected in the activities along Corridor 4b. CAREC Corridor 4b is the most important transport link between Mongolia and its trading partners. Goods from PRC and many other countries are brought to Mongolia through this corridor.

Zamyn-Uud is the main gateway for goods imported from PRC or through PRC seaports (e.g. Tianjin). Construction material, equipment, automobile, consumer goods and food are the main commodities that enter Mongolia through Zamyn-Uud. After clearing Mongolian Customs, the vast majority are taken to the Zamyn-Uud rail station for transport to Ulaanbaatar and other Mongolian cities.

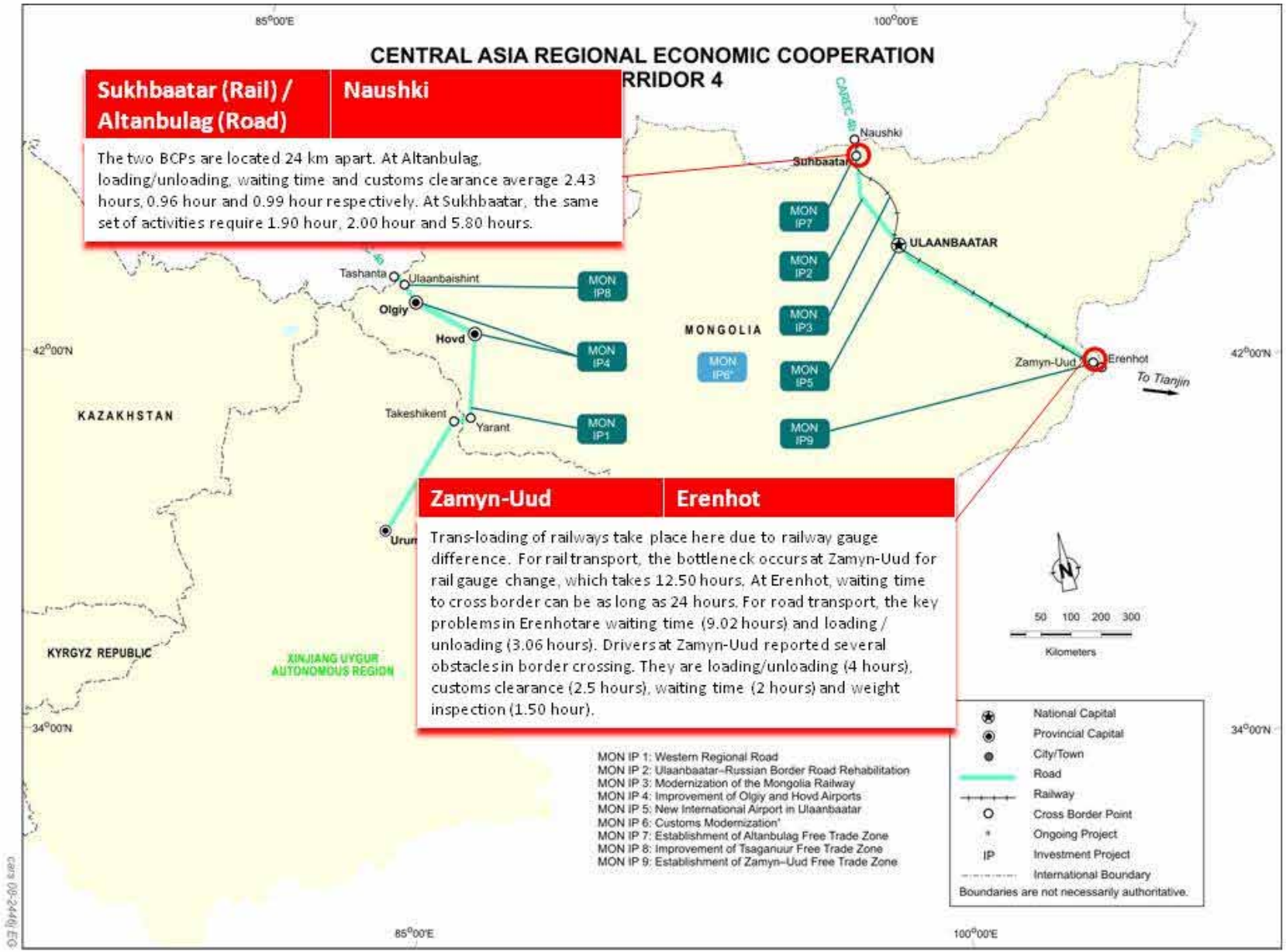
According to recent TCD data, the time for large cargo trucks to clear Erenhot and Zamyn-Uud BCP has increased to 6 hours or more. Poor infrastructure, insufficient automation and cumbersome border management processes all contribute to the long wait. After crossing the BCP, truckers have to wait again for many hours at the Zamyn-Uud rail station to transload cargo onto northbound trains.

Consequently, most small traders prefer to have their goods shipped from Erenhot to Zamyn-Uud in small vans or jeeps. Small vans and jeeps carrying trader parcels and accompanied baggage can clear Erenhot and Zamyn-Uud BCP in one to two hours using special passenger lanes.

Unless border management procedures are streamlined and facilities improved, this delay is expected to worsen as trade volume increases. PRC and Mongolia are working on several fronts to increase the throughput and speed of processing at the border (e.g. Joint Customs Control, Single Window). ADB is also providing assistance in developing logistics centers along the border and improving the multimodal handling capacity of Zamyn-Uud station to improve the trade flow.

Trucks piled high with cargo queued at Zamyn-Uud BCP

MON Railway luggage cars used in carrying trader parcels


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
RRIDOR 4
Sukhbaatar (Rail) / Altanbulag (Road)
Naushki
The two BCPs are located 24 km apart. At Altanbulag, loading/unloading, waiting time and customs clearance average 2.43 hours, 0.96 hour and 0.99 hour respectively. At Sukhbaatar, the same set of activities require 1.90 hour, 2.00 hour and 5.80 hours.
Zamyn-Uud
Erenhot
Trans-loading of railways take place here due to railway gauge difference. For rail transport, the bottleneck occurs at Zamyn-Uud for rail gauge change, which takes 12.50 hours. At Erenhot, waiting time to cross border can be as long as 24 hours. For road transport, the key problems in Erenhot are waiting time (9.02 hours) and loading / unloading (3.06 hours). Drivers at Zamyn-Uud reported several obstacles in border crossing. They are loading/unloading (4 hours), customs clearance (2.5 hours), waiting time (2 hours) and weight inspection (1.50 hour).
Naushki
Suhbaatar
ULAANBAATAR
Tashanta
Ulaanbaishint
Olgiy
Hovd
Takeshiken
Yarant
Zamyn-Uud
Erenhot
To Tianjin
MONGOLIA
KAZAKHSTAN
KYRGYZ REPUBLIC
XINJIANG UYGUR AUTONOMOUS REGION
MON IP1
MON IP2
MON IP3
MON IP4
MON IP5
MON IP6
MON IP7
MON IP8
MON IP9
85°00'E
100°00'E
42°00'N
34°00'N
50 100 200 300
Kilometers
MON IP 1: Western Regional Road
MON IP 2: Ulaanbaatar–Russian Border Road Rehabilitation
MON IP 3: Modernization of the Mongolia Railway
MON IP 4: Improvement of Olgiy and Hovd Airports
MON IP 5: New International Airport in Ulaanbaatar
MON IP 6: Customs Modernization'
MON IP 7: Establishment of Altanbulag Free Trade Zone
MON IP 8: Improvement of Tsaganuur Free Trade Zone
MON IP 9: Establishment of Zamyn–Uud Free Trade Zone
National Capital
Provincial Capital
City/Town
Road
Railway
Cross Border Point
Ongoing Project
IP Investment Project
International Boundary
Boundaries are not necessarily authoritative.

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

89. This corridor holds the same strategic significance as Corridor 3. The route allows CAREC countries to access seaports in Pakistan. From Urumqi, the cargo can pass through Kyrgyz Republic and Tajikistan, entering Afghanistan before going eastwards to Pakistan. From there, the cargo can move to Karachi. There is no rail transit in this corridor since the railways in Tajikistan do not run in north-south direction while Afghanistan has only a 2-km railway line at Hairatan.

90. In reality, however, the direction of traffic is mostly northbound: imported goods that land in Karachi are transported to Kabul in Afghanistan. This is not a popular route for CAREC countries to access seaports due to security threats in Afghanistan and Pakistan. The 60 km stretch from Torkham (Afghanistan) to Peshawar (Pakistan) is dangerous as well as expensive, due to the presence of many police checkpoints. This is evident by looking at the cost of activities under police checkpoints in Table 9.

A. Speed Indicators

91. SWOD and SWD are slightly lower than that in Corridors 1, 2 and 3. Nevertheless, the variability of using Corridor 5 is relatively low, so although slower, the arrival time can be estimated with a higher degree of confidence.

92. Waiting in queue and loading/unloading are two major activities that lengthen time in transit. The latter is also a very costly activity. Interviews with freight forwarders in Afghanistan reveal that material handling equipment (MHE) is not commonly available in the country. For instance, one freight forwarder has to ship a forklift from Dubai to Kunduz for loading and unloading of cargoes. Customs clearance and Transport inspection/GAI also add to the overall cost of transport.

Figure 13a: Road Speed (per 20 ton)

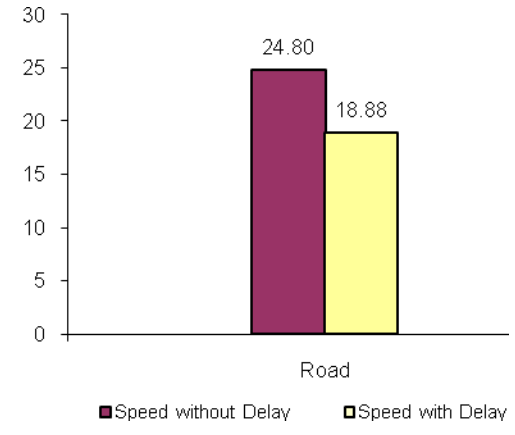
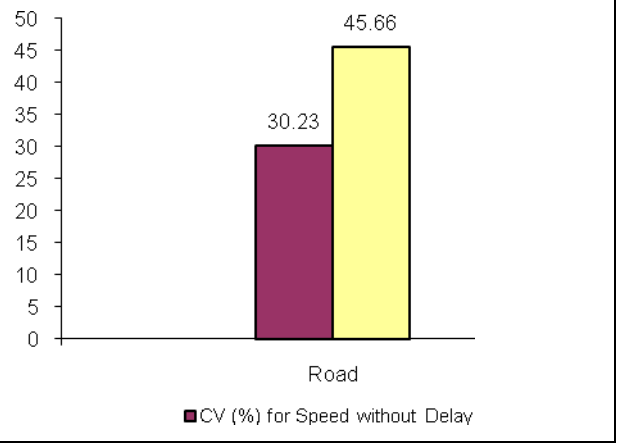


Figure 13b: Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

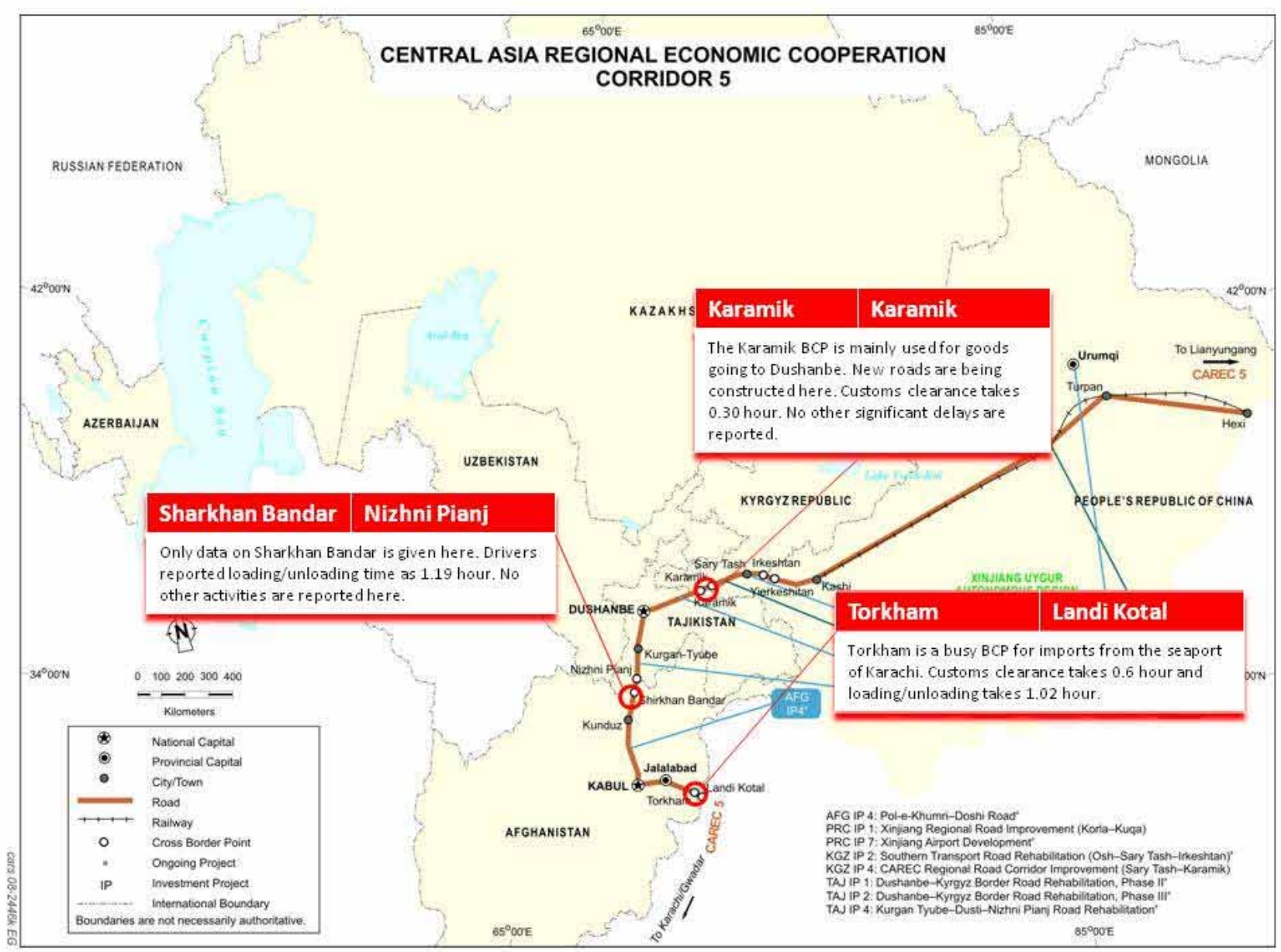
Table 9: Average Duration and Cost of Activities by Mode of Transport

Activity	Duration (hours per 500 km)	Cost (US$ per 500 km)
Health / quarantine	0.18	5.00
Phytosanitary	0.26	9.00
Veterinary inspection	0.20	5.64
Border security / control	0.30	12.75
Visa / immigration		
Customs clearance	0.40	18.78
Detour	0.74	12.56
Waiting/ queue	1.96	9.61
Loading / unloading	1.40	111.17
Escort / convoy	0.96	9.67
Weight/standard inspection	1.24	12.83
Police checkpoint / stop	0.72	20.11
Transport/GAI inspection		18.67
Environment/ecology checkpoint	0.77	13.32
Vehicle registration	0.21	7.04
Repair / tire replacement	0.40	14.87
Transhipment	0.27	
Meals	1.42	12.40
Rest/overnight stay	5.20	13.11
Other activities	0.34	44.45

C. BCPs and Bottlenecks

93. As mentioned, this route is not popular with drivers, thus there are limited data to substantiate any observations on the BCPs. Nevertheless, drivers report relatively smooth crossing at **Karamik**, a BCP between Kyrgyz Republic and Tajikistan. **Shirkhan Bandar – Nizhni Pianj (TAJ-AFG)** and **Landi Kotal – Torkham (PAK-AFG)** are two other Corridor 5 BCPs.

94. Current data suggest no major issues at Torkham and Sharkhan Bandar. The values are reflected in the map below.



Karamik | **Karamik**

The Karamik BCP is mainly used for goods going to Dushanbe. New roads are being constructed here. Customs clearance takes 0.30 hour. No other significant delays are reported.

Sharkhan Bandar | **Nizhni Pianj**

Only data on Sharkhan Bandar is given here. Drivers reported loading/unloading time as 1.19 hour. No other activities are reported here.

Torkham | **Landi Kotal**

Torkham is a busy BCP for imports from the seaport of Karachi. Customs clearance takes 0.6 hour and loading/unloading takes 1.02 hour.

Corridor 6: Europe – Middle East and South Asia

95. The northern part of Corridor 6 in Kazakhstan and Uzbekistan is heavily used by transporters, while the southern part in Tajikistan and Afghanistan is less utilized. Certain segments of Corridor 6a overlap with Corridor 2a, but there is an important difference. While both corridors allow cargo from Tashkent, Navoi and Bukhara to move northwards, Corridor 6a extends from Beyneu to Atyrau where drivers drive around the Caspian Sea to access Russia and Europe.

96. Likewise, segments of Corridor 6b/c overlap with the western section of Corridor 1b. However, this section has no paved roads and makes it very challenging for drivers to traverse the region. To go to Aktobe, Atyrau or Aktau, drivers take a round-about route through Almaty-Shu-Balkhash-Karaganda-Astana-Aktobe. Major road construction is now underway and when completed, should cut down transport time linking east and west Kazakhstan. Corridor 6c has a busy section along Shymkent-Tashkent. The data also highlight an important section currently not labeled as part of any CAREC corridor. Much cargo from Uzbekistan passes through Hairatan-Mazare-e-Sharif to an important node called Pulkhumri. This node is the junction where drivers can go north to Shirkhan Bandar into Tajikistan, or northwest to Hairatan to enter Uzbekistan.

A. Speed Indicators

97. Corridor 6a has relatively good roads which facilitate a high SWOD, but the various stop activities such as Transport/GAI and waiting time, as well as CIQ, reduce the overall speed drastically. Corridor 6c reported very low SWOD and SWD, which is not surprising. As mentioned, the Kazakh section has very bad roads, and the Tajik section is difficult to navigate, being mountainous. In winter, the Tajik portion of 6c cannot be used as the underground tunnels are closed.

Figure 14a: Road Speed (per 20 ton)

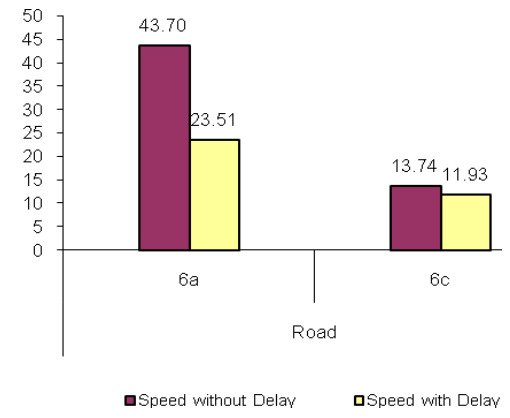
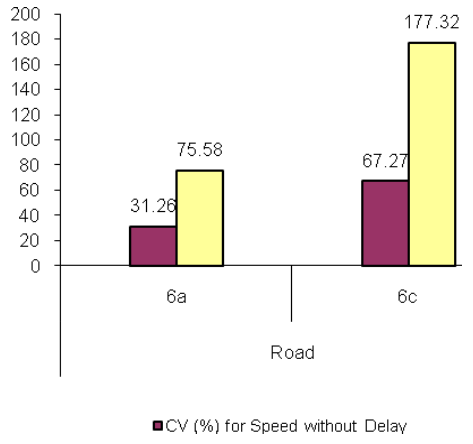


Figure 14b: Coefficient of Variation (Road)



B. Cost and Time Spent on Delays

98. Customs clearance is the key factor that slows the speed. An examination of the table below also reveals that the stop activities along Corridor 6a are varied and many. One important finding is that the costs of those stop activities are rather high compared to other corridors. This deserves further investigation as such high costs add a heavy burden to road transporters using this route.

Table 10: Average Duration and Cost of Activities by Mode of Transport

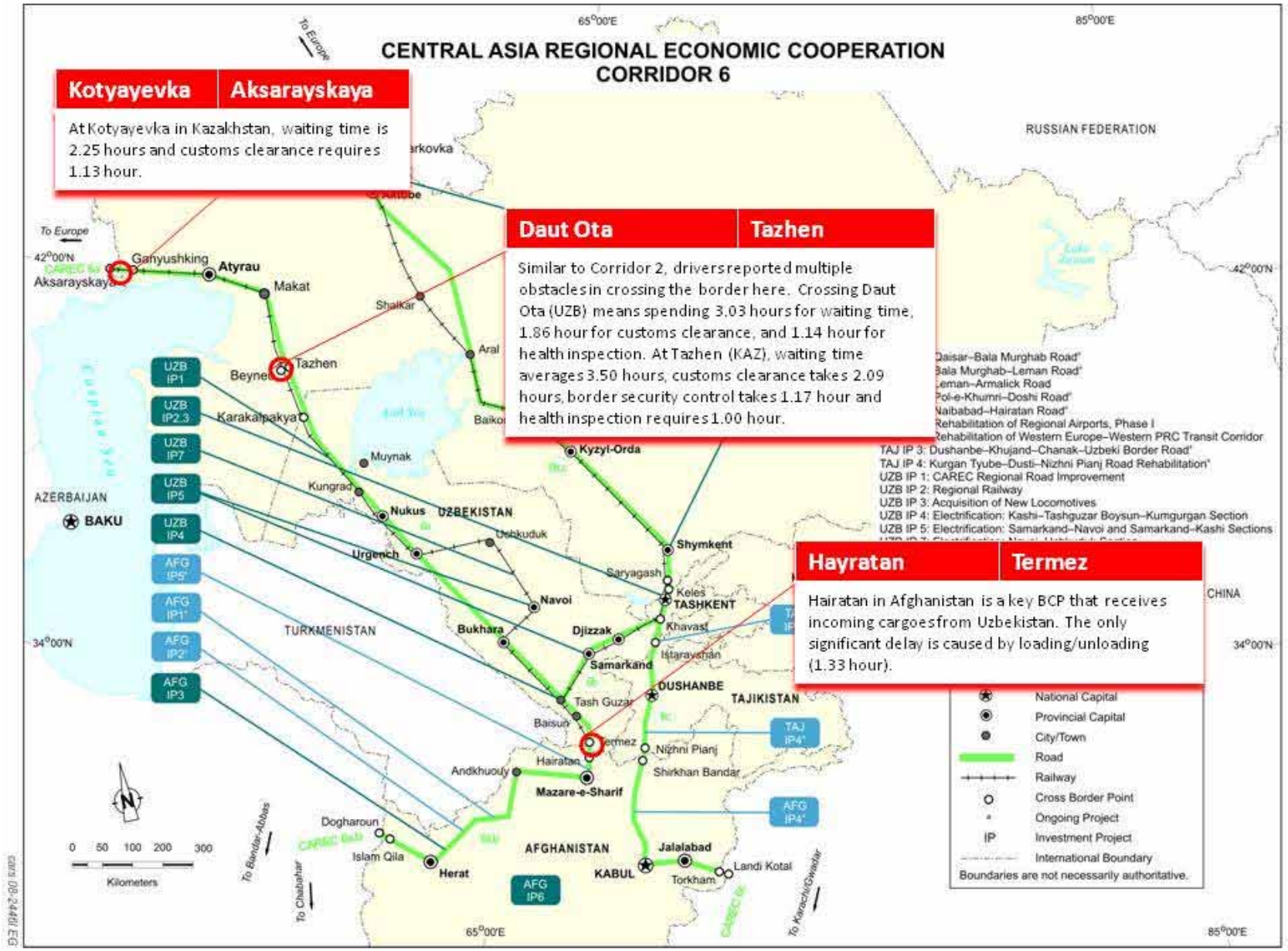
Activity	Duration (hours per 500 km)		Cost (US$ per 500 km)	
	6a	6c	6a	6c
Health / quarantine	4.12		137.76	
Phytosanitary	5.84		183.67	
Veterinary inspection	8.65		267.45	
Border security / control	7.16		727.36	
Visa / immigration	0.45		71.23	
Customs clearance	29.50		1420.39	
Detour				
Waiting/ queue	6.40			
Loading / unloading	1.53			
Escort / convoy				
Weight/standard inspection	0.48	1.79	12.48	
Police checkpoint / stop	1.28	1.43	32.77	29.58
Transport/GAI inspection	9.29		533.87	
Environment/ecology checkpoint		1.53		
Vehicle registration	0.62		43.32	
Repair / tire replacement	0.50		25.86	
Transhipment				
Meals	9.41	10.14	200.53	15.61
Rest/overnight stay	11.02	0.59	15.45	
Other activities	0.72	23.53	123.84	19.01

C. BCPs and Bottlenecks

99. Two BCPs deserve monitoring in Corridor 6. **Kotyayevka – Aksarayskaya (KAZ-RUS)** located in northwestern Kazakhstan is a gateway to Russia and Europe. **Hairatan** is a BCP at the Uzbek – Afghan border which lies along a popular section of Corridor 6a/b for cargoes bound for Kabul.

100. Drivers cited waiting time to cross border and customs clearance as principal delay factors at Kotyayevka. At Hairatan, loading and unloading activity takes an average of 1.33 hour.

101. The data collected along Corridor 6 complement that of Corridor 2 for **Daut Ota-Tazhen BCP**. Again, waiting time is a primary delay factor, consuming 3 to 4 hours at each side. The delays caused by other activities are indicated in the map below.


CENTRAL ASIA REGIONAL ECONOMIC COOPERATION
CORRIDOR 6
Kotyayevka
Aksarayskaya
At Kotyayevka in Kazakhstan, waiting time is 2.25 hours and customs clearance requires 1.13 hour.
Daut Ota
Tazhen
Similar to Corridor 2, drivers reported multiple obstacles in crossing the border here. Crossing Daut Ota (UZB) means spending 3.03 hours for waiting time, 1.86 hour for customs clearance, and 1.14 hour for health inspection. At Tazhen (KAZ), waiting time averages 3.50 hours, customs clearance takes 2.09 hours, border security control takes 1.17 hour and health inspection requires 1.00 hour.
Hayratan
Termez
Hairatan in Afghanistan is a key BCP that receives incoming cargoes from Uzbekistan. The only significant delay is caused by loading/unloading (1.33 hour).
RUSSIAN FEDERATION
CHINA
AZERBAIJAN
BAKU
UZBEKISTAN
TURKMENISTAN
TAJIKISTAN
AFGHANISTAN
Ganyushking
Atyrau
Makat
Aksarayskaya
Shalkar
Aral
Beyneu
Tazhen
Karakalpakya
Muynak
Kungrad
Nukus
Urgench
Ushkuduk
Bukhara
Navoi
Kyzyl-Orda
Shymkent
Saryagash
Keles
TASHKENT
Khavast
Djizzak
Istaravshan
Samarkand
DUSHANBE
Tash Guzar
Baisun
Termez
Nizhni Pianj
Shirkhan Bandar
Hairatan
Andkhuoy
Mazare-e-Sharif
Dogharoun
Islam Qila
Herat
KABUL
Jalalabad
Torkham
Landi Kotal
UZB IP1
UZB IP2.3
UZB IP7
UZB IP5
UZB IP4
AFG IP5*
AFG IP1*
AFG IP2*
AFG IP3
TAJ IP4*
AFG IP4*
AFG IP6
Daisar–Bala Murghab Road*
Bala Murghab–Leman Road*
Leman–Armalick Road
Pol-e-Khumri–Doshi Road*
Naibabad–Hairatan Road*
Rehabilitation of Regional Airports, Phase I
Rehabilitation of Western Europe–Western PRC Transit Corridor
TAJ IP 3: Dushanbe–Khujand–Chanak–Uzbeki Border Road*
TAJ IP 4: Kurgan Tyube–Dusti–Nizhni Pianj Road Rehabilitation*
UZB IP 1: CAREC Regional Road Improvement
UZB IP 2: Regional Railway
UZB IP 3: Acquisition of New Locomotives
UZB IP 4: Electrification: Kashi–Tashguzar Boysun–Kumgurgan Section
UZB IP 5: Electrification: Samarkand–Navoi and Samarkand–Kashi Sections
National Capital
Provincial Capital
City/Town
Road
Railway
Cross Border Point
Ongoing Project
IP Investment Project
International Boundary
Boundaries are not necessarily authoritative.
0 50 100 200 300
Kilometers
To Europe
To Bandar-Abbas
To Chabahar
To Karachi/Gwadar
65°00'E
85°00'E
42°00'N
34°00'N

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusion 1: It is possible to reduce the time and cost to transport goods.

Recommendations: The first approach is to address the problems of physical infrastructure. The lack of paved roads and the shortage of funds to maintain the road surface can lengthen the time and increase cost of transport. The second approach is to reform policies and regulations to address the delays. The customs officials should discuss synchronizing of border post operating hours and harmonizing customs procedures and tackle the issue of unofficial payments. Most of the unofficial payments occur at BCPs, increasing the cost of transport. The third approach is to increase the operational capacity of the logistics and transport industry. The lack of material handling equipment can lengthen the loading/unloading time. Capacity building can be strengthened through training and regional cooperation led by organizations such as the CAREC Federation of Carrier and Forwarder Associations (CFCFA). A fourth approach is to improve operational practices to make use of underutilized infrastructure capacity.

Conclusion 2: Some BCPs require improvements

Recommendations: *Dostyk-Alashankou, Daut Ota-Tazhen, Alat-Farap, Aul-Veseloyarsk, Zamyn-Uud –Erenhot* are identified as BCPs which pose significant delays. The report suggests reviewing activities such as loading/unloading, waiting time to cross border and customs clearance procedures to find solutions that can reduce border crossing time. Throughput capacities of BCPs can be strengthened through investment in hardware and software (such as building better roads, using more X-ray machines and constructing warehouses), as well as policy reforms (such as adopting modern risk management measures and introducing single window systems).

Conclusion 3: Rail offers a cost effective way to transport freight

Recommendations: Rail offers a cost effective way to send bulk goods over long distances. However, data on time and cost of rail transport are currently limited, with only the Chinese International Freight Forwarders Association (CIFA) and Mongolian National Chamber of Commerce and Industry (MNCCI) providing the data. In 2010, the sample size of rail transport will be increased, with additional data coming from Kazakhstan Freight Forwarders Association (KFFA) and Inner Mongolia. This will provide more observations to support more meaningful analysis.

This concludes the Quarterly Report for October to December 2009. In 2010, work will continue with the various transport associations in CAREC countries to monitor transport conditions in the region. Over time, this CPMM study will show pertinent information on transport efficiency and bottlenecks. It is hoped that the study will serve as a useful guide for organizations in policy formulation, investment decisions and process improvements.

VI. APPENDIX

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)		
Akzhigit-Orenburg	KAZ-RUS	Road	429	18.42	55.35	23.29	3,792.67	2,859.33	933.33
Almaty-Astana	KAZ-KAZ	Road	1,250	27.20	81.05	45.53	2,624.21	92.66	2,531.55
Astana-Shymkent	KAZ-KAZ	Road	1,463	30.49	70.51	47.98	7,473.38	273.38	7,200.00
Aul-Samarkand	KAZ-UZB	Road	655	22.26	65.43	29.42	4,235.06	344.15	3,890.91
Karaghandy-Uralsk	KAZ-KAZ	Road	1,428	42.33	64.41	33.73	2,711.46	140.04	2,571.43
Kokshetau-Almaty	KAZ-KAZ	Road	1,560	35.32	63.91	44.17	1,361.19	81.19	1,280.00
Korgas-Ashgabat	KAZ-TKM	Road	1,046	36.31	54.03	29.10	6,414.29	2,993.24	3,421.05
Korgas-Tashkent	KAZ-UZB	Road	1,070	45.84	55.97	23.21	6,812.90	2,974.67	3,838.24
Korgas-Turkmenbashi	KAZ-TKM	Road	1,047	43.32	65.81	24.17	3,861.49	1,746.11	2,115.38
Troitsk-Almaty	RUS-KAZ	Road	1,899	55.22	57.97	33.42	8,044.06	2,105.24	5,938.82
Troitsk-Astana	RUS-KAZ	Road	256	20.02	43.84	12.79	8,582.50	6,562.50	2,020.00
Troitsk-Karaghandy	RUS-KAZ	Road	612	20.91	65.04	29.27	9,273.86	4,723.86	4,550.00
Troitsk-Kostanai	RUS-KAZ	Road	188	12.65	51.23	14.86	9,036.08	6,619.41	2,416.67
Troitsk-Ust-Kamenogorsk	RUS-KAZ	Road	255	21.83	43.16	16.25	22,690.43	15,595.43	7,095.00
Shanghai-Almaty	PRC-KAZ	Rail	3,997	386.75	12.31	10.35	1,386.14	25.74	1,360.40
Shanghai-Bishkek	PRC-KGZ	Rail	4,584	543.80	9.61	8.45	2,577.27	45.44	2,531.83
Shanghai-Moscow	PRC-RUS	Rail	3,128	318.91	11.53	9.80	1,266.15	32.06	1,234.08

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
Akzhigit-Orenburg	0.29		0.38	15.54			0.38	38.85			0.87	699.30											0.58	155.40	0.20	23.31							
Almaty-Astana																	1.31								0.10	8.02							
Astana-Shymkent																	0.74								0.11	5.70							
Aul-Samarkand																									0.31	43.25							
Karaghandy-Uralsk																	0.55								0.06	1.17					0.23		
Kokshetau-Almaty																	1.23								0.16	17.09							
Korgas-Ashgabat	0.28	10.36					0.38	37.45			0.56	250.16			0.34						0.24	2.55	0.48	50.99	0.34	19.92					0.24	15.93	
Korgas-Tashkent	0.12						0.23	21.82			0.39	157.56									0.23		0.19	44.74	0.58	27.98							
Korgas-Turkmenbashi	0.24	15.92					0.32	63.67			0.56	127.35			0.52						0.16	15.92	0.48	47.76	0.36	47.75					0.96		
Shanghai-Almaty							0.50	2.50			0.25	3.75			6.76		0.25	2.50															
Shanghai-Bishkek							0.44	2.18			0.22	3.27			6.28		0.22	2.18															
Shanghai-Moscow							0.64	3.20			0.32	4.80			6.81		0.32	3.20															
Troitsk-Almaty	0.05		0.04	3.05			0.12	4.13			0.25	125.68			1.86		0.72						0.09	15.67	0.10	15.89							
Troitsk-Astana	0.49	26.04	0.49	26.04			0.82	52.07			1.95	1,171.88			1.46		6.19						0.33	130.21	0.33	13.03							
Troitsk-Karaghandy	0.14	10.89	0.47	27.23			0.47	16.34			0.96	408.50			0.68		3.88				0.20		0.41	81.70	0.47	43.58							
Troitsk-Kostanai	0.66						1.12	35.48			3.54	1,418.43			4.87		8.86				0.88		0.88	177.31									
Troitsk-Ust-Kamenogorsk	0.36		0.88	35.45			1.10	53.19			2.72	1,097.41			6.01						0.51	31.06	0.92	140.42									

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
Alashankou	PRC	70							4.00	20.00			2.00	56.74						294.65		46.13													
Dostyk	KAZ	68	0.67	4.67					1.33	16.67			1.67	192.37			47.72		2.00	20.00							1.00	120.00							
Zhaisan	KAZ	11	0.41	8.83	0.58	12.22			0.58	65.82			1.29	385.19			0.72								0.67	100.95	0.67	90.00							
Chaldovar	KGZ	8	0.64	16.86	0.64	16.86	0.83	27.33	0.92	41.13			2.38	176.25			2.67					475.00					1.17	40.00							
Kuahy	KGZ	7																							0.25	1.26								
Merke	KAZ	7	0.64	16.00	0.76	13.29	0.84	17.00	1.29	35.29			2.86	222.86			2.60					325.00	1.00	100.00			1.30	102.00			0.75	35.00			
Topa	PRC	7											0.17	3.77											0.08	1.25								
Torugart	KGZ	7							0.45	4.71			0.57	5.29									0.46	1.06	0.48	1.10								
Troitsk	RUS	7	0.58	9.67					0.68	47.43			2.34	320.00			0.42						0.25		1.00	53.33	0.54	70.00							
Korgas	KAZ	6	1.06	8.00					0.72	47.22			1.26	196.67			0.78						0.39	4.00			0.67	59.45							
Kairak	KAZ	2	0.17						0.17	13.33			1.58	516.67			1.29						0.21		0.33	53.33	0.33	100.00							
Kordai	KAZ	2	0.54	20.67					0.80	11.00			2.08	340.00			1.34						0.33	4.00			0.96	76.67							
Ak Jol	KGZ	1	0.17	5.00	0.33	3.00	0.33	3.00	0.67	25.00			2.00	30.00											0.33	10.00	0.50	15.00							
Karday	KAZ	1	0.33	10.00	0.67	10.00	0.50	30.00	0.33	40.00	0.17		2.00	30.00			3.00																	
Sapatay	KAZ	1	0.25	17.00	0.25	17.00	0.25	17.00	0.67	20.00			4.00	150.00													0.50	40.00							

Appendix Table 2a : 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)		
Tongshan-Bukhara	PRC-UZB	Rail	1,545	174.40	8.95	8.95	459.73	34.42	425.31
Tashkent-Luftabad	UZB-IRN	Road	1,312	89.25	50.65	14.56	2,812.73	1,256.41	1,556.32
Tashkent-Moscow	UZB-RUS	Road	2,087	103.61	47.81	20.84	3,268.29	791.82	2,476.48
Erkechtam-Karasu	KGZ-KGZ	Road	283	51.53	21.67	5.43	610.22	610.22	0.00
St.Petersburg-Tashkent	RUS-UZB	Road	2,578	93.03	50.49	27.27	3,004.47	642.82	2,361.66
Zimkana-Khodjand	KGZ-TAJ	Road	755	58.69	24.71	12.87	294.42	294.42	0.00
Tashkent-Novosibirsk	UZB-RUS	Road	28	24.20	7.76	0.46	384.15	43.65	340.49
Kotyayevka-Tashkent	KAZ-UZB	Road	538	16.51	61.41	35.89	3,277.37	1,903.74	1,373.64
Aktau-Tashkent	KAZ-UZB	Road	513	28.68	62.79	17.89	4,914.42	3,639.42	1,275.00

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-Tashkent							0.97	97.47			2.60	675.77					5.85						1.14	123.46										
Erkechtam-Karasu							2.40	5.03			7.01	7.32			7.23		13.20				0.64	4.66	5.84	15.22	0.62	5.55			0.43			
Kotyayevka-Tashke	0.20						0.30	85.27			1.27	536.78											0.56	82.94	0.13							
St.Petersburg-Tash	0.20	2.88	0.20	3.15	0.17	2.85	0.27	10.44			1.36	43.12			0.54		1.31				0.18		0.14	2.72	0.31	25.92						
Tashkent-Luftabad	0.20	6.15	0.54	14.54			1.24	27.74			1.33	35.94			3.26						0.88	6.50	2.01	7.55	1.32	5.20			0.39	3.87	1.97	22.34
Tashkent-Moscow	0.17	4.88	0.17	4.90	0.13	4.08	0.36	13.21	0.08	8.75	1.85	50.78			2.35		2.70				0.08	8.75	0.13	5.14	0.29	28.79			0.08	3.00		
Tashkent-Novosibirsk											50.00				41.67		166.67															
Tongshan-Bukhara																			70.50													
Zimkana-Khodjand			0.18	1.52			0.66	2.05			4.41	1.25					2.71		1.74	0.87	0.85	2.68	5.31	0.43	3.81			0.17	0.99		

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
Tazhen	KAZ	44	0.68	16.34	0.62	16.68	0.56	14.28	1.14	51.05	0.44	26.00	3.05	187.27			6.68				600.00		0.67	35.00	0.80	21.20	1.32	104.55			0.61	75.67		
Daut Ota	UZB	42	0.42		0.39		0.32		0.63		0.50		1.47				1.75																72.00	5.00
Alat	UZB	28	0.29	11.00	0.41	12.07			1.12	26.30			1.25	27.11			1.75						0.74	5.30	0.45	2.00	0.40	2.19					3.39	35.95
Farap	TKM	28	0.17		0.46	13.19	0.17		1.29	23.04			1.14	28.39			1.89						0.73	5.96	0.42	1.00	0.51	1.02			0.55	4.26	2.50	20.00
Artik	TKM	27	0.50	10.67	0.52	12.93			0.95	25.81			1.18	39.41			3.35						0.82	5.81	0.54	1.00	0.44	1.07			0.45	5.78	3.00	30.00
Akzhigit	KAZ	11	0.52	11.84	1.08	13.33			0.53	34.54			0.97	329.39			0.22						0.67	5.33	0.55	91.67	0.67	95.56						
Krasniy Most	AZE	10											8.78	40.63			31.33																	
Samur	AZE	10											0.72	43.75	0.50		108.00																	
Erkechtam	KGZ	7			0.18	2.30			0.24	1.29			0.15	1.29													0.25	1.29						
Dustlik	UZB	5							1.07	39.00			3.73	124.00			3.00										0.63	42.50						
Kyzyl Bel	KGZ	4																									0.08	1.50						
Aybek	UZB	3							0.83		0.75		1.00																					
Batken	TAJ	3			0.17				0.25	1.25			0.33	1.25																				
Fotichoobod	TAJ	3							1.33	10.00			1.00	23.33			3.00																	
Kazakh	AZE	2											0.75																					
Beyneu	KAZ	1																							0.33	20.00	0.33	10.00						
Bukhara	UZB	1																							0.42	2.00							1.17	20.00
Kungrad	UZB	1																																
Ustyurt	UZB	1																															24.00	35.00

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)		
Almaty-Dushanbe	KAZ-TAJ	Road	1,612	127.43	46.71	12.65	6,459.80	2,519.40	3,940.40
Bandar Abbas-Shymkent	IRN-KAZ	Road	1,749	99.81	43.35	17.75	3,690.40	1,171.78	2,518.62
Tashkent-Almaty	UZB-KAZ	Road	703	61.95	46.97	12.58	6,890.55	1,858.21	5,032.33
Tashkent-Bishkek	UZB-KGZ	Road	626	128.50	46.66	4.87	9,656.13	7,398.30	2,257.83
Tashkent-Dushanbe	UZB-TAJ	Road	1,033	80.53	46.63	13.49	24,917.49	7,202.26	17,715.22
Tashkent-Ozinki	UZB-RUS	Road	592	40.99	44.98	14.44	1,652.01	0.00	1,652.01
Troitsk-Tashkent	RUS-UZB	Road	117	4.34	70.06	26.96	3,627.52	2,877.52	750.00

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
Almaty-Dushanbe	0.65	4.65	0.21				0.88	10.86			2.22	37.22			2.15		1.09				0.47	7.75	2.07	12.41	0.62	35.67			0.57	4.65	0.31	18.61
Bandar Abbas-Shym	0.11	0.96	0.13	1.15	0.14	1.15	1.28	9.46	0.10		1.51	11.41			4.63																	
Tashkent-Almaty	0.65	13.63	0.76	12.94			0.99	18.11			3.71	832.21			4.14		7.39	33.33			0.52	2.58	1.52	11.15	1.04	101.84			0.52	5.16	2.58	85.22
Tashkent-Bishkek	2.79	41.52	3.19	27.95			3.79	71.86			10.57	263.49			10.37		3.59				1.47	59.89	3.55	39.92	1.72	109.39			1.73	63.88	1.60	91.82
Tashkent-Dushanbe							1.15	4.85			4.22	12.75			5.71		6.80	14.66											0.25	7.42		
Tashkent-Ozinki											1.69						3.38						1.33									
Troitsk-Tashkent	0.73						0.73	28.50			2.86	1,994.32			1.41								1.41	284.91								

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	39	0.38		0.73		0.25		1.05				1.31				5.94						0.87		0.51								2.67	86.67
Farap	TKM	39	0.27	5.40	0.45	9.19	0.23	2.00	0.95	21.35	1.04		1.34	24.71			7.06						0.84	4.50	0.62	1.75	0.50	5.00			0.45	5.32	2.29	84.29
Aul	KAZ	17	0.42	9.55	0.50	11.72	0.83	22.60	0.91	73.77	1.00		1.92	271.25			4.74				300.00		0.88	78.33	0.65	100.00	1.03	118.17						
Konysbaueva	KAZ	16	0.38	14.30	0.22	8.34			0.58	38.38			1.18	322.08			1.03						0.46	4.67	0.47	62.78	0.69	78.07						
Kaplanbek	KAZ	14	1.00	13.29	1.00	11.00			1.01	28.57			2.03	44.64			2.59						0.42	9.64	0.42	3.57	0.50	16.71			0.50	15.36	1.50	82.50
Navoi	UZB	14	0.55		0.88				1.06				1.62				3.23						0.57		0.45						0.50			
Sarahs	TKM	8	0.24	2.43	0.27	2.71	0.28	2.33	1.39	4.25	0.25		1.15	16.25			7.97								1.00	20.00	0.33	6.00			0.33	6.00		
Veseloyarsk	RUS	8	0.60	26.43	0.66	24.29	0.61	23.40	0.99	65.00			2.56	212.86			6.60						0.61	60.00	1.00	17.00	1.21	168.57						
Sarakhs	IRN	7	0.22	6.00	0.17		0.17		0.33				1.56	12.50			41.60						0.25	1.00	0.33	2.00								
Saryasiya	UZB	7	0.42						1.19				1.24				1.50						0.50		0.42						0.42			
Chaldovar	KGZ	6	0.99	18.33	1.06	14.17			1.44	31.67			2.75	130.83			2.89						0.43	35.00	0.83	19.83					0.66	30.00	2.00	70.00
Sipatay	KAZ	6	1.14	25.00	0.95	11.00			0.93	34.17			1.91	166.67			3.83						0.42	35.00	0.43	3.00	0.51	88.33			0.51	40.83		
Pakhtaabad	TAJ	5							1.03	10.00			1.57	26.00			2.50														0.50	15.00		
Chardjou	TKM	1															8.00																	

Appendix Table 4a : Major routes in CAREC Corridor 4

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Tianjin-Ulaanbaatar	PRC-MON	Rail	1,277	187.04	8.09	7.12	4,485.55	98.36	4,387.19
Ulaanbaatar-Tianjin	MON-PRC	Rail	1,266	166.88	12.93	8.51	2,138.93	163.81	1,975.12
Erenhot-Ulaanbaatar	PRC-MON	Road	719	48.18	29.55	15.77	4,325.33	125.66	4,199.67
Ulaanbaatar-Zamiin-Uud	MON-MON	Road	728	40.77	31.16	17.74	2,735.71	53.57	2,682.13
Ulaanbaatar-Altanbulag	MON-MON	Road	336	36.33	24.23	9.59	3,926.79	143.45	3,783.33
Ulaanbaatar-Khiyagt	MON-RUS	Road	336	28.87	21.46	11.48	9,037.37	462.65	8,574.73
Ulaanbaatar-Erenhot	MON-MON	Road	604	45.83	31.52	13.13	4,296.60	114.65	4,181.96

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
Tianjin-Ulaanbaatar															7.37																	
Ulaanbaatar-Tianjin											2.24				14.08																	
Erlen-Ulaanbaatar	0.37	3.40	0.29		0.19		0.73	2.04			2.57				2.31		5.28						0.37	5.96					0.28	2.04	2.26	11.79
Irkutskaya-Ulaanbaatar	1.11	7.42	0.73		0.70		1.46		0.30		4.13		0.49		3.29		7.45				34.12		0.61	9.26					0.75	7.42	2.05	19.54
Ulaanbaatar-Altanbulag			0.37		0.37		0.74				1.98				0.74		18.40						0.57	7.44					0.52		4.46	29.76
Ulaanbaatar-Erlen			0.44		0.44		1.16				1.74				1.45		5.03						0.22	4.35					0.22			
Ulaanbaatar-Khiyagt	0.87		0.37		1.11		1.65				1.99				1.24		12.18						0.57	22.27					0.52		4.46	22.28
Ulaanbaatar-Zamiin-Uud																	5.57						0.43	4.29					0.20		2.11	7.01

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		Gauge Change	
			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	D	C
Altanbulag	MON	52	0.42	5.00	0.26		0.27		0.53				0.99		0.33		0.96		2.43						0.29	5.67					0.26	5.00	0.95	10.00				
Erlen (Rail)	PRC	77															24.00																			
Erlen (Road)	PRC	28	0.29	5.00	0.26		0.25		0.53				1.21				9.02		3.06												0.28	3.00				
Sukhbaatar	MON	72											5.80				2.00		1.90				23.00		0.31	5.00							1.77	14.75		
Zamiin Uud (Rail)	MON	46																																	12.50	189.52
Zamiin Uud (Road)	MON	28	0.25		0.30		0.25		0.75				2.50				2.00		4.00			1.50														

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)		
Hayratan-Torkham	AFG-AFG	Road	699	35.94	30.62	19.34	1,403.93	686.74	717.18
Kirgiziya-RT	KGZ-TAJ	Road	446	23.00	23.41	18.77	4,323.88	2,160.03	2,163.85
Tashkent-Domodedovo	UZB-RUS	Road	172	4.75	51.65	36.21	204.45	38.33	166.11
Torkham-Sharkhan Bandar	AFG-AFG	Road	607	35.07	28.90	17.34	1,696.58	813.40	883.18

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
Hayratan-Torkham	0.23	7.94	0.46	17.42	0.59	26.09	0.35	16.16			0.42	18.04	0.74	12.56	1.63	9.16	1.39	110.53	0.96	9.36	0.77	12.72	0.33	11.76		14.68	0.37	11.06			0.37	13.70
Kirgiziya-RT	0.16	4.02	0.15	3.74	0.16	3.38	0.16	5.64			0.34	18.07									1.84		1.55	31.26			1.39		0.20	7.83		
Tashkent-Domodedovo																							1.22	14.53								
Torkham-Sharkhan Bandar	0.21	11.33	0.50	22.34			0.41	19.15			0.47	21.39			2.38	10.19	1.42	112.72		10.30	0.71	13.07	0.45	14.65		22.65	0.52	17.85			0.47	17.10

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
Karamik	KGZ	40	0.15	3.80	0.13	3.60	0.14	3.70	0.14	4.30			0.30	16.23											0.17	4.85		0.17		0.15	4.65		
Torkham	AFG	33	0.31	11.56	0.66	26.29	0.89	38.00	0.52	23.52			0.60	28.58					1.02	82.00		0.46	0.27	10.50		28.00	0.30	9.40						
Sharkhan Bandar	AFG	14																	1.19	102.27														

Appendix Table 6a : Major routes in CAREC Corridor 6

Route	Country	Mode	Distance	Total Time	SWOD	SWD	Total Cost	Cost of Activities	Transport Cost
							(US$ per 20 tons per 500 km)		
Atyrau-Aktau	KAZ-KAZ	Road	561	15.00	90.92	37.40	994.47	94.47	900.00
Karamik to Dushanbe	TAJ-TAJ	Road	275	35.24	13.76	7.61	1,361.68	752.51	609.16
Kotyayevka-Aktau	KAZ-KAZ	Road	512	17.76	64.65	28.83	2,791.15	1,591.15	1,200.00
Kotyayevka-Atyrau	KAZ-KAZ	Road	290	12.83	58.94	22.60	5,943.05	4,293.05	1,650.00
Kotyayevka-Bukhara	KAZ-UZB	Road	642	18.18	79.36	35.31	7,572.52	4,392.52	3,180.00
Tashkent-Moscow	UZB-RUS	Road	728	52.43	48.40	14.32	4,004.65	2,786.48	1,218.16
Tashkent-Ozinki	UZB-RUS	Road	1,516	118.54	46.07	12.79	5,794.41	2,513.90	3,280.51
Zhaisan-Ashgabat	KAZ-TKM	Road	283	6.24	52.31	45.35	823.65	91.94	731.71
Zhaisan-Samarkand	KAZ-UZB	Road	495	11.17	48.67	44.32	675.65	8.98	666.67

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
Atyrau-Aktau																	0.37								0.14	17.83						
Kotyayevka-Aktau	0.17						0.17				0.81	585.94											0.49	65.11								
Kotyayevka-Atyrau	0.29	22.98					0.29	57.47			1.86	919.53			2.16	5.74							0.43	172.41	0.28	23.00						
Kotyayevka-Bukhara	0.13	25.96					0.13	41.53			0.72	467.29			0.52								0.26	77.88	0.12	31.15						
Tashkent-Moscow	1.62	52.12	1.67	58.93	1.40	48.40	2.31	179.12	0.45	71.23	6.50	436.73			6.42	0.45					0.42	11.21	1.20	34.47	1.76	214.45			1.06	58.92	0.45	12.08
Zhaisan-Ashgabat																									0.58	35.34						

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	27					0.67	33.00	0.52	24.37			0.68	26.07					1.33	93.30			0.49	7.67	0.27	7.50		20.00	0.23	8.25			0.35	9.00
Krasniy Yar	RUS	25	0.75	30.90	0.66	30.08	0.66	29.64	1.14	57.36		17.00	3.36	207.60		3.39							0.50	8.00	1.15	30.20	1.07	118.74			1.28	100.40		
Kurmangazy	KAZ	24	0.79	19.61	0.74	19.71	0.65	16.29	1.14	93.38	0.33	35.00	2.94	204.17		20.13									0.67	25.00	1.09	105.45			0.94	60.00		
Daut Ota	UZB	21	1.14		0.42	10.00			0.65	25.00			1.86	25.00		3.03							0.54	5.67	0.37	2.00	0.42				0.42		3.17	50.00
Kotyayevka	KAZ	12	0.56	21.11	0.46	15.28			0.59	39.73			1.13	216.81		2.25							0.57	12.37	0.46	13.63	0.52	38.79			0.42	8.75		
Tedjen	TKM	11	1.01	18.00	0.45	18.33			1.27	37.73			1.63	116.36		5.02							0.75	28.36	0.57	5.64	1.34	65.00			0.33	30.45	1.00	50.00
Tazhen	KAZ	8	1.00	21.75	0.75	15.00			1.17	45.00			2.09	175.00		3.50							0.78	45.00	0.55	15.00	1.38	76.88			0.62	45.00	1.00	135.00
Karaozek	RUS	4	0.58	20.00	0.45	18.33			0.79	40.00			1.50	80.00		2.50							0.59	13.00	0.40	9.00	0.60	25.00			0.67	45.00		
Krasniy Most	AZE	3	1.11	25.00	0.42	25.00			1.17	35.00			2.33	131.00		2.72							0.50	9.33	0.42	8.67	0.94	41.67			1.14	115.00		
Akzhigit	KAZ	1	1.00	26.67					0.75	8.00			2.50	160.00		0.75											0.92	106.67						
Sirim	KAZ	1	0.33	10.00	0.33	10.00	0.33	10.00	0.67	70.00			3.00	127.00													1.00	52.00						

Appendix 7 : Coefficient of Variation

The coefficient of variation (CV) is a statistical value that compares the size of variability relative to the size of the mean. This value is expressed in percentage terms.

To see how CV is applied in CPMM, consider the classic objective of determining transport reliability. In transport, providing on-time delivery of goods is a paramount objective, because clients may suffer of goods are delivered late. The transport manager measures the total time taken by the same delivery truck (Truck A) along the same route on different days. After a month, the transport manager is able to collect a total of thirty timings. A conventional method will be to calculate the average (or mean) and the standard deviation from the sample.

9	*7*	*8*	*11*	*10*	*7*	*9*	*10*	*14*	*12*
7	*8*	*12*	*13*	*15*	*7*	*11*	*9*	*7*	*11*
8	*16*	*9*	*8*	*10*	*9*	*13*	*12*	*11*	*7*

The thirty samples (in hours) on the total transport time are recorded as shown above. The mean time is 10 hours and standard deviation is 2.5.

Assume the transport manager has another client located in another destination. He conducts the same experiment using Truck B.

21	*17*	*22*	*20*	*18*	*20*	*19*	*20*	*21*	*16*
22	*24*	*19*	*20*	*17*	*20*	*20*	*18*	*20*	*20*
20	*22*	*23*	*19*	*20*	*19*	*20*	*24*	*16*	*23*

Another thirty samples (in hours) for this new route are recorded as shown above. He calculates the mean time to be 20 hours and standard deviation is 4.

“Which truck has a more reliable delivery time, Truck A or B?”

If one is to compare the standard deviations solely, the answer is Truck A has a lower standard deviation. A lower standard deviation implies the variability of the data is lower in value. However, it is meaningless to compare standard deviations from two different routes, since route A takes 10 hours and route B takes 20 hours. To achieve a meaningful comparison, the transport manager must consider the size of the standard deviation relative to the mean. Expressed in percentage, this value becomes the CV.

Thus, route A has a CV of 2.5/10 = 25%.

Route B has a CV of 4/20 = 20%.

Thus by comparing the CV, the transport manager is able to conclude that the transport time for Truck A is more volatile. Sometimes the Truck may take 10 hours, but it can be 8 hours or 12 hours at other times. The CV does not tell the transport manager the cause for the variability. This could be random factors such as traffic conditions, unpredictable road closures, limited operating hours of the border post and random police check points. What the CV does is to warn the transport manager to monitor Truck A’s deliveries more closely. Through this process, the transport manager can identify the systematic and unsystematic causes of variability and try to reduce the variability if possible.