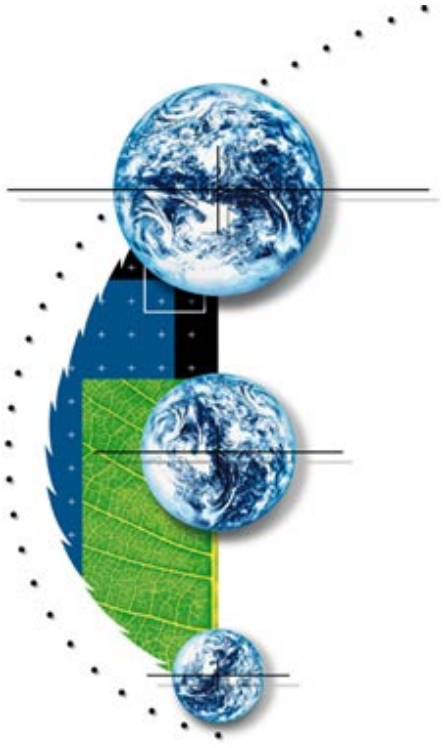
RECOMMENDATIONS IMPLEMENTATION ANALYSIS

Telecom Development Symposium (TDS)



TELECOM 99

Geneva, 10-17 October

Inter@ctive 99

International Telecommunication Union

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Introduction

The TELECOM Development Symposium (TDS), created in 1995 to facilitate the access to TELECOM for representatives of the least developed and low-income countries, has now been conducted over an entire cycle of TELECOM events: World TELECOM 95, Americas TELECOM 96, Asia TELECOM 97, TELECOM Interactive 97 and Africa TELECOM 98. At each event, the Working Groups animated by industry and government representatives and by experts of ITU's Telecommunication Development Bureau (BDT) have drafted a number of recommendations related to the various themes discussed.

We considered that it would be an asset, as we are starting a new cycle of TELECOM events, to evaluate what actions had been taken in the different Member States, following the recommendations elaborated during TELECOM 95 and TELECOM Interactive 97.

A survey was drafted, based on the TDS recommendations, and sent out to the 83 countries who participated. Over half of them communicated their results. The answers were analysed with the support of Ernst & Young Consulting, which covered the costs of the analysis. This report not only contains the analysis, but also a lot of material from the Telecommunication Development Bureau, ITU's Strategic and Planning Unit and Ernst and Young.

The purpose of this report is mainly to evaluate how the various Member States who participated in the last two World TELECOM Development Symposia perceive the evolution of the issues that were addressed during these two workshops. Its aim is not to present policies or strategies to be implemented but to provide valuable input to the participants of future TDS.

Fernando Lagraña
Vice-President, TELECOM and
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Developing Countries and the Information Society

Developing countries have been taking major steps to get connected to the global network. Some have advanced further than others and a few have reached levels of access equivalent to that of developed countries. While the level of access in the main cities of a number of developing countries is as good as in developed countries, access in rural and lower income areas in developing countries is lagging far behind.

This study – aiming at evaluating Internet development in such countries – is based on the results of a survey conducted with the administrations of ITU Member States (least developed countries [LDCs] and developing countries) invited to attend and participate in the TELECOM 99 + Inter@ctive 99 TELECOM Development Symposium. This survey concerns the implementation of a set of recommendations proposed during various workshops at TELECOM Interactive 97.

TELECOM Development Symposium workshop recommendations

During the two workshops, namely the Internet and Services Workshop and the Infrastructure Workshop, various strategies and policies for the developing countries regarding the development of the Internet were discussed. The following section briefly reviews the various recommendations proposed during the workshops.

Internet and Services Workshop

During the Internet and Services Workshop, it was pointed out that the Internet is frequently seen as the leading prototype of the information highway. Despite its impressive exponential growth, vast media coverage and unrelenting hype, however, the vast majority of users live in high-income countries. The overall theme of this workshop focused on the strategies and policies that developing countries should adopt in order to get connected and a number of recommendations were made with a view to ensuring that the Internet does not contribute to widening the gap between information-rich and information-poor countries.

According to the workshop participants, the following essentials should be kept in mind.

Firstly, information technology (IT) equipment provides the backbone for a wide range of information and communication services, but it is also an engine of economic development. Countries should target the promotion and usage of electronic and telecommunication equipment (computers, modems, etc.) that can enhance the use of the Internet. They should also influence other factors affecting Internet usage, including the pricing of local calls, second telephone lines, international private lines and Internet service pricing which also have an impact on penetration. Such measures should be applied by countries in view of the existing correlation between high Internet penetration and low access charges for the Internet.

Secondly, LDCs should institute competitive market structures, along with a regulatory environment ensuring fair competition. Where markets are fully opened up to competition, price structure will tend to gravitate towards costs. In low-income countries, the most widely prevailing type of market structure is one in which the ISP market is open to competition, usually to private-sector companies, while basic telephone services are still subject to monopoly conditions. Lack of competition in the international services – i.e. the international gateways market – is one of the main factors affecting Internet access pricing for most of the developing countries. This monopoly structure induces high charges for international leased lines for ISPs operating in those countries.

Based on the discussion, the following recommendations were proposed:

1. One of the main priorities should be to provide access for the population, and promoting the use of electronic and software equipment. To promote the use of the Internet, it was recommended to reduce set-up costs incurred by users on electronic and telecommunication equipment.
2. Governments should encourage Internet development by creating a transparent regulatory framework, in which competition drives Internet growth in terms of users and content.

Infrastructure Workshop

Because the Internet relies on existing public and private telecommunication networks, countries with a poor telecommunication infrastructure will probably have limited Internet penetration. However, poor infrastructure can be turned to advantage, by leap-frogging into newer digital technologies that can better support the development of the Internet. In particular, some attention should be given to the funding and development of rural telecommunication infrastructures.

The ITU Telecommunication Development Advisory Board (TDAB) has recommended that BDT should request equipment makers to provide simple and cheaper digital switches for developing countries for their much-needed voice service before they talk of providing sophisticated technology for value-added services such as data transmission or the Internet. Meanwhile, the right infrastructure at the right price seems to be a kind of moving target in the struggle of developing countries to ensure faster growth for their telecommunications.

Nevertheless, there is also no doubt that very large-scale micro-electronic circuits and technologies software have proved several times to be the most powerful drivers of cost reduction in telecommunications, even for basic telephony. It is necessary to find ways to tailor these modern technologies to fit the real telecommunication needs of developing countries in the best possible manner without inherently limiting the future evolution of those countries' network.

Developing countries must therefore find ways and means to invest and use existing technologies in an efficient manner to meet their specific requirements. The main recommendation proposed by the workshop to overcome the above-mentioned problems was the following:

1. Infrastructure should be deployed in such a way as to allow a gradual upgrade of its capabilities. Countries should seek a modular type of infrastructure making it possible to provide basic services and gradually take new services on board with minimal duplication. To summarize, it was recommended to lower monthly Internet access charges for end-users by using the existing infrastructure efficiently and, if required, use new technologies to drive the charges down.

Evaluation of the application of the working group recommendations

To measure the implementation of the above recommendations in the various countries attending the Symposium, the TELECOM Secretariat of ITU conducted a survey based on a questionnaire. The questionnaire was sent by ITU TELECOM to 82 LDCs and developing countries, Member States of ITU.

The first objective of the questionnaire was to identify which of the recommendations have been fully implemented, partially implemented or not implemented at all.

The second objective was to measure the impact of the implementation of TDS recommendations in different countries, as well as their effectiveness.

The average percentage of responses to the questionnaire received from the surveyed countries was 55%, with the rate of reply significantly varying from one region to the next. Figure 1 shows the number of responses received and the percentage of replies for the different regions.

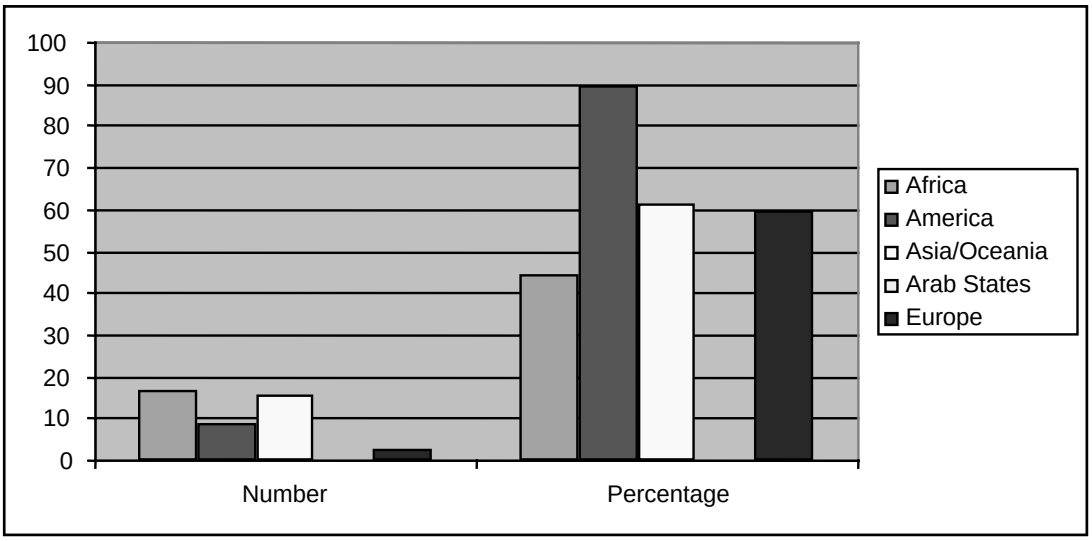


Figure 1 – Number and percentage of responses by region

As is clear from in Figure 1, some countries were quite reluctant to provide feedback to the questionnaire. Those countries, with the help of ITU, through a better interaction and communication process, should be encouraged to respond to ITU in future studies.

As mentioned above, the first objective of the study was to analyse the implementation of the recommendations in the various countries. To realize this objective, a frequency analysis method was carried out to study the implementation of the three recommendations. Such an analysis allows us to indicate the percentage of countries that have followed one of the specific recommendations, but also to identify those regions that faced difficulties in their implementation system and try to develop explanations for the problems they met. The results of the analysis are developed in the following section.

Recommendations focusing on lowering the usage cost of the Internet

Objective

The first recommendations analysed are the two aimed at reducing the usage cost for Internet users. To follow this recommendation, countries may choose between (1) lowering Internet access charges, which represent the operational costs, by using the existing infrastructure efficiently – thus following the first recommendation with regard to the Infrastructure Workshop, and (2) reducing the set-up costs incurred by users on equipment acquisition – thus following the first recommendation issued by the Internet and Services Workshop.

On one hand, the latter recommendation focused on the need to reduce the set-up costs, i.e. the cost of the electronic devices and equipment needed to access the network. For example, this recommendation could be implemented by cutting taxes and duties on electronic and telecommunication equipment imports. By cutting those taxes and duties, governments would reduce the gap between developed and developing countries' set-up costs vis-à-vis per capita income, thus promoting the information society.

On the other hand, in order to reduce the operating costs for end-users, the Infrastructure Workshop participants were mainly advised, firstly, to use existing infrastructures and technologies more efficiently in order to promote usage. To understand the motivation behind the need to implement this recommendation, the fact that the efficient use of existing technologies allows ISPs to access the Internet at lower costs must be underlined.

Indeed, the efficient use of existing technologies induces a reduction for ISPs in the leased-line charges. Given the strong correlation (see Figures 2 and 3), between costs incurred by ISPs to access the network and the end-user access charges in many countries, it is believed that the efficient use of technologies will result in a reduction in subscription fees for users.

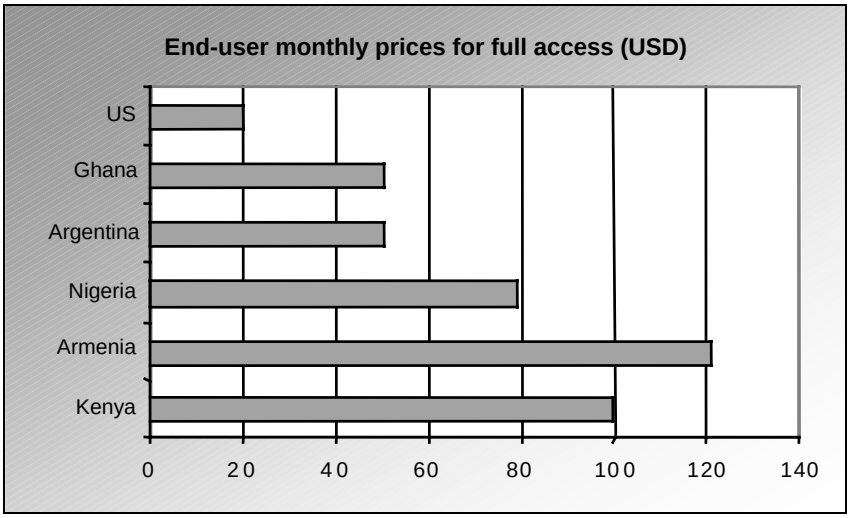


Figure 2 – End-user monthly prices for full access (USD)

Source: Communication of the ACM, June 1999, Vol. 42, No.6.

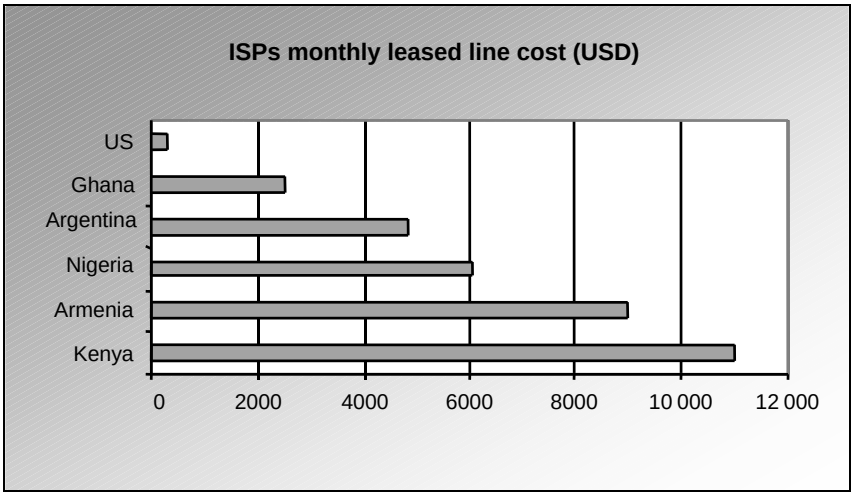


Figure 3 – ISP monthly leased line cost (USD)

Source: Communication of the ACM, June 1999, Vol. 42, No. 6.

Analysis

To analyse the implementation of either or both recommendations aimed at cost reductions for Internet usage, ITU TELECOM asked the various participants in its survey the following question:

> "During the last Telecom Development Symposium, it was recommended to lower costs by using existing infrastructures and efficient technology, but it was also recommended to lower prices by reducing taxes and duties on equipment, and promote usage. Was any of these recommendations applied in your country? If yes, how?"

The two parts of this question seek to determine whether and how the cost reduction objective has been implemented in the various countries. On the basis of the answers to this question, the various countries are classified according to the type of recommendation applied. Finally, one can look at the efficiency of application of the recommendation by comparing the type of recommendation implemented and average monthly rates for Internet access.

Results

The responses to the survey question (Was any of these recommendations applied in your country?) are summarized below (Figure 4):

	Africa	Americas	Asia/ Oceania	Europe	Total
Recommendation application	70.6%	33.3%	62.5%	33.3%	57.8%

Figure 4 – Implementation of recommendation on lowering costs

According to the responses to the survey, 26 countries out of 45 (57.8%) have applied one or both of the two recommendations regarding cost reductions for Internet usage. As discussed above, this recommendation can be implemented in two ways, (1) either through direct cuts on set-up costs or (2) through an efficient use of new technologies with a perceived objective of indirectly reducing the leased-line charges for ISPs; both approaches are used to promote the usage of the Internet. Hereafter, the analysis is divided according to the two approaches and the percentage frequency of their implementation is studied across the various regions as shown in Figure 5.

Internet usage promotion method	Africa	Americas	Asia/ Oceania	Europe	Total
(1) Cutting of set-up costs	45.5%	50%	60%	0%	50%
(2) Efficient use of existing technologies	36.4%	0%	30%	100%	33%
(3) Both methods	18.2%	50%	10%	0%	16.7%

Figure 5 – Internet promotion methods used for lowering costs by region

Given the above findings, it can be concluded that Internet promotion globally is based mainly on the reduction of taxes and duties on electronic equipment.

To check the efficiency of the recommendation, the following question may be asked: Does Internet service pricing for end-users correlate with the application of the recommendation on the efficient use of existing technologies?

To answer this question, the average monthly price of Internet services for end-users has to be examined in relation to the type of recommendation applied. This is illustrated in Figure 6, which shows the average Internet access charge in relation to the type of recommendation followed.

Internet usage promotion method	Africa	Americas	Asia/ Oceania	Europe	Total
Other methods (1) & (3)	$52.5	$22.5	$37.1	–	$39.4
Efficient use of technologies only (2)	$16.25	–	$26.6	$35	$26.4
No recommendation applied	$56	$37.1	$56.6	$67.5	$39.4

Figure 6 – Correlation between average monthly Internet access charges and efficient use of technology

Figure 6 clearly shows that the efficient use of existing technologies by the various countries has a direct effect on the subscription fees paid by Internet users. Besides, the average prices are significantly higher for those countries which do not apply the recommendation on to the efficient use of technologies.

Recommendation focusing on competition implementation

Objective

Competition is a major factor in the development of the information society. Low access prices and better quality of service are generally believed to be driven by competition among different players on a market. However, in practice, market structure alone does not appear to play a significant role in explaining variations in the cost of Internet access.

In assessing ISP markets, there are two aspects to consider: (1) the end-user market and (2) the ISP market access to the international network. Four possible market structures based on ISPs and international gateways can be identified.

1. Complete monopoly (ISP and international gateway markets are monopolies)
2. Partial monopoly (ISP and international gateway markets are monopolies but services such as email are liberalized)
3. Partially competitive (ISP market is liberalized)
4. Fully competitive (ISP and international gateway markets are liberalized)

Few Internet markets can today be described as complete monopolies. Although partial monopolies continue to exist, they are dwindling in number. One partial monopoly was, until recently, India, where the Government made a distinction between providers of the email service and full Internet service. Email was an open market while Internet access could only be provided by the international carrier. After several delays, the ISP market has now been liberalized.

In most developing countries, the prevailing type of market is one in which ISP services are liberalized but the incumbent PTO continues to control the international gateway. Many ISPs complain that this results in high international access costs, negating any possible benefits of a competitive, end-user market.

One reason given for charging above-cost access charges to the international network is to finance network expansion. Another is the differing methods of international accounting for the Internet, which generally result in PTOs from developing countries paying the full costs of connection to international backbones.

Analysis

To assess the implementation of competition in different countries, ITU TELECOM surveyed the various countries regarding their ISP market structures. The following question was asked:

"Was the ISP market encouraged?"

This question focused mainly on the development of partially competitive markets, in which only the ISP market is open to competition. The results are shown in Figure 7.

ISP markets	Africa	Americas	Asia/ Oceania	Europe
Liberalized countries	70.6%	55.6%	66.7%	67.2%

Figure 7 – Liberalization degree by continent

Given the application of this recommendation regarding the opening up of ISP markets, does its implementation have a direct effect on access charges for Internet services?

To measure the impact of competition on prices, one can look at the correlation between competition on the ISP market and the monthly access charge for Internet services.

Results

The conclusion from Figure 8 – which focuses on monthly Internet charges and ISP market liberalization – is that the sole liberalization of the ISP market is not a sufficient condition to drive Internet monthly access fees down to their costs.

ISP market	Africa	Americas	Asia/ Oceania	Europe
Liberalized ISP markets	$40	$25	$43	$67.5
Non-liberalized ISP markets	$55	$45	$26	$35

Figure 8 – Monthly Internet charge and ISP market liberalization

In fact, there is no apparent correlation between competitive ISP market policy and low average Internet access charges. Although most developing countries have implemented partially competitive market structures, and thus have only liberalized their ISP markets, such a policy does not seem to guarantee realization of the low access fee objective. This paradox may be explained by the absence in the analysis of another decisive factor for access fees: the liberalization of international gateways.

The lack of competition on international gateway markets, which is a major determinant of ISP costs, may explain the higher fees on markets that are only ISP-liberalized. If ISP markets and international gateways are not simultaneously liberalized, ISPs suffer from the abusive monopoly position exercised by the monopoly operator in the upstream market, the international gateway market. Thus there is no guarantee of low cost-driven access charges.

So the charges applied by the backbone service providers – induced by the liberalization of the international gateway market – play a crucial role in driving the Internet access charges for end-users down. Therefore, to reach low Internet access charges, international gateway markets must also be liberalized.

Conclusions

Given the above results, the following two recommendations can be made:

1. Efficient use of existing technologies to lower the costs of Internet access for users

   The analysis clearly illustrates that where efficient use of technology has been adopted the Internet access charges are significantly lower. Policy makers should focus mainly on this aspect, and develop the use of their resources accordingly.
2. Development of a fully competitive market for Internet provision

   The main motivation under such a policy is to reduce the access charges supported by users through the liberalization of the international gateway market thus reducing ISP costs which impact end-user Internet access subscription fees.

Human Resources and Technology

In 1995, the TELECOM 95 event proposed a comprehensive and specific Programme for Development to 143 senior telecommunication engineers and personnel managers from the administrations of LDCs and developing countries, who were granted fellowships to come to Geneva. Their stay had a triple purpose: (1) to visit the exhibition; (2) to attend forum sessions, in particular that of the Technology Summit on Telecommunications in Developing Countries; and (3) to take part in a Workshop on Human Resources and Technology.

The Workshop was aimed at showing how the combined use of technology and human resources could serve to advance telecommunication development in LDCs and developing countries.

Workshop recommendations

More specifically, the Workshop aimed at enabling participants:

1. to combine technology and human resources management/development to improve the efficiency of their businesses;
2. to harness integrated technological/human resources solutions to the services of their countries;
3. to make effective use of technology and human resources to promote telecommunications in their countries.

The Workshop called for the active participation of all delegates. The delegates, who were divided into small groups under the guidance of facilitators, had the opportunity to highlight key issues in human resources and technology. During the final session of the Workshop, each group, through its spokesperson, presented the main issues debated in the group. To conclude the Programme for Development at TELECOM 95, a set of recommendations was proposed.

Analysis of application of the recommendations

To measure the implementation of the set of recommendations in different administrations, ITU TELECOM conducted a survey, based on a questionnaire sent to 84 LDCs and developing countries Member States of ITU.

The objective of the study was to identify whether or not the recommendations had been implemented. Forty answers to the Human Resources and Technology Survey were received (47.6% of interviewed countries). The results presented in this analysis are based on those answers.

The recommendations proposed during the Symposium are reviewed below. The main motivations behind the potential implementation of those recommendations are then presented. Lastly, the analysis examines how the recommendations have been implemented in the various countries.

Recommendation focusing on improving communication within the organization

Objective

This recommendation specified the need to communicate clearly both upwards and downwards within the organization.

In an era of privatization, liberalization and integration of markets, business is more competitive. Consequently, awareness of those concerns calls for new organizational structures. Communication can have a synergistic effect on the successful implementation of a change programme. In a world of

change, the common sense approach is to improve communication between people and, in particular, from the upper management to the company's front-line employees.

Analysis and results

To follow up the implementation of this recommendation, the survey asked the various administrations about the major changes that the organization had introduced over the previous four years with regard to internal communication. Specifically, it asked whether the organization had introduced at least one of the following methods to increase communication:

1. In-house journal or newsletter
2. Institutional adviser on internal communication
3. Increased use of email
4. A corporate internal website

As shown in Figure 9, the most frequently applied method for improving internal communication is based on the development and the extensive use of email. Email can be regarded as an essential tool in developing countries, mainly because it permits substantial communication cost reductions.

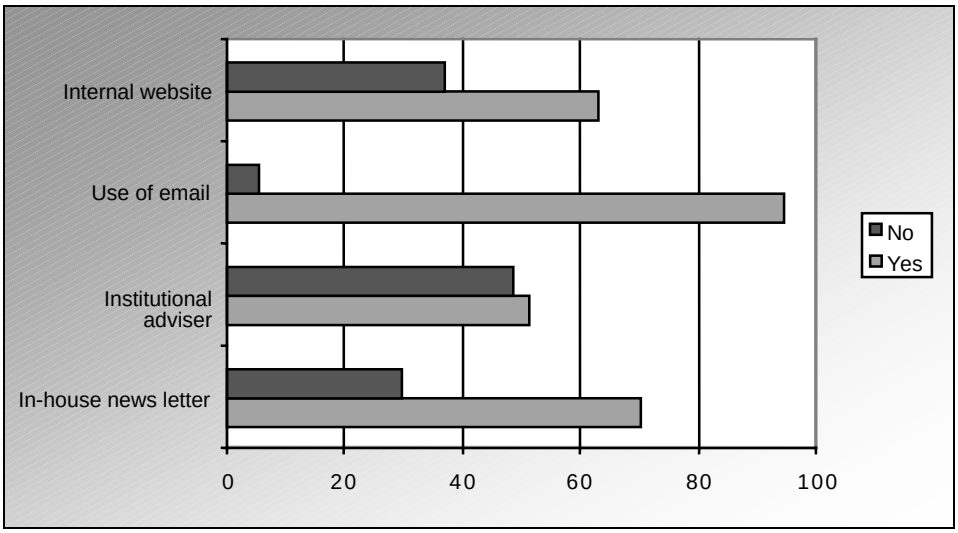


Figure 9 – Methods used for promoting internal communication

Recommendation focusing on implementation of the SWOT analysis

Objective

The recommendation specified the need to carry out the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

The analysis of strengths, weaknesses, opportunities and threats (SWOT) in order to better understand government policy, market potential, competitors and one's own organization was recommended. By applying this recommendation, administrations become sensitive to development and to the institutional and regulatory reforms affecting the telecommunication sector. Therefore, organizations which neglect this aspect of the recommendations may not be well prepared when facing new business environments, and thus could suffer from an inadequate organizational structure.

Analysis and results

To examine the implementation of this recommendation across countries, one can look at the percentage of countries which have adopted the SWOT analysis. Figure 10 shows the results.

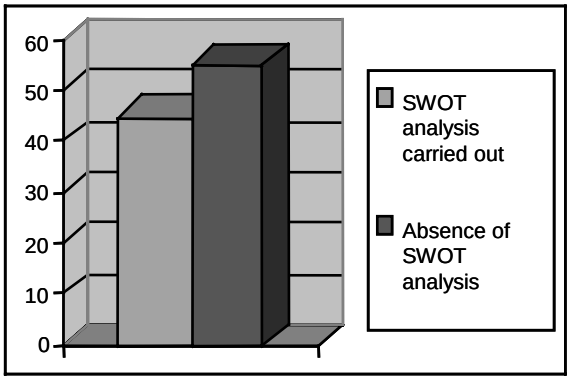


Figure 10 – SWOT analysis adoption percentage

A possible explanation for the lower follow-up of this recommendation compared with others is that people cannot stand criticism, because no distinction is drawn between criticizing people and criticizing ideas. However, some discipline is required and SWOT analysis use has to be encouraged further.

Recommendation focusing on promotion of a regional approach

Objective

This recommendation specified the need to promote a regional approach through regional development institutions with specific and measurable objectives regarding technology transfer, development of expertise and exchange of experts.

In order to maintain and develop its competitive position, any organization has to acquire and develop competencies in terms of human resources. Because the telecommunication industry is confronted by technical change, interaction and communication mechanisms between organizations can provide a continuous opportunity for sharing new competencies by regional approaches such as technology transfer, training programmes and exchange of experts. The creation of partnerships is valuable not only to sell equipment, but also to share skills and capitalize on human resource competencies.

Analysis and results

For the countries who followed this recommendation, the percentages of regional approaches adopted are presented in Figure 11.

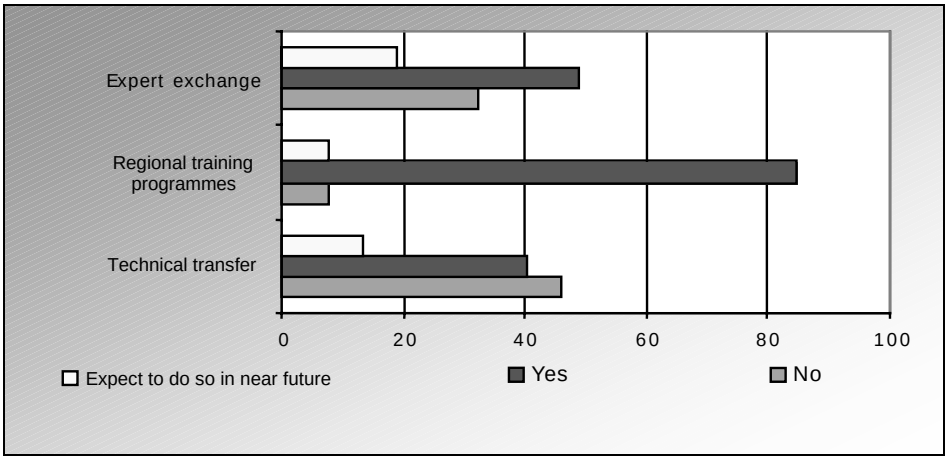


Figure 11 – Percentages of regional approaches developed

Thanks to ITU support, the main regional approach applied in the various countries is that regarding the development of training programmes. Moreover, human resources development experts (both at headquarters and in the regions) continue to provide assistance in the area of organization development and management development to the developing countries, especially to the LDCs.

Conclusions

Clear communication both upwards and downwards within an organization facilitates the integration of change within that organization. In the telecommunication environment in particular, the use of communication tools such as email, intranet, in-house newsletters or newspapers, can help organizations to promote their changes at the company level and therefore has to be encouraged further.

The development of regional collaboration approaches is recommended. Technical transfer or the exchange of experts are instruments which allow a better understanding of the industry by sharing experiences and competencies.

The SWOT analysis – carried out by some of the organizations surveyed – is a very useful instrument. Although it is not readily accepted in many organizations, the SWOT analysis can support them in defining and assessing their strategies. But the SWOT analysis is also an unwieldy instrument. This inconvenience may explain why few countries have carried out this analysis in their organizations. Moreover, any strategic analysis must ensure that all are contributing to the strategies defined. This helps to avoid the disjunction between financial goals and what each person does on a day-to-day basis to contribute to those goals. This is why many organizations are now implementing performance management and balance scorecard programmes.

Managing performance using balanced scorecards

Companies are searching increasingly for ways to incorporate intangibles, such as quality of management, customer retention, R&D and innovation, into their regular performance evaluations. They need to identify key measures for their firms and industries and allocate resources to strategically manage these important intangibles.

Through strategic performance measurement or balanced scorecard systems, they are gathering critical non-financial data to help identify problems, improve processes and achieve organizational goals in ways that can be understood and used at all levels of the organization.

A study completed by Ernst & Young shows that not only do non-financial measures matter to corporate executives, but more importantly that investors take these measures into account when valuing companies. The study highlights the need for companies to identify the key non-financial measures that matter to investors in their industry in order to gain or sustain a competitive edge. Performance measurement and management programmes have the potential to affect, and ideally to improve a company's share price and by extension its ability to compete for capital.

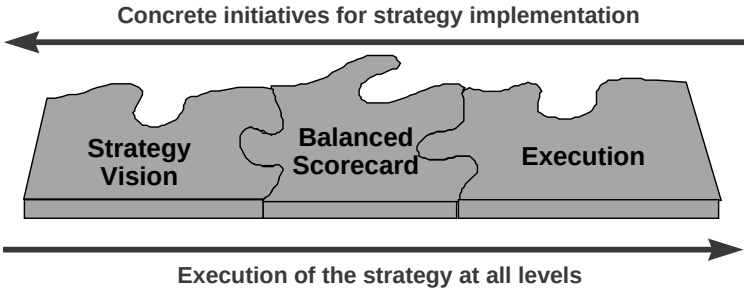
Performance management objectives

The goal of performance management is to provide linkage between business strategy and the day-to-day execution of that strategy. Performance management provides a way to gauge success in executing strategies using both financial and non-financial measures. It provides the key link between strategy and the actual execution of that strategy. Traditionally, many organizations have measured what is being executed without realizing how that was linked to ultimate execution. And today they are realizing that they must review their current performance measurement systems in order to track progress towards achieving organizational goals and objectives, identify improvement opportunities and use performance measures as enablers of change.

The performance management process must ensure that all are contributing to clearly defined and communicated strategies. This process aims to influence behaviours in support of the strategies. As a result, recognition and rewards should be based on performance to a set of measures that support the

goals and strategies. This helps to avoid the disjunction between financial goals and what each person does on a day-to-day basis to contribute to those goals.

A balanced scorecard is a concise set of the vital few measures that comprise a consistent, reliable and meaningful reporting system for senior management. It is used to assess and monitor short- and long-term business performance – both financial and non-financial. The components of the balanced scorecard consist of key measures that define success in achieving business objectives. Therefore, the components of a balanced scorecard are unique to each company's strategy and initiatives. In brief, the balanced scorecard offers a consistent, structured approach to translate the strategy of the organization, developed by senior management, into concrete activities of the workforce.



The performance management cycle

The performance management cycle comprises three phases:

- Measurement definition
- Scorecard reporting and analysis
- Business and operations assessment

The cycle (Figure 12) begins at the measurement definition phase and continues until there is more information to feed and again develop measures and their definitions.

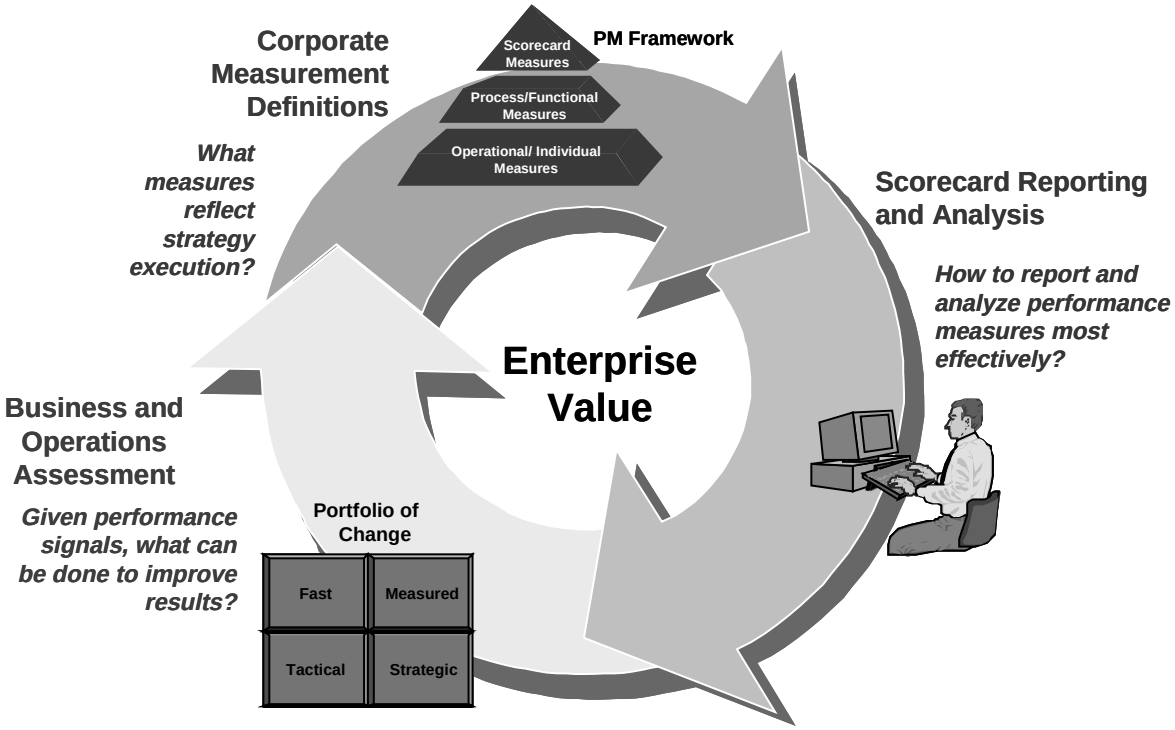


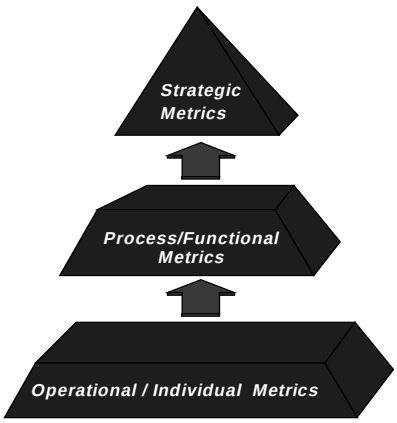
Figure 12 – The performance management cycle

The measurement definition phase involves the selection of measures, the setting of targets for those measures, and the definition and calculation of measures. The balanced scorecard involves a periodic review and revision of the measures.

The scorecard reporting and analysis phase involves the development and implementation of the process of data collection, report generation and usage, and the review and analysis of measurement information.

The business and operations assessment phase is the process of using the balanced scorecard to make sound business decisions. This involves reviewing the results, monitoring the business (tactical and strategic), and developing action plans and follow-up.

There should be an alignment of the measures to the strategic direction at all levels.

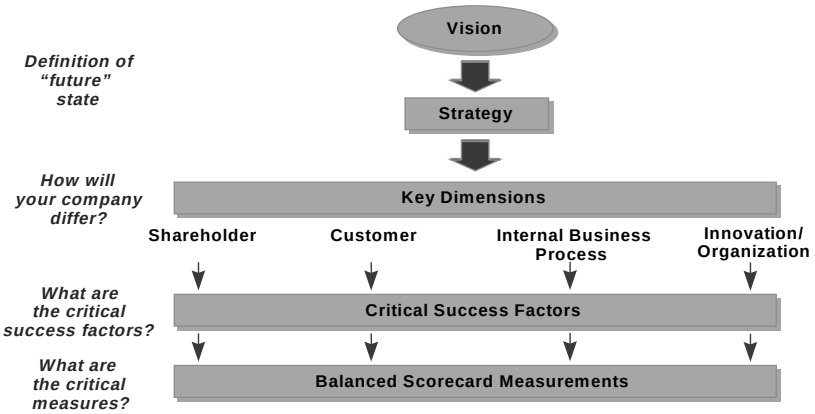


To develop the measures, the focus will be "top-down". Measures will first be determined for the strategic level of the business (enterprise/business unit/country). These measures will be used to drive the development of measures used for tactical decisions at the process/functional level. Finally, measures will be developed at the operating unit level. These measures will affect the behaviours in the organization by reaching all individuals. Reporting, however, will occur in a "bottom-up" fashion. Measures from the operating unit will align themselves and impact the measures at the process level. The process level measures will align with and impact certain measures at the strategic level.

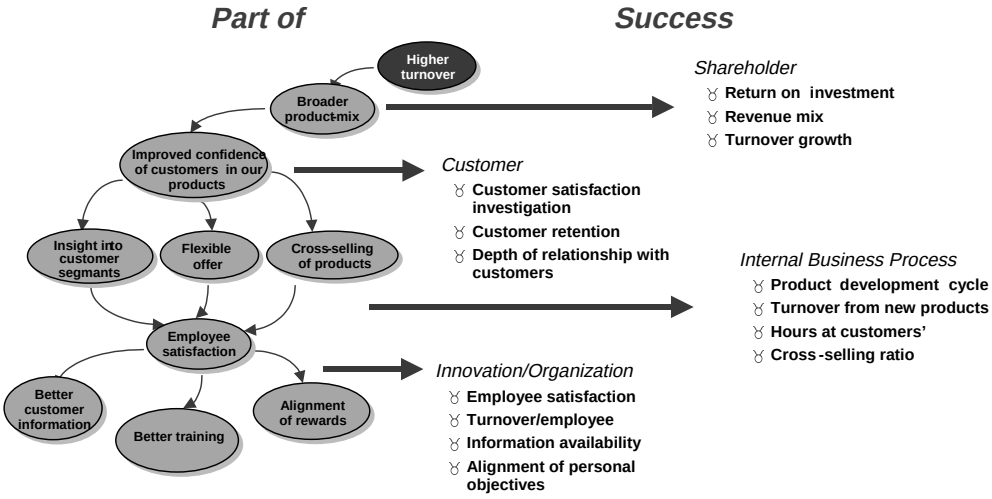
Strategic control

The balanced scorecard approach focuses on understanding and measuring the critical success factors associated with strategy implementation. It translates the strategic objectives into measurable indicators in four key dimensions, namely:

- Shareholder *(How do we create value for our shareholders?)*
- Customer *(To meet our financial objectives, what surplus value should we offer our customers?)*
- Internal business process *(To be able to provide our customers with this surplus value, what processes must we excel at? What infrastructure do we need?)*
- and innovation/organization *(To excel at these processes, what capabilities, experience, information and innovation possibilities must we possess?).*



In addition, as illustrated below, all measures leading towards the same value objective can be linked through cause-and-effect diagrams, translating the strategy into operational goals and clearly defined expected results. Moreover, defining those linkages allows formal validation, management and control of the company goals and objectives.



Implementing performance management

Guiding principles

- Organizations should take a holistic approach to developing performance measurement information within their organizations.
- Performance measurement should be viewed as a key business process with continued focus on improvement and enhancement.
- Performance measurement information should focus management attention on activities that create value and should be integrally linked with their overall strategy.
- Performance measurement should be an integral part of the overall culture within organizations.
- Sharing of knowledge is critical to the successful integration of performance measurement within the overall culture.
- Performance measurement should be used as an instrument of change within organizations.

Operational infrastructure

Operationally, companies need to invest in technologies that will seamlessly integrate the performance measurement infrastructure to improve overall efficiency. They also need to provide improved information delivery tools to enable the access and analysis of information by managers and executives. Organizations must invest in and manage their performance measurement processes to be flexible and responsive to change.

Internal communication and knowledge management

Sharing of knowledge is a key to the success of any performance measurement process. Knowledge management is a combination of process, technology, people and cultural attributes coordinated to ensure value creation. Sharing of knowledge across the organization through the creation of common approaches, consistent methodologies, comprehensive databases, credible information and user-friendly development and analytical tools for access is critical to ensuring extensive and active participation and buy-in at all levels. Since a very important component of this is to get people involved, internal communication tools and channels must be carefully designed and spread throughout the whole organization.

The Economic Regulation of the Internet

Today, no issue divides the Internet community as much as that of Internet regulation. For some, Internet is simply a new method of communicating and doing business, and thus the regulatory framework will need to be adapted and altered, but for others, the Internet should be treated like any other industry, and if necessary should be regulated.

Indeed, the Internet is a revolutionary, global medium. It combines elements of telecommunications, computing, broadcasting, publishing, commerce and information services into a new model for communications. Thanks to technical progress, traditional circuit-switched telecommunications and packet-switched Internet are steadily converging. The functionality of the Internet and the public switched telephone network are merging with Internet service providers, on one hand, increasingly offering telecommunication applications, and telecommunication carriers, on the other, steadily migrating their networks to digital transmission.

Consequently, the differences between the Internet and the PSTN are more than a clash of cultures: each historically uses radically different technologies, architectures and pricing mechanisms.

Thus the Internet in many ways breaks all the modes of regulatory classification applied to traditional telephony. Its expansion and growth create both risks and opportunities in the emerging "war of two worlds" between telecommunication carriers and Internet providers.

The regulatory challenge in classifying the Internet using the older models applicable to telecommunication is difficult at best and quixotic at worst. Unlike circuit-switched telecommunications, packet-switched Internet communications "share" bandwidths, so there is no physical connection between client and host computers. Moreover, IP addresses are inherently non-geographic. Therefore, regulation must be appropriately be tailored to the technology and economics of the medium. PSTN type regulation cannot simply be applied to the Internet.

This trend in technological convergence creates business instability, as the roles of the various players are changing rapidly. Business instability in turn leads to regulatory conflict.

LDCs are even more concerned by these problems regarding the convergence of the two worlds. The new digital technology they are implementing speeds up the convergence of both worlds. This study highlights some current areas of controversy raised by this convergence that are likely to be main concerns for those countries. Although the regulatory treatment of the Internet is highly complex, this study suggests potential solutions to some of the current issues faced by a regulator. These problems caused by convergence mainly concern the access charges and the development of IP telephony.

Access charges

Access charges – the fees paid by long distance telecom providers to local exchange companies (LECs) for originating and terminating calls using local network facilities – are the next battleground in the war between the PSTN and the Internet.

In many nations, the enhanced services utilizing computers for storage and retrieval are treated differently from the plain old telephone service (POTS), with the former exempt from paying the access charges. This is verified under the following mechanism. ISPs typically purchase business lines from local phone companies. Those lines usually include a flat monthly charge, and a per-minute charge for making outgoing calls. Because ISPs receive calls from their subscribers rather than making outgoing calls, ISPs generally do not pay any per-minute charges for their lines. By contrast, access charges for long distance companies include per-minute fees for both outgoing and incoming calls.

What is so special about the Internet?

(*Source:* CHALLENGES TO THE NETWORK – Internet for Development – 1999)

To address the question of what makes the Internet special, it is useful to consider a closely related question: what makes the Internet different from other telecommunication services, such as those which run over the public switched telephone network (PSTN). There are arguably a number of differences.

Underlying technology: both the Internet and the voice telephone network run over essentially the same wires but the equipment attached to those wires and the use made of them is different. On the Internet, messages are broken down into digital "packets" of data which means that the wires can be used much more efficiently, to carry a much higher volume of information at a lower cost. Pricing: the PSTN has traditionally been priced on the basis of usage. By contrast, the dominant pricing principle for the Internet is flat-rate pricing. The model for wholesale pricing differs too. A service provider terminating a particular telephone call receives a fee for doing so. By contrast, on the Internet, there is almost no flow of cash on an end-to-end basis. On the telephone network, developing countries are net recipients of financial flows, but on the Internet they make net outpayments for carriage of their traffic.

Traffic flows and value flows: in most telephone calls, the traffic flow is approximately even between the caller and the called party. But with web-browsing, the traffic flow is highly asymmetric with the main flow being towards the party which originated the call, who also gains most value from the call.

US-centric: whether measured by the location of Internet users, websites or the direction of traffic flows, the United States takes the lion's share of the Internet. This is reflected too in the policy-making process in which all major decisions have, until now, been effectively set by the United States.

Pace of diffusion: while it took the telephone close to 75 years to reach 50 million users, it has taken the World Wide Web (WWW) only four years to reach the same number (see Figure 1). On the supply side of the equation, the number of international carriers grew to more than 1000 in 1998, but this is still a long way behind the estimated 17 000 Internet service providers (ISPs) that have mushroomed around the world.

In many cases, however, Internet service providers offer services directly competing with long distances services. For example, there are several fax servers that accept emails which are converted to a local fax call. There are also several Internet telephony software packages that allow for long distance voice calls. In some cases, these systems offer interconnection with the public switched telephone network.

Therefore, is it appropriate that the Internet providers avoid exchange access charges? But should the access charges for ISPs be addressed in the context of overall access charges for telecommunication providers? And would imposition of usage base access fees on ISPs threaten the flat-rated pricing plans currently available for Internet access?

On one hand, through regulation, the ISPs will incur some costs, but on the other, they will potentially benefit from this regulation. So the regulator is facing a trade-off between positive and negative impact. Many countries have already adopted some regulatory positions. In the United States, the Federal Communications Commission (FCC), following a consultation decided not to allow local telephone companies to impose per-minute access charges on ISPs. In the European Union, Internet telephony is not regarded as a "voice telephony" service, therefore the providers are not subject to access charges.

Moreover, LECs are arguing that increasing Internet "dial-up" usage is creating "congestion" of the PSTN, thus increasing switching costs for the LECs. Individuals who access the Internet via the telephone service generally have lengthier calls. In order to maintain the same quality of service for voice telephony, the local carriers have to add significant capital equipment in terms of switches and lines. According to the LECs, the regulatory question is: who pays for these increased costs?

IP telephony and regulation

Another approach to offer telephony is to provide a voice telephony service bundled with Internet access. The technology, which goes under the generic name of Internet telephony, is currently experiencing explosive growth. While, in its early days, Internet telephony was mainly used by hobbyists and computer freaks, today it is changing into a highly potential mass market. Internet

telephony has evolved from a service that was available only between similarly equipped computers, into a service that allows a call to be made from a computer to any telephone or fax. Today, it is even possible to phone from telephone to telephone with the call routed through the Internet.

Broader national and international regulatory concerns may arise with regard to Internet telephony. Should Internet telephony providers be licensed? Should they be subject to the same regulatory regime as other telecom providers? Should they be required to contribute to universal service obligations? Should they be subject to broadcasting regulation (e.g. on advertising, content filtering...)? Should their operations be taxed? Brief answers to these questions are proposed below.

Computer-to-computer IP telephony

When equipped with multimedia PC and specific software, Internet users simultaneously logged-on are able to talk together: this is IP telephony. The main advantage of this system is that both users avoid any usage-based telephone charges. However, for the regulator, this aspect of Internet telephony can be seen as a negligible concern because it represents a minority market mainly used by computer enthusiasts. Given the quality of the service, which remains lower, it is unlikely to become a substitute service of the plain old telephone system.

Computer-to-phone IP telephony

In this case, suitably equipped Internet users are able to call any telephone user (but not necessarily vice versa) worldwide. The main motivation for this system is the substantial reduction in international telephone charges it implies.

For the regulator, the main concern here is that Internet telephony constitutes a possible by-pass of a legal PTO monopoly (if applicable) for the origination and termination of international telephone traffic. It may also be regarded by the regulator as a possible threat to the revenue base of the PTO.

Phone-to-phone IP telephony

With this system, any telephone user may reach any other telephone user, with the call transiting through the Internet. The main motivation for such a system is the accounting rate bypass it implies.

For the regulator, there is also a possible bypass of a legal PTO monopoly that the regulator should control. But other problems may arise, such as possible congestion at the local switch due to the large amount of bandwidth required, thus the problem of access charges arises again.

IP telephony costs and benefits resulting from regulation

Potential benefits

- ISPs could have access to interconnection at wholesale prices
- Regulators could protect ISPs against unfair practices by the incumbent
- ISPs could offer other telecom services and build their own infrastructures
- Bona fide ISPs may benefit from legitimization and the exclusion of rogue traders

Potential costs

- ISPs may be required to contribute to universal service obligations
- ISPs may be required to pay settlements for delivery of traffic
- ISPs may be obliged to permit telephone tapping by official agencies
- ISPs may have to submit to some sort of price control or code of practice

Source: Dr Tim Kelly. ITU, Internet Telephony, Regulatory Issues.

Internet regulation key themes summary

1. *Internet telephony: to regulate or not to regulate?*

   Internet telephony is facing huge growth in the number of its subscribers, and the use of this new technology is fading the border between traditional voice telephony and enhanced voice telephony. Thus, the convergence of the plain old telephone system (POTS) is calling for some regulation in this field. However, the regulation applied to POTS may not be duplicated for the Internet given the differences between the two systems.

   Any regulator could ask the following questions. Should the Internet be subject to the same regulatory regime as other telecommunication services? Should it be required to contribute to universal service obligations? Should it be subject to broadcasting regulation (e.g. on advertising, content filtering...)? Should its operations be subject to access charges?

2. *Access charges*

   Local exchange companies (LECs) are arguing that increasing Internet “dial-up” usage is creating congestion of the PSTN, thus increasing switching costs for the LECs.

   Individuals who access the Internet via the telephone service generally have longer calls. In order to maintain the same quality of service for voice telephony, local carriers have to make significant investment in equipment in terms of switches and lines. The regulatory question here is: who is going to pay for these increased costs?

Towards a Wireless Connected Society

Mobile telephony: a worldwide growth

According to the Ernst & Young Leadership Connection study findings, our prediction here is that wireless communication is going to become the standard for voice communication. Now, will it happen next year? Probably not, but it is beginning to happen around the world and we're already seeing the early indicators that this is where we are going.

Subscriber growth

If we look at the growth rate of wireless versus wireline (Figure 13), we observe a sevenfold difference in subscriber growth for wireless versus wireline. The growth rate of wireless telephony in Africa – where a fixed line telephony network has not been built out completely – is 108% a year! And even in parts of the world with very well built out telephony, like Europe and the Americas, we still see huge growth rates in subscribers for wireless telephony of 48% and 44%, respectively.

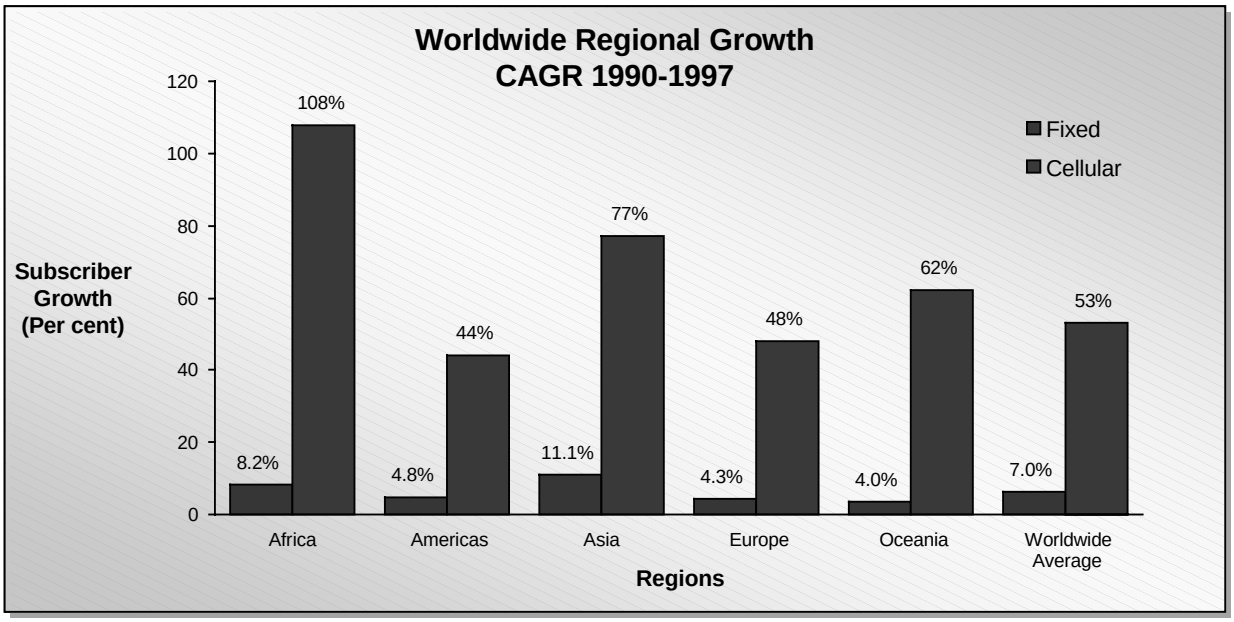


Figure 13 – Mobile telephony subscriber growth worldwide

Source: ITU, World Telecommunication Development Report, 1996-1997.

Mobile wireless versus fixed voice

As Figure 14 shows, the number of mobile wireless subscriber lines is growing approximately six times faster than fixed lines and, given current growth rates, should surpass the number of fixed subscriber lines by 2008. Other data peg the worldwide average for mobile wireless subscriber growth at 7.6 times that of fixed lines, though specific geographies vary widely: in Africa it is 13 times higher, in Europe 11 times, and in the Americas 9 times. Whether mobility is a basic human instinct embedded from the time of nomadic tribes or an outgrowth of hectic late twentieth century life, we can conclude that the idea of being connected regardless of location has been fully embraced by people.

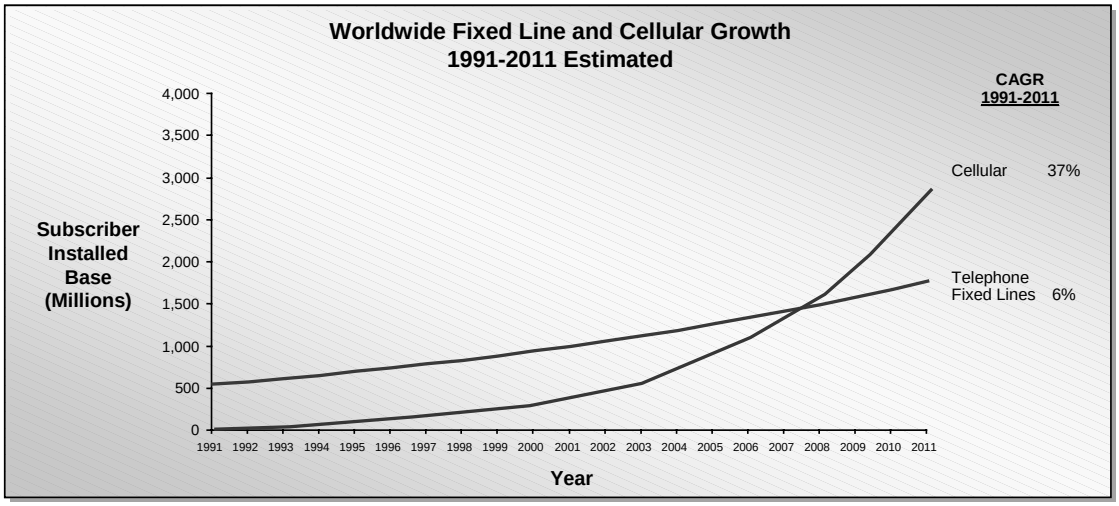


Figure 14 – Mobile wireless penetration is poised to exceed fixed penetration globally by 2008

Source: The Strategies Group, 1996; ITU Telecommunication Indicators Database; The Leadership Connection TM interviews, Ernst & Young Analysis.

Revenue growth

Most of the revenue still tends to go to fixed line and most of the minutes still go to fixed line. But if we look at the growth rate (Figure 15), we see a very fast growth rate, especially in Asia-Pacific and Europe, for revenue going to wireless communication.

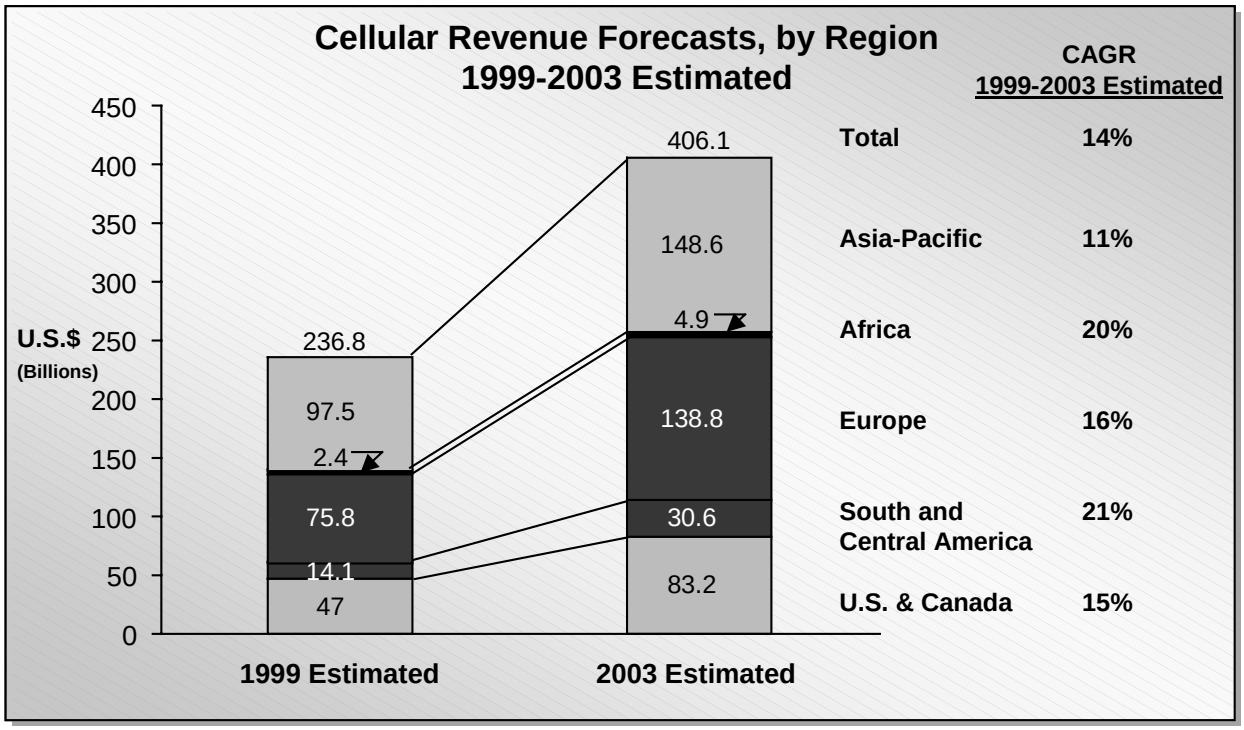


Figure 15 – Cellular revenue is projected to grow globally

Source: Ovum, "Ovum Forecasts, Telecoms, the Internet and Digital TV", 1999.

Finally, wireless represents a fast and cost-competitive way to enter the local loop for voice services. We see this happening in both developed and developing nations. In developed nations, it's a way for competitors to enter; in developing nations, it's simply the fastest way to build out service.

The mobile telephony evolution model

Ernst & Young has developed a model that is useful for informing strategic thinking and for predicting market dynamics in a given service area. The model (Figure 16) describes four stages in the development of any mobile wireless market.

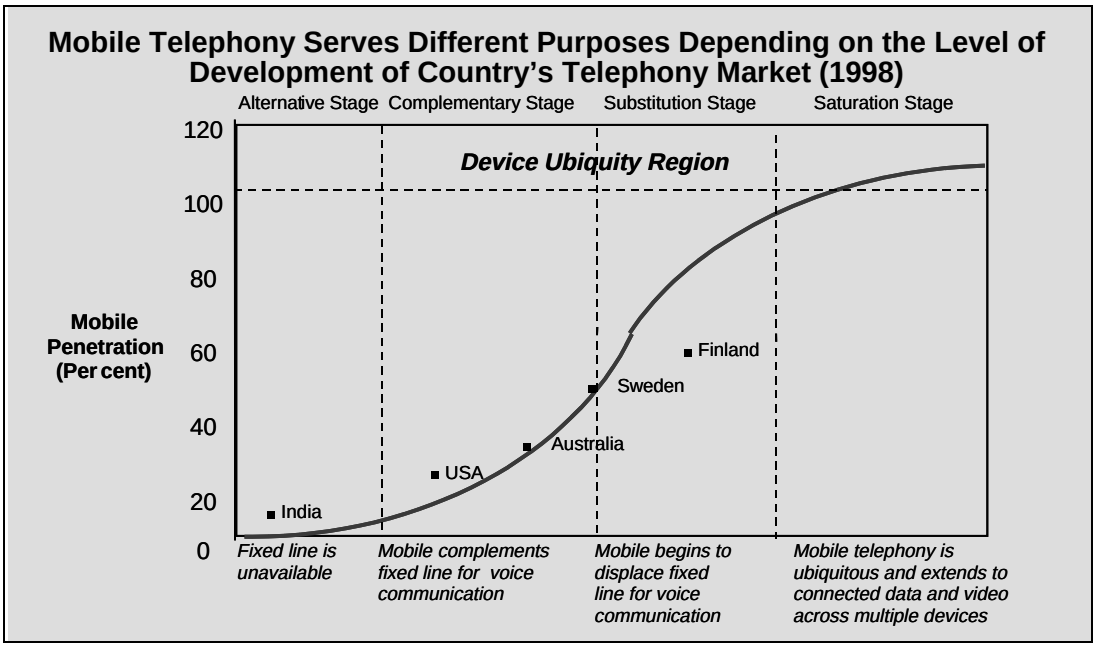


Figure 16 – Mobile telephony growth follows an evolution towards market saturation
Source: The Leadership ConnectionTM interviews, Ernst & Young Analysis.

- The alternative stage, where the fixed-line service is either not available or very limited. We see this today in many developing countries.
- The complementary stage, in which the developing mobile service complements a well-developed fixed-line infrastructure, and the two services co-exist. This is the standard in most developed countries.
- The substitution stage, where mobile begins to displace the fixed-line service for voice communications. Early pioneers in this direction are in Europe, particularly Scandinavia.
- The saturation stage, where mobile personal telecommunications are ubiquitous, are used for data and (limited) video as well as voice, and employ a cornucopia of diverse choices in mobile personal communication devices. Wireless system-to-system communications have also become widespread.

The characteristics and drivers of each stage are different. And it is important to note that this evolution is not necessarily linear and will be different for each geographical area. For instance, an area that begins in the alternative stage is likely to bypass the complementary stage.

Surprisingly, certain countries have raced through their complementary stage and are now either in the substitution stage or headed there shortly. The saturation stage is not likely to occur within a five-year horizon because it is dependent on the deployment of third-generation wireless infrastructure and user terminals capable of significantly higher data throughput rates.

Alternative stage

To understand alternative stage telephony, we need to look at the growing gap between demand and supply (Figure 17). Demand, as ITU measures, is not just people who want a phone, but people who can pay for a phone and just cannot get one. About a quarter of the world's countries have a waiting time for a phone of under a year, and almost three-quarters of countries in the world have a waiting

time of over a year. In fact, about half the world's countries have a waiting time of over two years for a fixed line phone. Insufficient supply in many developing countries creates a market for wireless as an alternative telephony choice. In some areas in developed countries, if you're a customer building a new house and you ask for a phone, you will be told that you cannot get one for X months, but a cell phone will be sent to you.

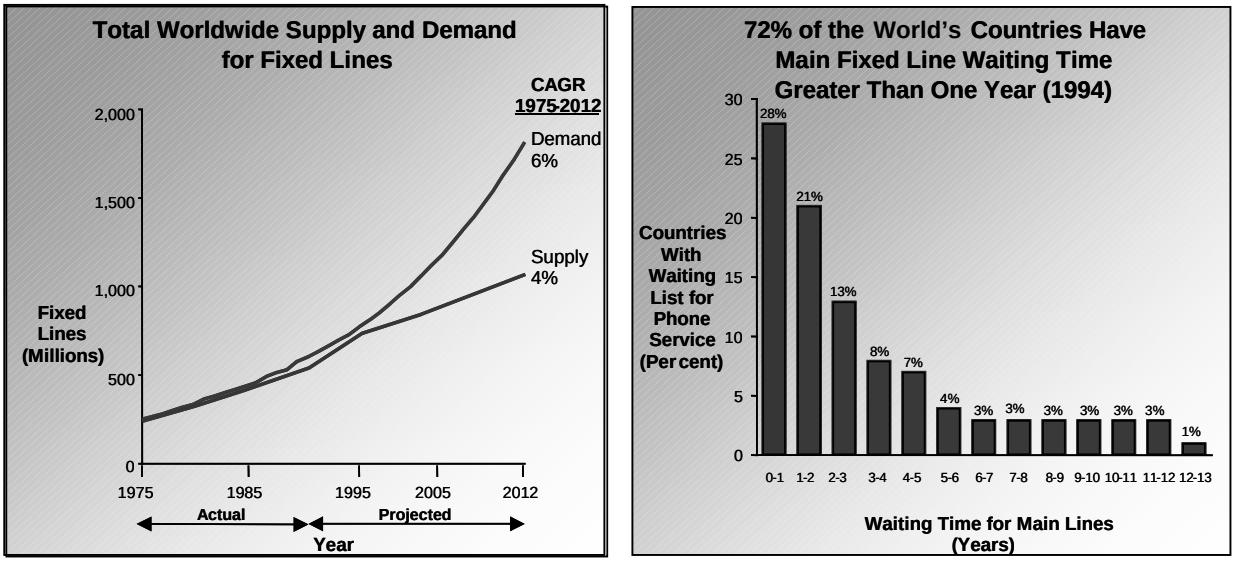
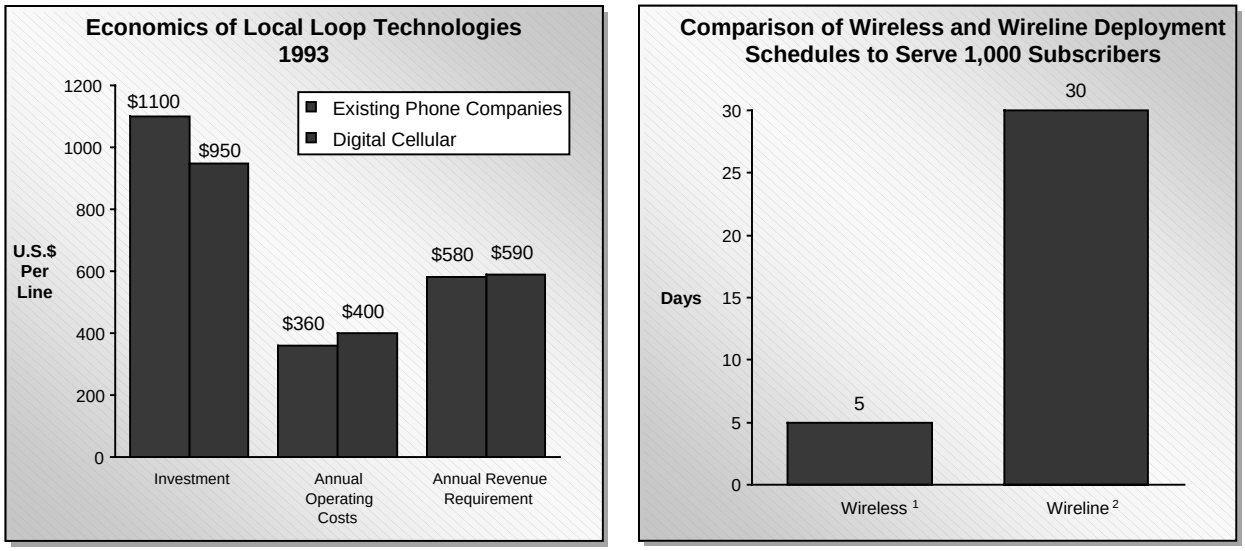


Figure 17 – Insufficient supply in many developing countries creates a market for wireless as an "alternative" telephony choice.

Source: ITU World Telecommunication Indicator Database – 1997;
The Leadership ConnectionTM interviews, Ernst & Young Analysis.

Moreover, digital cellular, which offers a cost structure comparable to fixed lines (Figure 18), is economically competitive and the time for building out infrastructure is shorter.



1 Wireless: 2 people installing 1 cell site with 1000 Erlang Capacity

2 Wireline: 2 people installing 1000 drops (typical rate is 30 drops/day)

NOTE – Assumes 100% penetration.

Figure 18 – Wireless is increasingly cost competitive with fixed, especially in new infrastructure areas

Source: Crandall, Robert, and Leonard Waverman, Talk is Cheap, Table 7-4, 1995;
Qualcomm, Asia-Pacific Telecommunications, September 1998; E&Y Leadership Connection TM interviews.

Therefore, we believe that the connected society will see developing countries increasingly rely on wireless to provide basic telephony. Consequently, the complementary stage will probably be bypassed; wireless will directly become the choice medium for voice telecommunications. Cambodia illustrates well how a low fixed main line penetration rate and large unsatisfied demand lead to dramatic wireless subscriber growth (Figure 19).

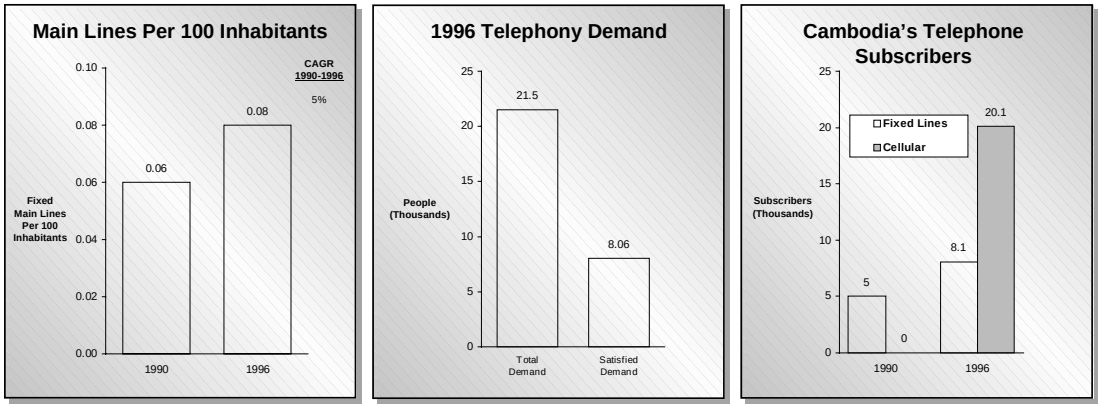


Figure 19 – Mobile telephony as an alternative to fixed line telephony in Cambodia

Source: ITU, World Telecommunication Development Report, 1998.

Complementary stage

Complementary stage markets are triggered by significant price declines leading to increased usage. The two main factors in play here are: (1) prices are declining, but (2) minutes are starting to go up. As minutes become cheaper, people use cell phones more. The revenue per user levels off, but the number of subscribers rises dramatically. However, because of the big increase in subscribers, revenue continues to grow despite the lower prices.

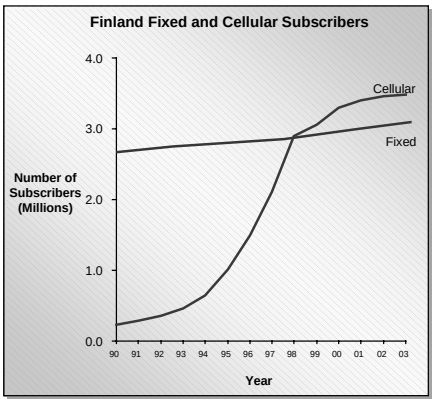
Substitution stage

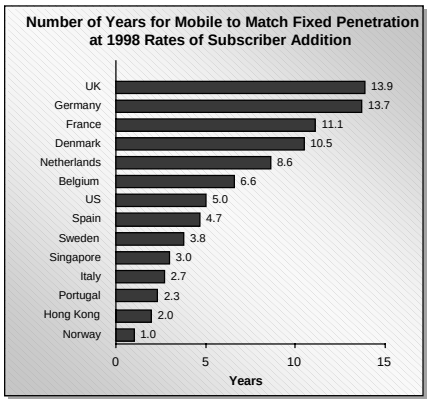
In the substitution stage mobile wireless subscribers actually begin shutting off their fixed lines, a primary industry driver being the declining profitability per subscriber that the industry faces. Capturing fixed line revenues will allow wireless operators to move to positive profit growth. For consumers, once quality, reliability and coverage reach an acceptable level, and the pricing differential has diminished or been eliminated, why have more than one phone number? Thus wireless begins to replace wireline.

Only Finland is already at the substitution stage (Figure 20): mobile wireless subscribership overtook fixed subscribership in 1997. Sweden stands on the threshold: the last year in which Telia, the nation's PTT, had a net increase in fixed lines was 1992. Since then it has shut down thousands of lines each year, with annual net reductions of up to 25,000. During the same period, annual new mobile wireless subscriptions have soared from approximately 100,000 per year to between 500,000 and 650,000 per year. As Figure 20 shows, the phenomenon is not limited to Scandinavia.

Saturation stage

This is the stage at which broadband data communications become wireless and mobile, and PCs, intelligent devices and mobile phones merge into "smart user terminals". But the saturation stage requires standards and technologies that are still on the drawing board and many industry executives are sceptical of ever getting to this stage because of the continuing advantage fixed lines will have for carrying broadband data. But so much energy and money is being invested here that Ernst & Young expects to see the most advanced areas of the world (in terms of mobile wireless evolution) begin edging into the saturation stage at the very end of a five-year time horizon.





NOTE – Population of Finland in 1996 was 5.14 million.

Figure 20 – Mobile telephony penetration surpassing fixed penetration

Source: ITU, Indicator Database; Bloomberg News, December 1998; Francis Woollen, Global Wireless Communications Industry – Growing Minute by Minute, Goldman Sachs, February, 1998; Ernst & Young Analysis.

Competition in mobile wireless telecommunication markets

Competition in the mobile wireless market is a worldwide trend: to date, about sixty countries around the world have granted licences to two or more wireless providers.

> Most Eastern European countries have licensed two wireless providers, and second operators are emerging in many countries of the Commonwealth of Independent States, including Russia, Ukraine and the Baltics, where wireless constitutes most of the growth in installed lines. Second operators are also present in East and South Asia. Competition has been introduced in many countries in the Middle East and North Africa (Egypt, Lebanon) and will soon be introduced in others (Morocco). Several sub-Saharan African countries (Côte d'Ivoire, Madagascar, Tanzania) have also introduced a second GSM operator. (The World Bank Group, 1999)

But what does competition introduction mean for customers and wireless operators?

In particular, we observe that, where it exists, competition globally implies (1) a decline in wireless pricing, (2) the provision of new services, (3) the introduction of new payment schemes and (4) new challenges for the incumbent operator:

Decline in wireless pricing

As wireless markets are becoming increasingly competitive, wireless service pricing around the world continues to decline (Figure 21). Worldwide wireless prices have decreased by an average of 36% between the fourth quarter of 1996 and the first quarter of 1999.

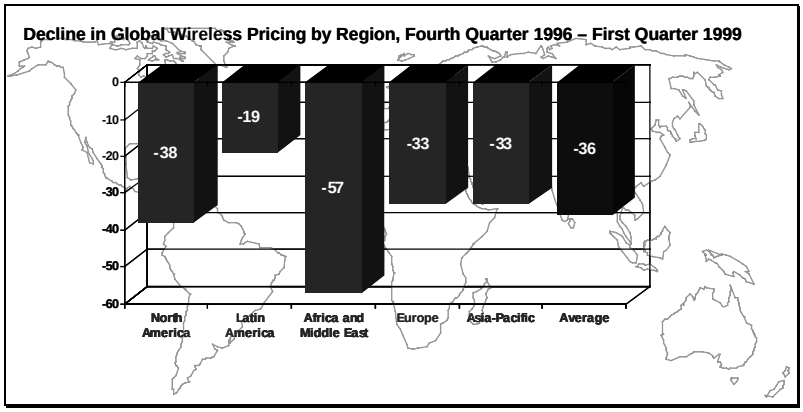


Figure 21 – Worldwide wireless prices are decreasing

Source: The Yankee Group, 1999.

The World Bank Group observes that in several competitive markets the average price of a call from a mobile handset is 40 to 50 per cent lower than in markets with a single provider. In the Middle East and North Africa it is Lebanon, where competition is most intense, that has the lowest prices (7 cents a minute, against a regional average of 40 to 50 cents a minute). Prices have also fallen sharply in several markets in western Europe: four years after the introduction of competition, tariffs had dropped by as much as 60 per cent in Norway and as much as 70 per cent in Germany.

In addition, as wireless prices decrease, the premium over wireline rates also falls, making wireline displacement more likely to occur and service affordability increase, which leads to penetration rate growth. Figure 22 illustrates the correlation between affordability of wireless services – measured by the percentage of the total monthly salary a wireless bill of 100 minutes of use would consume – and penetration in selected cities.

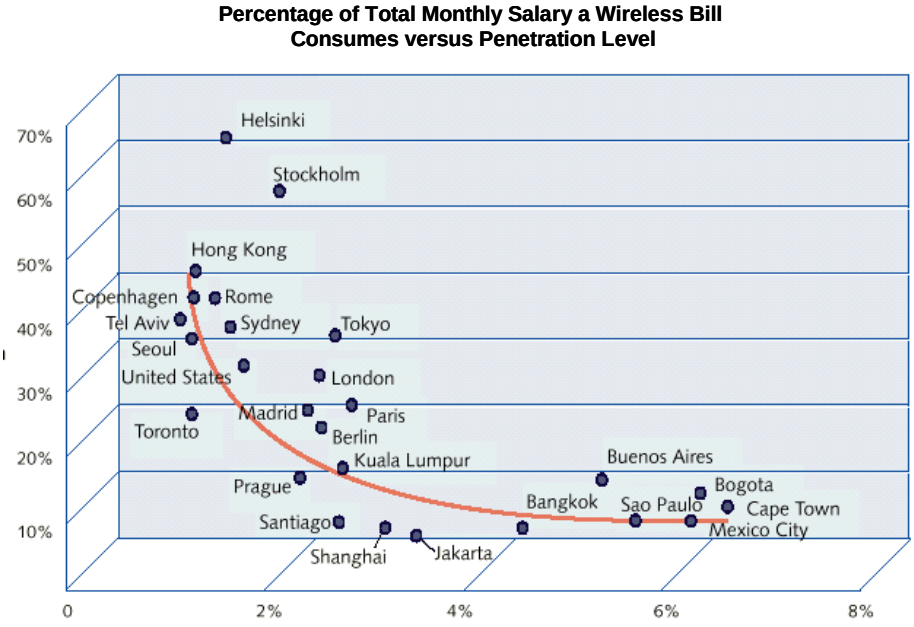


Figure 22 – Correlation between affordability of wireless services and penetration level

Source: The Yankee Group, 1999.

New services introduction

Another positive consequence of competitive wireless markets is the offering of a broader range of services. In addition to price reductions, incumbent operators and new entrants start competing on services and introduce more and more new features, such as caller ID, call forwarding, call waiting or voice mail services. So competition leads to more complex services and to a broader customer choice.

New payments schemes

In several developed and developing countries, competition has also stimulated the introduction of prepaid cards. Prepaid cards are an increasingly important segment of the wireless market that has been a key driver of growth in penetration rate, especially in light of the financial and economic crisis experienced.

In the United Kingdom, for example, there were over 2.5 million new subscribers in the fourth quarter of 1998, three quarters of whom selected a prepaid plan. In France, about 30% of new subscribers signed on to prepaid packages.

In Asia, where carriers have struggled with bad debt resulting in high churn following the economic turmoil experienced in 1997 and 1998, a rebound of the wireless industry had been driven by the increase in prepaid services. In the United States, about 30% of applicants for wireless services are rejected due to bad credit creating a large potential market for wireless prepaid services.
(The Yankee Group, 1999)

Therefore, there is a large market potential for wireless prepaid services in countries with a high percentage of low-income population, cash-based economies and an unstable economic environment that threatens consumer solvency.

New challenges for the incumbent operators

Finally, it appears that introducing wireless competition does not necessarily harm the operational and financial performance of the incumbent operator. The challenge for incumbent operators now stems from the fact that the people who own the wireless cellular operations are often largely the same people who own the fixed line telephony operations. By entering the mobile market, they switch customers to wireless and open themselves up to competition that they didn't face when the customers were wireline. And the incumbent has to reinvent itself to be a mobile communication company and not just a wireline communication company. Nevertheless, evidence from both developed and developing countries shows that incumbents are able to react appropriately:

- The threat of new competition is usually enough to make the incumbent operator review its strategy in order to maintain its competitive advantage.

  In Morocco, for example, where wireless competition is expected to be introduced in 1999, the incumbent is rapidly expanding its wireless network and reducing its tariffs to consolidate its market position.

- As new wireless operators start to enter the market, the incumbent maintains its efforts to increase its competitiveness, enabling it to enlarge its subscriber base and retain a large share of the growing wireless market. This strategy is observable in both developed and developing countries.

  In Belgium, the incumbent operator, Belgacom Mobile, has expanded from about 200,000 subscribers at the beginning of 1996, the year in which competition was introduced, to more than 900,000 today.

  Italy's incumbent operator – Telecom Italia Mobile – has increased its subscriber base from about 2 million at the end of 1995, when competition from Omnitel was introduced, to about 12 million today, retaining about 72 per cent of the mobile telecommunication market and 65 per cent of the wireless segment. Estonia's incumbent operator, Eesti Mobiltelefon, more than doubled its number of subscribers after the entry of two operators into the mobile market. Having achieved annual growth rates as high as 98 per cent in 1997-1998, Eesti Mobiltelefon holds about 60 per cent of the wireless market.

Nor does the advent of competition in the wireless market seem to harm the incumbent's profitability.

- The large investments in mobile infrastructure that incumbents typically make to build up barriers to entry reflect strong confidence in the continued profitability of the wireless business. And when the incumbent is a provider of both fixed and mobile services, its overall profitability does not seem to suffer either. In some countries, the incumbent's overall profitability has tended to increase.

  In Spain, the incumbent operator increased its revenues by 72 per cent in the year in which competition was introduced and by 31 per cent in the year before. In the same period, the growth rate of profits increased from 8 per cent to 16 per cent.

As Figure 23 shows, the introduction of new wireless players into the market, providing new services and attracting new subscribers, tends to globally increase overall investment in telecommunications as well as revenues from them.

Telecommunication revenues before and after wireless competition

(%)	YC–1		YC (a)		YC+1	
	Telecom revenue as a share of GDP	Mobile telecom revenue as a share of total (b)	Telecom revenue as a share of GDP	Mobile telecom revenue as a share of total (b)	Telecom revenue as a share of GDP	Mobile telecom revenue as a share of total (b)
Belgium	1.6	5	1.7	11	1.8 (c)	21
Estonia	2.7	7	2.9	9	–	–
Italy	1.8	14	1.9	21	1.9 (c)	34
Philippines	1.4	10	1.3	18	1.3	32
Romania	1.2	1	1.6	9	–	–
Singapore	3.0	22	3.3	25	3.6 (c)	38

(a) Year in which competition starts

(b) Conservative estimates

(c) Estimate

Figure 23 – Competition introduction induces growth in global investment and in revenues

Source: International Telecommunication Union; Strategic Policy Research.

The wireless local loop alternative

In recent years, there have been several new technological developments and the application of access networks. In the local loop, a wireless access network can complement or replace the local cable telephone loop or establish subscriber access network in areas where the fixed local network is poorly developed. In brief, the term “wireless local loop” (WLL) refers to the distribution of the telephone service from the nearest telephone central office to individual customers or subscribers using wireless technologies.

The base portion of the system is a radio base station hub located at or near the telephone central office or connected to the central office by a microwave backhaul or by satellite. The wireless portion of the system is located between the hub and the individual subscribers, each of whom has a full duplex transceiver with control circuitry which allows an ordinary telephone to be connected to the device. By definition, WLL is a full duplex, voice grade service suitable for voice, fax or data transfer.

There is an enormous demand for a basic telephone service in many developing countries. In locations where fixed network installation would incur large costs, the gap can be filled with a wireless network. Therefore, certain telecommunication companies see this method as a major area of expansion for rural and local subscriber growth. Thanks to their flexibility, speed of installation and cost advantage, wireless access networks have become one of the most interesting alternatives in access techniques for many countries.

International Mobile Telecommunications, the ITU vision of global wireless access in the twenty-first century, is aimed at providing direction to wireless technological developments to assist the convergence of wireless access technologies. In addition, ITU has launched the IMT-2000 initiative to provide wireless access to the global telecommunication infrastructure through both satellite and terrestrial systems, serving fixed and mobile users in public and private networks.

Driving forces and barriers

The take-up of wireless local loop is being driven by:

1. *Unsatisfied demand for network access*

   The long waiting lists for the telephone service in many countries around the world generally reflect the lack of switching and trunk capacity and the unavailability of local loop access. However, the deployment of switches and trunk capacity represents the easiest part of expanding a telephone infrastructure when compared to the effort required to provide network access to each subscriber. Today, WLL systems are fast becoming an economically and technically viable alternative to wired local telephone infrastructures.

   New wireless markets are emerging in the least developed countries, where getting just one or two lines to the average village would be a massive improvement. Here, network infrastructure is largely funded by the urban business user. However, since the marginal cost of adding a few lines on the periphery of the cell coverage is very low, WLL can be a technology of economic and social choice.

2. *Need for economic growth*

   Access to the telephone network is a key aspect of countries' economic development. Moreover, the positive economic impact can be compounded as access to telecommunications attracts foreign investment and further spurs economic growth. Plans for local loop deployment are therefore motivated by the desire to accelerate regional economic growth. However, finding the necessary capital to fund the required infrastructure development can pose significant problems.

3. *Deregulation*

   The effects of telecommunication deregulation in the industrialized and developing economies can be different and distinct. In the industrialized world, deregulation is fostering the development of new services. In less advanced markets, deregulation is accelerating the pace at which the basic telephone service is deployed. But in both cases, increased competition due to deregulation results in increased demand for local loop access.

4. *Technological developments*

   Wireless access systems have benefited from significant advances in technology which have increased their efficiency and reliability, making them suitable in many more situations.

Factors that are constraining the take-up of wireless local loop include:

1. *The cost of systems*

   Many of the operators considering wireless local loop are operating under severe financial constraints. Vendors must develop lower-cost systems for these markets.

2. *Spectrum availability*

   There is little standardization of frequencies for wireless local loop. Regulators must free spectrum for wireless local loop, at suitable frequencies and in suitable quantities, and support moves to harmonization.

3. *Substitute technologies*

   Wireless local loop competes with many other fixed access technologies and, increasingly, mobile communication networks. To succeed, wireless local loop must offer advantages over these alternatives.

4. *The limitations of the technology*

   Some wireless technologies are subject to a number of inherent limitations, such as limited range, inferior line quality and poor security. Vendors must address the market's concerns about these issues.

Wireless local loop advantages

To develop the telephone service, there are basically only two alternatives: install a traditional wireline infrastructure or adopt a WLL solution. Since the installation of wireline is extremely labour-intensive, the cost tends to increase over time with increasing wages and standards of living. By contrast, the cost of wireless technology has been steadily declining in recent years, a trend which tips the balance in favour of WLL solutions. In comparison to the alternative of deploying fixed lines, WLL technology offers a number of key advantages that should be considered:

- *Flexibility*

  Wireless local loop technology intrinsically offers flexibility to meet uncertain levels of penetration and subscriber growth rates. And because the subscriber locations are fixed and not mobile, the initial deployment of WLL need only provide coverage to areas where immediate demand for service is apparent. Further flexibility can be gained in modular WLL systems that allow base stations to be redeployed and network capacity to be redistributed among existing base stations as needed to best meet traffic demand.

  WLL deployment may also be used as a transitional system while a fixed infrastructure is deployed. Once the wireline service is in place, the WLL equipment can then be redeployed elsewhere to allow full amortization of its cost. In brief, easy capacity expansion allows gradual increase of investment and more accurate tracking of user demand growth.

- *Security and anti-disaster capability*

  Wireless systems have higher capability than wire systems against disasters such as earthquakes and floods. And wireless access systems are easy to repair when damaged in disasters.

- *Faster deployment*

  WLL systems can be deployed in weeks or months as compared to the months or years needed for the deployment of above-ground or underground copper wire. Faster deployment can induce faster realization of revenues and reduced time to pay back the deployment investment. Even with the higher costs per subscriber that may be associated with the WLL terminal and base station equipment, the faster rate of deployment can permit a higher return on investment. Rapid deployment can also secure a first-mover advantage with respect to competitive services, accelerate the pace of regional economic growth, and provide political value as tangible evidence of substantive progress in the development of required infrastructure.

  Prime WLL markets are the middle-income countries worldwide. From Russia to Brazil to China, these countries have established themselves as industrial nations, but lack thecessary infrastructure to carry them into advanced status. Speed of deployment is a key factor, as most are facing growing social pressures for a more equitable distribution of the benefits of modernization. Thus service must be delivered at lower capital and operating costs.

- *Lower construction costs*

  The deployment of WLL technology involves considerably less heavy construction than the laying of copper lines. The lower construction costs may be more than offset by the additional equipment costs associated with WLL technology. In urban areas especially, there may be considerable value in avoiding the disruption that the wide-scale deployment of copper lines entails. Moreover, the cost of wireless access networks is independent of the transmission distance, insensitive to such factors as user density, and is especially suitable for areas with fairly long transmission distance and low subscriber density.

- *Lower network maintenance, management and operating costs*

  In some WLL systems, network management, including fault-finding and system reconfiguration, can be conducted from a centralized location to fully administer the WLL network between the telephone network interface and the subscriber terminal. The overall result is reduced network management costs.

- *Lower network extension costs*
  Once the WLL infrastructure is in place, each incremental subscriber can be installed at very little cost. WLL systems that are designed to be modular and scalable can furthermore allow the pace of network deployment to closely match demand, minimizing the costs associated with underutilized plant. Such systems are flexible enough to meet uncertain levels of penetration and rates of growth.

Typical application fields

Finally, some of the cases to which the use of wireless local loop is best suited may be identified as:

- Sparsely populated rural and outlying areas where wire access needs heavy investment and yields lower benefits.
- Areas where it is difficult to lay cables because of the geographical environment or climatic conditions, e.g. mountain areas, islands, water-net regions, deserts, etc.
- Areas in urgent temporary need of the phone service or in cases of urgent access needs such as large construction sites, big sports events, rescue and relief work, public security or emergency operations.
- Newly developed shopping areas and residential areas in cities where there are large phone call demands and where it would need enormous investment and take a long time to build a new local phone network.

Wireless telecommunication key themes summary

1. *Mobile wireless telecommunications*
   Early indicators, including huge growth rates in mobile wireless subscribers, faster mobile wireless than fixed line growth, growth in wireless operator revenues, show us that the idea of being connected regardless of location has been fully embraced by people worldwide and wireless communication is becoming the standard for voice communication.

   Moreover, insufficient fixed line supply in many developing countries, where the fixed line service is either not available or very limited, creates a market for mobile wireless as an alternative to fixed lines for telephony.

   As significant connectivity gaps remain in different places throughout the world, mobile wireless can represent a cost-competitive way to enter the local loop, mainly in highly populated urban areas, as well as a fast way to build out telephony and value-added services.

2. *Competition in mobile wireless telecommunications markets*
   The world's economy is shifting from regulator-driven telecommunications to market choice, mainly led by deregulation, and competition in the wireless market is becoming a worldwide trend.

   When a telecommunication market becomes competitive, new investments are made and infrastructure grows much faster. In addition, competition leads to lower cost to the consumer, to higher service affordability and to broader service offers. Therefore, the shift to market choice can dramatically accelerate progress towards to the connected society.

   However, introducing wireless competition creates new challenges for incumbent operators who now have to deal with a decline in pricing and customer churn. They have to redefine their strategies in order to sustain their competitive advantage. In a competitive wireless market, how can customer base as well as revenue streams be secured and increased?

3. *The wireless local loop alternative*
   In the local loop, a wireless access network can advantageously complement or replace the local cable telephone loop, or establish a subscriber access network in areas where the fixed local network is poorly developed. Key current drivers, including unsatisfied demand for telecommunication services, pressure for economic development and deregulation, plead in favour of wireless access. Therefore, this option should be carefully evaluated as a means to extend telecommunication services to new or under-provided areas, to develop new competitive networks or to bypass the existing local network.

Conclusions

As expected, this report concludes that much effort remains to be made in two key areas of development: the Internet and mobile communications. The creation of a regulatory framework favouring fair competition is also high on the agenda of the TDS participants. It is also not surprising to note that many entities have difficulty in implementing innovative management policies: this is constant in the industry. More surprising, however, is the preference that some countries seem to give to an "improved usage of existing technologies".

I would like to challenge this approach, in particular at the time of opening TELECOM 99 + Inter@ctive 99. Many new technologies for infrastructure, services and applications will be presented which can without a doubt provide most of the developing countries with better alternatives.

I would like to invite future TDS participants to reevaluate the conclusions drawn in 1995 on this matter.

Welcome to TELECOM 99 + Inter@ctive 99.

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