

# Corridor Performance Measurement and Monitoring (CPMM)

By Max Ee  
International Consultant



Corridor Performance Measurement and Monitoring:  
**CAREC Experience and International Prospects**

- 1 What is CPMM?
- 2 Data Collection
- 3 Data Aggregation
- 4 Data Analysis
- 5 Validation and Verification

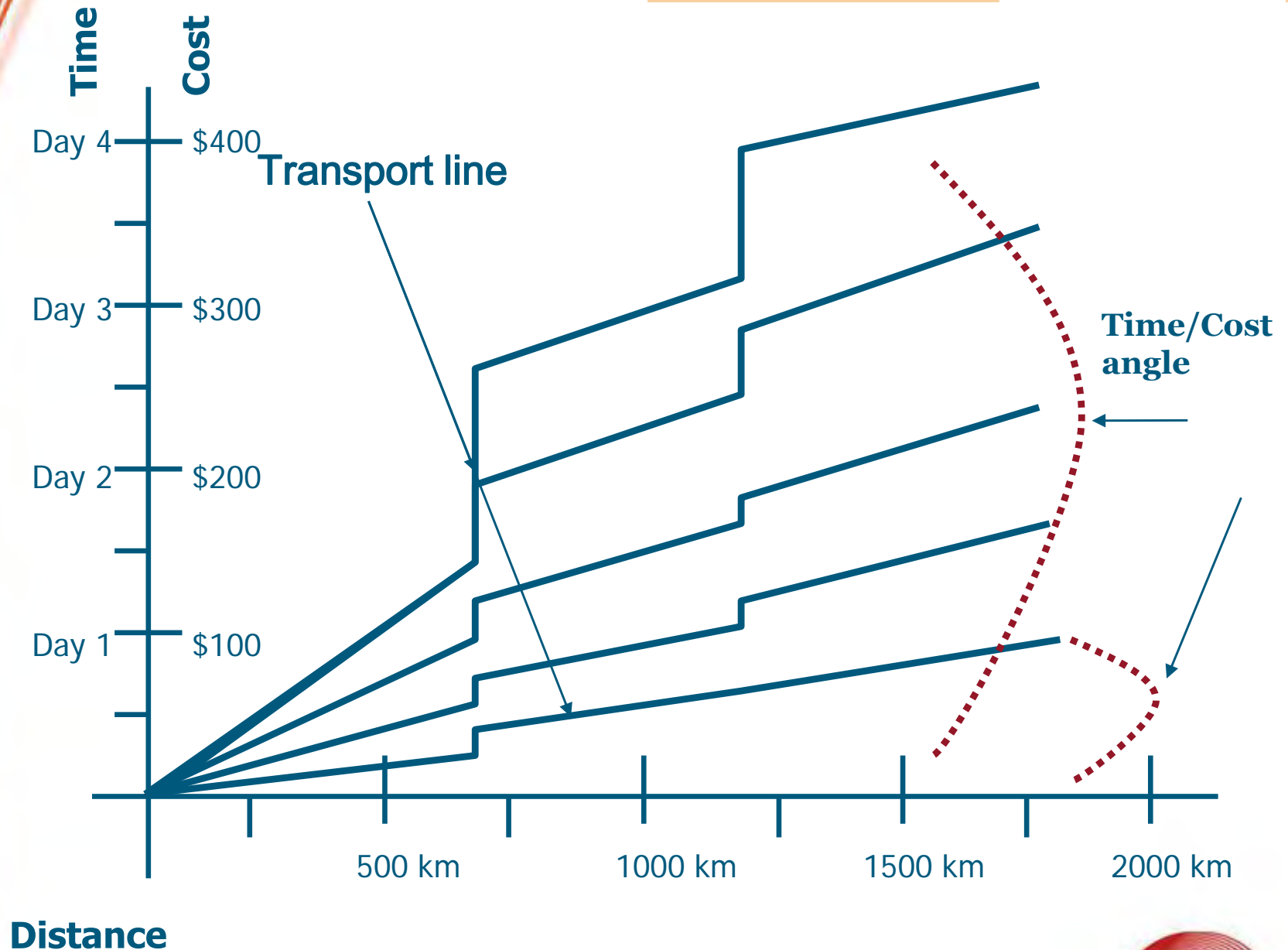
- Mandated by the CAREC **Transport and Trade Facilitation Strategy (TTFS)**
- It is a region-wide study in Central Asia that focuses on
  - Infrastructure
  - Border Crossing Efficiency
- Empirical data on shipments are collected
  - Time
  - Cost
- Adopts the UNESCAP Time-Cost-Distance (TCD) method

# Difference Between TCD and CPMM

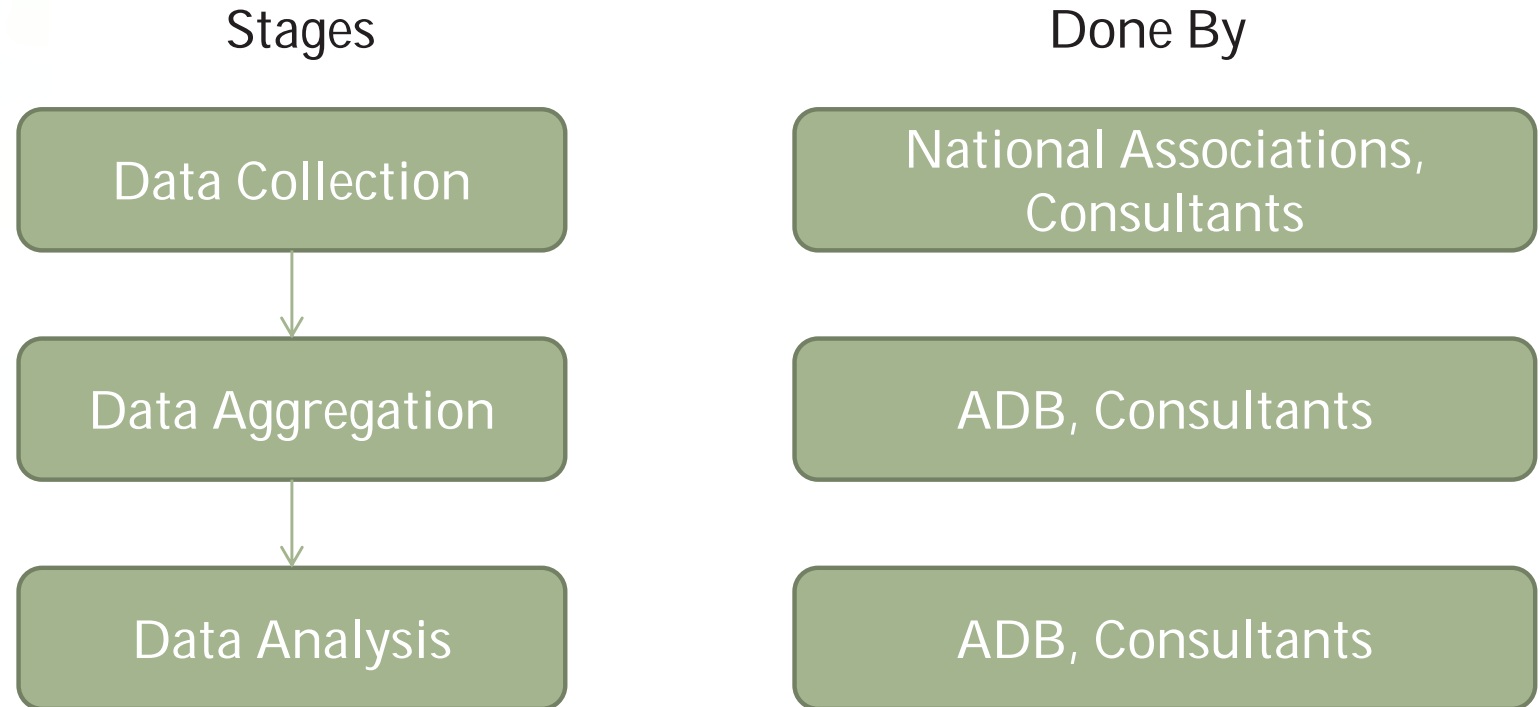
Factors	TCD	CPMM
Sample Size	One, few	About 300/month
Duration	One-Time	Continuous (2009-now)
Partners	Freight Forwarders	National Associations
Border Crossing Activities	Selected and reported at the discretion of freight forwarders	A standardized list of border crossing activities is used
Applicability	To grasp an understanding on the transport efficiency	Allows for time series analysis



# Objectives of CPMM

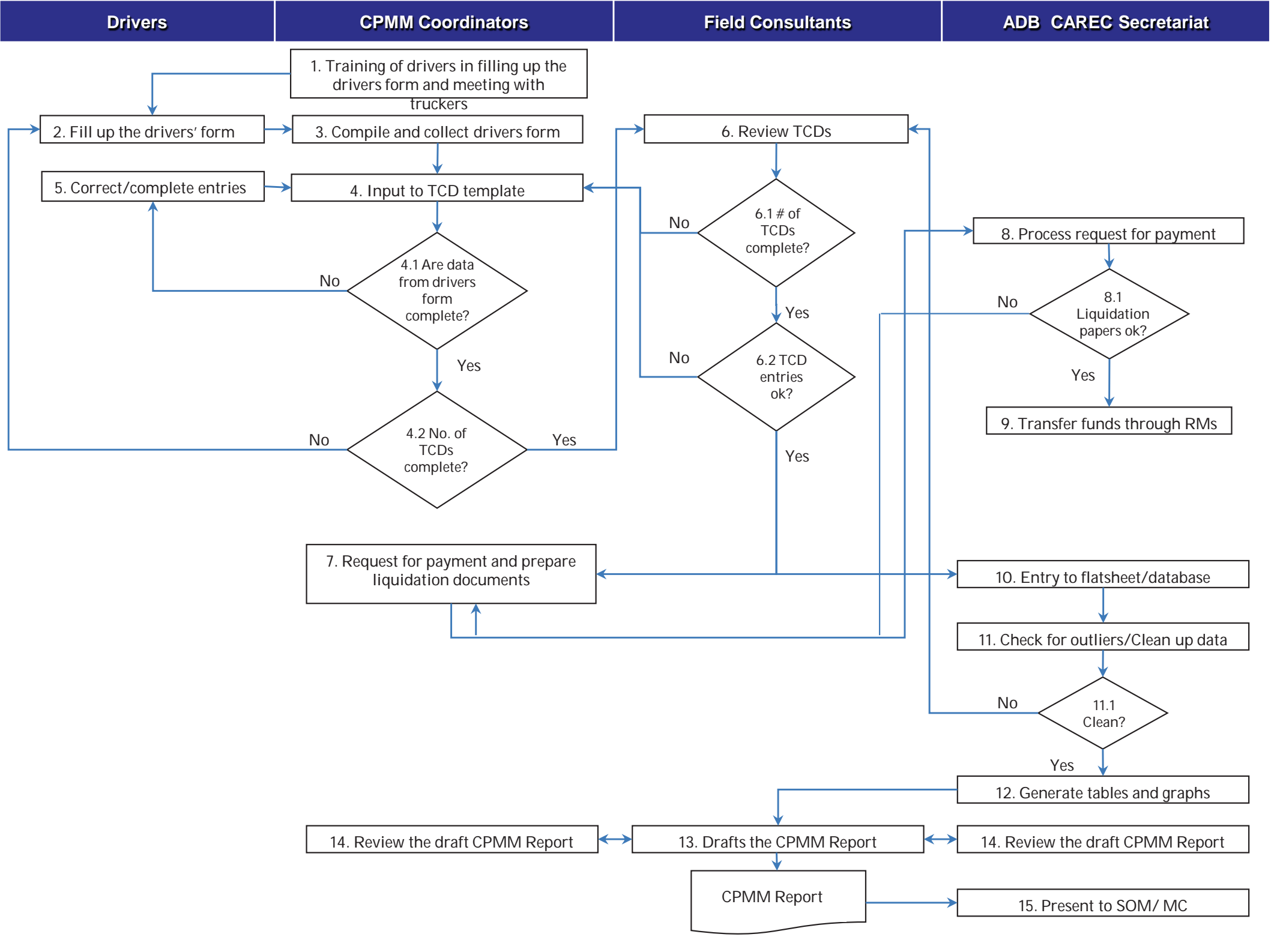


# CPMM Framework



Due to the extensive nature of CPMM, the right partner is important for CPMM to be successful. In some countries, there are a few national associations that fit the description, so they are interviewed and only the most qualified ones were chosen in the end as partners in CPMM.

# Stage 1 : Data Collection





# CPMM MS Excel Template

- The written records from drivers are manually entered into a CPMM custom-designed Excel Template.
- Consultants will review the template and send to ADB.
- ADB will aggregate the data from all templates.
- The template consists of a dashboard, summary and detailed worksheets for shipment samples.

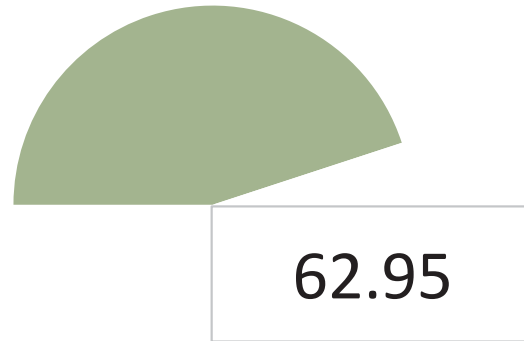


Chart 1 : Speed Without Delay (SWOD)

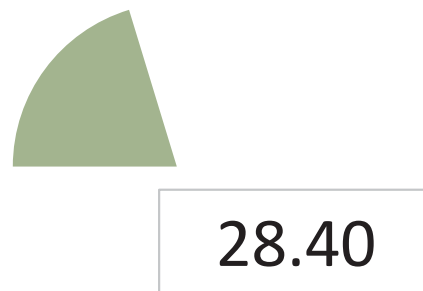


Chart 2: Speed With Delay (SWD)

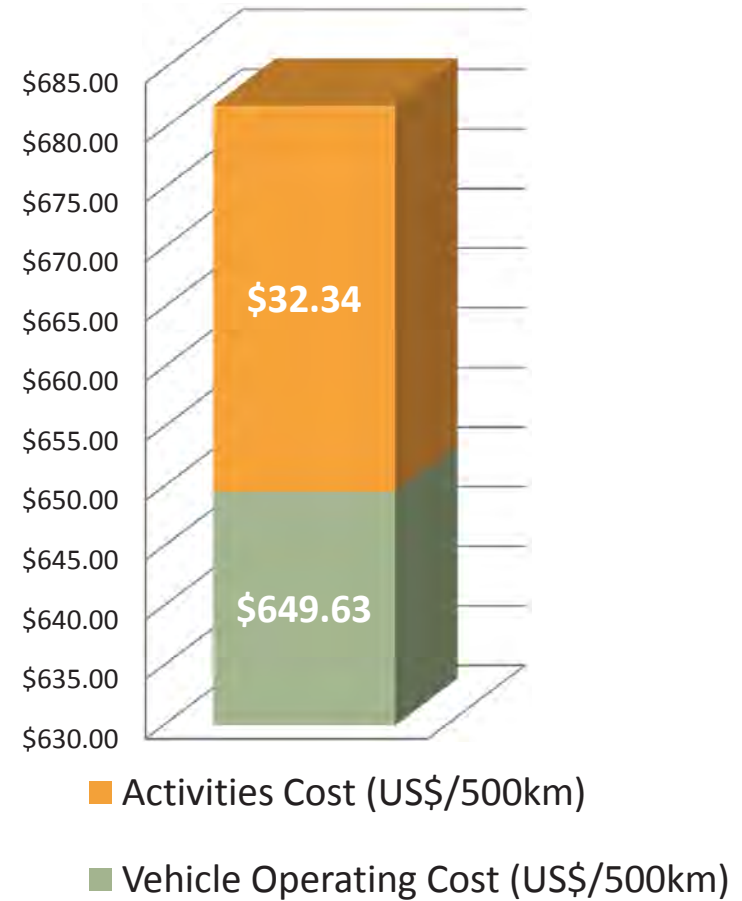


Chart 3 : Cost Analysis

# Summary Worksheet

FILE ID	1	2	3	4	5
Route	Kuldzha-Moskow	Korgas-Troitsk	Bakhty-Tashkent	Dortmund-Shymkent	Stambul-Bishkek
Commodity	Footwear	Equipment	Consumer Goods	Rubber discs	Home appliances
Commodity Classification	CC12 Shoes	CC16 Machineries	CC20 Manufactured Items	CC7 Plastics	CC16 Machineries
Perishable	No	No	No	No	No
Cargo Weight (tons)	20	20	22	19	15
Container?	No	No	No	No	No
TIR?	Yes	Yes	Yes	Yes	Yes
Date of questionnaire completion	10-Jan-13	10-Jan-13	11-Jan-13	11-Jan-13	11-Jan-13
Distance (km)	2,485.00	2,451.00	1,765.00	2,106.00	2,458.00
Transit Time (hrs)	43.78	38.47	29.95	33.08	38.12
Activities Time (hrs)	86.25	78.18	46.33	27.50	35.83
Total Time (hrs)	130.03	116.65	76.28	60.58	73.95
Vehicle Operating Cost (US\$)	\$1,441.30	\$7,132.41	\$2,389.81	\$2,232.36	\$4,936.90
Activities Cost (US\$)	\$402.01	\$98.17	\$137.34	\$82.01	\$139.35
Total Trip Cost (US\$)	\$1,843.31	\$7,230.58	\$2,527.15	\$2,314.37	\$5,076.25
SWOD (km/h)	56.76	63.72	58.93	63.66	64.49
SWD (km/h)	19.11	21.01	23.14	34.76	33.24

# Road - Border Crossing Activities

1. Border Security / Control
2. Customs Clearance
3. Health / Quarantine
4. Phyto-sanitary Inspection
5. Veterinary Inspection
6. Visa/Immigration
7. Traffic Inspection
8. Police Checkpoint / Stop

9. Transport Inspection
10. Weight/Standard Inspection
11. Vehicle Registration
12. Emergency Repair
13. Escort / Convoy
14. Loading / Unloading
15. Road Toll
16. Waiting/ Queue





# Rail - Border Crossing Activities

1. Change of Railways Gauge
2. Classification of Trains
3. Technical Inspection
4. Commercial Inspection
5. Load Protection
6. Security Services





CPMM uses two measures of speeds.

## Speed Without Delay (SWOD)

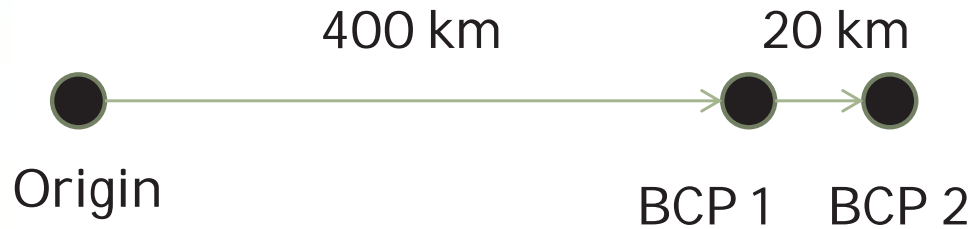
Speed = Distance / Transit Time

## Speed With Delay (SWD)

Speed = Distance / (Transit Time + Activities Time)



# Examples of Speed

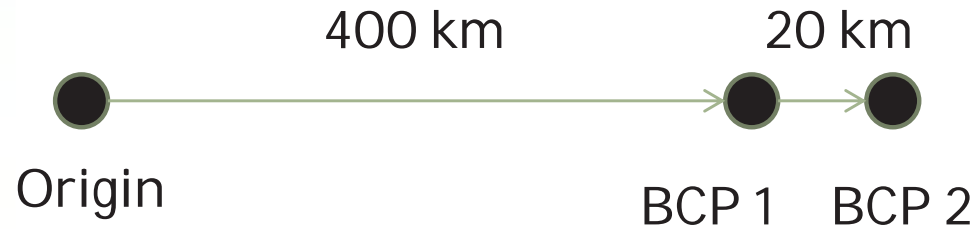


Parameters	Origin – BCP <sub>1</sub>	BCP <sub>1</sub> – BCP <sub>2</sub>	Total
Distance	400 km	20 km	420 km
Transit Time	6.5 hours	0.5 hours	7 hours
Activities Time	1 hour	6 hours	7 hours

$$\text{SWOD} = 420 / 7 = 60 \text{ km / hr}$$

$$\text{SWD} = 420 / (7+7) = 30 \text{ km / hr}$$

# Measuring Costs



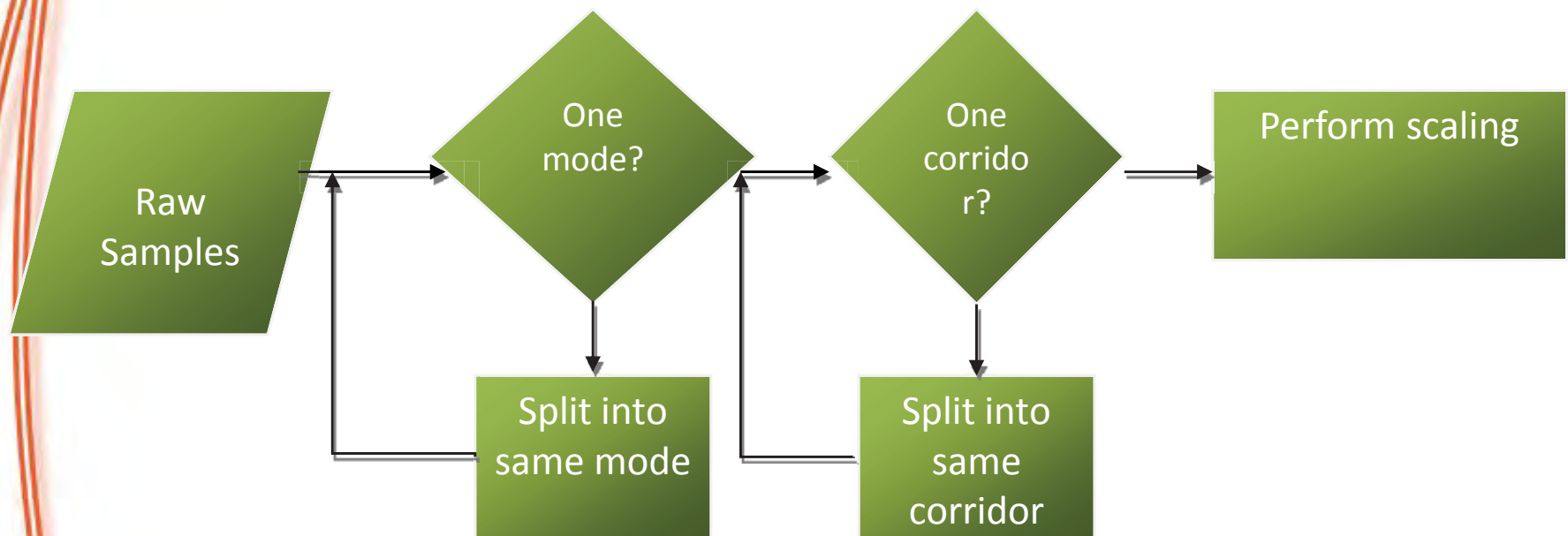
Parameters	Origin – BCP <sub>1</sub>	BCP <sub>1</sub> – BCP <sub>2</sub>	Total
Distance	400 km	20 km	420 km
Vehicle Operating Cost	\$1,120	\$20	\$1,140
Activities Cost	\$60	\$600	\$660

$$\text{Total Cost} = \$520 + \$660 = \$1,180$$

$$\text{Cost} / 500 \text{ km} = (\$1,180 \times 500) / 420 = \$1,404.76$$

# Stage 2 : Data Aggregation

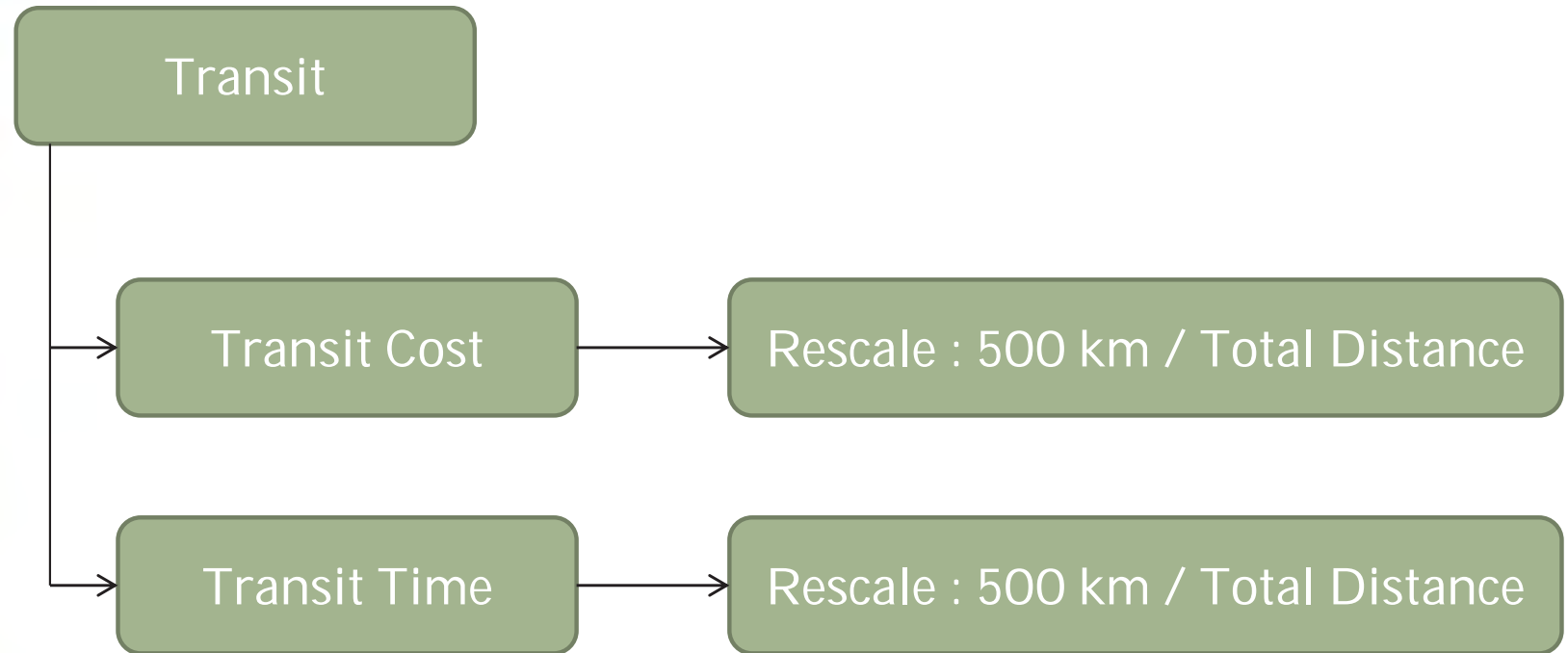
# Data Aggregation Step 1



All the CPMM samples are first categorized into groups of the **same transport mode** and **same corridor**. This is because road and rail have very different transport economics. Each corridor also has different characteristics.

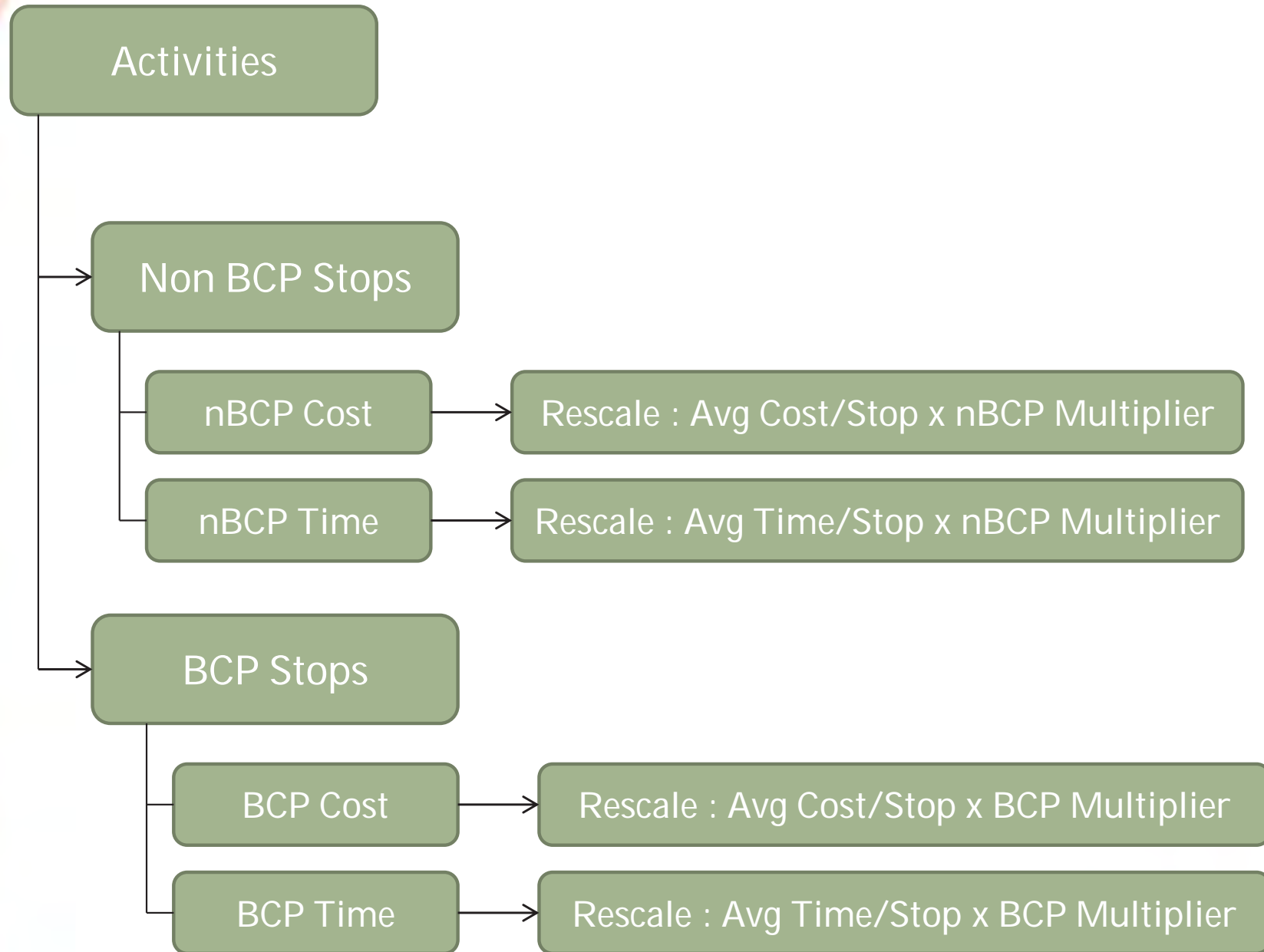


# Data Aggregation



Transit time refers to the total time the vehicle is moving on the road. Transit cost refers to the vehicle operating cost. These two parameters depend on the total distance travelled. Since each corridor has different distances, they are converted to 500 km for easier comparisons.

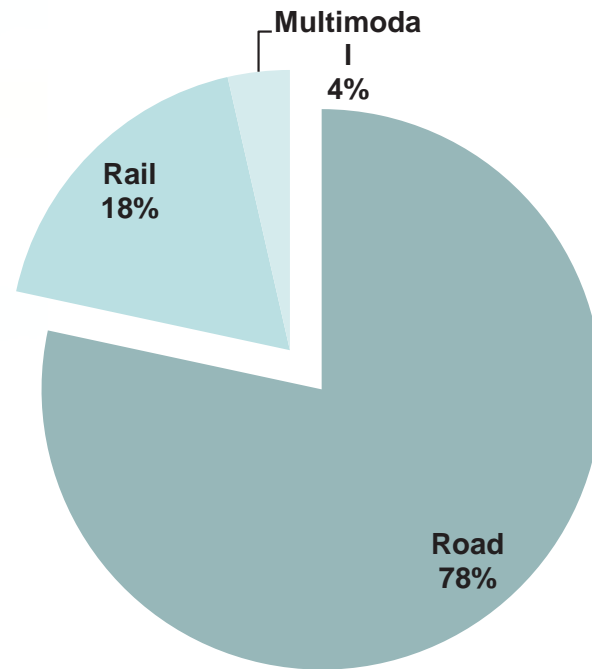
# Data Aggregation



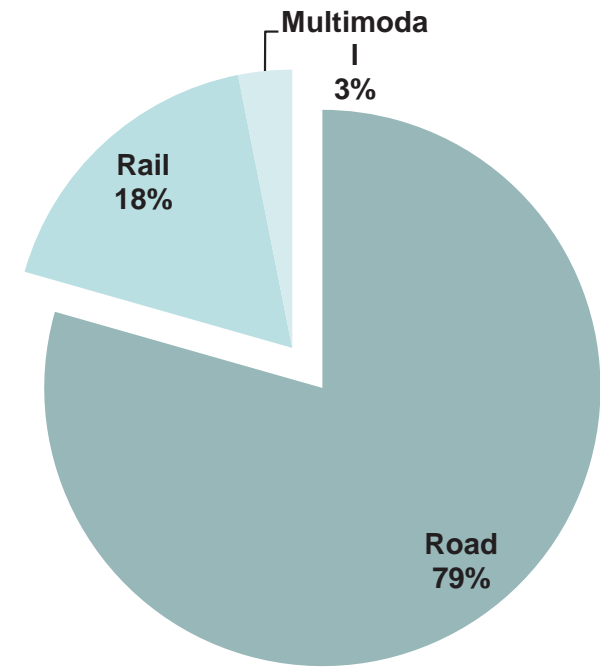
# Stage 3 : Data Analysis

# Data Profile - Mode of Transportation

Mode of Transport, 2011



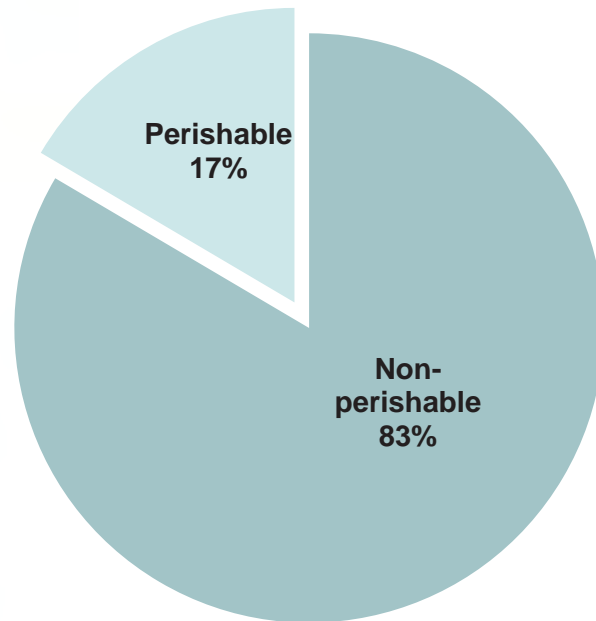
Mode of Transport, 2012



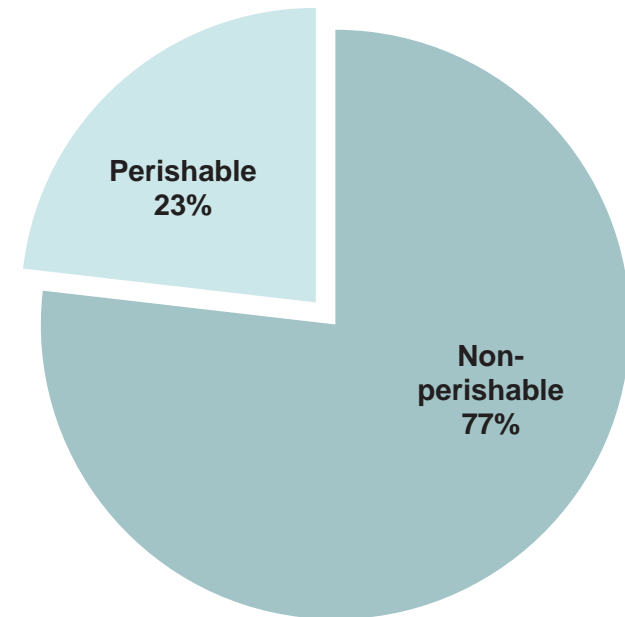
Mode of Transport was little changed. **Road transport** remains as the dominant transport in CPMM samples.

# Data Profile - Perishables

Perishables, 2011



Perishables, 2012

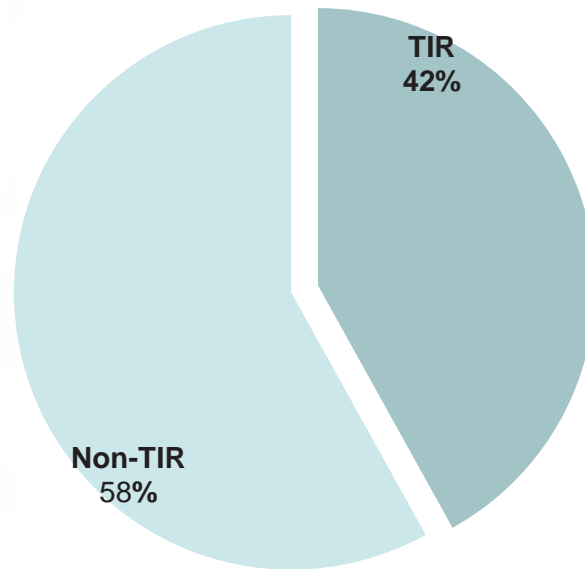


The proportion of shipments carrying perishables increased slightly in 2012. The movement of **fruits and vegetables** accounted for this behaviour.

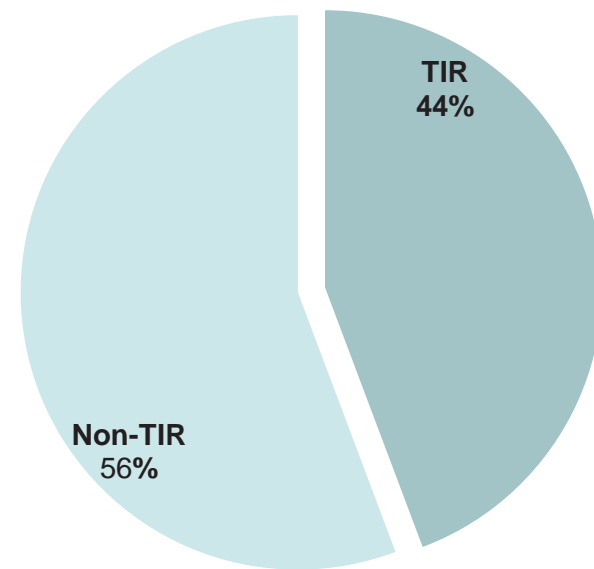


# Data Profile - Use of TIR

TIR, 2011

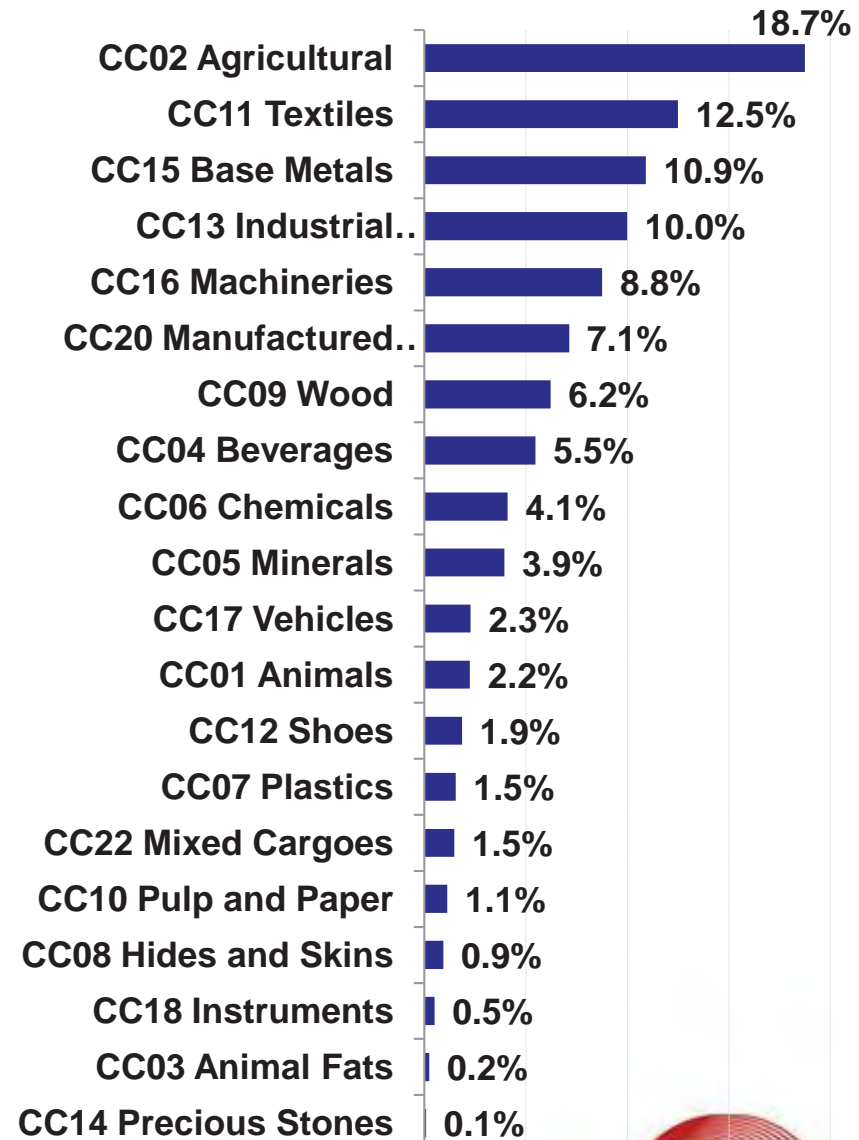


TIR, 2012



TIR accounted for more than **40%** of all road shipments.

# Data Profile - Goods Classifications



# Trade Facilitation Indicators (TFI)

TFI1 : Time Taken to Cross a BCP (Hours)

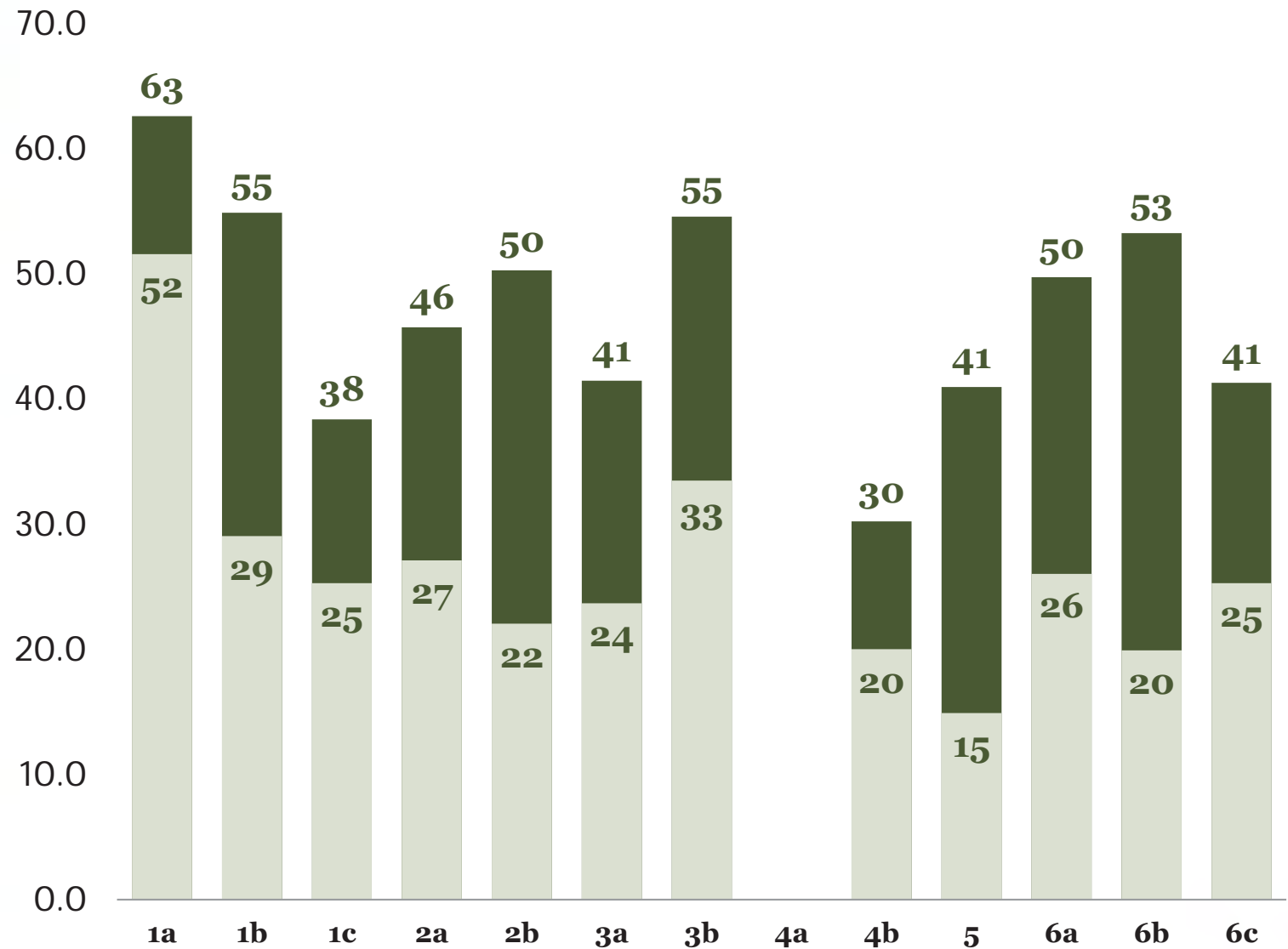
TFI2 : Cost Incurred in Border Crossing (\$)

TFI3 : Cost Incurred to travel a 500 km Corridor Section  
carrying 20 tons

TFI4 : Average Speed Along Corridor (SWOD, SWD)

These four values are selected as part of the official indicators under Development Effectiveness Review for the Transport and Trade Facilitation Strategy (TTFS)

# Comparing Speeds Across Six Corridors



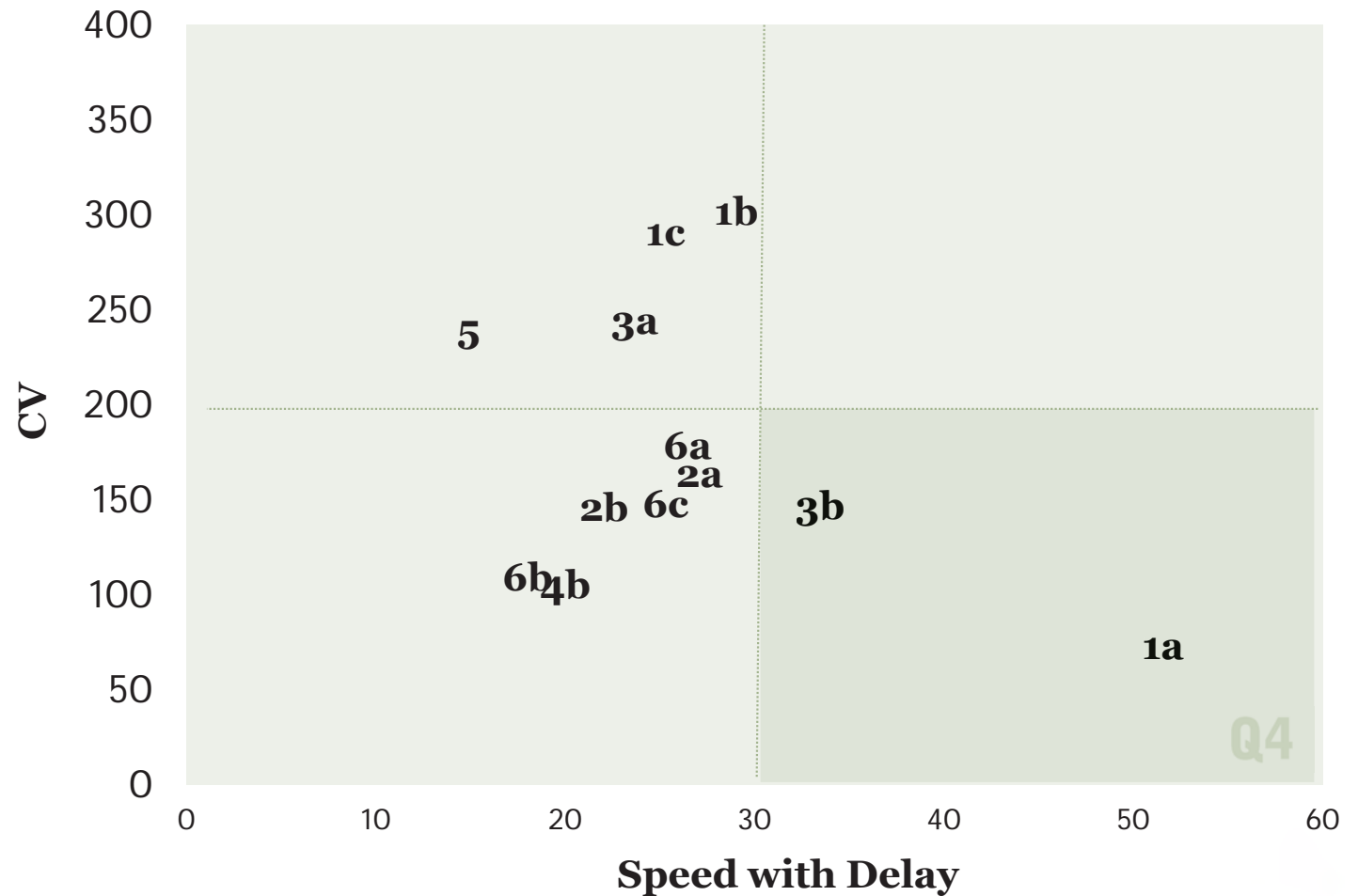
Road Transport, SWOD/SWD Comparisons, Q3 2012





# Comparing Reliability Across Six Corridors

CV is coefficient of variation, derived by dividing the standard deviation over the average SWD.



Road Transport, Reliability Comparisons, Q3 2012






# Analyzing BCPs at Reasons for Delays

BCP	Country	Count	Duration (hrs)																		
			Average	Median	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1 Kairak	KAZ	36	1.2	1.0	0.3		0.2				0.3	0.2	0.3	0.4	0.1					0.8	
Troitsk	RUS	36	1.1	0.9	0.3		0.3					0.2	0.3	0.4						0.8	
Khorgos	PRC	32	19.4	16.1	0.2		3.6	2.9	3.0		0.2				0.3				3.7	0.1	16.0
Kordai	KAZ	32	4.1	4.3	0.3		0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.1					2.7
Ak Zhol	KGZ	31	3.2	3.4	0.2		0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1					2.0
Torugart	PRC	30	60.7	9.4	0.2		1.0	3.0	0.2	0.3	0.2								28.0		63.6
Khorgos	KAZ	23	18.6	9.3	0.3		3.7				0.3										14.3
Merke	KAZ	15	1.9	1.2	0.2		0.7	0.1	0.1	0.1		0.3	0.2	0.3	0.3		1.0				4.2
Torugart	KGZ	15	2.8	0.8	0.3		0.8	1.0	0.2		0.1				0.3	0.1					3.0
Petuchovo	RUS	13	0.8	0.8	0.2							0.2		0.2							0.8
Taraz	KAZ	12	0.5	0.3								0.2	0.2	0.4							

CPMM identifies all the BCPs in each corridor and displays the average time for border crossing. In addition, average value is also decomposed further into specific reasons (e.g. customs clearance, waiting time etc.)

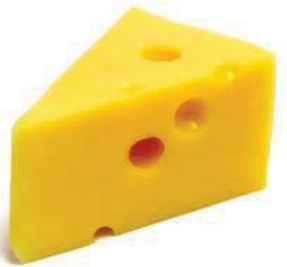
# CENTRAL ASIA REGIONAL ECONOMIC COOPERATION CORRIDOR 1

Sub-Corridors with heavy traffic

-  Urumqi - Astana
-  Urumqi - Almaty
-  Urumqi - Bishkek
- Almaty - Bishkek



Wood



Cheese



Chemicals



Fruits & Vegetables



Plywood



Electronics Equipment



Children Bicycle










Clothing



Furniture



Kilometers

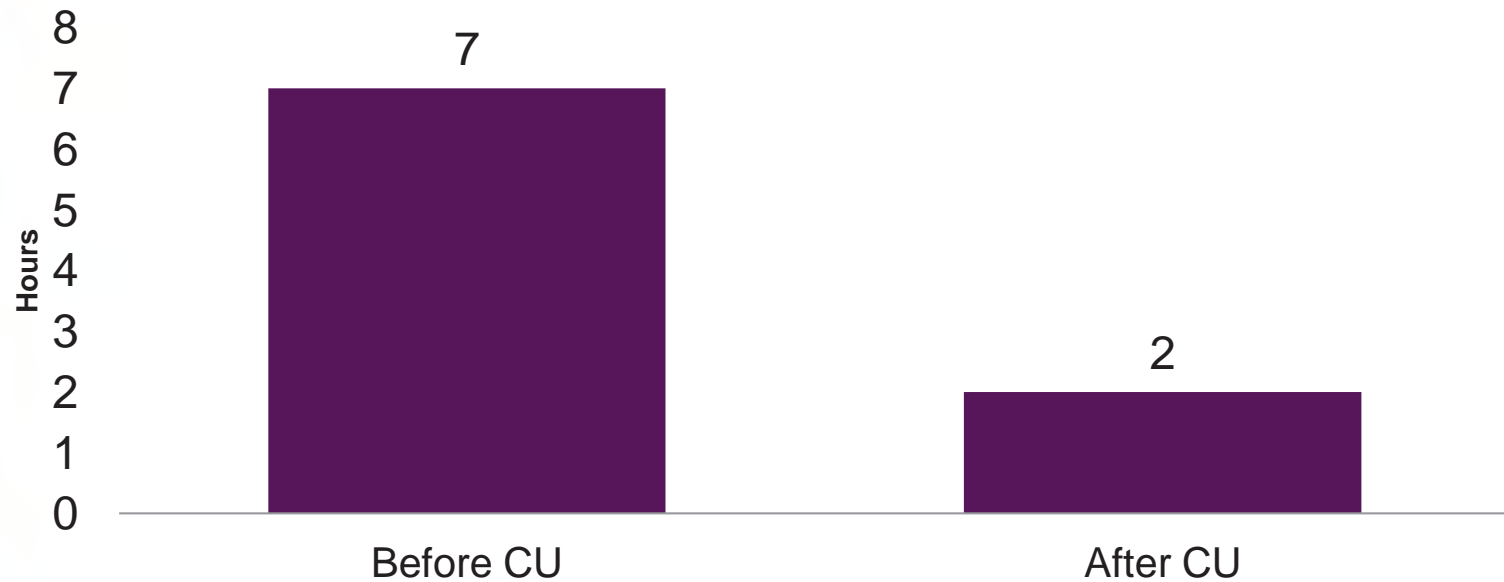
-  National Capital
-  Provincial Capital
-  City/Town
-  Road
-  Railway
-  Cross Border Point
-  International Boundary

Boundaries are not necessarily authoritative.



# Data Analysis - Impact of Customs Union

## Change in Average Border Crossing Time (KAZ-RUS)



Trucks leaving KAZ and entering RUS enjoy significantly shorter time after customs union.

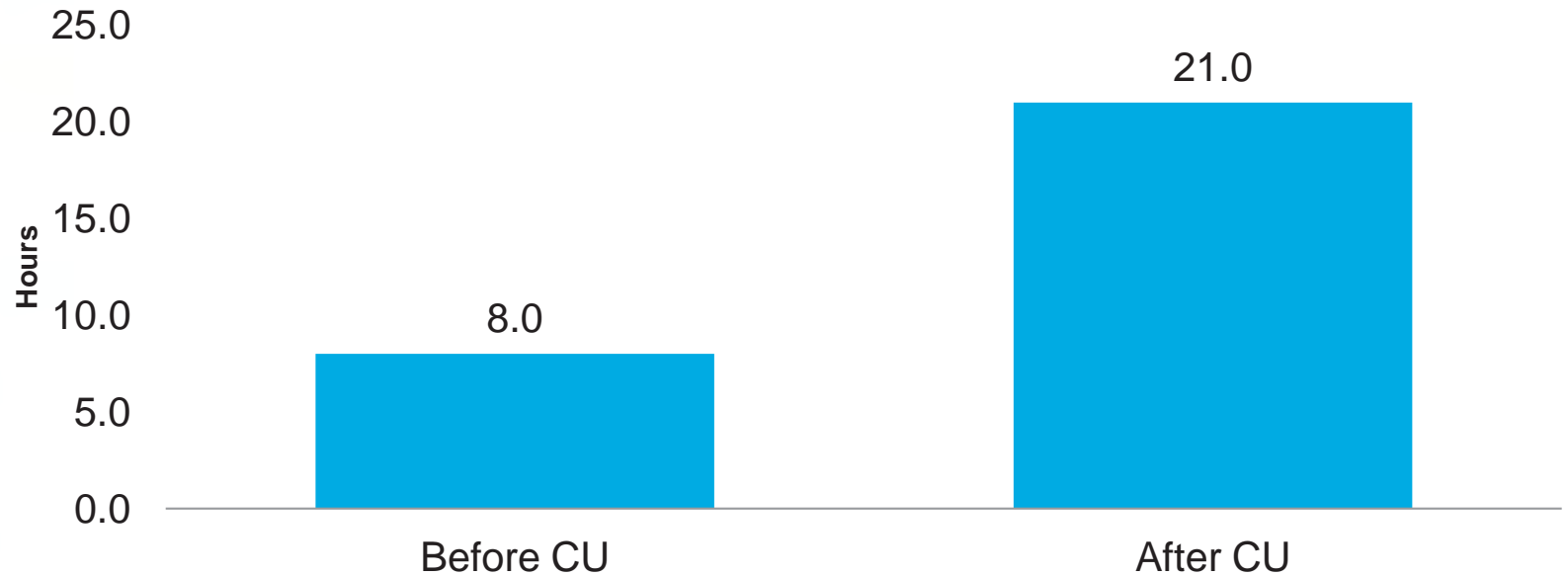
Notable improvements observed at

- Kairak-Troitsk
- Sirim – Mashtakova
- Jana Jol – Petuhovo
- Semey - Veseloyarsk



# Data Analysis - Impact of Customs Union

**Change in Average Border Crossing Time (Non CU to KAZ)**



On the other hand, there is no change to trucks leaving KAZ to Non-CU countries.

Interestingly, trucks leaving Non-CU and entering KAZ experience significant delays. This border crossing changes from 8 hours to 21 hours on average, an increase of 2.6 times!

# Data Analysis - Impact of Customs Union

		Total Duration		Border Security		Customs Clearance		Health / Quarantine		Phyto-sanitary		Veterinary Inspection		Visa/Immigration		GAI/Traffic Inspection		Transport Inspection		Weight Inspection		Wait/Queue	
		B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
<b>Exiting KAZ</b>																							
To Russia	KAZ Side	7.7	2.4	0.6	0.6	2.2	1.1	0.4	0.2	0.4	0.2	0.3	0.2	0.5	0.3	0.3	0.7	0.5	0.4	0.5	0.3	4.7	2.1
	Partner Side	7.7	1.7	0.6	0.5	2.7	1.1	0.5	0.2	0.5	0.2	0.3	0.2	0.3	0.1	0.3	0.2	0.8	0.5	0.5	0.4	4.3	1.7
To a Non-CU Country	KAZ Side	8.1	7.1	0.6	0.5	2.1	1.0	0.4	0.2	0.4	0.2	0.3	0.2	0.2	0.2	0.4	0.2	0.7	0.4	0.5	0.3	5.5	6.9
	Partner Side	4.3	5.0	0.5	0.4	1.4	0.8	0.3	0.5	0.3	0.2	0.2	0.1	0.3	0.2	0.2	0.1	0.3	0.2	0.3	0.3	3.5	4.6
<b>Entering KAZ</b>																							
From Russia	KAZ Side	5.8	2.4	0.5	0.6	2.2	1.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.5	3.3	0.4	0.5	0.4	0.2	4.0	2.1
	Partner Side	7.8	1.6	0.6	0.5	2.7	1.3	0.4	0.2	0.4	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.6	0.5	0.5	0.2	4.8	0.9
From a Non-CU Country	KAZ Side	10.4	10.7	0.7	0.5	3.1	3.7	0.4	0.4	0.5	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.8	0.4	0.5	0.3	6.8	6.6
	Partner Side	8.6	21.0	0.5	0.4	1.3	1.9	0.5	1.5	0.4	0.3	0.2	0.2	0.2	0.1	0.3	0.3	0.2	0.3	0.4	0.3	10.2	20.4

**Legend:** B—Before 1 July 2011  
A—After 1 July 2011

**Note:** Shaded cells indicate significant difference in duration after July 2011, at 5% level of significance.

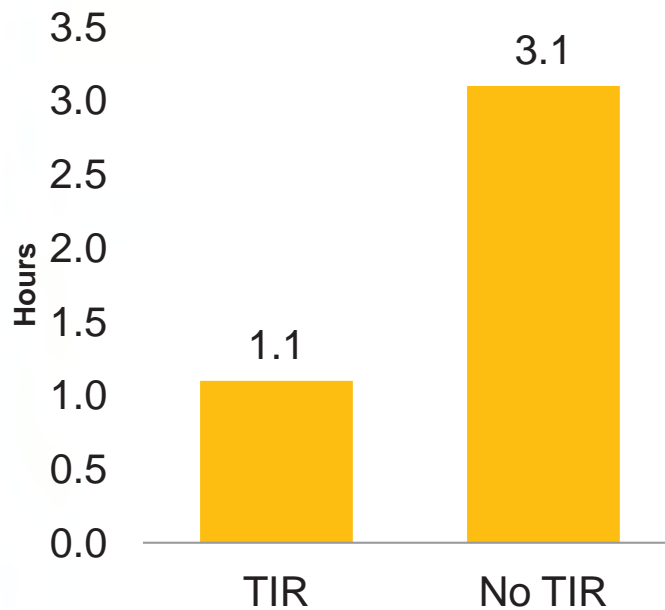
■ Significant decline ■ Significant increase

## Conclusions :

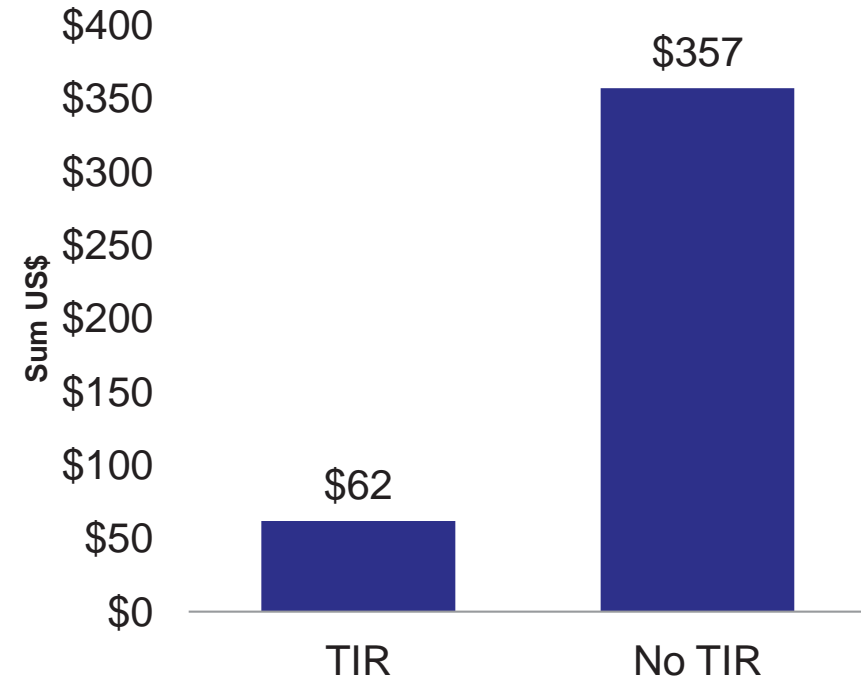
1. Waiting time doubled.
2. Customs clearance, health/quarantine, transport inspection were also significantly lengthened.

# Data Analysis - TIR's Effectiveness

## Difference in Border Crossing Time



## Difference in Border Crossing Cost



## Conclusions :

1. TIR is effective in reducing the time and cost during border crossing in Central Asia, based on samples in 2012.



# Validation and Verification



- Validation is the assurance that the CPMM methodology meets the needs of the transport study.
- “Building the Right Thing”
- In CPMM, validation was done on the following
  - CAREC Six Corridors
  - Key Border Crossing Points (BCPs)
  - The list of border crossing activities (for both road and rail)

# Validation Meetings

- Validation meetings were held with national associations to ensure that the methodology and parameters are acceptable.
  - Guangzhou (Feb 2009)
  - Seoul (Oct 2009)
  - Chongqing (Feb 2011)
- National associations discussed and offered their practitioners' inputs to refine the methodology.

- Verification evaluates whether the outcomes comply with the CPMM specifications. This involves standardization, compliance and data accuracy.
- In CPMM, verification is focused on
  - Commodity Classifications
  - Corridor Routes
  - Border Crossing Activities
  - Time and Cost data

# Data Collection Form

Every CMM sample has a control form for the CPMM coordinator to keep track. If there are questions, the coordinator knows which driver to contact.

File ID:

<b>Form reviewed for completeness?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Review (Form):	<input type="text"/>
<b>Form reviewed for accuracy?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Review (Form):	<input type="text"/>
<b>Followed-up with driver?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Follow-up:	<input type="text"/>
<b>Form entered into TCD?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Data Entry:	<input type="text"/>
<b>TCD reviewed for completeness?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Review (TCD):	<input type="text"/>
<b>TCD reviewed for accuracy?</b>	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Date of Review (TCD):	<input type="text"/>

<b>Name and Signature of Coordinator</b>	<input type="text"/>
------------------------------------------	----------------------





# Drivers' Training



Drivers training workshop in Almaty, Kazakhstan on 1 April 2009. Here, Mr. Berik Bulekbaev conducted a briefing on CPMM with the drivers at the trucking terminal.

International consultants visit the national associations to impart the CPMM methodology. This is similar to 'Train the Trainers'. The appointed CPMM manager and coordinator will then train the drivers before they start the data collection process.



# Verification Meetings



Driver's Meeting in Kabul, conducted with AAFFCO



Driver's Meeting in Ulaan Baatar, conducted with NARTAM

An important verification process is the drivers' meeting. International consultant meet the drivers personally, with the help of national associations. The discussion includes a review of past quarter/year, identifies problems in data collection, understanding events happening on the ground, as well as advising solutions.



# Verification of Data

When the CPMM data are submitted, the international consultants act as a gateway to identify incorrect entries. The current result is compared with previous quarter and also the same month in the previous year (year-on-year). If there are significant discrepancies, the national associations will be asked to explain the causes.

ID	Year	Month	Vehicle Operating Cost
1	2012	January	\$1,000
2	2012	October	\$1,200
3	2012	November	\$1,050
4	2012	December	\$1,100
<b>5</b>	<b>2013</b>	<b>January</b>	<b>\$1,600</b>

Comparing (1) and (5) removes seasonality factor and comparing (2,3,4) with (5) accounts for trend factor. If there is a significant difference, the reasons are then identified. The difference could be due to data entry error, or real events.

# Audits/Site Visits



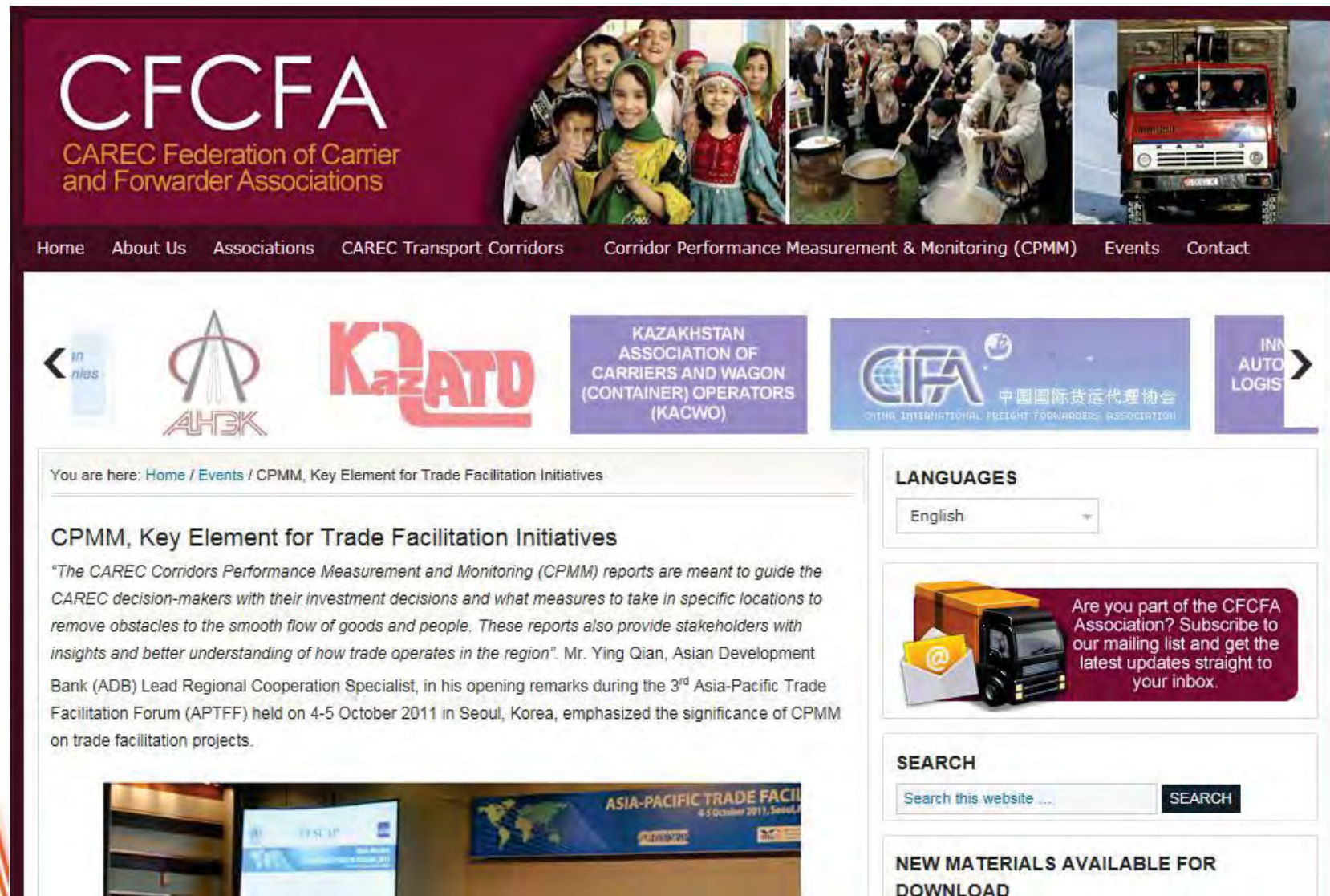
National associations dispatch their expert staff to visit the border crossing points (BCPs) monthly. While this is done to issue orders to drivers, the staff also monitors the progress. Sometimes the staff may accompany the drivers for a trip to verify the results.



In March 2010, an ADB workshop was held in Almaty. After the meeting, the delegates were invited to travel Almaty-Khorgos. Traversing this round trip enables the officials to witness first hand the road condition and the actual situation at the two BCPs, one of the busiest in the region.





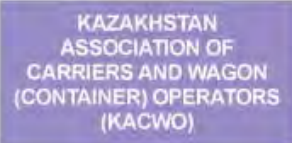


CPMM results are published for Quarter 1, 2 and 3. You can download the Quarterly Reports at <http://cfcfa.net/>. Annual Reports are also available. In addition, interactive charts are available for customized queries.



The screenshot displays the CFCFA website interface. At the top, the CFCFA logo is prominently featured, along with a navigation menu including Home, About Us, Associations, CAREC Transport Corridors, Corridor Performance Measurement & Monitoring (CPMM), Events, and Contact. Below the navigation, there are logos for member organizations: AHEK, KazATU (Kazakhstan Association of Carriers and Wagon (Container) Operators - KACWO), CIFA (China International Freight Forwarders Association), and INN AUTO LOGIS. The main content area is titled "CPMM, Key Element for Trade Facilitation Initiatives" and contains a paragraph explaining the purpose of the CPMM reports. To the right, there is a "LANGUAGES" dropdown menu set to "English" and a promotional banner for the mailing list. At the bottom, there is a "SEARCH" bar and a section for "NEW MATERIALS AVAILABLE FOR DOWNLOAD".

**CFCFA**  
CAREC Federation of Carrier and Forwarder Associations

Home About Us Associations CAREC Transport Corridors Corridor Performance Measurement & Monitoring (CPMM) Events Contact


    

You are here: [Home](#) / [Events](#) / CPMM, Key Element for Trade Facilitation Initiatives

### CPMM, Key Element for Trade Facilitation Initiatives

*"The CAREC Corridors Performance Measurement and Monitoring (CPMM) reports are meant to guide the CAREC decision-makers with their investment decisions and what measures to take in specific locations to remove obstacles to the smooth flow of goods and people. These reports also provide stakeholders with insights and better understanding of how trade operates in the region".* Mr. Ying Qian, Asian Development Bank (ADB) Lead Regional Cooperation Specialist, in his opening remarks during the 3<sup>rd</sup> Asia-Pacific Trade Facilitation Forum (APTFF) held on 4-5 October 2011 in Seoul, Korea, emphasized the significance of CPMM on trade facilitation projects.

**LANGUAGES**  
English

 Are you part of the CFCFA Association? Subscribe to our mailing list and get the latest updates straight to your inbox.

**SEARCH**  
Search this website ...

**NEW MATERIALS AVAILABLE FOR DOWNLOAD**

- CPMM is a **region-wide transport study** that has one of the **largest scale in data collection and analysis**.
- The results are useful for policy makers to **identify bottlenecks** in CAREC corridors.
- By improving the **infrastructure**, harmonizing the **border crossing procedures** and strengthening the **operational capacity of the logistics sector**, the CPMM will show an improvement on the TFIs and the other results.

Thank You!

**Max Ee**

Supply Chain Consultant

SCMi Group LLP

Contact : +65 8138 8700

Email: [max.ee@scmigroup.com](mailto:max.ee@scmigroup.com)

