Incorporating risk analysis into telecom investment projects

Dr. Dimitris VAROUTAS
Lecturer
University of Athens
Dept of Informatics & Telecommunications

D.Varoutas@di.uoa.gr
Agenda

- UoA in modeling telecom investments
- Risk analysis in telecom investments
  - The problem
  - The methodologies
  - The tools
- Some examples
  - Broadband access networks
  - 3G-WLAN business cases
- Conclusions & Discussion
UoA Technoeconomic activities

- Conduct techno-economic evaluations for telecommunication investment projects like:
  - Next generation mobile networks and services
  - Fibre access evolution
  - Broadcast convergence
- Formulate pertinent recommendations to policymakers, network operators and service providers regarding communications investment strategies.
- Demand modelling
- Study the risk and externalities effects in communications
- Promotion and dissemination of the results
Consolidation of results and guidelines for deployment scenarios

- Standards, Research projects and field trials
- Information gathering / exchange
- Common framework
- Network Studies
- Common conclusions
- Guidelines
- Other Sources
Steps in technoeconomic modelling

- Marketing Strategy
- Services
- Marker Share
- Network Technology
- Components Cost
- Prices
- Revenues
Risk and uncertainty are the only certain factors.
Risk in marketing strategy

- Lucrative segments of markets/areas/services
- Suitable models for the evaluation of the segments
  - Diffusion or choice based models
  - Market studies or expert reports
  - Cross technology models
  - Cross country models

E.g. Can we evaluate and forecast the number of innovators and imitators?
Risk in evaluating services

- Which are the profitable applications and services
  - Online or offline services
  - Determinants of telecom service
    - Rate
    - Distance
    - Mobility

Hedonic Price Index Evolution

\[ y = 0.0396x + 0.7633 \]
Risk in choosing the network technology

- Can we take lessons for existing technologies
- Need for risk analysis in new technologies
  - xDSL
  - WLAN
Risk in evaluating pricing concepts

- Appropriate pricing models
- Evaluation of price models in real or simulated situations
- Unified price indices
  - across technologies
  - across services
  - across countries

- Need for new approaches in econometric models
  - Price elasticity
  - User behavior
  - Externalities
  - Cross technology effects
Risk analysis outputs

- Selection of technologies based on actual costs
- Concentration
- Non profitable cases
- Calculation of “costs per user” and “costs per subscriber”
- Optimum solution
- Rest value calculations

- Critical components
- Renegotiation of components’ purchase costs
- Profitable services
- Detailed analysis of services costs
- Rules and guidelines for viable cases
- Market opportunities
An example

Fixed BB telecommunication investments
The Fixed BB scenarios

Central Exchange (CE)

Local Exchange (LE)

Main cable

Cabinet(Cab)

Distribution cable

Subscriber location

NT

ATM (P-t-MP) FTTC

ATM (P-t-MP) FTTH/O

Ethernet (P-t-P) FTTH/O

Ethernet (P-t-P) FTTC

ATM STM4

GbE

100BaseFx

PON

Customers < 750m

OLT

ONU

OLT

ONU

ONT

ONT

Customers < 750m
# Financial results

## Net Present Value (NPV)

<table>
<thead>
<tr>
<th>Area</th>
<th>FTTC ATM</th>
<th>FTTC Ethernet</th>
<th>FTTH/O ATM</th>
<th>FTTH/O Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Urban</td>
<td>29,45 mill €</td>
<td>29,40 mill €</td>
<td>18,31 mill €</td>
<td>7,47 mill €</td>
</tr>
<tr>
<td>Urban</td>
<td>18,13 mill €</td>
<td>18,06 mill €</td>
<td>-9,11 mill €</td>
<td>-22,30 mill €</td>
</tr>
<tr>
<td>Suburban</td>
<td>-34,42 mill €</td>
<td>-38,21 mill €</td>
<td>-279,49 mill €</td>
<td>-295,32 mill €</td>
</tr>
</tbody>
</table>

## Internal Rate of Return (IRR)

<table>
<thead>
<tr>
<th>Area</th>
<th>FTTC ATM</th>
<th>FTTC Ethernet</th>
<th>FTTH/O ATM</th>
<th>FTTH/O Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Urban</td>
<td>66,8 %</td>
<td>56,2 %</td>
<td>46,1 %</td>
<td>21,5 %</td>
</tr>
<tr>
<td>Urban</td>
<td>30,8 %</td>
<td>29,7 %</td>
<td>no return</td>
<td>no return</td>
</tr>
<tr>
<td>Suburban</td>
<td>no return</td>
<td>no return</td>
<td>no return</td>
<td>no return</td>
</tr>
</tbody>
</table>

## Pay back Period [years]

<table>
<thead>
<tr>
<th>Area</th>
<th>FTTC ATM</th>
<th>FTTC Ethernet</th>
<th>FTTH/O ATM</th>
<th>FTTH/O Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dense Urban</td>
<td>3,8</td>
<td>4,3</td>
<td>5,5</td>
<td>7,5</td>
</tr>
<tr>
<td>Urban</td>
<td>5,3</td>
<td>5,7</td>
<td>no return</td>
<td>no return</td>
</tr>
<tr>
<td>Suburban</td>
<td>no return</td>
<td>no return</td>
<td>no return</td>
<td>no return</td>
</tr>
</tbody>
</table>
CAPEX figures

Zoom in:
Financial risk in fixed BB investments

Probability of NPV < 0 [%]

Scenarios

FTTC– ATM, Dense Urban
FTTC EoVDSL, Dense Urban
FTTC– ATM, Urban
FTTC EoVDSL, Urban
FTTH/O EoVDSL, Dense Urban
FTTH/O EoVDSL, Urban
An example

3G and WLAN investments
The idea for 3+/4G networks

- Home
- Airport
- Hotel & Conference
- Public space
- Office
- Train station
- Wide area
  - Cellular Datacom
- Local Area
  - WLAN Datacom
Transmission rate - Mobility

Mobility/Deployment Area
- High Speed /Nationwide
- Moderate Speed /Citywide
- Walking /Premises
- Static /Indoor

Target Area of Service
Beyond IMT-2000

Systems Beyond IMT-2000 (2007-2010?)

Transmission Bit Rate (Mbit/s)

0.1  1  10

2G IMT-2000 (2001)


Millimeter-wave LAN
WLAN Roaming

1) SIM authentication signaling

2) Authentication to HLR using MAP

3) Billing info stored to GPRS/GSM billing system

4) Billing data exchange as in GSM

WLAN access points

Access controller

Operator A IP network

Auth. server

Cellular operator A GPRS core

Charging gateway

Billing system

HLR A

SS7

HLR B

Charging gateway

Billing system

WLAN access points

Access controller

Operator B IP network

Auth. server

Cellular operator B GPRS core

Charging gateway

Billing system

2.4 GHz 11 Mb/s

Roaming user, operator A SIM
ARPU Estimations

TONIC yearly ARPU estimations

- BB Internet
- Internet
- SMS
- BB streaming
- video streaming
- audio streaming
- videoconf
- video calls & gaming CS & PS
- voice CS+PS
Sensitivity analysis

<table>
<thead>
<tr>
<th></th>
<th>Low Value</th>
<th>High Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td>183</td>
<td>1.714</td>
</tr>
<tr>
<td>Total Penetration</td>
<td>253</td>
<td>1.643</td>
</tr>
<tr>
<td>End Market Share</td>
<td>453</td>
<td>1.444</td>
</tr>
<tr>
<td>Start Market Share</td>
<td>748</td>
<td>1.147</td>
</tr>
<tr>
<td>OAM</td>
<td>1.037</td>
<td>860</td>
</tr>
<tr>
<td>UMTS BTS</td>
<td>1.033</td>
<td>864</td>
</tr>
<tr>
<td>Marketing Multiplier</td>
<td>971</td>
<td>926</td>
</tr>
<tr>
<td>Terminal Subsidy</td>
<td>964</td>
<td>932</td>
</tr>
<tr>
<td>WLAN Building Begin</td>
<td>948</td>
<td>961</td>
</tr>
<tr>
<td>Churn</td>
<td>953</td>
<td>943</td>
</tr>
</tbody>
</table>
Risk factors

- Risk in marketing parameters
  - Market size
  - Market share
  - Service determinants

- Risk and uncertainty in network parameters
  - Technology costs
  - Technology changes
  - Cost components evolution
  - Area characteristics
Some ideas on telecommunications investments in developing countries

- Demand forecasting
  - Effects of cross-country diffusion processes
  - Competition level
- Technology selection
- Critical mass effects
- Communications or telecommunications
Conclusion

- Risk analysis is a critical issue for telecom investment projects
- Need for specific problem statement, methodology and tools development
- Research is needed as well as coordination among key players
Time for Questions & Answers

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