Session 6: Using Statistics

Telecommunication statistics are used by a variety of different people: policy-makers, regulators, operators, researchers, financial analysts, press. This session reviews different perspectives of what indicators are important and why.

"Benchmarking"
R. Worthington, Pomona College (USA)

"Country policy use"
J. Houghton, BIA, Australia

Wednesday
20 March

INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION DEVELOPMENT BUREAU

INFORMATION SYSTEMS UNIT

Document WTIM96/11-E
18 March, 1996
Original: English

World Telecommunication Indicators Meeting
(Geneva, 19 - 21 March 1996)

SOURCE: POMONA COLLEGE (USA), Richard Worthington

TITLE: A PERFORMANCE ASSESSMENT FRAMEWORK FOR THE GLOBAL TELECOMMUNICATIONS INDUSTRY

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for the Global Telecommunications Industry

Richard Worthington
Pomona College
and
Center for Telecommunications Management
University of Southern California, USA

present to

World Telecommunication Indicator 1996
International Telecommunication Union
Geneva, Switzerland
19, 20, 21 March 1996

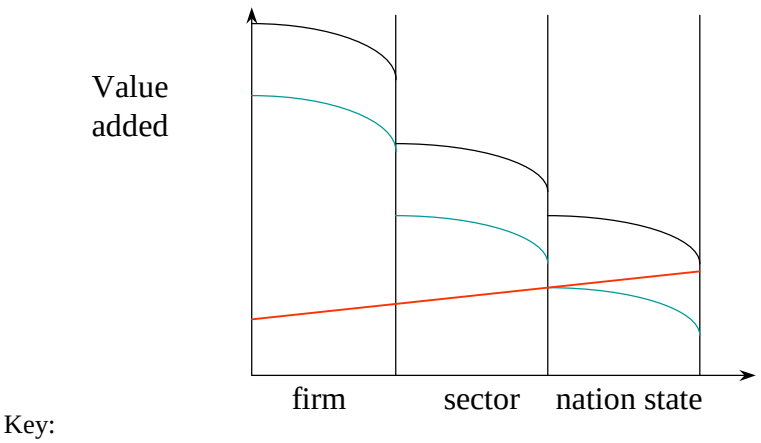
Objective

- " The principal research goal is to create a FRAMEWORK for consideration by the industry, to be used in evaluating the performance capabilities of telecom infrastructures on an absolute and relative basis" - CTM Research Proposal
- Research Philosophy
  - Academic/industry collaboration
  - Multinational research team
- Actions
  - Inventory metrics and indicators
  - Collect and analyze data
  - Design proposed framework elements
  - Recommendations for implementation

Research Design

- Literature review
- Questionnaire design and distribution
- Database construction and analysis
- Interviews
- Report preparation & dissemination

Value-added through framework application in a liberalizing world



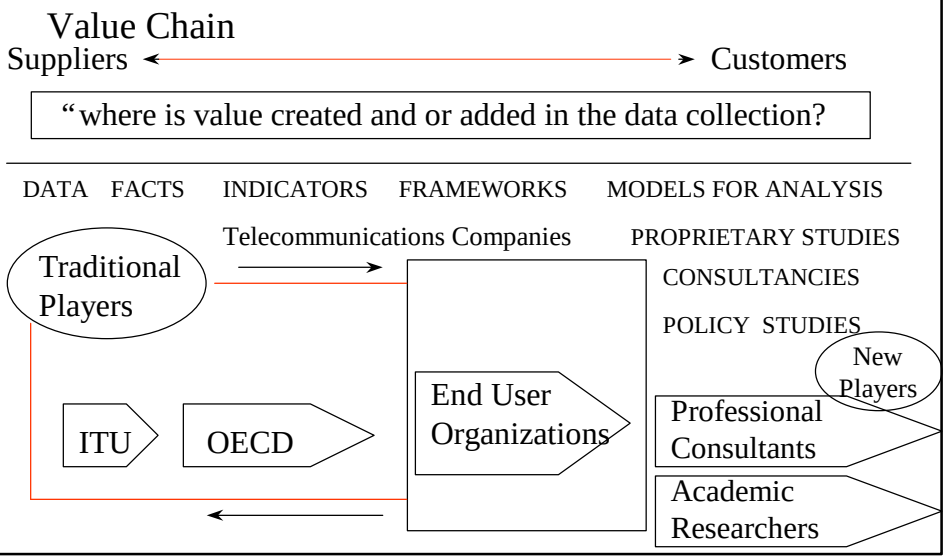
Key:

value-added when standardization of metrics and reporting of data are high

value-added when standardization of metrics and reporting of data are low

value-added in traditional data collection under monopoly regime

Changing Players in Telecom Performance Research



Performance Assessment Framework

- Customer Satisfaction
- Service Quality and Network Reliability
- Speed and Responsiveness to Markets
- Technology and Network Modernization
- Fulfillment of Franchise Requirement
- Global Access and Interoperability
- Price and Usage Structure
- Productivity of Resources and Assets

Attribute - Customer Satisfaction

- Customer trouble reports
- Customer out of service reports
- Hours during which customer service is available (P)
- Customer satisfaction with installation, repair, and business office service, segmented by large business, small business and residential customers (P)
- Percent of subscribers who elect to change service provider (P)

Attribute - Service Quality and Network Reliability

- Call failure rates
- Faults repaired within 24 hours
- Percentage of payphone that are cardphones
- Percentage of unsuccessful local calls
- International call completion rate
- Total minutes of switching downtime per year
- availability of itemized billing
- Company certified under ISO 9000 series? (P)

Attribute - Speed and Responsiveness to Markets

- Average wait time for installation of business and residential service
- Average length of time for rollout of new services
- Percentage of sales from new services

Attribute - Technology and Network Modernization

- Expenditures on R&D in following categories: basic, infrastructure, and applications (P)
- Number of R&F collaborative projects (P)
- Number of patents attained and outstanding
- Mainlines served by digital switches
- Mainlines equipped with digital transmission technology
- Deployment of fiber optic cable as percent of total

Attribute - Fulfillment of Franchise Requirement

- Mainlines per 100 inhabitants (teledensity)
- Percentage mainlines urban, rural, residential and business
- % of schools and libraries with Internet access (P)
- % of exchanges with 100% of lines served by emergency services (P)
- Interferon funding law? (P)
- Citizen Utility Board structure (P)

Attribute - Global Access and Interoperability

- Percent of network with x.400 (and potentially x.500)
- Percent of network with EDIFACT/xI2
- Percent of network with x.25/x.75
- Percent of network with ISDN (basic rate)

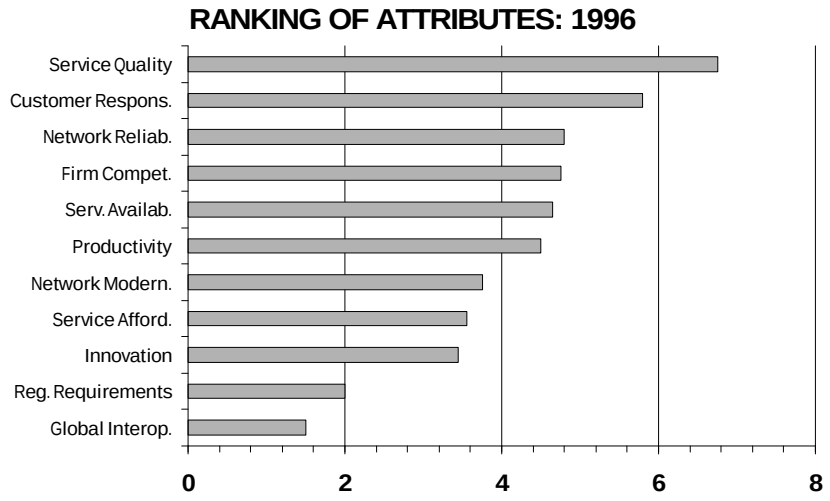
Attribute - Price and Usage Structure

- Tariff basket data
- Traffic data
- Percentage of customers subscribing to calling plants/package offers (P)

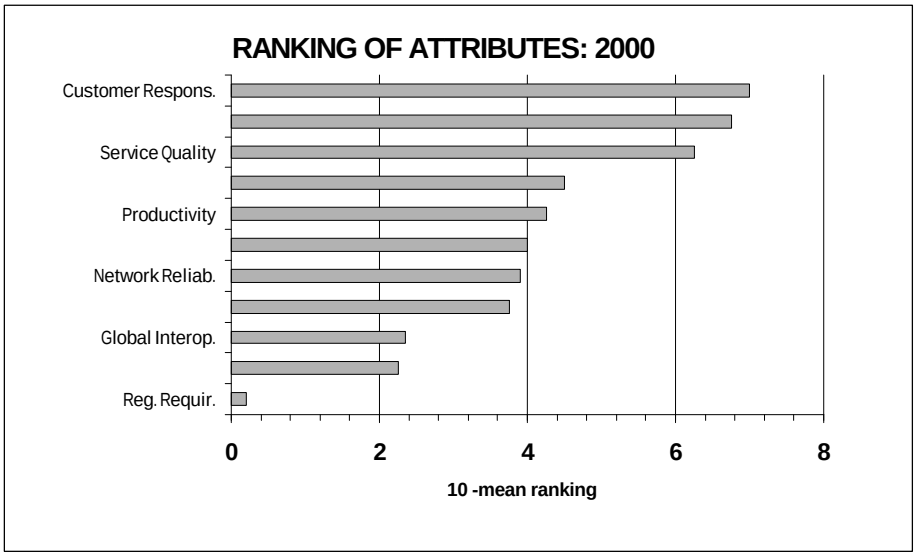
Attribute - Productivity of Resources and Assets

- Capital expenditure on switching and transmission for transport and access elements of the network (P)
- Capital stock (fixed and total assets)
- Employee working conditions (P)
- Employee training (P)

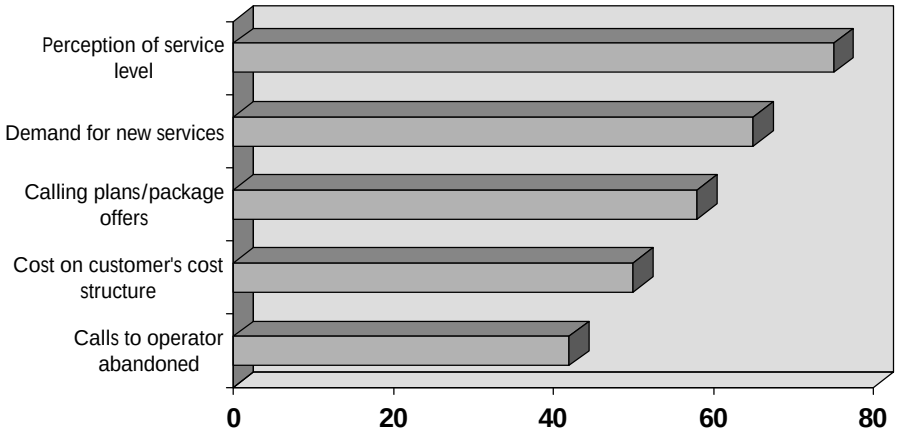
Ranking of Attributes



Ranking of Attributes



Percentage of Telecommunication Services Providers Monitoring Selected Quality Items



Survey of Customer Satisfaction

Residential

ONE THING COMPANY HAS DONE TO IMPRESS ME - RESIDENTIAL		ONE THING COMPANY HAS DONE TO ANNOY ME	
Category	Percentage	Category	Percentage
Service	22	Many Sales Calls	17
Price	13	Poor Performance	13
Features	10	Price	12
Billing	5	Billing	7
Dependability	5	Service	7
Programs	3	Program	6
Technology	2	Advertisements	5
Nothing	38	Nothing	30

Survey of Customer Satisfaction

Business

ONE THING COMPANY HAS DONE TO IMPRESS ME - RESIDENTIAL		ONE THING COMPANY HAS DONE TO ANNOY ME	
Category	Percentage	Category	Percentage
Service	53	Service	45
Price	10	CSRs	12
Billing	10	Billing	10
Dependability	8	Unreliable	6
Features	5	Too many calls	6
Nothing	8	Nothing	6

Source: Unisys, "Act Now! You may already be a loser", *Unisys*, November 1995

Telecom infrastructure and economic growth

	Growth in GDP per capita	
	Model 1	Model 2
10% Growth in Mainlines	2.9%	2.1%
R. square	0.64	0.63

Source: J.J. Hanlev and R.K. Worthington. " The Global Telecommunications Infrastructure: A Framework for Analysis of Industrial Performance and Effectiveness". ITU. Seventh World Telecommunication Forum. Volume 2. Geneva. 1995. pp.. 73-77.

Working Conditions and Service Quality Performance

Industry	*Service Quality*	*Wages*	*Employee Turnover*	*Percent of nonsupervisory employees unionized*
Cable TV - high skill, low wage	Low	US$ 11.35/hr.	High	5%
Telcos - high skill, high wage	High	US$ 15.50/hr.	Low	70%

Adapted from Patrick J. Hunt, "Wage models for the communications industry," *Installation and Maintenance*, October/November 1993, and Communications Workers of America, *Preserving High-Wage Employment in Telecommunications: CWA Public Policy Recommendations for a Competitive Regulatory Framework* , Washington, DC, 1994.

Recommendations and conclusions

- Using the framework is more important than perfecting it
- Seven approached to performance assessment
  - Regulator/Core provider
  - Recognition
  - Certification
  - Industry cooperation
  - Commercialization
  - Scorecards
- Coordination of key players
  - Pool resources
  - reduce overlapping requests
  - Assure consistency in distributes and reporting
  - Consistency in distribution of information
- Continues research and development

INTERNATIONAL TELECOMMUNICATION UNION

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SOURCE: BIE (AUS), John W. Houghton

TITLE: COUNTRY POLICY USE OF TELECOMMUNICATIONS PERFORMANCE INDICATORS IN AUSTRALIA

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Bureau of Industry Economics

Country policy use of Telecommunications Performance Indicators in Australia

John W. Houghton
Principal Economist
Bureau of Industry Economics

Transcript of a presentation to the World Telecommunications Indicators Meeting, at the International Telecommunications Union, Geneva, 19-21 March, 1996

The Bureau of Industry Economics, a centre for research into the manufacturing and services sectors, is formally attached to the Department of Industry, Science and Technology. It has professional independence in conducting and reporting it is research.

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Introduction

I have been invited to discuss my work at the Bureau of Industry Economics benchmarking Australia's infrastructure services, including telecommunications and the broader information infrastructure. So, the aim of this paper is to share some thoughts about the telecommunications performance indicators we use, how and why we use them, what we found in our most recent study (published in March 1995) and some of the issues we confronted. But first, I want to put our work into the broader Australian policy context.

While my knowledge of the details of policy discussion in other countries is limited, I understand that Australia is unusual in the extent to which there is an explicit micro-economic reform agenda. Why?

Well, by the mid 1970s it had become apparent that the protectionist regime Australia ran during the post-war boom years could no longer deliver sustainable economic growth and full employment. High tariff protection was seen as one of the factors contributing to an inward looking, and uncompetitive manufacturing sector, and the extent of financial regulation was believed to be having a negative impact on the effectiveness of monetary policy.

In 1983, the Australian dollar was floated, and most exchange controls abolished. And during the 1980s government introduced a program of phased tariff reductions. These trade policy reforms increased the competitiveness of the traded sector. But, there were many goods and services inputs to that sector provided by enterprises not themselves subject to the same competitive pressures, such as public utilities, some of the professions and areas of agricultural marketing.

By the late 1980s, there was an increasing focus on the need to reduce the cost of basic infrastructure and services inputs to trade exposed industries. In 1987, the government introduced a package of reforms aimed at government business enterprises, and in March 1991, the Prime Minister directed the Bureau of Industry Economics to identify the importance of major infrastructure services in business costs, develop relevant measures for international comparisons and publish performance comparisons on a regular basis. This work was extended in 1994 to include core government services.

To date, we have published international benchmarking studies of electricity supply, rail freight, road freight, ports, coastal shipping, aviation, gas supply and telecommunications. In addition to regular updates of these, current studies include: road construction, water and sewage, the science system, business licensing and the national information infrastructure. So, our interest in telecommunications performance indicators is a part of a broader body of work.

The sample for the BIE's 1995 Telecommunications study included the OECD and 6 of the more developed Asian countries: Hong Kong, the Republic of Korea, Malaysia, Singapore, Thailand and Taiwan. As in all our international

performance comparisons, we focused on price, quality of service and operational efficiency. I want to explore each of these in turn.

Prices

We sought to assess the extent to which business users in Australia are advantaged or disadvantaged by the prices they pay for telecommunication services. But, of course, price comparisons are not straight forward. Communications prices are multifaceted. Charges are made for installation, rental, subscription and usage. And there are a number of ways to compare prices.

Simple rate comparisons compare each of these charges individually. They have the advantage of simplicity and of wider international coverage, but they don't reflect the total service charge picture very well. Using a basket approach combines all the charge elements into a representative user basket, and gives a better view of the overall picture. But the coverage of internationally comparable data for baskets is limited to the OECD. So, we undertook both simple rate and basket comparisons, in an attempt to get as wide an international coverage as possible, and as a double check on the results.

Our simple rate comparisons included: business user fixed charges; the price of a 3 minute, long distance call at peak rate up to 100 kilometres; the price of a 3 minute peak rate international call; mobile fixed charges; and the price of a 1 minute mobile call to a distance of less than 110 kilometres.

So, in terms of simple rate comparisons, we found that Australia performed well on cellular mobile charges, but rather less well on business fixed charges, international and national trunk charges. We found that the Asian countries in the sample, excluding Japan, had among the lowest business fixed charges, but higher usage charges. Which suggests that they may be at an earlier phase, or simply experiencing less rate rebalancing.

We also used OECD tariff baskets, including: the national business, international, PSDN, mobile, leased line and composite business baskets. We found that Australia performed relatively poorly in the national business basket, but quite well in the international and cellular mobile baskets. Australia fell below the OECD average in the PSDN basket, but performed relatively well overall in the leased line baskets. In terms of the composite business basket, we found that Australia ranked marginally above the OECD average.

We also undertook a comparative static analysis of rankings in 1992 and 1994, to get a picture of Australia's relative progress. We found that Australia's position had remained unchanged in the national business, international call and mobile baskets, improved in the leased line baskets, but had fallen behind in the PSDN basket. Interestingly, we found that Australia's ranking in the composite business basket had remained *unchanged since 1989.*

Now, as we all know, tariff basket comparisons are based on published tariffs. They do not reflect the prices paid by customers able to take advantage of discount schemes. So we attempted to construct representative baskets for small, medium and large business users, and to apply discounts to them.

To construct these baskets we took the OECD national business basket, and factored up the dollar value by the weightings from the composite basket. This basket was taken to represent small business users. Medium business users were represented by this basket x50, and large business users by this basket x500. This allowed us to make account estimates based on list prices for small, medium and large business users.

Published discounts were then applied to the small, medium and large business user baskets on a service category-by-category basis, using the best available discounts. For example, a 20 per cent discount on mobile calls would reduce the overall basket charges by 1.34 per cent. That is, 20 per cent of the 67 per cent usage element, of the 10 per cent mobile element.

There are two important embedded assumptions in this construction. Firstly, use patterns are held constant while scaling up for the medium and large business users. Secondly, the composite basket services proportions are held constant for small, medium and large users.

Though severely hampered by a lack of data, our analysis suggested that the discounts available in Australia were among the highest in OECD countries, but did not produce substantial changes to the relative rankings.

We unashamedly borrowed the OECD's time series analysis. Our examination of the national business basket revealed falling prices in Australia since the introduction of competition in 1992. However, we found that tariff falls in Australia at 9 per cent over the period 1990 to 1994, were less than the OECD average fall (15 per cent). Similarly, peak rate 3 minute international call tariffs in Australia declined by 28 per cent, while the OECD average decline was 35 per cent. However, cellular mobile tariffs in Australia fell 26 per cent, compared to an OECD average decline of 21 per cent.

The reason for Australia's relatively poor performance over the 1990 to 1994 period appears to have been price increases between 1990 and 1992. Immediately before the introduction of competition.

In comparing prices we confronted a number of problematic issues. We faced all the usual problems associated with using representative models and choosing to compare on the basis of exchange rates or PPPs. But the main questions emerging were:

- how to deal with comparisons in multi-layer and multi-player competitive markets. Should we compare interconnect prices? Should we include service providers and callback operators?

- how to deal with discounts in markets where private deals with major business users are common, and there are numerous long and short lived discounts available;
- how to deal with discounts to specific classes of users and/or specific regions;
- how to deal with regulatory differences - such as Australia's untimed local calls;
- how to bring Asian countries into the price comparisons;
- and how to account more meaningfully for 'environmental' factors.

On this last point it is worth mentioning that in rail freight benchmarking, we use a model developed by the consulting company, Travers Morgan, which standardises international comparisons by making allowances for the impacts of key environmental factors, such as scale and traffic density.

A similar model for telecommunications, allowing for such things as: switching scale, size of local call zones, population size, density and age distribution, urbanisation, and characteristic business size and trading patterns would be an interesting and welcome development.

Quality of Service and Innovation

Quality of service indicators are possibly the most problematic. We attempted to focus on a few key indicators of quality of service and innovation. These included:

- IDD completion rates based on answer seizure ratios, which we believe important to business users in trade exposed industries,
- faults cleared within 24 hours,
- and mobile call drop-out, for which we could find little data.

Our innovation indicators included: cellular mobile subscribers per 100 population, percentage of digital mainlines, compound annual growth rate in optical fibre, and the availability of itemised billing.

We found that Australia was performing reasonably well on most of these indicators, but was generally below international best practice.

One of the main issues is the trend towards using customer surveys. The dangers of this were brought home to me at a conference presentation I attended last year. A senior executive of Telecom New Zealand gave a presentation in two parts. The first discussed the enormous success Telecom New Zealand were having with their advertising campaign featuring 'Spot', the dog. And the second, discussed the improvement in Telecom New Zealand's customer service since privatisation. We were told in one breath, that the advertising campaign had been very successful in changing customer

perceptions. And in the next, that service had improved according to customer surveys. Now there is an obvious danger here.

With deregulation and evolving competition, customers are bombarded with well funded and targeted advertising campaigns. Campaigns that would not attract the hundreds of millions of dollars spent on them, if they were not effective in changing customer perceptions. In such a context it would be misleading to rely on customer perceptions as the only indicators of service quality. While opinions and perceptions can complement the more traditional, engineering-based indicators, they cannot and should not be substitutes for them.

It is also worth noting that feedback from business users in Australia, suggested that larger companies often have extensive and up-to-the-minute service statistics relating to their voice and data networks. In surveying customers, it seems to me, that we should focus on business users. They are somewhat less likely to be misled by advertising, and much more likely to have some hard data - objective, engineering-based indicators of performance. To date, I suspect that this source of data has not been fully explored.

Operational Efficiency

The third major area of performance we examined was operational efficiency.

There are difficulties in choosing measures of output and input that reflect the operations of any business. Partial productivity indicators need to be interpreted with caution, because of changing input mixes. To get an accurate impression of overall productivity it is necessary to look at all outputs and all inputs. So we constructed a multifactor productivity model for international comparisons, and a total factor productivity model for Telstra.

Our multi-factor productivity model portrayed a telecommunications industry which produces both the network, or lines, and services, or calls by combining labour, or full time equivalent employees, and capital, or the estimated dollar value of network capital stock. The output index was constructed by combining *lines* and *calls*, according to the division of labour costs, between fixed labour costs, relating to the construction and maintenance of the network, and variable labour costs, relating to traffic levels. The input index was constructed as the sum of labour and capital weighted by the ratio of 1992 labour costs to the value of the annual user cost of capital.

Our labour productivity index showed that Australia was the worst performing in the 11 country sample in 1992. Australia ranked 7th in terms of the capital productivity index, and 8th in terms of the Multi Factor Productivity index. Clearly, Telstra’s labour productivity has been low by international standards.

One of the major barriers we encountered in the Multi Factor Productivity analysis, was the paucity and unreliability of call data - be it calls, minutes, pulses, erlangs or whatever. We also found it impossible to get internationally

comparable data for Total Factor Productivity analysis. Although the work that the ITU have been doing on operator indicators is a major step forward.

One of the difficulties faced in calculating operational efficiency is estimating the value of capital stock. Capital stock is not consumed in the current period in the way that other inputs are. It is durable - consumed over a number of years. Estimates of the value of capital stock must take account of this gradual consumption. Moreover, in industries like telecommunications, technological change can have a profound, and sometimes unpredictable effect on the value of the existing network capital stock, and on the fraction of that stock consumed in any one year.

In calculating capital stock values, we used a 12 year investment series. While it is usual to deflate the capital series, we did not do so. Our intention was to take some account of the pace of technological change, and consequent changes in cost - functionality. But our formulation was very crude. Clearly, we need to develop a way to systematically factor cost - functionality changes into the valuation of capital stock.

We also confronted problems related to Australia's competitive telecommunications market. It seems unreasonable to compare incumbents with new entrants. They are different types of organisation. So, I assume we should compare incumbents with other incumbents internationally, and new entrants with other new entrants.

Specialist mobile carriers face completely different economies of scale. So, I assume we should compare mobile carriers with each other, and not with fixed-network carriers.

There seem to be significant economies of scope in the provision of telephony, and what is variously called pay, cable or subscription TV. Should we distinguish between types of fixed-network facilities, and only compare operators of the same type?

And in a multi-layer industry, should we compare service providers, IAPs and ISPs? If so, how? And who with? It is not simply a question of extending coverage, there are 'channel' issues to consider. There is, for example, a sense in which 'switchless resellers' represent an implicit contracting out of carrier customer relations and marketing functions. So it is not clear how, or even if, the service provider industry should be accommodated.

Conclusion

I have run out of time without even mentioning the information infrastructure benchmarking we are about to commence. Let me simply comment on the context.

There is a shift underway, post Porter, from cost-based industry policy, to knowledge-based industry policy. The focus of government attention is shifting

from simple cost reduction, towards overcoming imperfections in knowledge markets, and directing public investment into immobile hard and soft infrastructure. So, while much benchmarking focuses on costs, we are now moving towards a focus on immobile infrastructures. And few can be more important for the future than the information infrastructure.

No doubt people attending the ITU appreciate the importance of extending this kind of national performance comparison, to the broader information infrastructure. And it is heartening to see that so many people around the world are grappling with the same problems. But we should not underestimate the difficulties involved.

Finally, it must be obvious from this discussion that the work we are doing in Australia would simply not be possible without the efforts of the ITU, the OECD and many of the other organisations represented here. I thank them for their contribution to our work. And I thank you for your attention.

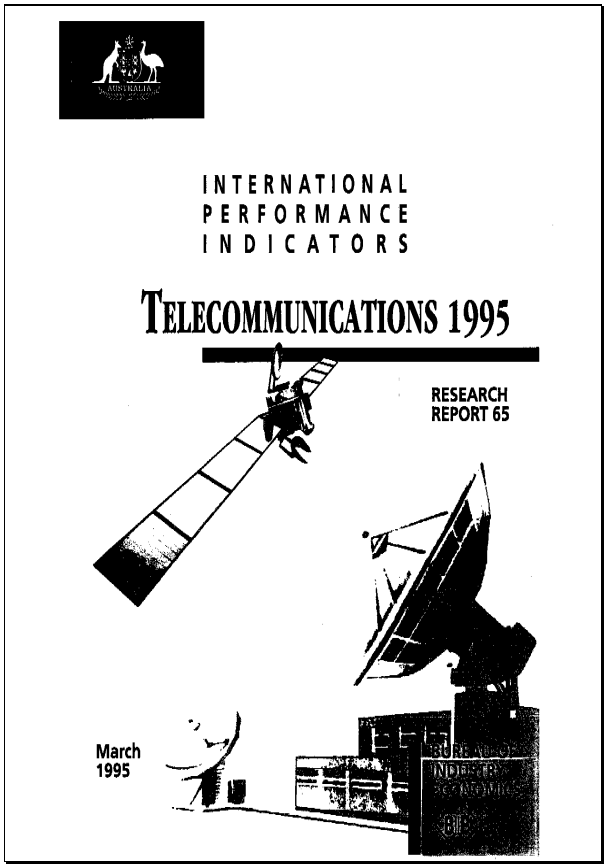
Country Policy Use of International Telecommunications Performance Indicators in Australia

Dr John W. Houghton
Principal Economist
Bureau of Industry Economics
Australia

http://www.das.gov.au/~dist/bie/bie-home.html

International Performance Benchmarking

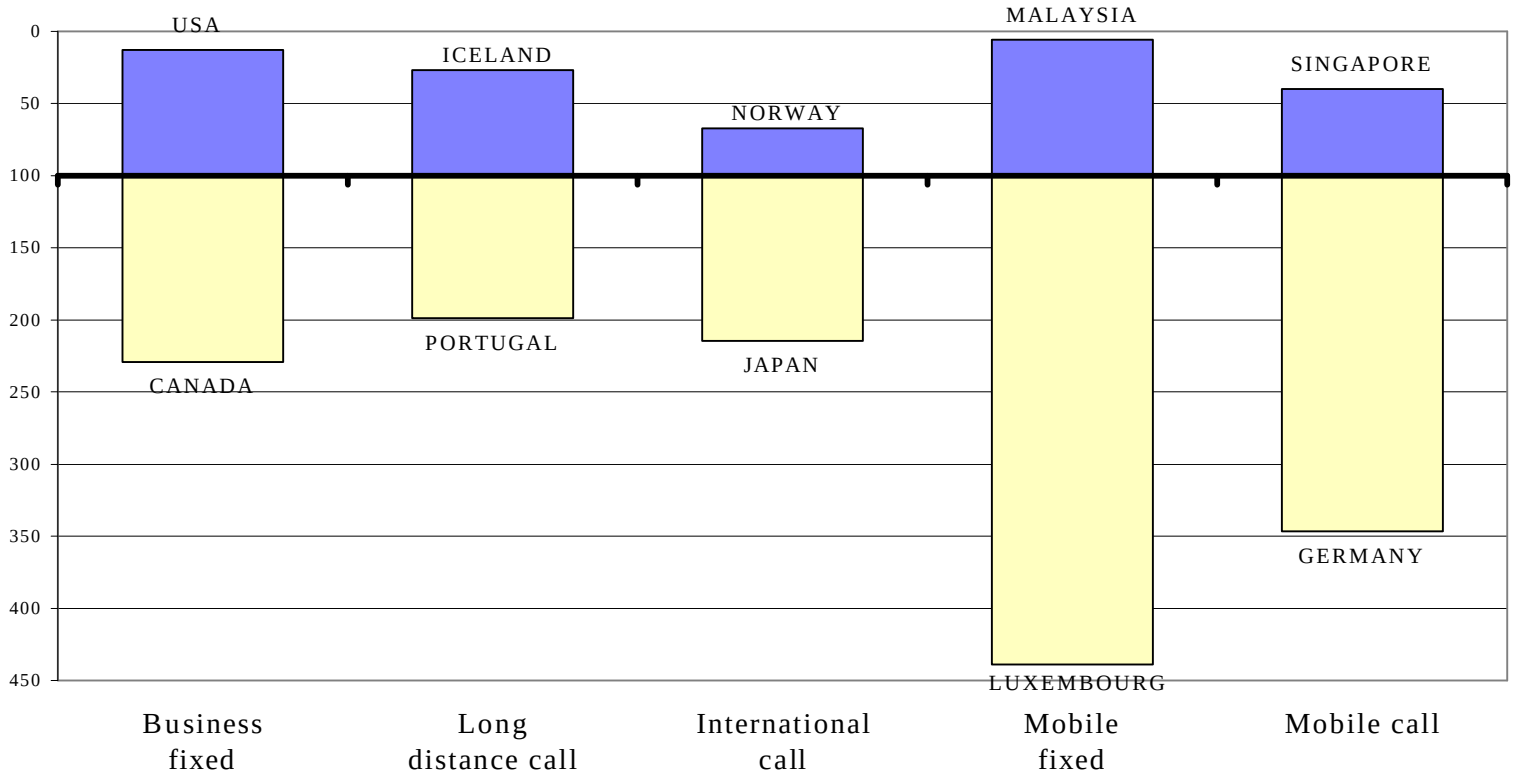
- **identify the importance of infrastructure services**
- **develop relevant measures for international comparison**
- **publish performance comparisons**



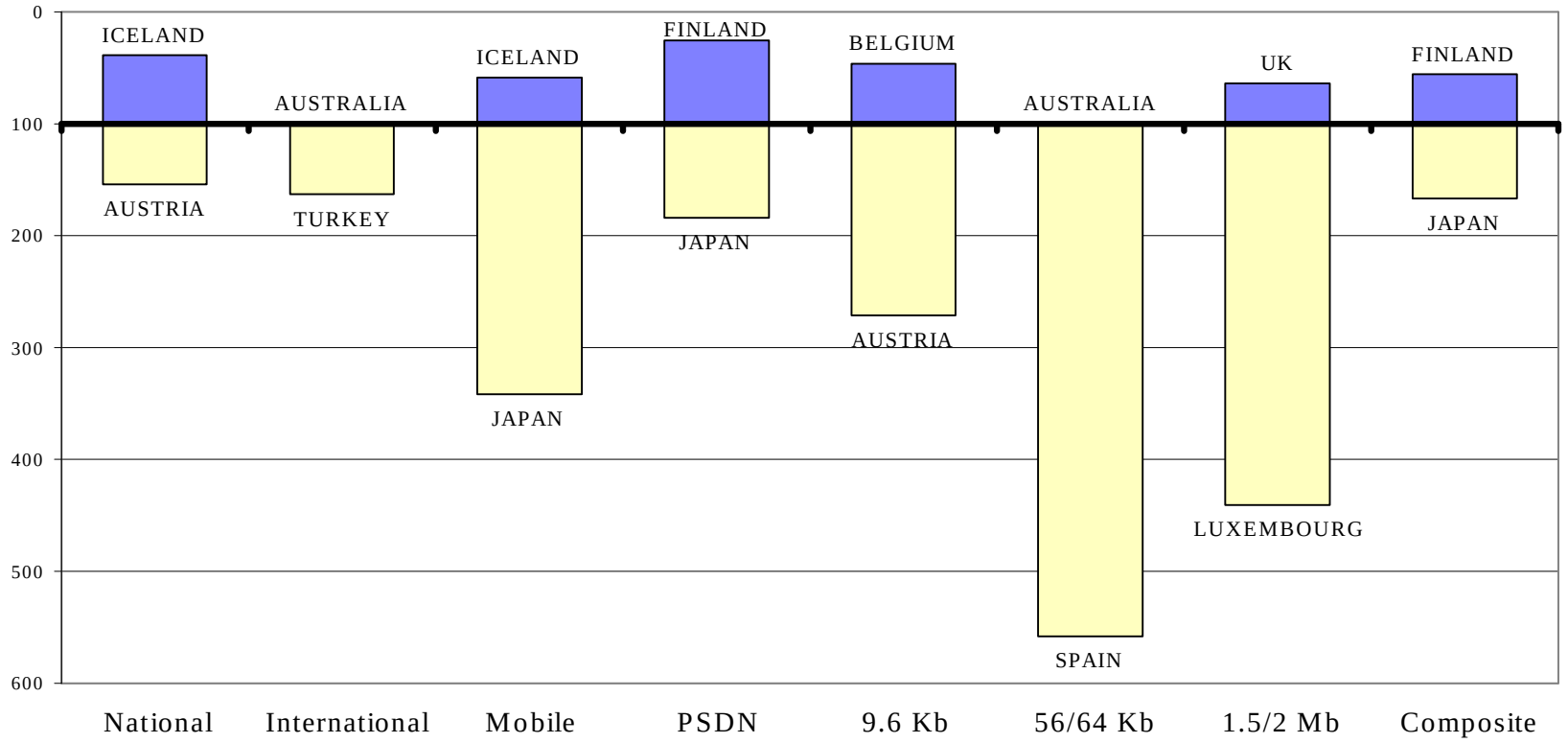
International Performance Indicators: Telecommunications 1995

Available at
http://www.das.gov.au/~dist/bie/bie-home.html

Simple Rate Comparisons (1993-94)



Tariff Basket Comparisons (1994)



Discount Baskets (Australia's OECD ranking, 1994)

	Undiscounted	*Discounted*	*Discount (%)*
Small Business	**14**	**13**	**6.4**
Medium Business	**14**	**13**	**7.7**
Large Business	**14**	**11**	**10.1**

Time Series (1990-94)

	Australia	*OECD Average*	*Competitive*	*Non-competitive*
National Business Basket	**-8.9%**	**-15.3%**	**-21.6%**	**-12.0%**
International Calls	**-28.4%**	**-34.5%**	**-**	**-**
Mobile Basket	**-26.3%**	**-20.6%**	**-31.4%**	**-16.9%**

Price Comparison Issues

- **multi-player, multi-layer markets**
- **private and variable discounts**
- **class and regional discounts**
- **regulatory differences**
- **data for Asian countries**
- **the operating environment**

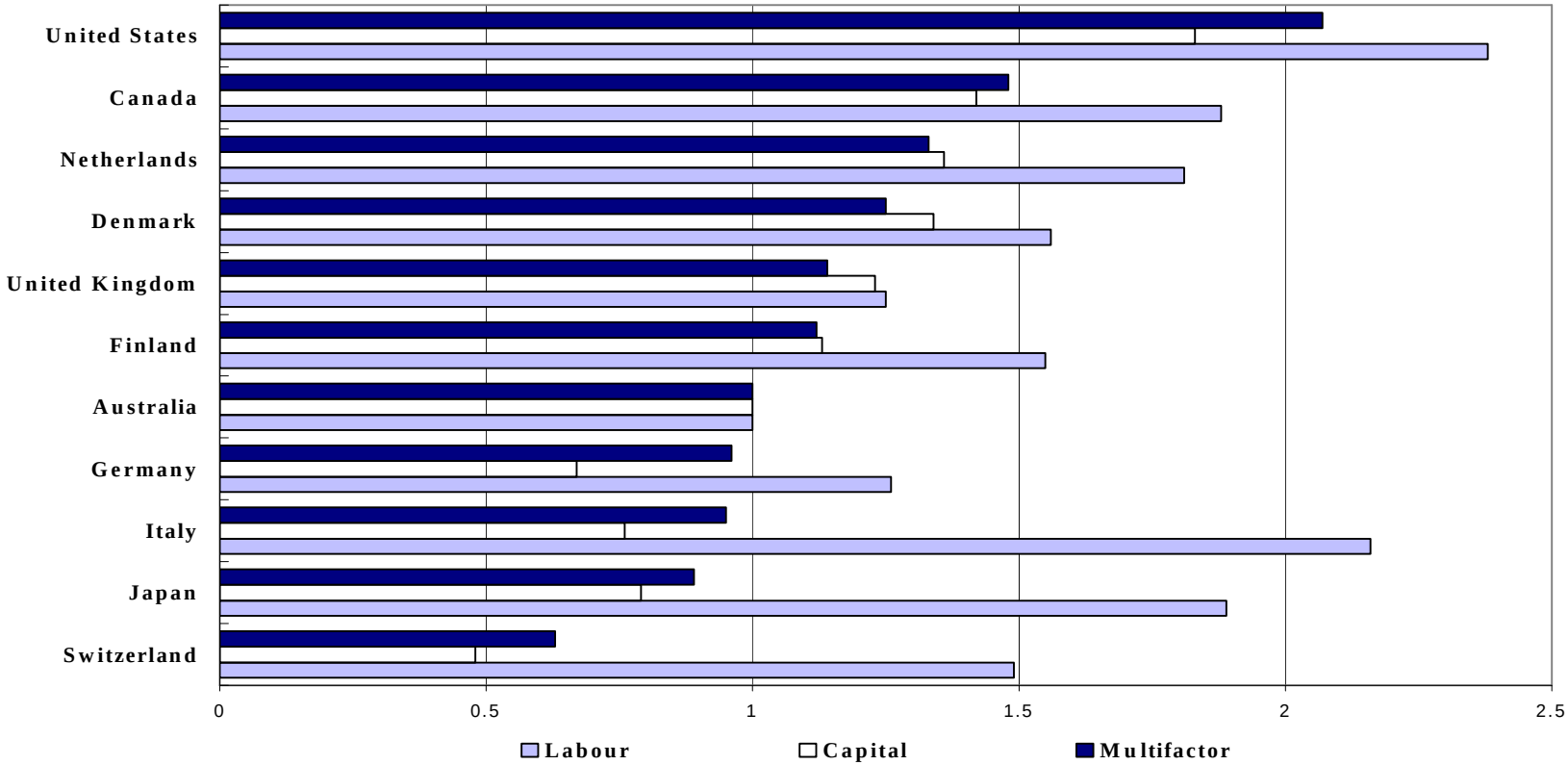
Quality of Service and Innovation

	Year	*Best Observed*	*Worst Observed*	*Australia Ranked*
IDD Completion Rates	**1992**	**US**	**Greece**	**15th of 24**
Fault Clearance	**1992**	**Netherlands**	**Taiwan**	**15th of 19**
Mobile Penetration	**1994**	**Sweden**	**Turkey**	**8th of 30**
Digitalisation	**1993**	**Hongkong**	**Austria**	**23rd of 30**
Fibre Deployment	**1990-92**	**Sweden**	**Canada**	**6th o f 12**
Itemised Billing	**1992**	**Canada/France**	**Denmark**	**5th of 13**

Quality of Service Comparison Issues

- **customer surveys - complements not substitutes**
- **corporate user statistics under utilised**

Multifactor Productivity, Ranked (1992)



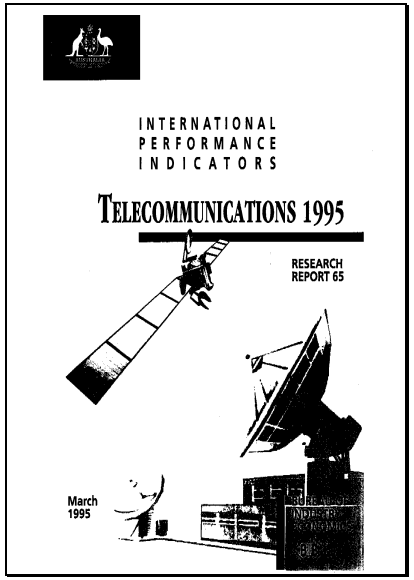
Operational Efficiency Comparison Issues

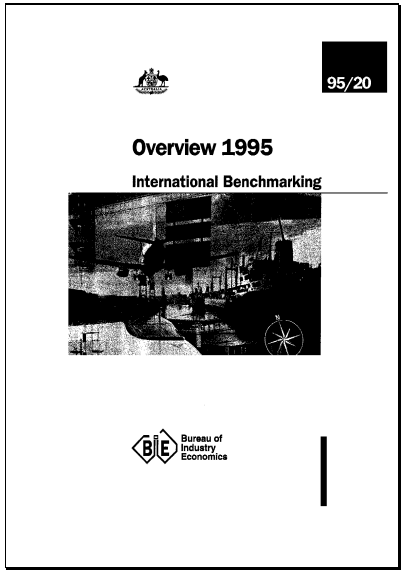
- **value of capital stock**
- **comparing like with like**
- **economies of scale**
- **economies of scope**
- **the ‘channel’**

Summary

- **competition & discounts**
- **the operating environment**
- **customer perceptions**
- **the value of capital stock**

MODELING OPERATIONAL EFFICIENCY





The work we are doing in Australia would not be possible without the efforts of the ITU, OECD and others

Reports, a transcript of this presentation, information and news are available from

Bureau of Industry Economics

http://www.das.gov.au/~dist/bie/bie-home.html

Wednesday
20 March

Session 7: Managing Statistics

What are the issues involved in maintaining and disseminating telecommunication statistics? Which statistics should be collected, how can they be stored in a computer system, how can reports be generated? What about the role of the Internet for disseminating information?

"Electronic statistics dissemination & ☆STARS☆"
M.B. Vinci Gigliucci, ITU

"Disseminating information via the Internet"
Bob Shaw, ITU

Workshop 2: Telecom Statistics Database

A tutorial on the key statistics to collect, ideas for storing and disseminating the data.

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SOURCE: ITU, Maria Beatrice Vinci Gigliucci

TITLE: WORLD TELECOMMUNICATION INDICATORS DATABASE ON ☆STARS☆
(only description of the Database)

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WORLD TELECOMMUNICATION INDICATORS

DATABASE ON DISKETTE

(3rd Edition, 1996)

The *World Telecommunication Indicators Database on diskette* contains annual time series data for the period 1960-1995 for around 100 communications statistics covering telephone network size and dimension, other services, quality of service, traffic, staff, tariffs, revenue and investment. Selected demographic, macro-economic and broadcasting statistics are also included on the diskette. See the attached list showing the statistics contained on the diskette. Data for over 200 economies are available. Notes explaining data exceptions are also included.

The data are collected by the Telecommunication Development Bureau (BDT) annual questionnaire. Additional data are obtained from reports of telecommunication ministries, regulators and operators and from ITU staff reports. In some cases, estimates are made by ITU staff; these are noted on the diskette.

This electronic publication uses the World Bank's Socio-economic Time series Access and Retrieval System (☆STARS☆). This software operates on IBM PC compatible microcomputers. Users can select and retrieve any combination of countries, indicators and years for rapid display on the screen or extraction to Lotus, Excel or ASCII text file formats for further processing by spreadsheet or other packages. A user guide is included with the diskette as are the definitions of the time series.

Subscribers to the yearly package will receive 1995 data as it becomes available throughout the year. They will also benefit from on-going updates and revisions of the data. The subscribers with Internet mail addresses will automatically be mailed electronic files on a continuous basis. Subscribers without Internet addresses will receive a diskette each quarter. All subscribers are entitled to BDT Information Systems reference services such as clarification of data, sources and methodology used.

ANNUAL TIME SERIES

TELEPHONE NETWORK
Main telephone lines in operation
Main lines per 100 inhabitants
Main telephone lines in largest city
% of automatic main lines
% of digital main lines
% of main lines equipped for direct int'l dialling
% of households with a telephone
% of residential main lines
% of urban main lines
Connection capacity of local exchanges
Telephone sets
Estimated facsimile machines
Public pay phones
  Coin-operated pay phones
  Card-operated pay phones
  Public call offices
International telephone circuits
Waiting list for main lines
Number of local telephone calls
Number of national long distance telephone calls
International outgoing telephone traffic (calls)
International outgoing telephone traffic (minutes)
International incoming telephone traffic (minutes)
% of telephone faults cleared by next working day
% of unsuccessful local calls
Telephone faults per 100 main lines
Total kilometre of fibre optic cable in network

TARIFFS
Residential telephone connection charge
Residential telephone connection charge (US$)
Business telephone connection charge
Business telephone connection charge (US$)
Residential telephone monthly subscription
Residential monthly telephone subscription (US$)
Business telephone monthly subscription
Business telephone connection charge (US$)
Cost of three minute local call
Cost of three minute local call (US$)
Analog cellular connection charge
Analog cellular connection charge (US$)
Digital cellular connection charge
Digital cellular connection charge (US$)
Analog cellular monthly subscription charge
Analog cellular monthly subscription charge (US$)
Digital cellular monthly subscription charge
Digital cellular monthly subscription charge (US)
Analog cellular 3 minute call
Analog cellular 3 minute call (US$)
Digital cellular 3 minute call
Digital cellular 3 minute call (US$)

MOBILE
Cellular mobile telephone subscribers
  Analog cellular subscribers
  Digital cellular subscribers
Radio-paging subscribers

TELEX, TELEGRAM
Telex subscribers
International outgoing telex traffic (minutes)
National telegrams
International outgoing telegrams

DATA
ISDN subscribers
ISDN basic rate interface subscribers
ISDN primary rate interface subscribers
Leased circuits
Videotex subscribers
Public data network subscribers
Circuit switch data network subscribers
Public packet data network subscribers
Estimated modems in use
Number of Internet networks
Number of personal computers

EMPLOYMENT
Total full-time telecommunications staff

DEMOGRAPHY, MACRO-ECONOMY
Population
Population of largest city
% of urban population
Households
Gross domestic product (GDP)
Gross domestic product (US$)
Gross Fixed Capital Formation (GFCF)
National currency per US$ (end of year)
Average annual exchange rate (local currency p.US$)
Exports of telecommunication equipment (US$)
Imports of telecommunication equipment (US$)
Consumer Price Index (1987=100)

TELECOM FINANCE
Total telecommunication service revenue
Telecom revenue (US$)
  Income from telephone service
  Income from telegram
  Income from telex
  Other telecom income
Total telecom expense
  Operating costs
  Depreciation
  Net interest paid/(received)
  Taxes on telecom income
  Other costs
Net profit / loss
Total telecom investment (capital expenditure)
Telecom investment (US$)

BROADCASTING
Radio receivers
Television receivers
Television households
Cable television subscribers
Estimated DTH satellite receivers

INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION DEVELOPMENT BUREAU

INFORMATION SYSTEMS UNIT

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TITLE: DISSEMINATING INFORMATION VIA THE INTERNET

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Disseminating Information via the Internet

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Overview

- What is the Internet?
- Internet Jargon
- Connecting to the Internet
- Serving Info on the Internet
- Tips for Countries in Early Stages of Internetworking
- Some relevant Links

What is the Internet? Competing Definitions

- Protocols: “a set of interconnected computer networks using the protocol TCP/IP”
- Applications: “email, file transger (FTP), World Wide Web”
- Resources: “hundreds of thousands of electronic sites representing collective human knowledge

Internet Jargon

- Domain Name System: user-friendly names masking Intenet routing addresses
  - Example: “ www.itu.ch”
  - Last part is “ top level domain”
  - In most countries, Top Level Domains (TLD) are ISO country codes (e.g., .fr, .ch, .mx)
  - Other TLDs exist (e.g.m .com, .org) typically used in the US

Internet Jargon

- URL: Uniform Resource Locator - identifies Internet network resources for WWW
  - Compsed of protocol, domain name and file name
  - Example: “http://www.itu.ch/WTDR95” is the URL for 1995 ITU World Telecommunication Development Report

Internet “Admin” Bodies Jargon

- ISOC: Internet Society at http://www.isoc.org
- IETF: Internet Engineering Task Force at http://www.ietf.cnri.reston.va.us
- IANA: Internet Assigned Naming Authority at http://www.isi.edu/div7/iana
- Internic: provides non-country specific doman name registration (e.g., “.com”) at http://rs.internic.net

World Wide Web

- Application “Esperanto” of the Internet
- HTML (Hypertext Markup Language) is coding technique to make hypertext documents displayed in WWW browsers (e.g., Netscape)
- URLs embedded in HTML files used to create hypertext links to other WWW sites

Connecting to the Internet

- Very easy in some countries, very very difficult in others (LDCs)
- For “ access” only - (WWW, send/receive email), recommend commercial online companz (Microsogt Network, Compuserve, AOL)

Tips for Countries in Early Stages of Internetworking

- Technical training at annual “INET” conferences - email ISOC VP for Education (Georges.Sadowsky@nyu.edu)
- Network Startup Resource Center - provides free toolkits to set up Internet connectivity at http://www.msrc.org/
- Thousands of tools available online - see http://www.itu.ch/CWSApps/cwsa.html

Tips for Countries in Early Stages of Internetworking

- Find out who (if anyone) is controlling “top level domain” (TLD) management for your country (as last resort, email Jon Postel, Director of IANA at postel@isi.edu)
- If there are trademark names you want to protect, register domain names both under .COM and your countr code (now!)

Serving Info on the Internet

- To be simple info provider (create, post WWW pages) requires specialist expertise & service provider that allows you to “post” WWW pages (latter not necessary if you have direct Internet connection)

Serving Info on the Internet

- However “indicators = database” so ideal is to directly interface WWW server to database (requires even more specialist expertise)
- Direct database <-> WWW Server interface typically requires you to have direct Internet connection

Serving Info on the Internet

- If database in desktop tools (e.g., Access, Excel), suggest using Microsoft NT Internet Information Server (free at http://www.microsoft.com)
- If database in SQL (e.g., Oracle), suggest using Netscape Server (http://home.netscape.com)

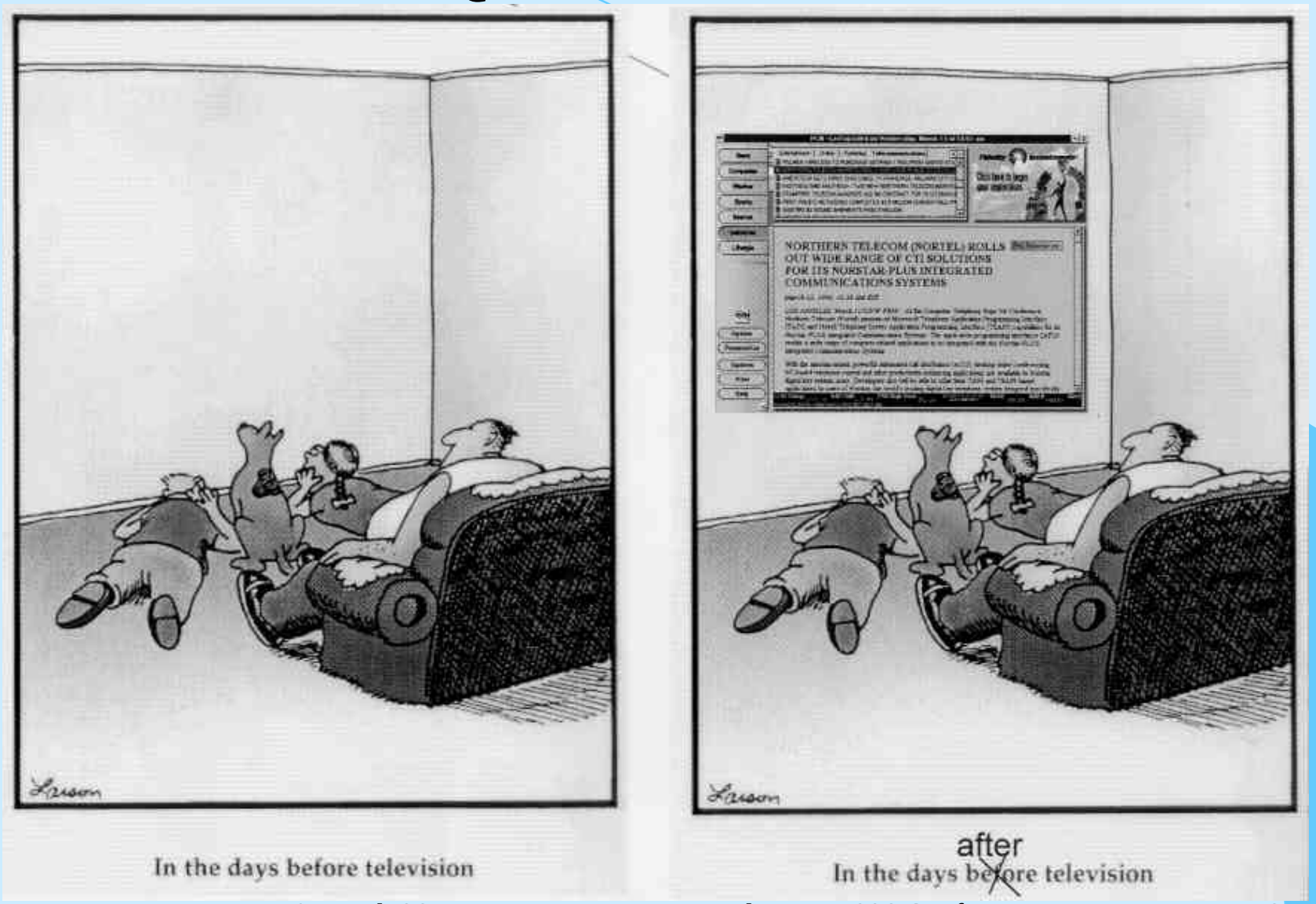
Some Telecom & Indicators Links

- Telecom Information Resources on the Internet: http://www.spps.umich.edu/telecom/telecom-info.html
- WWW Library Communications & Telecommunications: http://www.analysis.co.uk/commslib.htm
- ITU: http://www.itu.ch
- OECD: http://www.oecd.fr
- Statistical Office of the European Communicties: http://www.cec.lu/eurostat.html
- World Bank: http//www.worlbank.org/
- Great Search engine: http//www.altavista.digital.com/

Internet Indicators

- Matrix Information and Directory Services at http://www.mids.org
- Also see “What is the Internet?”: see http://www.mids.org/what.html
- World Wide Web consortium discussing demographic information at http://www.w3.org/pub/WWW/Demographics

Questions?


NORTHERN TELECOM (NORTEL) ROLLS OUT WIDE RANGE OF CTI SOLUTIONS FOR ITS NORSTAR-PLUS INTEGRATED COMMUNICATIONS SYSTEMS
In the days before television
after
In the days before television