

Rural Transport Training Materials

Module 4:

Rural Mobility

Promoting the use of Intermediate Means of Transport – vehicle choice, potential barriers and criteria for success

Session 4.2

Part 1

Presentation 4.2a



The World Bank



DFID Department for
International
Development



theIDLgroup 

The Training Modules

Module 1. Policies and Strategies

Module 2. Planning, Design, Appraisal and Implementation

Module 3. Management and Financing

This Module

Module 4. Rural Mobility

Module 5. Social and Environmental Issues

Module 4. Rural Mobility

Session 4.1 Rural Mobility: Overview of the Issues

This session

Session 4.2 Promoting the use of intermediate means of transport – vehicle choice, potential barriers and criteria for success

Session 4.3 Agricultural marketing and access to transport services

Session 4.4 Matching demand with supply in rural transport

1. Introduction

Learning Objectives

This session enables participants to:

- ③ Analyse the factors that hinder the adoption of IMTs
- ③ Describe the criteria for the successful adoption of IMTs by a wide range of users
- ③ Make recommendations for how IMT programmes can improve the development and dissemination of technology that serves the transport needs of the poor

Session Overview

- © IMTs in context
- © IMT technology
- © Economic issues
- © Critical mass
- © Programming

2. Putting IMTs in context

⊙ Problems of transport & access can be solved in **various ways**:

- non-transport solutions
 - e.g. water reticulation, improved village infrastructure and services
- combination of human walking/ carrying and large-scale motor transport
- IMTs

⊙ **IMTs are not a universal panacea**

- should only be promoted if there is good reason

Hand cart

Bicycle

Bicycle &
trailer

Elephants

Camel

Tractor

Motor
cycle

Rickshaw

Wheel
barrow

Ox cart

Motor
tricycle

Power
tiller

Pack
donkey

IMT programmes

- © Implemented by private sector manufacturers, retailers, development organisations
 - regional projects, NGOs, women's groups, farmers' associations
- © 'IMT programme'
 - manufacture, promotion and use of IMTs

The adoption of IMTs



Group Discussion

There has been mixed success in the adoption of IMTs throughout the world.

What are the possible reasons for this?

Promote IMTs if

Technical

Social

Economic

..... appropriateness has been demonstrated

3. IMT Technology

- ◎ Hand carts and wheelbarrows
 - short distance transport in towns and markets
- ◎ Bicycles with simple carriers
 - personal transport, load carrying
- ◎ Ox & donkey carts, using automotive technologies
 - sub-Saharan Africa in semi-arid areas
- ◎ Pack donkeys
 - dry zones and hilly areas

⊙ Motorised IMTs

- common in Asia

⊙ Motorcycles for personal transport

- small proportion of the population
- ... except Burkina Faso & neighbouring countries

⊙ Power tillers

- not yet widely used for rice production or transport

⊙ Adoption of other motorised IMTs (motor tricycles, autorickshaws)

- in peri-urban areas with economic demand and supporting infrastructure

IMTs complementary

- ◎ **Urban** areas and around **markets** favour IMT production, adaptation and use
- ◎ IMTs complement **motorised** transport
- ◎ Offer technological **choices** – not just one type of IMT
 - greater **understanding** of the issues
 - more **appropriate** technologies
 - higher **adoption** rate

A gender divide

- © Carts and bicycles – mainly owned and used by **men**
- © Despite the wide range of technologies available ... they are **rarely used** by rural women to transport domestic water & produce

Why is this?



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Gender and IMTs

- © **Women and men** require different types of IMTs
 - physical reasons
 - to fulfil their different gender roles

- © Promote **diversity** of technologies

4. Economic issues

Cost and affordability

Vehicle operating costs

Supply, distribution and maintenance systems

Credit and subsidies

Cost and affordability

- © The **potential to gain income** is a more crucial issue than actual cost
 - provided credit is available
- © **Low uptake** of socially-beneficial low-cost IMTs by disadvantaged people
 - including women
- © Many people (men) purchased **bicycles**
 - even if price was high relative to average incomes
 - increased personal mobility - high social and economic value

Example from Sri Lanka

- ⊙ Extended bicycle with a carrier increased safe loads up to **100 kg**
 - cost only 25% more than a normal bicycle

⊙ Yet!

- little uptake despite expectations
- users did not consider the possible benefits justified the costs

Efforts are required to

© Keep the costs of IMTs low

- subsidise IMTs
- types and rates of taxes and duties
- support to develop low cost manufacture, marketing and distribution systems
 - e.g. bulk purchases of materials/components for resale to small workshops, possibly through decentralised depots

© Stimulate **income-generating** activities for IMT users

Vehicle operating costs VOC

◎ Very sensitive to levels of **utilisation**

- especially motorised vehicles where capital costs are high

Use  costs 

◎ Examples

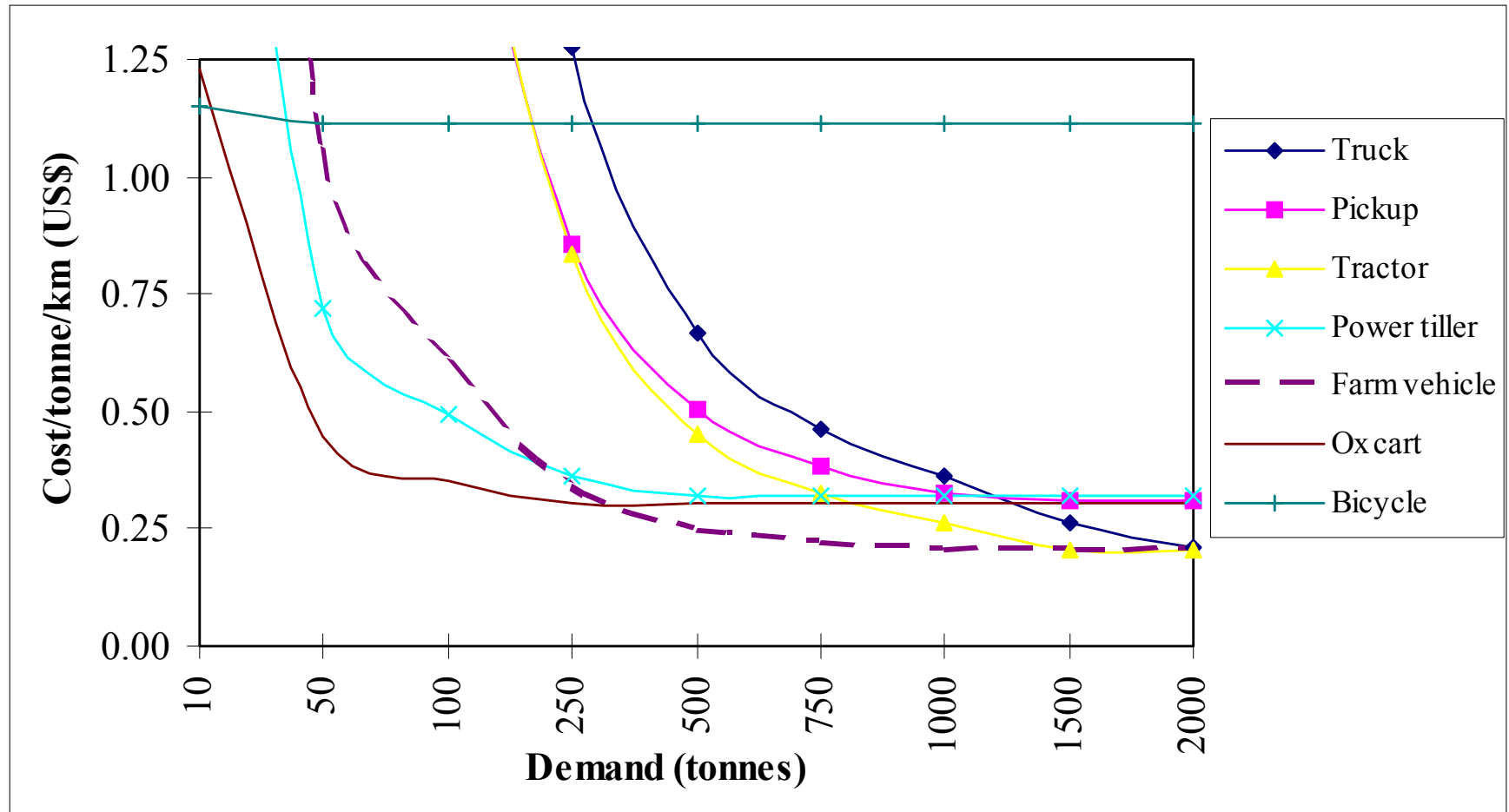
- tractor operating costs/tonne km =
 - 8 x higher for a 50 tonne than for 750 tonne over 50 km
- ox cart =
 - 50% more expensive for a 50 tonne than 250 tonne over 10 km

Vehicle choice is affected by demand

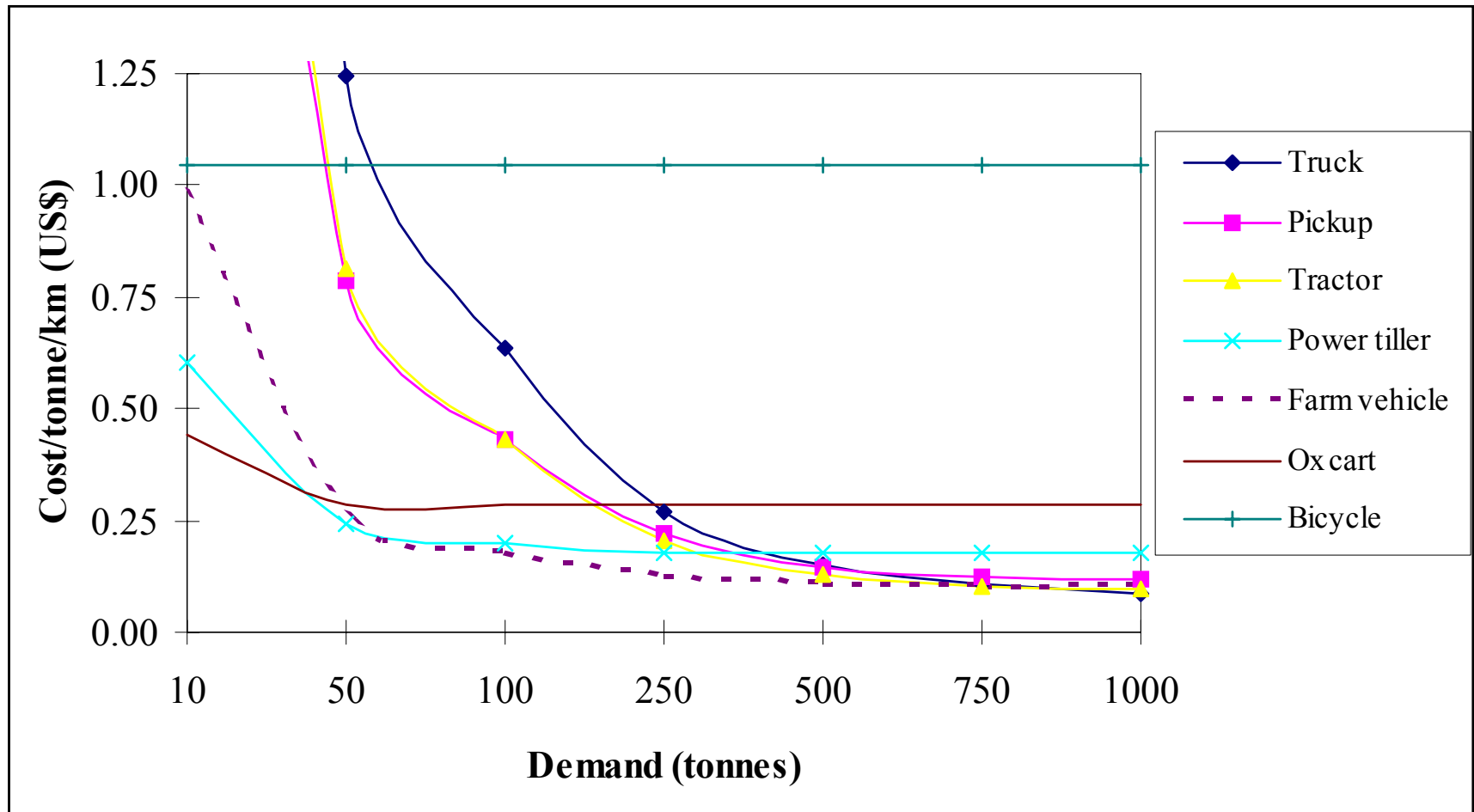
- ◎ Many vehicles suited to rural areas are **multi-purpose**
 - goods
 - passenger transport
 - agricultural preparation
- ◎ To determine total demand in tonnes - **assumptions**
 - one passenger = 70 kg
 - 50% utilisation
 - One acre ploughed in equivalent tonnes =

Hours to plough one acre x Av. speed of vehicle x load capacity
Av. trip distance

Vehicle operating costs assuming a 10 km distance and varying levels of demand



Vehicle operating costs assuming a 50 km distance and varying levels of demand



Operating costs for various IMTs

⊙ Rapid increase in **bicycle ownership** across Africa:

- **lowest operating costs** only at *short distances* where demand is low

and yet

- transport of **small loads over short distances** on informal tracks is the principal characteristic of rural transport
- **most affordable** transport for most rural households

⊙ **Load capacity** of a bicycle can be increased by

- attaching a trailer or used as a rickshaw
- upgrade to motorcycle technology

But!

- very rarely seen in SSA, though widespread in parts of Asia

Ox cart

⊙ Lowest cost option

- over 10 km until demand reaches 250 tonnes/year
- over 50 km up to 50 tonnes/year

⊙ Advantages

- also used for agricultural preparation - high utilisation levels
- can use most types of infrastructure
- maintenance costs are low, cart is simple to repair

⊙ Disadvantages

- limited range
- find food for the animal at the final destination

Farm vehicle

◎ Cost effective alternative to the pickup:

- **costs** are $\frac{1}{3}$ to $\frac{1}{2}$ **lower**
- similar load capacity
- very simple to repair and maintain
- suitable for local manufacture
- operating costs are lower over a wide range of distances and loads

Tractor

⊙ Maintain **high utilisation** throughout the year

- agricultural preparation, transport tasks, haulage for road construction and maintenance works
- quality of infrastructure is not a constraint
- technology is relatively simple
- load capacity is high

⊙ **A study in Malawi**

- a tractor and two trailers operated more cheaply than a conventional truck up to 40 km
- poor quality roads - speed is not an issue
- two trailers - the second trailer can be loaded as the first is being transported

Power tiller

- ⊙ Often disregarded in SSA because of its poor performance with ploughing in hard soils

Advantages

- ⊙ **Performs** well over both 10 and 50 km
- ⊙ High levels of **utilisation** in irrigated areas/areas of high rainfall
- ⊙ **Multi-purpose**
 - ploughing, transport, pumping water, threshing and electricity generation
- ⊙ **Low cost** at lower levels of demand
 - cheaper than the tractor - lower capital costs
 - ideal step between draught animal power and conventional tractors

Thailand

◎ **Local production** on power tillers and farm vehicles

- 80 factories
- vehicle chassis were manufactured in the factory
- rest of the vehicles were made up of second-hand conventional vehicle parts, new conventional vehicle parts and parts that were assembled in the factory

Result?

◎ Vehicles that were

- cheap to buy and easy to maintain
- easy to find and replace spare parts

Supply, distribution and maintenance systems

Low adoption of IMTs
in sub-Saharan Africa – linked to
availability and supply

- ⊙ 'Chicken and egg' situation
 - a vicious circle of low demand and low supply
- ⊙ Improved supply CAN stimulate demand and more rapid adoption
- ⊙ Identify limiting factors

Limiting factors

- ◎ Components and raw materials (local or imported)
- ◎ Manufacturing/assembling facilities and skills
- ◎ IMT designs
- ◎ Capital availability
- ◎ Marketing systems
- ◎ Low purchasing power of the users
 - suppliers will not invest in manufacturing or stocks if there is no *economic market* - as opposed to a *felt need*

Limiting factors can be overcome by:

③ Training

- to make the IMTs
- marketing
- management of small businesses
- establishment of stocks of raw materials

③ Credit for suppliers

③ Income-generating schemes

- to increase purchasing power of users
 - e.g. labour-intensive road construction

③ Subsidies

- where population density and uptake are low

A project from Zambia

Katopola Agricultural Engineering Centre (KAEC)

- © Funded by SIDA for 9 years
- © Courses on making IMTs and farm implements, blacksmithing, and rural technology

Results after 6 years

- © No one made wooden carts or wheelbarrows
- © Most carpenters worked on furniture production and house carpentry
- © KAEC staff were unaware of any people using the technologies with wooden wheels that had been promoted for several years
- © Some ox carts with pneumatic tyres had been bought in Malawi.

What went wrong?

Is training enough?



Group Activity

- A. *Explain the possible reasons why artisans did not make IMTs.*
- B. *Why did rural people not adopt the IMTs?*
- C. *What recommendations would you make to address the issues identified?*

Lessons from the Zambia project

- ⊙ **No obvious impact** on IMT use
- ⊙ **Predetermined** the IMTs to be promoted
 - did not offer design choices
- ⊙ The project addressed **one perceived element** (shortage of trained artisans)

but

- did not assist in production and marketing
- (though some general promotion of the technologies through the local extension service)
- ⊙ **Wooden-wheeled technologies were not popular**
- ⊙ **No self-critical** or participatory evaluation of progress
 - may have allowed the project to react to the situation and change its direction

Credit and subsidies

⊙ Allows

- users to purchase technologies
- workshops to fund the cost of manufacturing
- traders/ retailers to stock IMTs and spare parts

But

⊙ If credit is limited - may distort choice of IMT

- favour the 'safe' choices e.g. bicycles

⊙ Credit-providing programmes need to

- ensure women benefit
 - by providing accessible information and application systems, appropriate credit & repayment conditions

© Subsidies

- introduce new products

But!

- distort markets
- ensure subsidies do not create unfair competition
- avoid subsidising imported or urban manufactured technologies when comparable indigenous technologies exist

5. Critical mass

© Critical mass of users required to

- ensure a technology is viable and quickly adopted
- make potential adopters comfortable with the idea of using the technology
- justify support services (manufacture, sales, repairs)

Strategies to achieve a 'critical mass'

© **Promotion**

- demonstrations, field days, training, media coverage, advertising

© **Credit** to manufacturers, retailers and/or purchasers

- e.g. Bank of Agriculture and Co-operatives, Thailand

© **Direct or indirect subsidies**

- 'sale or return', in-kind support and training

© **Private sector**

- pilot marketing

Problems with achieving critical mass

- ⊙ Lack of **self-criticism** of IMT programmes
- ⊙ Great **optimism**
 - clear successes (donkey carts in West Africa)
 - technologies of unproven status (cycle trailers in Sri Lanka)
 - IMTs apparently rejected ('Flintstone' carts, wheeled tool-carriers, wooden wheelbarrows, cycle trailers in India)
- ⊙ 'Failure' **blamed** on a lack of effective marketing and promotion
 - not on the technology
- ⊙ If all these technologies had opted for achieving ***critical mass***
 - quicker adoption of some technologies
 - faster realisation that other technologies were not appropriate

6. Programming

Focus

Innovative
technologies

Gender

Monitoring &
evaluation

Networking

Focus

🌀 **Market research**

- to understand the needs, wants, preferences, priorities and purchasing power of the diverse users in their target groups

🌀 **Priorities for specific target groups**

- e.g., disadvantaged rural women

🌀 **Distinguish between access and ownership**

🌀 **Promotional activities carefully targeted**

- area of intervention and beneficiaries

Innovative technologies

◎ Work in areas where **adoption is most likely** - **a pragmatic early step**

- establish the technology in favourable conditions
- then try it where conditions less favourable

◎ **Favourable conditions** for IMT

- centres of trade & population - transport demand and income-generating prospects
- easier to then introduce IMT to outlying villages
- ... and then to more remote areas
- *men* are more likely to be the first adopters

Gender

Gender inequality

- transport burden
- interventions designed to alleviate that burden

IMT promotion programmes must

- ensure **gender-disaggregated data**
- involve **women's perspectives** in decision making processes, transport policies, IMT initiatives at all levels
- work closely with local **organisations that target women**
- provide **innovative** information provision systems and credit arrangements



Credit: TRL Limited

Produce designs
more **appropriate** to
the needs of
women

- address **gender imbalances** in IMT adoption and use
 - more than being ‘gender neutral’
- create a ‘**critical mass**’ of **women users** that will justify the manufacture and sale of suitable IMT designs

Monitoring & evaluation

⊙ Problems

- 'hobbyism'
- lack of objectivity
- irrational optimism in the face of disappointing adoption patterns

⊙ To overcome problems

- **mechanisms** that include potential users/ other interested parties in programme planning, monitoring, evaluation procedures
- **methods** that enable programme staff to understand viewpoint of users
- stakeholders allowed to **talk honestly** about needs, concerns, willingness to buy/use IMTs
- **'attitude' information** needs to be regularly cross-checked with objective information from *actual* sales & use patterns
 - discrepancies investigated at an early stage.

© Programmes & individuals **feared criticism**

- so selected sympathetic evaluators
 - restricts the potential for learning and programme changes

© **Solutions**

- self-evaluation with independent external person
- person from an IMT project in another country assists the evaluation
 - learning process benefits two programmes simultaneously
- document and disseminate lessons

Networking

- ③ **Strong links:** IFRTD, ITDG, IT Transport, ILO, World Bank
 - knowledge sharing and synergetic programme development
 - but dominated by Anglophone experience
 - disproportionate interest in certain IMTs - wheeled toolcarriers, 'appropriate technology' carts, cycle trailers, wheel making
- ③ **Indigenous experts** implemented most national IMT programmes in Africa
 - but international programmes were slow to build on African expertise
- ③ **National networks** formed
 - transport forums, RTTP steering committees
 - information exchange and policy development
 - emphasis on inter-African networking and honest exchanges concerning the success and failure of IMT initiatives

IMTs - what matters most?



Group Activity

*Numerous factors affect the adoption of IMTs.
Rank these factors in order of importance.
Explain the reasons for your rankings.*