

# UNESCAP

## Time/Cost-Distance Methodology

### Data collection, recording and processing

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# **Instructions on Data Collection for Route Analysis with the UNESCAP Time/Cost-Distance Methodology**

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- ❖ The “UNESCAP Time/Cost – Distance Methodology” is the graphical representation of cost and time data associated with transport processes. The purpose of the model is to identify inefficiencies and isolate bottlenecks along a particular route by looking at the cost and time characteristics of every section along a route.
  
  - ❖ The “UNESCAP Time/Cost – Distance Methodology” enables policy makers to:
    - ❑ compare - over a period of time - the changes of cost and/or time required for transportation on a certain route;
    - ❑ compare and evaluate competing modes of transport operating on the same route;
    - ❑ compare alternative transit routes.



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- ❖ The “UNESCAP Time/Cost – Distance Methodology” includes a detailed breakdown of cost and time spent, for example, associated with border crossings. This may be particularly useful to policy makers focusing their policy approaches on the most critical issues related to transport. In addition, the inclusion of data on inventory costs for particular commodities, demurrage charges and other indirect costs may be useful to specific export/import industries in evaluating their logistics performance.
  - ❖ The use of the “UNESCAP Time/Cost – Distance Methodology” allows national stakeholders to track time and cost issues along transport routes. Thereby it helps to identify bottlenecks and barriers in international transport.
  - ❖ The information on time and cost involved on certain routes informs general transport facilitation policy decisions (e.g. route prioritization, allocation of funds, allocation of socio-economic development efforts).



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- ❖ Main objectives of the data collection exercise in cooperation with the UNESCAP member countries are:
    - ❑ Familiarization of national stakeholders in the transport sector with the “UNESCAP Time/Cost – Distance Methodology”, so that they can apply it on their own
    - ❑ Development of a comprehensive database based on the data collection
  
  - ❖ The following instructions explain how to use the “UNESCAP Time/Cost – Distance Methodology” step-by-step using an example for a route from Lao PDR to The Netherlands.
  
  - ❖ Please note: The “UNESCAP Time/Cost – Distance Methodology” requires the installation of Microsoft Excel Software on your workstations.



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- ❖ The questionnaire for the application of the “UNESCAP Time/Cost – Distance Methodology” captures qualitative and quantitative information. On the following slides the information required for every line of the questionnaire will be explained.
  - ❖ Preliminary information required:
    - ❑ Decision on a transport route including place of departure, any kind of stops (e.g. border crossings) and final destination
    - ❑ Decision on the type of goods transported (e.g. specification if only one kind or multi-packaging of goods) as well as on the quantity and/or value.
  - ❖ One possibility to obtain the required data would be to directly contact transport operators and/or freight forwarders involved in cargo transport along the specified route. The national freight forwarders association may help to identify relevant transport operators or freight forwarders.

## The questionnaire – All in one MS Excel file



- ❖ Please fill out all of the highlighted cells in Part A and Part B of the questionnaire.
- ❖ Navigate on each worksheet by moving the bars on the right side and on the lower part of the worksheet (see green arrows).
- ❖ Navigate between the worksheets by clicking on the various tabs on the bottom of the page (see green circle).

Microsoft Excel - EN\_0507\_TCD Template detailed v2.0.xls

File Edit View Insert Format Tools Data Window Help

Type a question for help

F25

[Name of Project]

**Questionnaire for Application of UNESCAP Time/Cost-Distance Model**

a Date of questionnaire completion: [date of filling out the questionnaire]

b Route description: [detailed route description]

c Goods: [type of good(s) transported]

d Quantity: [TEU]

e Nationality of driver: [Only applicable when road]

f Country of vehicle registration: [Only applicable when road]

g Effective date of transport start: [date when transport leaves the place of departure]

h Effective delivery date of goods: [date when transport reaches the final destination]

i Was the transport performed under an international transit system (e.g. TIR, NCTS)? [yes/no, please specify the type of international transit system applicable]

j Overall distance of route: 0 km

The worksheets "Part A - General Questions" and "Part B - Route" require your input and information. Please fill out the highlighted cells only.

PART A - General Questions PART B - Route Graph Time - Distance Graph Cost - Distance Graph - All-in-One Graph Average Speed Data A1

# How to fill out Part A of the questionnaire?



Microsoft Excel - EN\_0507\_TCD Template detailed v2.0.xls

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Type a question for help

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	A	B	C	D	E	F	G	H	I	J	K	L	M
1			[Name of Project]										
2			<b>Questionnaire for Application of UNESCAP Time/Cost-Distance Model</b>										
3													
4													
5		a	Date of questionnaire completion:					[date of filling out the questionnaire]					
6		b	Route description:					[detailed route description]					
7		c	Goods:					[type of good(s) transported]					
8		d	Quantity:					[TEU]					
9		e	Nationality of driver:					[Only applicable when road]					
10		f	Country of vehicle registration:					[Only applicable when road]					
11		g	Effective date of transport start:					[date when transport leaves the place of departure]					
12		h	Effective delivery date of goods:					[date when transport reaches the final destination]					
13		i	Was the transport performed under an international transit system (e.g. TIR, NCTS)?					[yes/no, please specify the type of international transit system applicable]					
14		j	Overall distance of route:		0			km					
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30													

The worksheets "Part A - General Questions" and "Part B - Route" require your input and information. Please fill out the highlighted cells only.

PART A - General Questions / PART B - Route / Graph Time-Distance / Graph Cost - Distance / Graph - All-in-One / Graph Average Speed / Data A1

Ready NUM





### Part A – General Questions

- ❖ *Date of questionnaire completion*: Please insert actual date
- ❖ *Route description*: Either the route analyzed is already provided or please fill in the detailed information starting with place of departure, over main cities en route, junctions or highway numbers to place of final destination.
- ❖ *Goods*: Please enter the type of goods transported (single type of goods vs. multiple types of goods)
- ❖ *Quantity*: Please enter the quantity of goods transported. (If multiple goods then please indicate quantity by type of good.)
- ❖ *“Nationality of driver”* and *“Country of vehicle registration”* refer to transport by road only. In case of multimodal transports along the route please name nationalities of all drivers and vehicles involved.
- ❖ *“Effective date of transport start”* and *“Effective delivery date of goods”* refer to the dates, when the transport physically leaves its place of departure and when then goods physically arrive at their destination.
- ❖ *“Was the transport performed under an international transit system (e.g. TIR, NCTS)?”*: Please reply with “yes” or “no”. Please also specify, which international transit system has been applied.
- ❖ *Overall distance of the route*: No data entry is required, as it is automatically calculated as the sum of the length of the individual sections of the route (based on the data of Part B).



### Part B – Route

- ❖ The following two slides illustrate in detail how to fill out the template for the actual route. Please read each part top – down (green arrows). Each part captures one section/leg of the journey (i.e. from one stop to another). Overall the template provides space for up to 20 stops from departure to final destination along one route.
- ❖ Please repeat the steps that will be explained on slide 11 for as many times as necessary to provide information on the whole route including all stops.
- ❖ Please note that from “Leg 2” onwards, the template automatically fills in the field for “Place of departure”, because this information represents the “Place of next stop” of the previous route section.

# How to fill out Part B of the questionnaire?



Microsoft Excel - EN\_0507\_TCD Template detailed v2.0.xls

File Edit View Insert Format Tools Data Window Help

K11 Exit Border Crossing

		LEG 1				LEG 2				LEG 3						
2																
3	Place of departure	Name of city:						0				0				
4		Name of country:						0				0				
5	Mode of Transport	road				rail										
6	Distance to next stop	km						km				km				
7	Duration of travel	hrs min						hrs min				hrs 0 min				
8	Costs per leg (while en route, in USD)	\$0.00				\$0.00				\$0.00						
9	Place of next stop	Name of city:														
10		Name of country:														
11	Reason for stop	Intermediate Stop				Exit Border Crossing										
12	Description of stop	Type of activity	Duration		Costs	Intermediate Stop		Type of activity		Duration		Costs				
13		Activity A at stop	hrs	min		Exit Border Crossing		hrs		min	\$					
14		Activity B at stop	hrs	min		Entry Border Crossing		hrs		min	\$					
15		Activity C at stop	hrs	min		Final Destination		hrs	min	\$0.00	\$					
16		Activity D at stop	hrs	min		hrs	min	\$0.00	hrs	min	\$					
17		Activity E at stop	hrs	min		hrs	min	\$0.00	hrs	min	\$					
18		Activity F at stop	hrs	min		hrs	min	\$0.00	hrs	min	\$					
19		Activity G at stop	hrs	min		hrs	min	\$0.00	hrs	min	\$					
20		0	hrs	0	min	\$0.00	0	hrs	0	min	\$0.00	0	hrs	0	min	\$
21	Description of actions taken (e.g. procedures, formalities applicable to the section of the route).															
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- ❖ Please note that the cells circled contain drop-down menus, which you see by clicking on the cell. Please choose your answers from the drop-down menu.

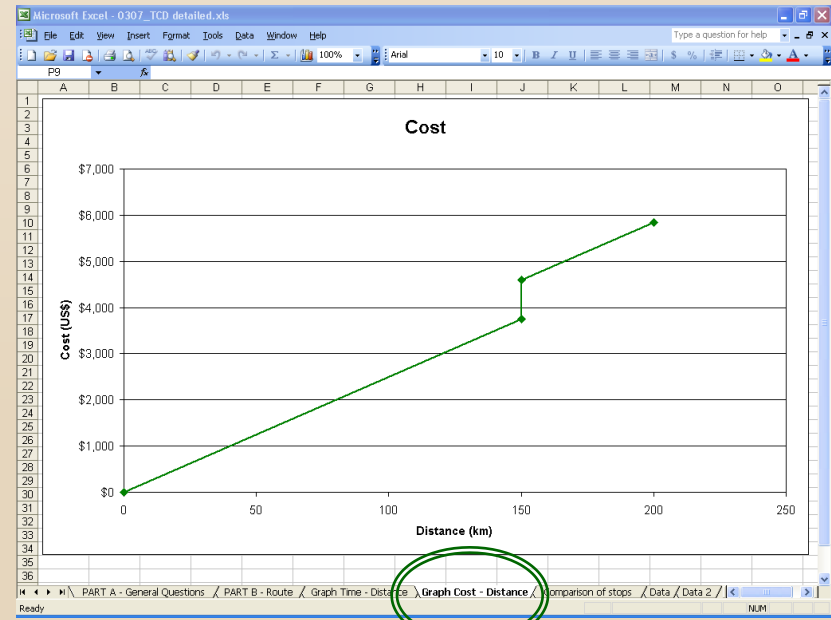
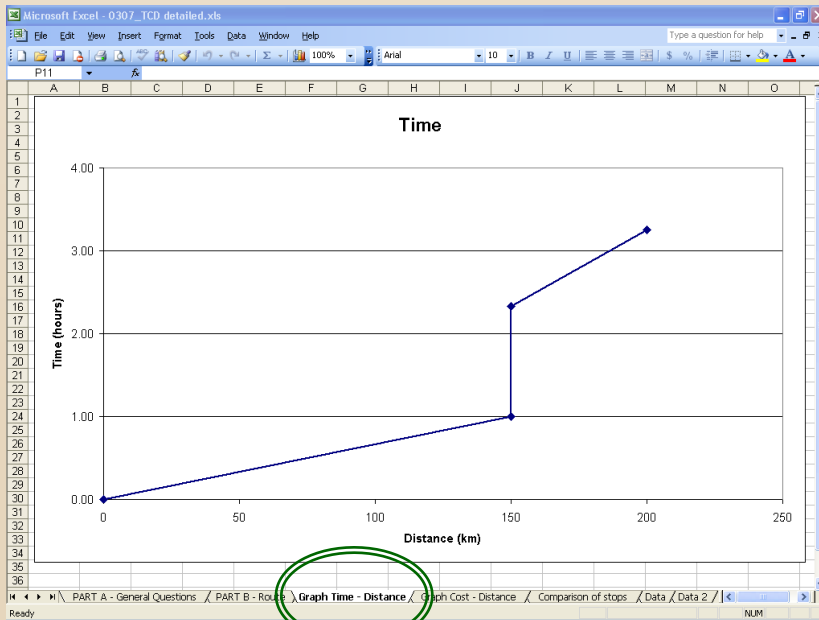


- ❖ Place of departure: Please insert name of city and name of country.
- ❖ Mode of transport: Please choose from the drop-down menu, if the used mode of transport is “road”, “rail” or “ship”.
- ❖ Distance to next stop: Please insert the distance from the place of departure to the first stop on the route.
- ❖ Duration of travel: Please fill in the duration of the journey from the place of departure to the first stop. Please specify hours and minutes.
- ❖ Costs per leg: The costs per leg (or for each section of the overall journey) refer to the variable costs on that particular leg. Please insert all costs related to the transport while being en route on that particular section, but exclude costs at stops.

# How to plot the graphs?



- ❖ The individual charts “Time over Distance” and “Cost over Distance” are plotted automatically as a function of the information you entered into the highlighted cells on worksheets “Part A – General Questions” and “Part B – Route”.
- ❖ The two charts are on separate worksheets in the file:
  - ❑ The time chart is on worksheet named “Graph Time – Distance”.
  - ❑ The cost chart is on the worksheet called “Graph Cost – Distance”.(Please navigate between worksheets with the tabs (see circles).)





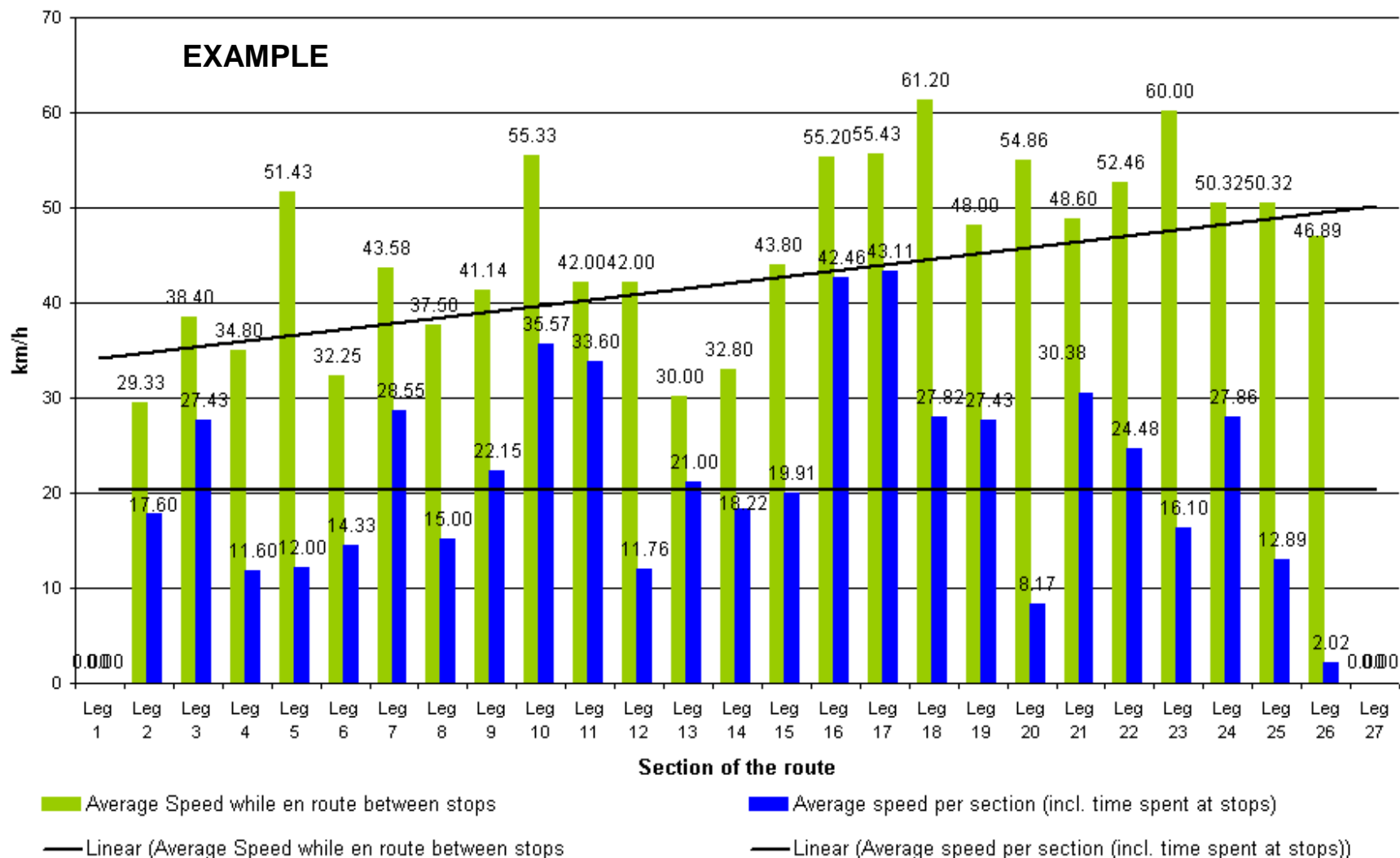
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- ❖ The y-axis represents either the time or the cost incurred, while the x-axis represents the distance from origin to destination. It is also possible to have two y-axes, one for time and one for cost (Please see back-up slide).
  
  - ❖ The unit costs and the time allocation of transport may vary between modes as well as over time, and the steepness of the cost/time curves reflect the costs (price) and/or time per distance.
    - ❑ The steeper the curve, the more time consuming or costly is a transport along the analyzed route.
    - ❑ Vertical steps in each curve indicate a sharp increase of time/cost without an increase in distance (i.e. without movement of the transport).
    - ❑ Vertical steps typically occur at stops (e.g. border crossings) and they indicate inefficiencies or bottlenecks on a transport route, since the larger the vertical step, the more time/cost are used for activities undergone at a stop.

**Please note: The additional worksheets contain a worksheet with time and cost depicted in one graph (see back-up slide), data tables required to plot the graphs and background information for the drop-down menus.**

# Comparison of average speed per section of the route



Average speed on EATL Route 5 (Rail): Bandar Abbas to Anzali

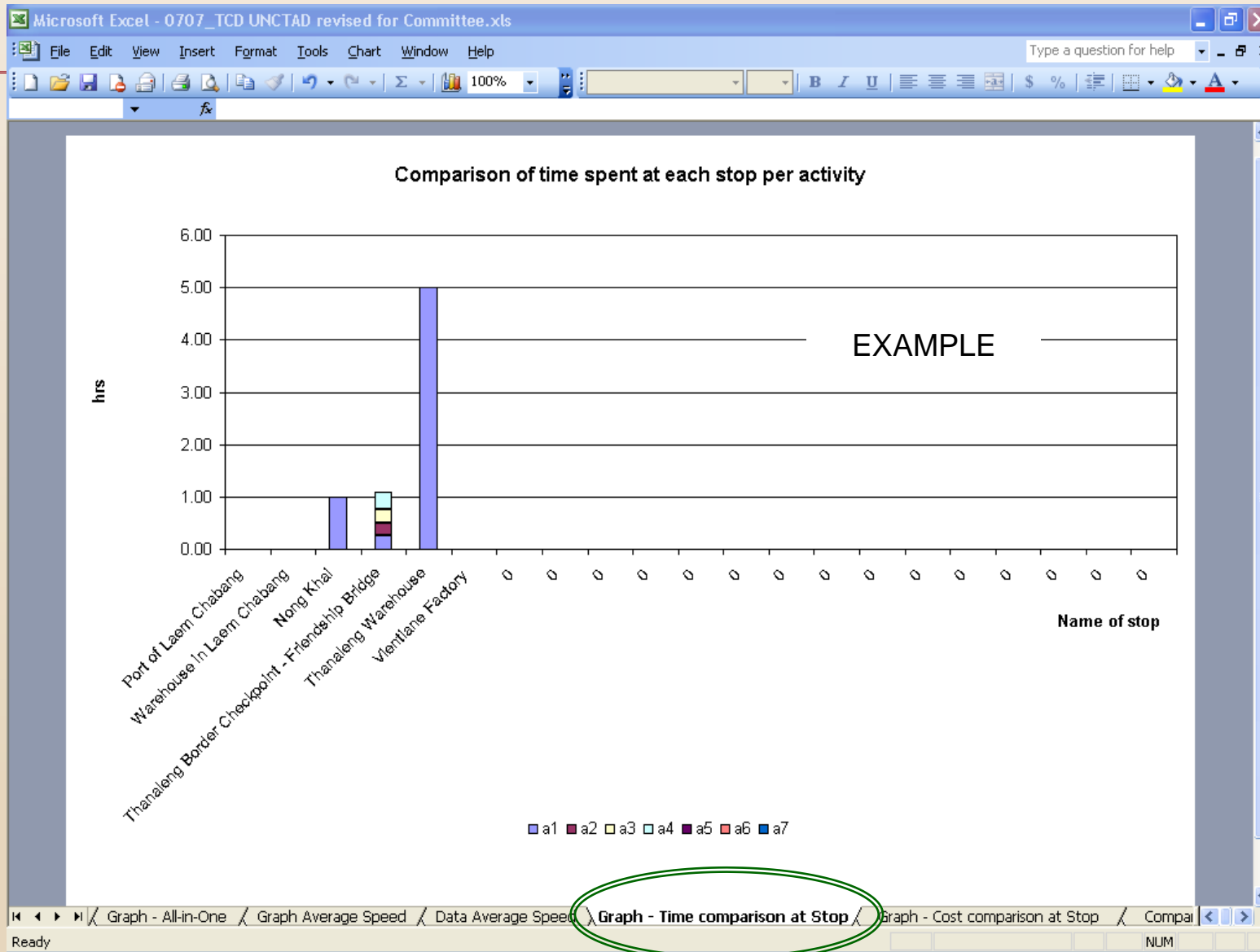




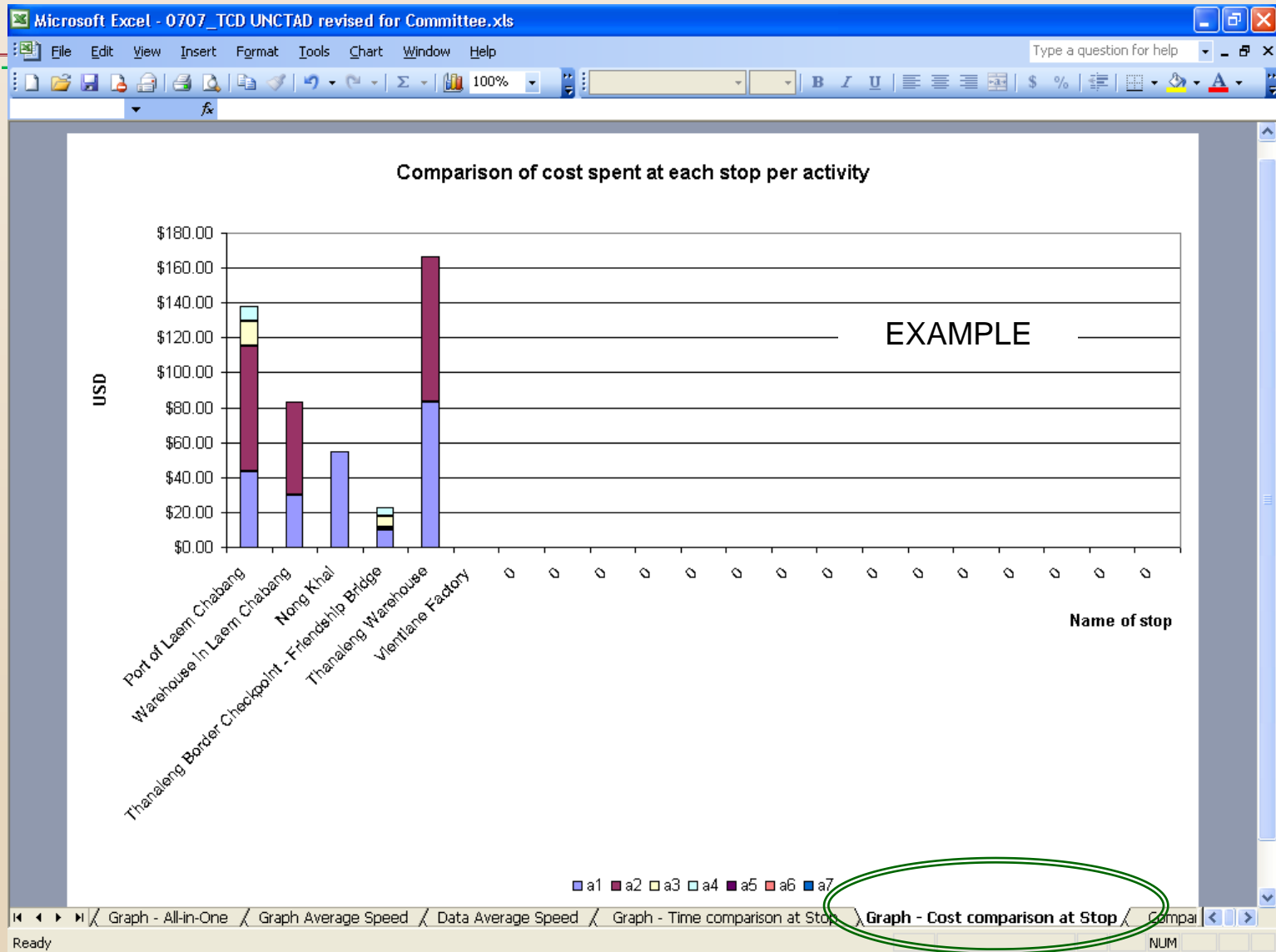
- 
- ❖ The previous chart provides an overview on the average speed along the captioned route.
  
  - ❖ The two graphs represent two data sets:
    - ▶ The points on the *green graph* reflect only the average speed for a transport between two stops
    - ▶ The points on the *blue graph* reflect the average for a transport between two stops, which includes the time spent at the designated stop as well.



# Comparison of time consumption at stops along the route



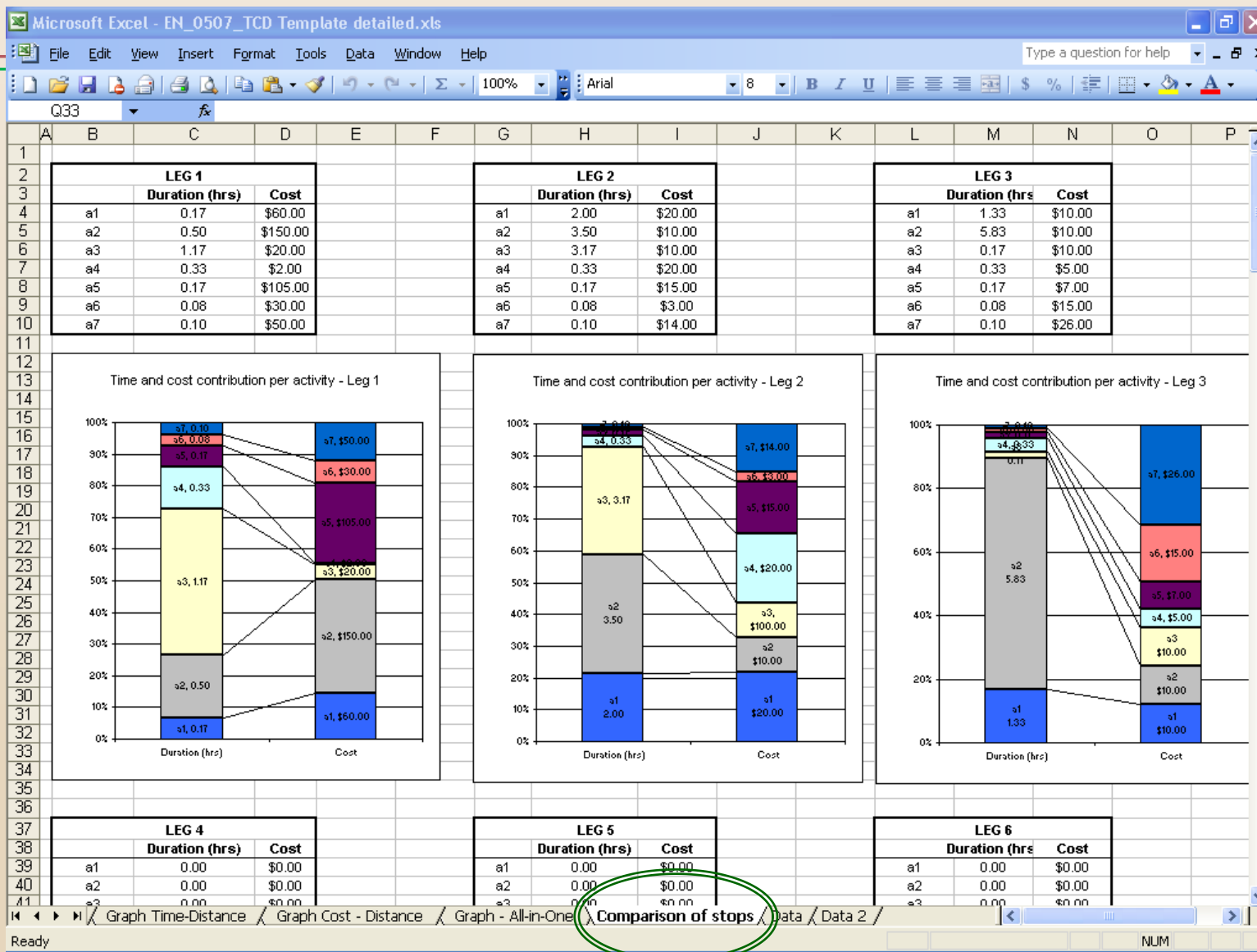
# Comparison of cost consumption at stops along the route





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- ❖ The previous two graphs illustrate independently the time (duration) and the costs allocated to activities undertaken at stops and compares between all the stops along the route analyzed.
  - ❖ The analysis allows to compare the efficiency between different stops along one route, since the graphs make visible differences in time/cost consumption. The degree of difference illustrated through the height of the bars reveals outliers and draws attention to potentially critical issues.
  - ❖ In conjunction with other data compiled with the UNESCAP “Time/Cost-Distance Methodology” it is possible to compare cost and time allocation at one stop during the transport with the cost and time allocation at the same stop, but occurring during another transport. For example, the time and cost for a freight transport of cotton stopping in Astana can be compared to the time and cost of a freight transport with vegetables stopping in Astana.
  - ❖ **Please note:** *The legend identifies the activities in an abbreviated form. Please be aware that the activity named as “a1” at the first stop is not necessarily the same activity also named “a1” at the second stop. This is due to the fact the information entered in Part B under “Description” is not the same at every stop, because it can be entered in a different order and it might be that not all activities take place at all stops.*

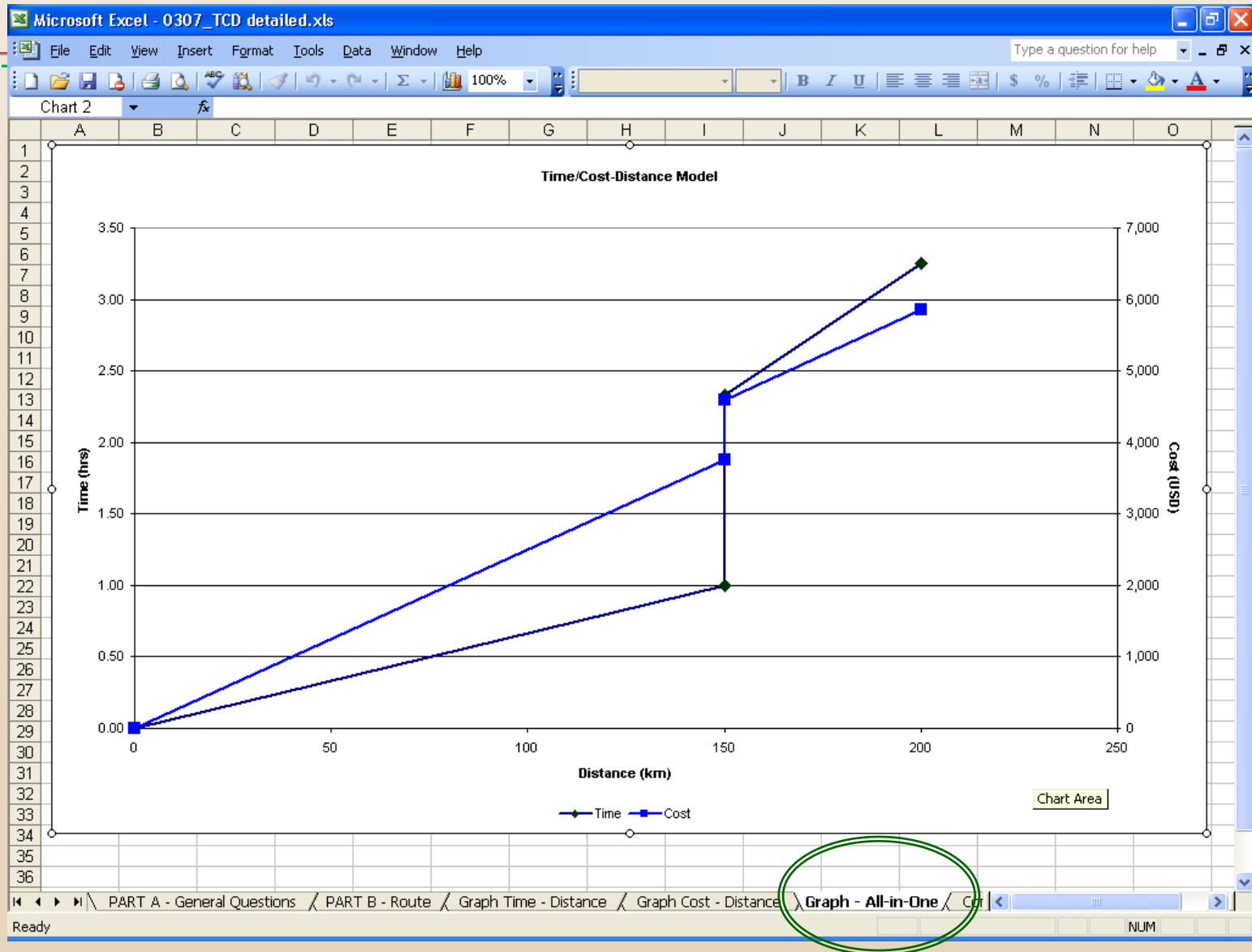
# Relationship between time and cost per activity at stops





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- ❖ Each graphs illustrates with two individual bars the time (duration) and the costs allocated to the activities undertaken at a stop.
  - ❖ The bar for time/duration (in hrs) shows how much (in per cent) each activity contributes to the overall time of the stop (sections of the bar), which is represented as 100%.
  - ❖ The bar for the costs depicts the amount each activity (sections of the bar) contributes to the overall costs of the stop.
  - ❖ The lines connecting the two corresponding sections of the bars facilitate the comparison between the percentage of time and the percentage of costs attributed to one activity.

# Back-Up: All the information in one graph



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**Thank you!**