INTERNATIONAL TELECOMMUNICATION UNION

Human resources development and management

BDT
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DEVELOPMENT
BUREAU

ITU-D Study Groups

First Study Period (1995-1998)
Report on Question 5/2

PUBLICATIONS OF ITU-D STUDY GROUPS

Study Period 1995-1998

Study Group 1

Report on Question 1/1	Role of telecommunications in economic, social and cultural development
Report on Question 2/1	Telecommunication policies and their repercussions at the level of institutional, regulatory and operational aspects of services
Report on Question 3/1	Impact of the introduction and utilization of new technologies on the commercial and regulatory environment of telecommunications
Report on Question 4/1	Policies and ways for financing telecommunication infrastructures in developing countries
Report on Question 5/1	Industrialization and transfer of technology

Study Group 2

Report on Question 1/2	Special concerns of developing countries in relation to the work of the Radiocommunication and Telecommunication Standardization Sectors
Report on Question 2/2	Preparation of handbooks for developing countries
Handbook on	*New developments in rural telecommunications*
Handbook on	*New technologies and new services*
Handbook on	*National Radio Frequency Spectrum Management and Monitoring System – Economic, Organizational and Regulatory Aspects*
Report on Question 3/2	Planning, management, operation and maintenance of telecommunication networks
Report on Question 4/2	Communications for rural and remote areas
Report on Question 5/2	Human resources development and management
Report on Question 6/2	Impact of telecommunications in health-care and other social services
Report on Question 7/2	Telecommunication support for the protection of the environment
Report on Question 8/2	Public service broadcasting infrastructure in developing countries

Human resources development and management

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REPORT ON QUESTION 5/2

Human resources development and management

I THE MANDATE

Study Group 2, Question 5/2, was asked to address human resources development and management with a view to changing the management culture of the telecommunications agencies and organizations in order to meet the challenges of the changing environment. The mandate, as defined at the Buenos Aires conference, can be found in **Appendix A**.

II BACKGROUND

1 The new telecommunications environment

1.1 Structure

The sector is undergoing substantial restructuring and is increasingly being liberalized. The functions of policy development, regulation and operations are being separated. Globalization is also modifying the structure of international telecommunications. Sector reform, whether at the stage of separation, corporatization, privatization, liberalization or competition is introducing a completely new dynamic in the industry and defining new roles for government, operators and users.

1.2 Technology

New technologies as well as the convergence of telecommunications, computing and broadcasting are redefining the boundaries of the industry and are also redefining the roles of the sector participants.

1.3 The Sector and its Place in the Economy and Society

A global information-based economy and society are emerging which is changing the way people work and live as well as relationships between all participants (individuals, organizations and governments). Telecommunication is becoming linked with almost all other element of economic and social development. History has shown that the business activities which constitute the infrastructure of a new economy must be implemented first. Once in place they evolve to other economic sectors and eventually permeate, enrich and enhance directly or indirectly the social and cultural components of a society. This was true during the agrarian as well as the industrial based economies. Success of a region or a country was always correlated to successful prior development of the activities that constituted the base of the economy. Telecommunications must therefore become a developmental priority.

1.4 Users/Customers

The trends described above are combining to create new choices and new expectations for all types of users. These new customers will become increasingly more demanding vis-à-vis policy-makers, regulators and operators.

1.5 Unprecedented Rate of Change

The magnitude and rate of change is unprecedented and is singled out as a characteristic of the new telecommunications environment because, as we will see below, it has significant HRD implications.

2 HRD Implications

The new environment described above has significant HRD implications in that the roles of all sector participants are being redefined.

Policy – makers and regulators will require new skills and knowledge to define and manage the reform of the sector. New concerns, like licensing of new market entrants, monitoring of license compliance coupled with dealing with an increasing number of transborder issues such as accounting rates and GMPCS will require new competencies in the areas of:

- policy analysis;
- financial and accounting analysis;
- economic, legal and engineering analysis.

Operators will also require new skills and knowledge as direct or indirect competition is gradually introduced and to cope with the increasing rate of introduction of new usable technologies. The need for both managerial and technical training will be very high and dramatically different in nature. For operators, the most significant training implication will derive from the need to change the mindset **of all employees** from that of a (monopolistic) supplier to one that is focused on a new customer that will increasingly be faced with new supply alternatives and choices.

Managing change and transformation will become the major task and main responsibility of senior managers everywhere. Innovative means will be required to provide technical training in highly dynamic and changing technological environment.

3 Managing Change

Powerful forces are transforming our sector and are creating pressures on organizations to change. The rate of change is not going to slow down. The nature and magnitude of the change required is also very different from what managers have been accustomed in the past: i.e., slow gradual and incremental change. What is now required is substantial, radical and often revolutionary changes to realize the required transformation/reform.

NOTE – For the purpose of this report, “reform” will refer to the required challenge for policy-makers and regulators, whereas “transformation” will refer to the required transition from operating entities. In both cases, major changes need to be implemented.

Transformation is now the central challenge and primary task of leaders in both the public and private sectors.

The problem is that most managers have no history or reference to guide them in this process. Neither universities nor the experience in the workplace have prepared managers to lead this change process.

However, in the last few years, business research from leading business schools and other researchers attempted to address this deficiency. From patterns of successful transformations, a skeleton of theory and practice of cultural and change management has developed and is being integrated into management training seminars and programmes to prepare senior mangers for transformational challenges.

III NEED ASSESSMENT

1 Workplan

The main source of data used by the working group was a comprehensive questionnaire sent to 100 respondents. Seventy-three (73) responses were received and analysed.

Secondary analyses were done using the same questionnaire and responses from 216 additional senior managers from developing countries.

The above were supplemented by personal interviews and two focus groups.

2 Survey Results

2.1 Management Training Needs

Seven distinct categories were surveyed and prioritized. For each category, a number of topics were ranked by order of importance to establish the most important training needs. Detailed results are shown in Appendix B.

The number of employees to be trained was estimated (limited to employees of levels 4 to 7 of the ITU classification).

The availability of training resources was also evaluated.

2.2 Technical Training Needs

Eight categories were surveyed and prioritized. Within each category, topics were ranked. Detailed results are shown in Appendix C.

The number of employees to be trained and the availability of training resources were also evaluated.

3 Lessons from Experience

Through a review of relevant sector reform experiences, the working group undertook to draw lessons relevant to HR "reform" and transformation:

3.1 Availability of Resources: Management, Technology, Financial

There is a growing body of evidence to support the increasing relative importance of the availability of quality management, relative to technology and financial resources, as the key determinant of a successful reform or transformation.

Technology is becoming a commodity and, although still important, is no longer believed and is seldom mentioned as a key to a successful reform or transformation.

Similarly the availability of financial resources will result from, not result in, a successful reform or transformation.

We were reminded that the above finding should not be a revelation since the *Maitland Commission Report* clearly identified HR weaknesses as the major cause of the development gap.

A number of major studies arrived at similar conclusions.

NOTE – The most notorious is a five-year study performed by MIT on the motor vehicle industry.

3.2 Leading Change

Available evidence shows that most public and private entities can successfully undergo major reform and transformation. A review of success stories reveals the following patterns:

The change must be initiated at the very top of the organization and must be lead as well as managed.

NOTE – We distinguish between leadership and management. Leadership is concerned with modifying the culture of an organization by establishing a vision and aligning and motivating people to operate a major useful change. Management operates within a given culture and is concerned with aligning resources to produce planned results.

The change follows a multi-step process that starts with “building the case for change” including the guiding vision of the desired future state, followed by lining up an increasing level of supporters through a structured communications plan covering all stakeholders, and a series of steps designed to operate, reinforce and consolidate the new culture (systems, structures, policies, etc.).

3.3 HRD Task Consistently Underestimated

The magnitude, importance and timing required to modify the organizational culture during sector reform or transformation of operating entities is almost always underestimated and sometimes ignored.

This requires a profound change not only of structures and processes, but more importantly permanent behavioural metamorphosis. This requires new skills, mindset and training to change the work culture. Changing structure and process alone will not succeed.

Training should be done under the guidance of an organization that has already lived the experience of a reform or transformation. It also will substantially increase the probability of a successful transformation.

3.4 Regulatory Paradox

Sector reform including the introduction of competition will not diminish the amount of resources required to regulate its implementation. Reform coupled with the rapid evolution of technology results in a more complex and diversified regulatory function demanding new skills and knowledge.

3.5 Technical Training

The extremely rapid evolution of technology, with new significant attributes appearing almost quarterly, renders the task of keeping up-to-date (and associated training) an overwhelming challenge that few have conquered. The speed will only increase and the situation is not likely to improve.

In this environment, the limitations of paper-based training material are becoming obvious. It is often said that by the time the paper-based training material is produced and distributed, it is out of date. By then its use could be limitative if not counter-productive. New and innovative ways to meet this challenge are needed.

3.6 Small and New

Many observers of the new environment have reached a view, from entirely different perspectives, that:

- It is easier to operate reform or transformation in smaller entities. Some advocate the separation of new activities (e.g., cellular) and even traditional ones (local versus long distance) as a way to improve efficiency.
- It is more difficult to change the culture of an existing organization (e.g., incumbent operator) than it is to create the proper culture in a new entity.

Lessons from experience tend to corroborate these two views when appreciated from an HRD perspective relative to the challenge required to prepare entities for the new environment.

4 Analysis

4.1 Management Training

Results in Appendix B

Appendix B establishes priorities for the seven management categories as well as the priorities for the main topics within each of the seven categories.

This information will be useful in designing programme/course content for specific subjects (e.g., policy and regulation) as well as those covering more than one category (e.g., strategic management and regulation).

Competencies and behavioural indicators are shown in Appendix D for the different categories. This list is published for illustrative purposes only and should not be interpreted as a definite or all inclusive set of competencies. Because of the dynamic nature of the industry the set of skills required will evolve over time.

Secondary Analyses

Secondary analyses were performed using the results of 216 additional respondents to the same questionnaire. These respondents were segmented geographically and by type of organization (commission, private sector, public sector).

The overall results of the main questionnaire were all validated except for the priorities of the programme categories which were found to be:

	Priority
strategic management	1
regulatory activities	2
marketing	3
financial planning	4
human resources	5
switched network	6
rural and wireless	7

The priorities vary depending on the type of organization of the respondent. Contrary to operators, and as expected, managers from regulatory agencies rank marketing and network management as low priorities. Operating managers from the public sector rate regulatory activities higher than managers from the private sector.

Priorities also varied between regions. For example, regulatory activities were rated highly in Asia and Africa but had a lower priority in the Americas and Europe. Conversely financial planning was rated high in the Americas and Europe but low in Asia and Africa.

Focus groups also identified a pressing need for immediate training to help ensure that senior managers/civil servants are or become computer literate and are able to access available technologies (e.g., web).

Population to be trained

Responses indicate that two (2) per cent of total employees should be given management training. For LCDs and lower middle income countries this would total 50 000 employed. Past experience however suggest that this number is severely underestimated.

Availability of training resources

Responses indicate that training resources are practically nonexistent.

4.2 Technical Training

Results in Appendix C

Appendix C established priorities for the eight technical categories as well as the priorities for the main topics within each of the eight categories.

This information will be useful in designing programme/course content for specific subjects (e.g., switching) as well as those covering more than one category (e.g., transmission and external plant).

Competencies and behavioural indicators are shown in Appendix D for the different categories. This list is published for illustrative purposes only and should not be interpreted as a definite or all inclusive set of competencies. Because of the dynamic nature of technology, the set of skills required will evolve over time.

Population to be trained

Responses indicate that four (4) per cent of total employees should be given technical training. For LCDs and lower middle income training this would total 100 000 employees. Past experience suggest that this number is severely underestimated.

Availability of training resources

Responses indicate that training resources are very limited.

IV RECOMMENDATIONS

1 Training Strategies

The purpose of a training strategy is to develop the skills and knowledge of individuals so that they can perform their roles effectively and efficiently. First, a concise training plan should be established covering:

- specific training needed;
- segmentation of training to be obtained from external versus internal sources;
- procedures to select individuals to be trained and evaluation of number of resources to be trained;
- funding;
- training schedule;
- strategic actions based on training interventions.

1.1 Management

It is important to recognize that management training should focus on changing the organizational culture to one that can successfully operate in the new environment. *This change must start at the very top of the organization.* Experience shows that *a full time involvement* by all senior managers *to lead as well as manage* the change is an absolute requirement for a successful transformation. This task cannot be delegated.

Senior managers have to undertake the following activities:

- build the case for change;
- establish the guiding vision of the desired future state;
- set up benchmarks for outputs;
- lining up an increasing level of supporters from *all* stakeholders groups through a detailed communications plan;
- undertake, lead and review steps to operate, reinforce and consolidate the new culture.

Total quality management (TQM) is a managerial approach most likely to successfully realize the required transformation.

Policy-Makers and Regulations

Government responsibility is shifting from ownership and operations to policy and regulation. Although the policy issues and options faced by governments in reforming the telecommunications sector are fairly universal, their relative importance, the package of solutions chosen and the strategy of implementation are turning out to be country (or region) specific. Whatever the form of restructuring, governments must implement a regulatory framework to ensure that policy objectives are realized.

Establishing sector policies or privatizing state enterprises can be completed relatively quickly but developing regulatory capabilities requires more time since it involves the acquisition of the following new skills:

- leading and managing change;
- policy analysis;
- financial and accounting analysis;
- economic, legal and engineering analysis.

Senior manager/civil servants (ministers and deputy ministers) should receive specific training on the new managerial skills noted above and be guided by people and organizations that have undergone a *complete* transformation cycle. Although the number of countries and organizations meeting this criterion is limited (e.g., United Kingdom, United States, Canada, Australia, etc.), it is important to learn from the experience and prevent the syndrome of “the blind leading the blind”.

Senior Managers should subsequently supervise and participate in the training of their subordinates following a cascade approach.

This training is best carried out face to face.

Operators

The transition from a government organization to a separate entity operating according to commercial principles requires a completely different work culture. Furthermore facing a competitive environment exacerbates the need for new management skills as well as a *customer-based organizational culture*.

The transformation of an operating entity from a monopolistic to a competitive environment is a major challenge. It is extremely difficult for someone who has not lived this transformation to even imagine, analyse and evaluate what is involved. The magnitude of this task is almost always underestimated.

Plant development must be accompanied by organization and management changes that focus the entire entity on customer needs and improving performance. This requires new skills in the following areas:

- leading and managing change;
- strategic management;
- marketing and sales;
- financial analysis;
- engineering analysis.

Experience shows that the probability of a successful transformation is almost nil unless this cultural change starts at the very top of the operating entity and is led and managed by the executive management team (top two levels of the organization) on an almost full-time basis.

These senior managers should be trained first by entities that have a prior working experience in such changes. Subsequently they should supervise and participate in the training of their subordinates following a cascade approach to cover other management levels.

The profile of senior managers, presently dominated by engineers, should be diversified to include other disciplines (e.g., accountants, financial analysts, lawyers, etc.).

This management training should be done face to face.

2 BDT

While we have witnessed a few success stories in developing countries, the facts lead us to conclude that globally the gap between the developed and developing worlds has widened in the decade since the Maitland report. Furthermore, the telecommunications needs of the developing nations are increasing while ITU resources are declining.

Faced with this reality, we believe that the BDT could and should orient its activities where it will have the greatest impact.

Fortunately, analysis of both successes as well as failures, coupled with a series of focus groups of senior managers and civil servants provide useful lessons that could provide guidance in focusing BDT's future activities:

The importance of HRD

There is a growing body of evidence to support the relative importance of quality management as the main determinant of a successful reform or transformation. Although still important the availability of technology and financial resources will result from not result in a successful reform or transformation and should not be the initial focus.

Where to start

The probability of a successful reform or transformation that does not start at the very top of an organization is almost zero. A lot of valuable resources can be wasted when a major change is attempted without being led and managed by senior managers (director general level) senior civil servants (ministers).

The HRD activities must focus on changing the organizational culture to one that can successfully operate in the new environment.

A study of successful reforms and transformations reveals a common pattern as well as a common sequence of activities that starts with the following:

- build the case for change;
- establish the guiding vision of the desired future state;
- lining up an increasing level of supporters from all stakeholder groups.

In view of the above, we recommend that the BDT:

- Focus the major portion of its activities and resources helping senior civil servants and managers to lead and manage the required reform and/or transformation.
- Organizes high-level (ministers, director general level) ***regional*** workshops designed to help them "build the case for change".
- Provides consulting services:
  - to help organizations in the design of their reform/transformation plan;
  - to assist in providing ongoing evaluations of how well the transformation is proceeding as well as correction measures if necessary;
  - to help governments in the design of regulatory agencies as well as the associated training of resources.
- Relies on the experience of those who have successfully completed their reform and transformation from both the developing and developed world. A special appeal for support from the G7 and other developed countries should be investigated.
- Relies on the expertise of specialized telecommunications training institutes of countries that have successfully completed their reform and transformation. A special appeal to the governments of these countries should be considered.
- Considers distributing its activities in such a way to encourage countries both to reform and transform the way in which their telecommunication organizations are managed. In implementing this policy and establishing its priorities, the BDT should be guided by criteria based on the results obtained or to be obtained and on the priority to be accorded to the LDCs.

3 Further Work (in addition to recommendations in 2)

The BDT should undertake the following main activities:

- Pursue the development of the virtual training centre (VTC) as well as designing measures to encourage and facilitate increased usage. The content should be continuously monitored and updated.

- The need for information (as opposed to training) is also crucial for developing nations. The BDT should research, on a continuous basis, what information is most needed and become an exchange vehicle for this documentation.

- Update and continue to publish listings of training available.

- Facilitate and assist the establishment of regional training centres.

- Continue their partnerships (training agreements) with specialized telecommunications training institutes and encourage such partnerships.

- Pursue the study of appropriate approaches to deal with surplus staff (e.g. retraining, etc.).

- Assist companies in the implementation of their training plan.

V CONCLUDING REMARKS

This report brings us one step further in our understanding of HRD/HRM implications relative to the task of changing the management culture of the telecommunications agencies and organizations in order to meet the challenges of the changing environment.

The education and training of a large majority of the sectorial workforce is now recognized as the central lever of telecommunications development and must be addressed in the most efficient manner. It is through higher quality human resources that we can maximize development impact. A growing body of evidence points to the importance of quality management as the main determinant of successful reforms or transformations, well ahead of the availability of technology or capital. These (capital and technology) will result from, not result in, successful reforms and transformations.

Finally, we hope that this report will help the BDT in allocating its precious resources in a way that will maximize telecommunications development.

APPENDIX A

Mandate

Question 5/2: Human resources development and management

NOTE – Study Group 1 will associate with the study of this Question in the relevant areas of its competence.

1 Statement of problem

The telecommunication sector, in many developing countries, is undergoing substantial restructuring in terms of the introduction of market principles into the activities of the operators and the revision of the regulatory framework governing the sector. It is essential that government policy-makers and regulators familiarize themselves with restructuring mechanisms.

The changes occurring in the technological and commercial environment also call for new skills, knowledge and expertise to manage telecommunication organizations and to operate networks and services. To cope with these changes in technology and market structures, human resources development must be intensified in the developing countries to upgrade in particular the skills of staff in the telecommunication organizations and to enhance management capabilities in order to implement business-oriented management structures.

A large number of technical and managerial training methods and instructional material have been produced by industry and otherwise within the sector; at the same time, technology has made it possible to deliver a full range of courses to targeted audience within the work place or elsewhere. This knowledge and experience should be used to make available to the developing countries comprehensive training programmes incorporated into or adopted for national and regional human resources development programmes.

2 Question

With a view to changing the management culture of telecommunication agencies and organizations as well as enhancing human resources development in network management and new technologies:

a) identify and evaluate what are the specific training requirements of managers, engineers and technicians to improve the efficiency of telecommunication organizations and to ensure a successful implementation of new technologies in an increasingly competitive global environment;

b) identify training programmes and methods to assist government officials to adapt to the new rules and responsibilities created by the changing nature of telecommunication organizations;

NOTE – This part of the Question may need to be considered by Study Group 1.

c) develop practical training methods and programmes for the planning, installation, operation and maintenance of new telecommunication networks and services, including computer-based training, distance learning and multimedia programmes; studies should also cover managerial activities and staffing requirements, taking account of opportunities and consequences of the telecommunication sector restructuring;

d) provide suggestions to the Director of the BDT on human resources development priorities and effective programmes;

e) training for adapting telecommunication enterprises to the new competitive environment.

3 Expected results

Preliminary Report and recommendations by mid-1996.

4 Liaison

Close liaison with Study Group 1 should be established.

APPENDIX B

Management Training Needs

73 respondents graded the categories or attributes for each item listed below in priority of importance (1 being most important, 12 being least important).

	Attributes	**Priority**
Most important	Service Quality	1
	Network reliability	2
	Service availability	2
	Modernization of network	3
	Service affordability	4
	Regularity requirements	5
	Customer responsiveness	6
	Productivity of resource	7
	Competitiveness of the firm	8
	Global Interoperability	9
Least important	Innovation	10

	Programme Categories	**Priority**
Most important	Strategic Management	1
	Switched Network	2
	Human Resources	3
	Regulatory Activities	4
	Service Marketing	5
	Financial Planning	6
Least important	Rural and Wireless	7

	Strategic Management	**Priority**
Most important	Strategic Planning	1
	TQM Principles	2
	Major Technology	3
	Cost/Profit	4
	Local Telecom.	5
	Re-engineering	6
	Information Technologies	7
	Financing International	8
	Benchmarking	9
Least important	World Trade	10

	Regulatory Activities	Priority
Most important	Policy Formulation	1
	Cost/frameworks	2
	Rate Setting	3
	Concepts Principles	4
	Service Quality	5
	Licensing	6
	International Experiences	7
	Electrom. Spectrum	8
	Rural Telecom.	9
Least important	Operation of International	10

	Switched Networks	Priority
Most important	New Technologies	1
	Delivery of Technologies	2
	Digitizing Strategies	3
	Network Control	4
	Network Engineering	5
	Traffic Management	6
Least important	WAN, LAN	7

	Service Marketing	Priority
Most important	Marketing Principles	1
	Value Added	2
	Customer Service	3
	Revenue Maximization	4
	Computer Systems	5
	Operator Service	6
Least important	Credit Assessment	7

	Rural Networks	Priority
Most important	Cellular Networks	1
	Technology Choices	2
	PCS	3
	Satellite Services	4
Least important	Paging Services	5

	Human Resources	Priority
Most important	Employee Performance	1
	Analysing Problems	2
	Technical Training	3
	Transf. Proc.	4
	Employee Evaluation	5
	Job Evaluation	6
	Recruitment	7
	Employee Benefits	8
	Productive Ideas	9
	Career Planning	10
	Industrial Relations	11
Least important	Health and Safety	12

	Financial Planning	Priority
Most important	Financial Effectiveness	1
	Corporate Financing	2
	Budgetary Forecast	3
	MIS	4
	Economic Value	5
	Internal Auditing	6
	Cash Management	7
	Automated Billing	8
	Tender Call and	9
Least important	Purchasing/Inventory	10

APPENDIX C

Technical Training Needs

73 respondents graded the categories or attributes for each item listed below in priority of importance (1 being most important, 11 being least important).

	Technical Training	**Priority**
Most important	Switching	1
	Transmission	2
	Signalling	3
	Network	4
	External plant	5
	Radiocomm	6
	Laboratories and workshop	7
Least important	Broadcasting	8

	External Plant	**Priority**
Most important	Line and Cables	1
	Fibre access system	2
	Protection	3
	Digital loop carrier	4
	Civil engineering	5
Least important	General	6

	Switching	**Priority**
Most important	Electro system	2
	Packet switching	2
	Frame relay	3
	Cell relay	4
Least important	Electro-mechanical	5

	Signalling	**Priority**
Most important	Install, opp principles	1
	Concepts and maintenance	2
Least important	Testing and measuring	3

	Transmission	**Priority**
Most important	SDH and principles	1
	Data transm. multiplex	2
	Concepts multiplex	3
	ATM	4
	Optical fibre systems	5
Least important	PDH systems	6

	Radio Communications	Priority
Most important	Digital microwave	2
	Mobile radio systems	2
	Satellite system	3
	Propagation	4
Least important	Digital troposcatter	4

	Broadcasting	Priority
Most important	Transmission	1
	Network facilities	2
	General systems	3
Least important	Production	4

	Network	Priority
Most important	Digital network	3
	ISDN	3
	Data networks	3
	Intelligent networks	4
	CATV	5
	General	5
Least important	Analogue network	6

	Laboratories	Priority
Most important	Repair and maintenance, e.g.	1
	Test and research lab. equipment	2
	General	3
Least important	Workshops	4

APPENDIX D

Competencies and Behavioural Indicators

2.1* Strategic Management and Corporate Policies

Management of Change

- Understands the process

Financial Management in Telecommunications

Understands:

- Systems and controls
- Budgeting
- Financing
- Current issues

Strategic Planning

- Understanding strategic planning process

Policy Development

- Understands basis for policy development

Quality Management

- Understands quality management, i.e., process, problem solving, benchmarking and policy deployment

Re-engineering

- Knowledgeable of various change models
- Understands the elements of re-engineering

Telecommunications Technology

- Knowledge of numerous telecommunications technologies, i.e., Coaxial cable, Microwave, Satellite, fibre optics

2.2 Regulatory Activities and Sector Policy Development

- Identify policy objectives
- Knowledgeable of regulatory frameworks
- Knowledgeable of licensing processes
- Utilizes licensing process in support of strategic direction of the organization
- Understands and utilizes rate-setting principles
- Knowledgeable of rural telecommunication service regulations and policies
- Understands international telecommunication issues
- Understands the elements of frequency management
- Understands the elements of quality management and change management

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* The numbering corresponds to the relevant chapters of the Questionnaire mentioned before.

2.3 Network Planning and Operations

- Review network management concepts
- Review of network planning concepts and tools
- Review of quality management
- Review of re-engineering
- Review of benchmarking
- Review of new network technologies
- Review of network performance indicators
- Review of change management

2.4 Service Marketing and Customer Service

- Knowledgeable of regulatory principles and implicators
- Knowledgeable of Marketing Principles
- Review of billing and collection practices
- Identifies and utilizes appropriate computerized systems and databases to manage customer information
- Knowledgeable of the operation of call centres
- Knowledgeable in quality management, change management, re-engineering and benchmarking

2.5 Rural and Wireless Network Technologies Management

- Knowledgeable of technology choices applied to rural access networks
- Understands wireless communications
- Understands satellite technology and possible applications
- Understands quality management, re-engineering, benchmarking

2.6 Human Resources Development and Management

- Knowledgeable of redeployment processes
- Knowledgeable of employee performance management principles
- Understands and utilizes administrative and technical training management principles
- Knowledgeable of current job evaluation models and classifications
- Utilizes job evaluation model to ensure that existing and future jobs support the strategic mission of the organization
- Knowledgeable of the various methods of employee evaluation
- Develops competitive employee benefit and compensation plans
- Utilizes standard recruitment practices to select and build work force
- Implement and manage career and succession planning of executives
- Knowledgeable of industrial relations management principles
- Implements occupational health and safety management practices

Managing Creativity

- Understands the creative process and its value to the organization
- Encourages others to experiment with new ways of doing things
- Stresses creativity in finding better ways to solve problems
- Creates structures and process that encourage innovation

2.7 Financial Planning, Management and Control

- Measures corporate financial effectiveness
- Knowledgeable of corporate financing policies and principles
- Assesses an organization's economic value
- Implement internal auditing and security processes
- Manages accounts receivables and payables
- Forecasts, controls and reports on budget
- Utilizes and implements appropriate Management Information Systems (MIS)
- Implements and controls purchasing and inventory processes
- Understands the regulatory environment and its implications
- Purchasing and supply chain management
- Understands TQM, re-engineering and benchmarking

3.1 External Plant Operations and Management

- Understands the function and components of the external plant
- Develops appropriate infrastructure to efficiently manage the external plant communication lines and personnel
- Installs and maintains lines and cables
- Examines and recommends the kinds of cable protection essential for their environment, i.e., conduits burial, warning signs, protective sheathing/coating
- Discusses and recommends communication links between telephone end office to the customer premises, i.e., digital loop or digital carriers
- Knowledgeable of and implements desired communication technology, i.e., Fibre access systems, digital microwave, coaxial cable, etc.

3.2 Switching Operations

Switching – Frame Relay

- Understands the basic concepts of frame relay technology, network architecture, services and data transfer procedures
- Discusses issues related to frame relay, such as congestion control
- Understands the frame relay architecture and technology and other WAN services
- Gains familiarization with fast packet technologies
- Discusses frame relay network services and the frame-relay market, frame-relay architecture, services and call control, data transfer procedures and protocols, ITU-TS standards, comparison with other services

Switching – Packet switching

- Can examine the kinds of data encountered in a data communications environment and the basic types of switching networks used for transmitting data
- Discusses packet switching networks and the various processing rules (datagram and virtual circuit)
- Describes the effects of queuing delay at packet switch, the concept of a layered architecture and the OSI reference model (which allows heterogeneous switching machines to exchange information)
- Understands description of the standard interface between user and the packet-switched network and understands various kinds of data in a packet-switched network, differences between circuit, message and packet switching, packet-switching, processing rules, queuing delays at a packet switch the OSI layered communication architecture and X.25 protocol
- Understands the principles and applications packet switching as well as evolution to broadband
- Understands switching networks (space division, time division, etc.), switching control, signalling including SS No. 7 used in circuit switching

3.3 Signalling Operations and Management

- Knowledgeable of the four functions of signalling, i.e., supervisory, status, control and addressing
- Discusses and recommends Signalling types: inband, out of band (common channel signalling)
- Understands and utilizes the appropriate call routing methodology, i.e., hierarchical or non hierarchical based on available nodes and fluctuating traffic patterns

3.4 Transmission

SDH Multiplex

- Understands the details about SDH network concepts, signal hierarchy, frame structures multiplexing procedures, network management functions, synchronization schemes and optical interface
- Discusses the rates, formats, and applications of SDH signals
- Understands the need for SONET/SDH, SONET/SDH standards, SONET/SDH interfaces
- Understand the SONET technology

Transmission – ATM

- Understands the ATM technology and its roles in supporting end-to-end networking (LAN, WAN, MAN) for voice, data, and image
- Understands ATM evolution and ATM relationships with multimedia and internetworking as
- Knowledgeable of ATM products and service features and market directions – the ATM Forum and competing technologies
- Explains why ATM is necessary, ATM network architecture and building blocks (switch, hub, DSU, etc.)
- Discusses how multimedia requirements will be met by ATM/B-ISDN networking standards, systems, and protocols
- Understands ATM-B-ISDN networking protocols and procedures
- Discusses transmission requirements of ATM, mapping user information onto ATM, switching/routing of ATM cells, traffic and congestion control, ATM network management
- Understands the concepts and goals of ATM – voice, data, and video networking concepts, ATM implementation, B-ISDN protocol, ATM adaptation layers, Signalling, Services

Transmission – Data Transmission

- Understands data transmission theory, system impairments and error checking, network configurations, transmission media an protocols
- Describes the three major components of a communications system, how data is transmitted, frequency, bandwidths, bits, codes, data exchange and synchronization
- Understands interface standards used in the United States and their importance, the purpose and function of modems, how data transmission flaws are detected and corrected, dedicated and shared facilities and their respective advantages
- Understands the important features of Local Area, Packet Switching and value-added Networks
- Understands the advantages and limitations of various transmission media, open wire, twisted pair, coaxial cable, microwave, satellite, and fibre optics
- Describes the four functions of protocols

Transmission – Optical Fibre Systems

- Understands fundamental optical communication principles, state-of-the-art fibre optic components, and optical system design
- Demonstrates how optical principles are used in system components
- Understands the following topics optical fibre communications, light sources, Optical fibre types and characteristics, Light detectors, System performances measures, Transmission system design, SONET concepts

3.5 Radiocommunications Development and Management

- Understands the technologies associated with radiocommunications
- Knowledgeable of infrastructure required to support the technology
- Identifies and integrates appropriate technologies to address customer needs
- Understands the process to acquire and utilize the technology

3.6 Broadcasting – Transmission Systems

- Understands the basic engineering configurations of various transmission systems
- Studies existing and new digital transmission systems from their building block architecture to synchronous optical carriers, to cellular and PC networks, and to satellite communications
- Understands the following topics: Digital multiplexers, Electronic cross connect, Radio frequency management, uplinks and downlinks in PC, cellular, and satellite networks, optical carriers
- Understands the three major components of a communications system, how data transmitted, frequency, bandwidths, bits, codes data exchange and synchronization
- Understand the technology of Interactive video technology and the multiple applications

3.7 Network Development and Management

Network Architecture

- Understands numbering plans
- Knowledgeable of world numbering plans
- Knowledgeable of organizations associated with telecommunications such as the ITU
- Understands how to interact with ITU to facilitate telecommunications growth within the region

Digital Networks

- Understands digital concepts, various digital terminal devices, network devices, and communications media used to provide digital service
- Evaluates the difference between analogue and digital services
- Understands the testing and maintenance techniques that facilitate the implementation and ongoing management of digital networks
- Shows proficiencies in the following topics; analogue to digital conversion techniques, data phone digital service, digital networking applications, digital terminals and transmission systems, digital theory an concepts, ISDN, packet switching theory, transmission media

Network – ISDN

- Compréhension des concepts et services RNIS, des protocoles de message LAP-D et Q.931, et les question de la couche et de l'interface physiques.
- Understands the concepts technologies, and applications of connection-mode networks and connectionless networks such as LANs and how they can be interconnnected using high speed networks
- Discusses ISDN evolution to ATM and frame relay, time division multiplexed interfaces, service attributes, information and flow scenarios
- Recognized products such as POSTMAN for ISDN
- Discusses how multimedia requirements are by ATM/B-ISDN networking standards, systems, and protocols

Network – CATV

- Understands the tools for designing networks to carry information from a customer's local plant to public and private networks
- Understands telecommunications Network Management platforms, Customer devices, Local plant architecture(copper, digital, optical, cellular, PCN, FR, ATM), integrated services (ISDN B-ISDN, CATV, voice, data)

Network – Data Networks

- Understands the concept of enterprise networking, ranging from data networking fundamentals to technologies and applications
- Understands the concepts, technologies, and applications of connection-mode networks (such as X.25 and ISDN) and connectionless networks (such as LANs) and how they can be interconnected using high speed networks
- Differentiates between synchronous and asynchronous data communications

Network – Intelligent Networks

- Understands the engineering architectures and the major switching and processing blocks of various switching systems: translations, routing and their interfaces to management, operations and intelligent networks
- Discusses intelligent networks and services from several countries and illustrates deployment strategies

3.8 Establishing and Managing Laboratories and Workshops

- Knowledgeable of purpose and structure of laboratories and workshops
- Identifies most appropriate facility(ies) for the environment
- Knowledgeable of process for repair and maintenance equipment
- Implements process to ensure rapid repair and maintenance of equipment
- Identifies appropriate test and research laboratory equipment
- Implements standarized testing processes and procedures