TRANSPORTATION

INTRODUCTION

TRANSPORTATION

Mechanical Engineering Department
Carlos III University

TRANSPORTATION INTRODUCTION

TRANSPORT DEFINITION

Part of the economic activity intended to satisfy human needs by means of geographic change position of people or things

Transportation tries to erase the obstacles due to distance

Ways in which transport is part of the productive activity:

• As phase of the production process
• As a production process
• Goods distribution
TRANSPORT DEFINITION

Transport cost

Time of transport

Competition

Safety of means of transport

Feasibility of the delivery

Industry situation

TRANSPORT FUNCTIONS

General function: Control of space and time

Specific functions:

• Integration of societies and territories
• Displacement needs satisfaction
• Strategic reasons (to promote a region)
• Establish connection between the productive system and the consumption regions
• Ensure the access to different geographic regions
• Economic activity in itself that generates wealth and jobs
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GROWTH TRANSPORTATION FACTORS

1. Population growth

\[ \Delta \text{Population} \Rightarrow \Delta \text{People transportation} \Rightarrow \Delta \text{Consume} \Rightarrow \Delta \text{Production} \Rightarrow \Delta \text{Material transportation} \]

2. Mobility increase

Mobility: Number of km travelled by citizen

Transport evolution
- Bigger speeds
- Less time

It is statistically proved that travel time investment is stable with time

- Bigger mobility
- Bigger demand of transportation

*When time is saved in travelling, the saved time leads to an increase of mobility*

Evolution of total mobility in the EU-15

![Evolution of total mobility in the EU-15](chart.png)

- Year
- Thousands of millions of km-passenger
- Car
- Bus
- Train
- Metro and streetcar
- Airplane
- Total

Energy & Transport in figures 2004
European Commission Directorate-General for Energy and Transport
GROWTH TRANSPORTATION FACTORS

3. Present production and consumption strategies
   Concentration of production centres where there are optimal conditions for product elaboration
   Better communications

4. Energetic factor
   Fuel restriction \(\rightarrow\) Alternative energy development

TRANSPORT EFFICIENCY

Influence efficiency transport factors:

- Improvement and increase of infrastructures
- Time travel reduction
- Decrease of specific consumption
- Load capacity increase
- Specialization of means
- Environmental negative impact reduction
- Safety increase
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SOCIAL TRANSPORTATION COSTS

1. Environmental impact
   • Pollutant gas emissions
   • Acoustic pollution
   • Vibrations
   • Visual impact: Infrastructures, dirt, deposits…

2. Traffic
   • Transport time increase
   • Consumption increase
   • Environmental impact

3. Safety
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SOCIAL TRANSPORTATION COSTS

Number of victims of traffic accidents in Spain

<table>
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<th>Year</th>
<th>Total (Thousands of people)</th>
<th>Dead (Thousands of people)</th>
<th>Seriously ill (Thousands of people)</th>
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A country has to have a good system of transport to have a good socioeconomic development.

Types of coordination:
- Intramodal
- Intermodal
- Multimodal
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TRANSPORTATION SYSTEMS

Intramodal: Combination between vehicles of the same mean of transport

Intermodal: Combination of not more than two means of transport
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TRANSPORTATION SYSTEMS

Multimodal: Coordination of more than two means of transport

CLASSIFICATION OF MEANS OF TRANSPORT

Discrete at medium and large distances
A unit transport moves with the load

Continuous at medium and large distances
Channels and pipes (petroleum pipeline, gas pipeline...)

Auxiliary means of transport for short distances
Belt conveyors, transportation rollers, funicular, cranes, passenger lift, service lift, moving staircase, lift trucks...
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CLASSIFICATION OF MEANS OF TRANSPORT

DISCRETE AT MEDIUM AND LARGE DISTANCES

- SURFACE
  - NON GUIDED
  - ALL-TERRAIN
    - ROAD
  - GUIDED
    - AIR
      - AIRPLANE
      - HELICOPTER
      - AIRCRAFT
  - SEA-RIVER
    - BOATS
    - HOVERCRAFT BOAT

RAILWAY

- HOVERCRAFT TRAIN

SEA-RIVER

Air transport:
Large distances. Valuable merchandises and urgent deliveries.

Railway transport:
Wagon -complete train. Intermodal systems (wagon, containers, ...). Combined with road transport.

River transport:
Coal, minerals, construction materials,...Cheap but slow. Great competition with surface transport.
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CLASSIFICATION OF MEANS OF TRANSPORT

Evolution of modal distribution of passengers (1950-2000)

- Railway
- Air
- Road

Evolution of modal distribution of merchandise (1950-2000)

- Sea
- Pipes
- Railway
- Road
TRANSPORTATION INTRODUCTION

TRANSPORTATION ORGANIZATION

Transport system design →

- Means of transport to be used
- Exploitation mode (public or private)
- Design of the company means

The choice of the mean of transport depends on:

- Annual tons to transport and its variations
- Nature of the merchandises
- Medium size of the transported lot
- Distance to be travelled
- Delay and duration of transport
- Infrastructure
- Final price of the different solutions

DATA TRANSPORT

The new technologies allow:

- Automation of deliveries
- Materials tracking