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
Objectives and technical requirements

- 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.
What kind of data is collected?

- 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.
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).
How to fill out Part A of the questionnaire?

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

- **a** Date of questionnaire completion:
- **b** Route description:
- **c** Goods:
- **d** Quantity:
- **e** Nationality of driver:
- **f** Country of vehicle registration:
- **g** Effective date of transport start:
- **h** Effective delivery date of goods:
- **i** Was the transport performed under an international transit system (e.g., TIR, CTS)?
- **j** Overall distance of route:

The worksheets "Part A - General Questions" and "Part B - Route" require your input and information. Please fill out the highlighted cells only.
How to fill out Part A & B of the questionnaire? – cont’d

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?

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.
How to fill out Part B of the questionnaire? – cont’d

- **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).)
How to interpret the data and the graphs?

- 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

EXAMPLE

Section of the route

| Leg 1 | Leg 2 | Leg 3 | Leg 4 | Leg 5 | Leg 6 | Leg 7 | Leg 8 | Leg 9 | Leg 10 | Leg 11 | Leg 12 | Leg 13 | Leg 14 | Leg 15 | Leg 16 | Leg 17 | Leg 18 | Leg 19 | Leg 20 | Leg 21 | Leg 22 | Leg 23 | Leg 24 | Leg 25 | Leg 26 | Leg 27 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 29.33 | 31.00 | 34.80 | 32.25 | 28.55 | 22.15 | 21.00 | 18.22 | 11.76 | 13.22 | 19.91 | 27.82 | 27.43 | 24.48 | 16.10 | 12.89 | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |

Legend:
- Green bar: Average Speed while en route between stops
- Blue bar: Average speed per section (incl. time spent at stops)
- Black line: Linear (Average Speed while en route between stops)
- Gray line: Linear (Average speed per section (incl. time spent at stops))
How to interpret the data and the graphs?

- 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

**Graph - Time comparison at Stop**
Comparison of cost consumption at stops along the route

EXAMPLE
How to interpret the data and the graphs?

- 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
How to interpret the data and the graphs?

- 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
Thank you!