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NETWORK EXTERNALITIES AND NETWORK GROWTH IN DEVELOPING COUNTRIES

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Introduction

1. Liberalization of the telecommunication sector 1990-1996
2. Exponential development of telecommunication networks (mobile networks)
3. Important technological developments (new, higher-performance equipment)
4. Innovative services (Internet, mobile money, SMS, MMS, etc.)

Introduction

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5. Take-up of services by populations
 6. Rapid development of the whole sector
 7. Possible explanation for this rapid development in telecommunications

Concept of externality

- Externality or external effect: effect or impact of the action of an economic player on another (positive or negative)
- Consequence not taken into account in setting the price of the good or service: market dysfunction
- Need for intervention by public authorities to address the dysfunction: compensation for disadvantages suffered

Concept of externality

- Network externalities – exist in network industries: e.g. telecoms, IT
- In the case of telecom networks: benefit derived from an economic player's decision to belong to a network
- Decision yields positive externalities for network users – a benefit which is overlooked

Concept of network externalities

- Consider state intervention to take account of network externalities
- Account for the value of network externalities in setting the price of services
- Need to determine the value of network externalities

Network externalities and network development

- External effects resulting from the existence of a “club” – the more people there are in the network, the greater the network externalities and the more attractive, innovative and high-performing the network becomes
- More demanding customers, more efficient, high-performing operators
- Objective: satisfy all customers (services provided, in quantity and quality)

Network externalities and network development

- Network externalities are a source of telecommunication development worldwide
- Exploit these external effects intelligently
=> balanced development of telecom networks
- Subscriber growth => network expansion
=> financing for investments

Network extension and introduction of a premium

- Exploit network externalities financially for faster network development
- Rapid growth = reducing the digital divide
- Need to determine the value of network externalities
- Objectives: implement Recommendation ITU-T D.156, reduce the digital divide and achieve access for everyone (PP, WTSA resolutions), increase operator revenues

Measuring the network externality premium: Methodology 1

- Develop an economic model and use econometric regression
- Demonstrate the existence of network effects using a vector autoregression (VAR) model
- Variables used: incoming international traffic on the network, network investment and number of subscribers
- Tests: stationarity and causality

Measuring the network externality premium: Results 1

- Positive impact of investment growth on the volume of incoming traffic on the network (with two-month time lag)
- Negative impact of traffic growth on investment initially, becoming positive as from 14th month
- Creates a unit shock on traffic – 11-month adjustment period; and a shock on investment – shorter adjustment period (6 months)

Measuring the network externality premium: Methodology 2 (premium)

- Stage 1: Construct the SOUTH/OECD investment ratio and determine the equality horizon
- Stage 2: Determine the desired growth rate of the ratio and compare planned vs observed ratio
- Stage 4: Determine the additional volume of investment needed to achieve the target within the desired time-frame
- Stage 5: Determine the tariff supplement required to provide the additional investment identified (price premium)

Measuring the network externality premium (results)

- Growth rates are calculated for time-frames of 5-15 years. Growth rates for these time-frames are shown in Table 2

Table 2: Growth rate in relation to time-frame

Time-frame	5	6	7	8	9	10	11	12	13	14	15
Growth rate	1.559	1.188	0.956	0.799	0.685	0.599	0.532	0.479	0.435	0.398	0.367
	0	1	5	1	4	7	8	2	3	7	8

- Estimate the expected additional investment (support) to achieve the desired growth rate

Measuring the network externality premium (results)

- The consolidated calculations point to a tariff increase according to the time-frame. The price premium varies from **16.85%** (at 7 years) and **4.90%** (at 15 years). The actual impact on prices is also presented (see Table 4 below)

Determining the value of the network externality premium (results)

Table 4: Price scenarios according to target time-frame

Time-frame (year)	7	8	9	10	11	12	13	14	15
Rate (%)	16.85	13.66	11.35	9.61	8.25	7.16	6.27	5.53	4.90
Former average price (EUR)	0.1446	0.1446	0.1446	0.1446	0.1446	0.1446	0.1446	0.1446	0.1446
New average price (EUR)	0.1690	0.1644	0.1610	0.1585	0.1565	0.1550	0.1537	0.1526	0.1517

Conclusions and recommendations

- Network externalities exist
- They can be exploited for network development by placing a value on externalities through a premium
- Need to introduce a network externality premium; reduce the digital divide; give more people access to telecom services

Conclusions and recommendations

- With a price increase of around **5%** on the tariff for international traffic, balanced infrastructure development is achieved at **15 years**.
- For a shorter target time-frame (7 years), the price increase is very sharp (16,85%).
- We therefore propose choosing a **5% premium to feed network extension** in our countries.