

# Session 1.4

## Matching Demand with Supply in Rural Transport

## Topics

- 1 How do we Match Supply and Demand?
- 2 Density of Demand
- 3 Where is the Supply?
- 4 Marketing and Storage
- 5 Transport Brokers & Empty Running
- 6 Network Interconnectivity
- 7 Communications
- 8 Complementary Investments

## 1. How do we Match Supply and Demand at Minimum Cost?

An efficient transport system is able to match transport supply with demand with the minimum of delays, waiting and costs to the users. This is achieved through:

- Concentration of economic activity (Density of Demand)
- Concentrated flows of goods and people
- An efficient market system
- Good Communications
- Efficient infrastructure

- Compared with African transport - Asian transport is:
  - more competitive
  - lower cost
  - higher service frequency
  - more diversified - for short distance rural movements

Why is this?

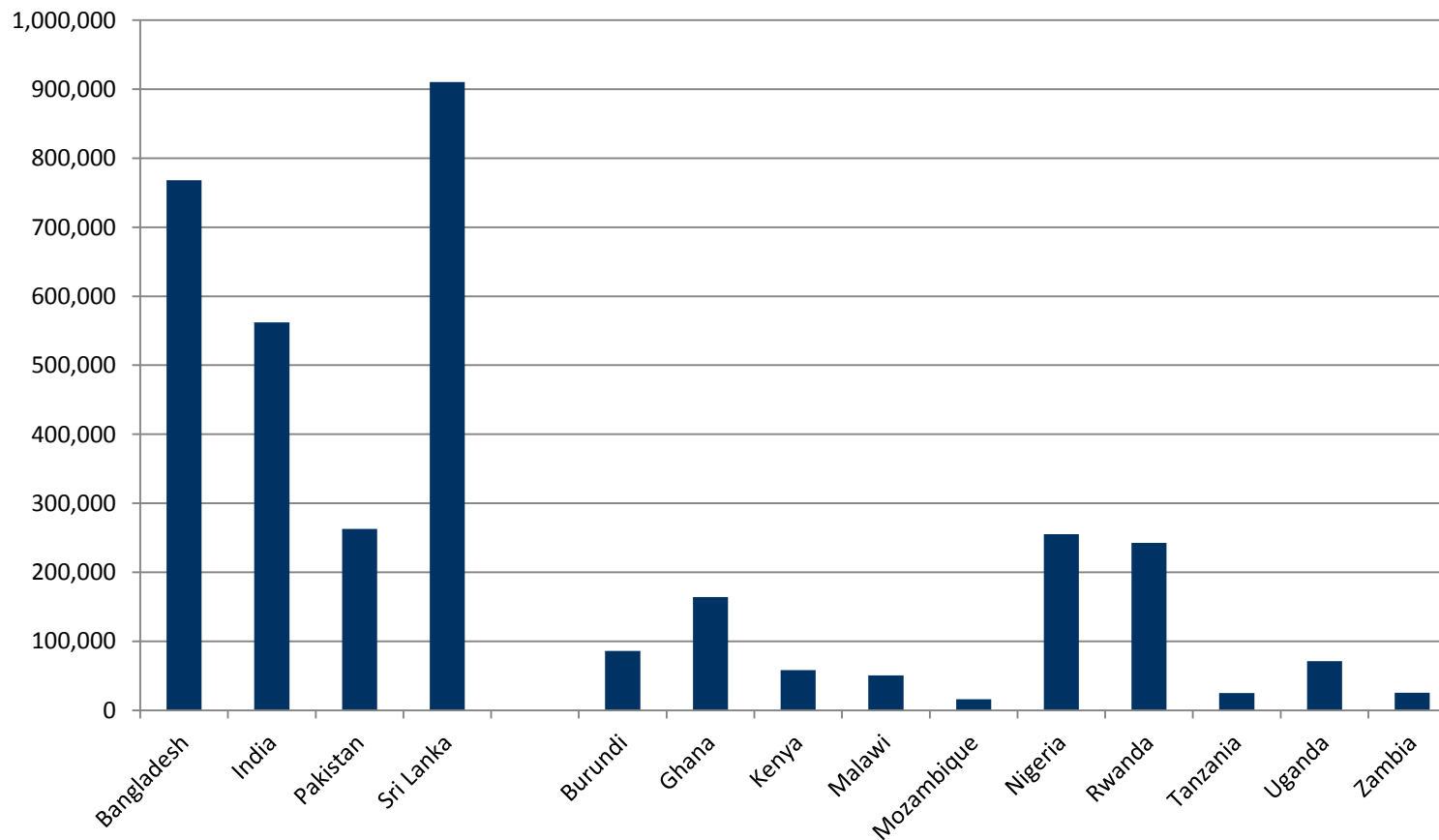
## 2. Density of Demand

- The key factor that determines the efficiency of rural transport services is the **Density of Demand** for transport
- Density of demand is determined by:
  - Population density
  - Income per head
  - Nature and distribution, of economic activities particularly agriculture, but also rural based activities such as mining, tourism etc.

- Population
  - Low population density and low incomes imply low demand
    - Sri Lanka 311 persons/km<sup>2</sup>
    - Pakistan 212
    - Mozambique 29
    - Zambia 18
- Farming systems
  - more intensive – more inputs and yields
- Income
  - little cash available

The *viability* of transport services is reduced by the need to service **poor, small and dispersed** rural populations.

## DENSITY OF DEMAND : GDP PER SQ KM IN 2011



## 3. Where Is the Supply?

### Iringa Region, Tanzania (Pop. 1.5 m)

Transport Type	No.	Unit value \$	Total Value \$ M.
Trucks	75	12,000	0.9
Buses (+20 seats)	26	8,000	0.2
Minibuses	45	4,500	0.2
Rural Taxis	32	2,000	0.1
<b>Sub Total Large Motorised</b>	<b>180</b>		<b>1.4</b>
Motorcycles	250	900	0.2
Animal-drawn carts	8,000	200	1.6
Bicycles	65,000	60	3.9
<b>Subtotal: IMTS</b>	<b>73,000</b>		<b>5.7</b>

The figures are for vehicles mainly used for transport within the region on a year round basis. It excludes long distance services . Data is from The Rapid Assessment of Rural Transport Services, by Paul Starkey, 2006

## Where is the Supply?

Region	Country	Pop 000s	No. Large Vehicles	L.V. Value \$M.	IMTs 000's	IMT Value \$M.
Boucle du Mouhoun	Burkina Faso	1,400	80	1.6	220	34.5
Southern	Cameroon	500	840	2.8	21	13.3
Singida	Tanzania	1,091	85	0.8	73	6.3
Iringa	Tanzania	1,500	180	1.4	73	5.7
Luapula	Zambia	800	180	1.8	80	7.0

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## 4. Markets and Storage Facilities

- The functional nature of a rural market is to match buyers and sellers through **concentrating economic activity**
- Dispersed populations = dispersed markets. This affects:
  - Information flows
  - Prices
  - Vehicle choice
  - Service frequency
  - Storage
  - Crop losses

## Vehicle Choice & Storage

- Vehicle choice - The larger the **demand** so more efficient and cost effective vehicles can be justified hence unit costs are reduced
- Storage - A market will be severely limited without storage – goods must be sold, taken back, or left to rot. (There are many rural markets without storage.) With storage goods can be sold over many days and more economical means of transport can be used. Traders can also amalgamate purchases over several days and use more efficient transport for the next phase in the marketing chain.
  - With a store a donkey cart can be justified for transportation to market
  - Without central storage only headloading may be justified

- Periodic markets (weekly/monthly etc)
  - serve a group of villages
  - communities within 30 kms of their nearest market
  - use IMTs and headloading (donkey carts, ox carts, bicycles)
- Motorised vehicle (if exists) use
  - depends on distance, quantity of goods, quality of the roads
  - services 1 day/ week
  - traders travel between markets
- Abundance of markets
  - goods easily amalgamated for transport by motorised services
  - IMTs viable for transport from village to market

- Marketing of agricultural products **dominated** by Agricultural Development Marketing Corporation (ADMARC)
  - state owned
  - buy agricultural produce at rates published at the beginning of the season
  - transport, store and sell produce to rural and urban buyers
  - has no vehicles – contracts out to local transporting companies
- **Since liberalisation in 1990s**
  - new private sector actors came into the market with Government encouragement
  - The issue was complicated by famine and food crises and the need to import maize.
  - ADMARC faced major financial problems and it gradually reduced the number of outlets to a low of 180 in 2002

### Agricultural Marketing in Malawi –post liberalisation

- Despite encouragement a range of factors prevented the private sector from filling the gap left by ADMARC. These included:
  - Poor market information, credit delivery high transport costs, weak infrastructure, limited external finance, limited organised commodity exchange, limited contact enforcement
  - Private traders had very volatile prices in contrast to ADMARC's stable prices.
  - In remote areas private traders were able to act as monopsonists/monopolists in local maize markets and they had little interest in selling maize to rural consumers in the hungry season.
- Because of the private sector's failure ADMARC's role expanded after to 2002 and by 2011 they had 904 outlets and remain an important component of agricultural marketing in Malawi.



- Marketing of agricultural produce historically dominated by the **parastatal marketing boards**
  - organised the collection of agricultural produce
  - paid the farmers a government agreed rate
- Liberalisation 1991+
  - **agricultural marketing companies** formed
  - formed collection points for produce = storage areas
    - farmers bring their produce to these collection points
    - or companies send large trucks to pick up directly from the farm
- Formal rural markets
  - **scarce**, distant, concentrated at district centres
  - e.g. high poverty districts of Eastern and Northern Provinces the average distance to markets is nearly **40 km**.

## Strategy for Demand Management

- **More rural markets**
  - long distances to rural markets make transport services more viable
- **Regular market**
  - increase incentives for farmers to buy IMTs
  - encourage transport operators and traders to visit the markets and can guarantee sufficient demand to warrant the trip
- **Mobile markets**
  - dispersed communities
- **Storage facilities**
  - amalgamation of goods for onward movement
- **Co-operation** with agricultural authorities

## 6. Transport Brokers

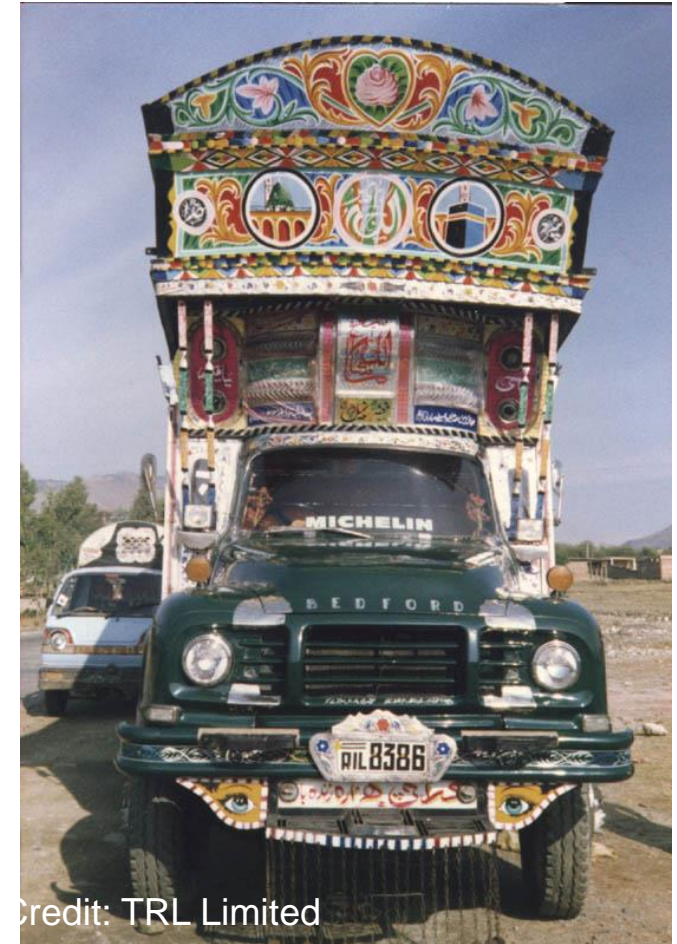
### The problem

- Lack of contact between transport operators and clients
  - lorries/ buses wait for passengers/ loads to come to them & will **not move** until full
  - **rare** for vehicle operators to travel and look for passengers/ loads
  - less populated areas - farmers **walk** to urban centre to find a vehicle prepared to pick up the load
  - **harvest spoils** on the roadside because transporters are unaware of the location of the harvest

Transport brokers can help .....

- Matching goods with vehicles
  - reduce the need for empty running
- An effective brokerage service needs:
  - nation-wide **network** of brokers
  - good **telephone system**
- Traditional role
  - service large vehicles on longer distances
- Could also serve **rural communities**
  - transport of agricultural produce
  - people
  - emergencies

- One of the **most efficient** freight transport systems in the world
- Large **network** of freight forwarding agents
- Charges 4.8% (of tariff) for long distance and 11.3% for less than 50 km
- Service response time to find vehicle:
  - 64% immediate,
  - 89% within one hour,
  - 96% within two hours



Credit: TRL Limited

## Empty Running in China and Pakistan

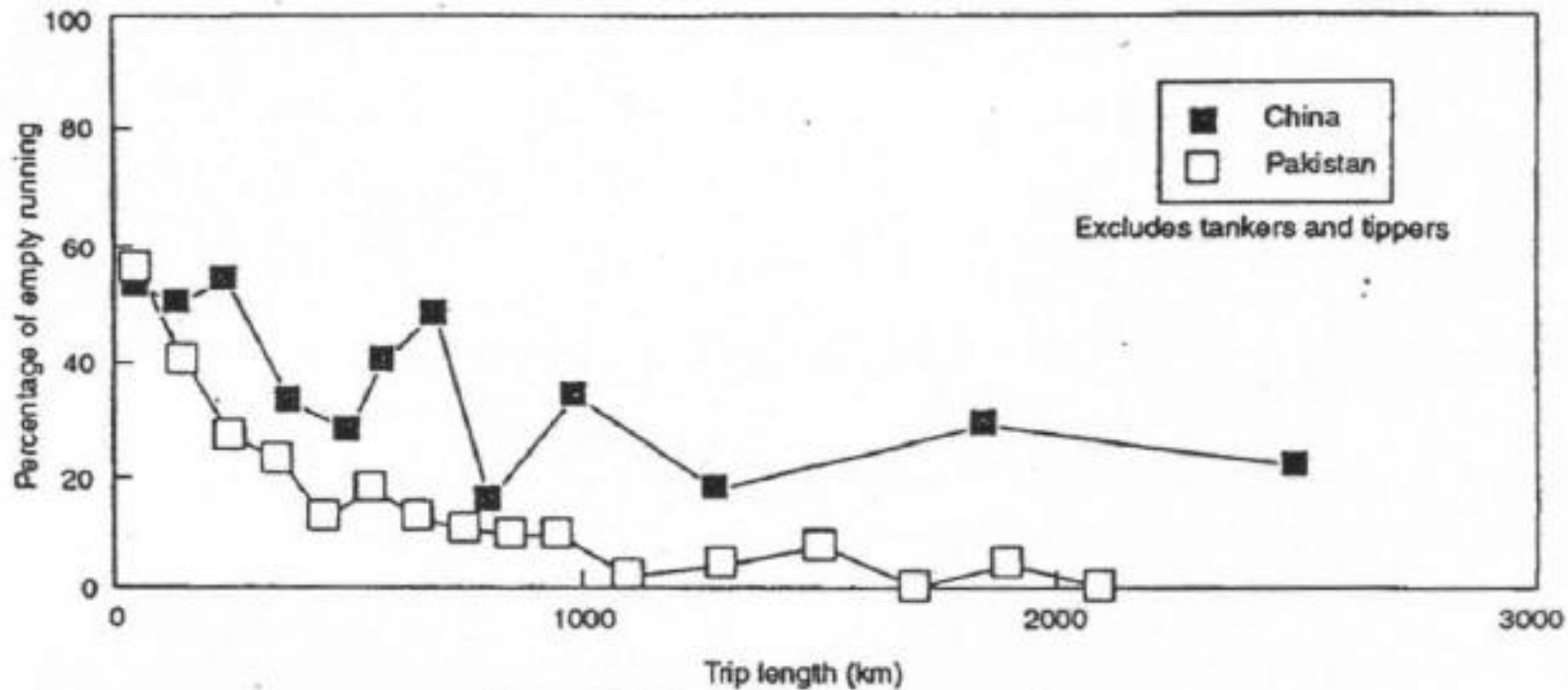


Fig 3. Distribution of empty running

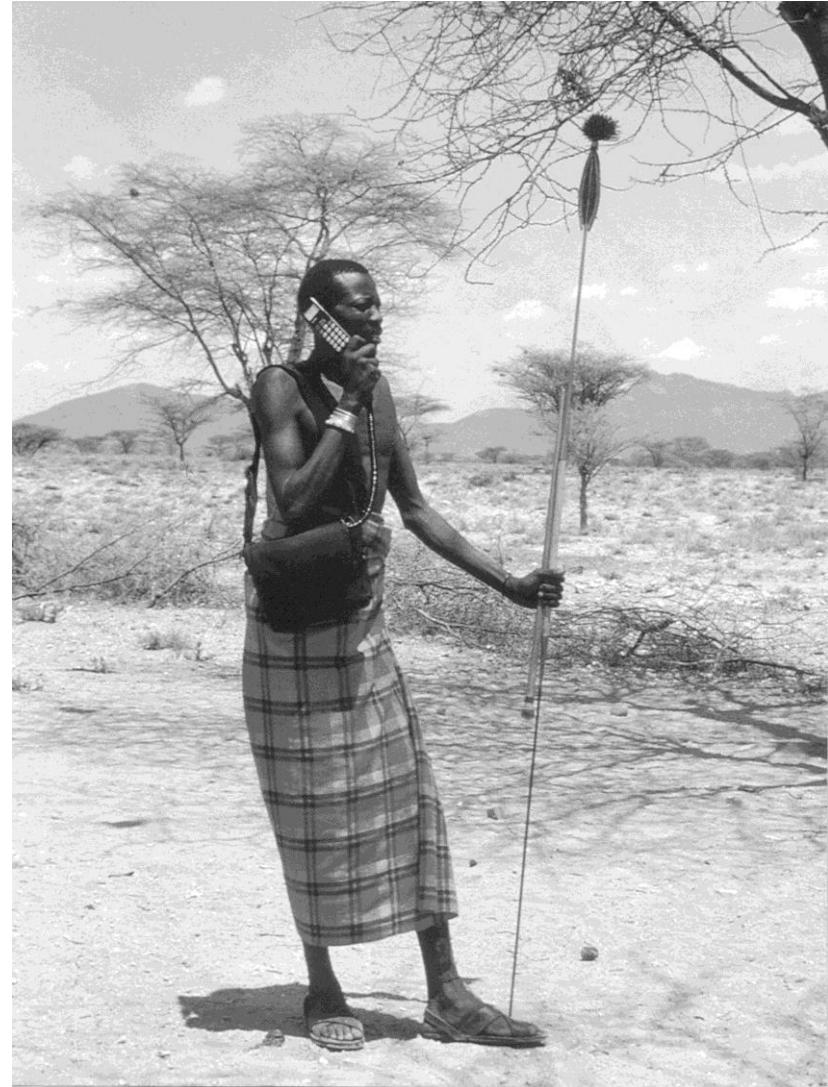
## 5. Network Interconnectivity

- Redundancy
  - more than the minimum number of links and length of road
  - many rural feeder road networks = **dead-end routes** (100km+)
- Problems with ‘dead-end’ roads
  - high **risk** for transport operators: less revenue & possible breakdown costs
  - community becomes **isolated** when road is impassable
- With inter-connectivity of routes
  - potential **demand** for transport services is maximised
  - operators can travel a route ‘**on spec**’ with a reduced risk of an empty return journey
  - **more transport operators** - competition

## 7. Communications

- Until very recently the vast majority of villages in rural Africa had no direct telephone communications with the outside world.
- Without direct information it was not viable for transport operators to travel on the off-chance that they pick up a load.
- Now with increasing mobile phone coverage opportunities exist to dramatically improve the efficiency of the transport and marketing systems.
- In 2000 it was estimated that only 5% of Sub Sahara Africa's population had cell phone coverage, however by 2008 this had increased to 65% (with over 400 m. subscribers), and is growing rapidly.

Mobile phone coverage is  
now very widespread.



## MOTOR CYCLE TAXI USING A MOBILE PHONE



Source: Paul Starkey

## Bicycle and Motorcycle Boda Boda/Okada Operations and use of Mobile Phones



## COMMUNICATIONS

**Better communications** may help the more efficient provision of transport:

- Matching supply and demand of both passengers and freight including development of new services like motorcycle taxi services
- Emergency services
- Substitute for travel – there is some evidence from Tanzania and South Africa (Samuel, 2005) that people can keep in touch with relations by phone and so reduce the obligation to travel. We now send money by phone.
- Access to markets and market information – now widely used around the world for this purpose. As a result can influence where and when to sell crops
- Will access to the internet have further impacts?

**Will mobile phone use reduce transport demand? Will it change the provision of transport and other social services?**

## 8. Complementary Investments

- There are obvious synergies in locating and developing public and private service centres and investments together in market towns to serve the rural population.
- By concentrating demand each individual activity will become more viable and overhead costs of establishing utilities such as electricity, water and roads will be able to be shared more widely. Important economies of scale can be achieved.
- Transport services will also benefit from this concentration.

## Examples of Investments and Facilities Most Suited to Small Market Towns.

- **Health** - hospitals or health centres
- **Education** - schools or colleges
- **Public administration**
- **Agricultural extension** - improved information and improved availability of seed and fertiliser
- **Industrial investments** - agro-industries
- **Small-scale enterprise** - support to local artisans
- **Banking and credit**- improved banking facilities or small scale credit schemes
- **Infrastructure** – roads, water supply, telecoms



Now Read  
Session 1.4  
Notes!