

TELECOMMUNICATIONS



PDNA GUIDELINES VOLUME B



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INTRODUCTION

In accordance with the most recent International Standard Industrial Classification of All Economic Activities of the world-wide System of National Accounts (United Nations, International Standard Industrial Classification of All Economic Activities, Rev.4, New York, 2008. (<http://unstats.org/unsd/cr/registry/>), the Information and Communications Sector covers the following activities:

- Publishing;
- Motion picture, video and television program production, sound recording and music publishing;
- Programming and broadcasting;
- Telecommunications;
- Computer programming, consultancy and related activities; and
- Information services.

Within that list, the Telecommunications sub-sector is of special relevance to many developing countries that are affected by disasters of any kind, as the ability to communicate is of paramount importance during emergencies and in subsequent post-disaster stages. This sub-sector involves transmitting voice, data, text, sound and video, and the facilities may be based on either single or combined technologies. Based on the type of infrastructure operated, the sub-sector may be broken down into the following divisions:

- Wired telecommunication activities;
- Wireless telecommunication activities;
- Satellite telecommunication activities; and
- Other telecommunication activities.

Wired telecommunications involve the operation, maintenance and provision of access for transmitting voice, data, text, sound and video using land-lines and satellite linkups, cable distribution systems, and telegraph facilities. Wireless telecommunications involve operation, maintenance and provision of access for omni-directional transmitting voice, data, text, sound and video through wireless telecommunications infrastructure, cellular and

other wireless networks. Other telecommunication activities include the provision of specialised telecommunications applications (such as satellite tracking, communications telemetry and radar station operation), operation of satellite terminal stations and associated facilities, provision of Internet access (including dial-up Internet access), provision of telephone and Internet access in facilities open to the public, provision of telecommunications services over existing telecom connections, and telecommunications reselling.

THE ASSESSMENT PROCESS

This chapter describes the procedure to assess the effects of a disaster on the Telecommunications sector, following the traditional methodology originally developed by the United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC) (Handbook for estimating the socio-economic and environmental impact of disasters, 4 volumes, United Nations, 2003), further developed by the World Bank's Global Facility for Disaster Recovery and Reduction (GFDRR) (Guidance Notes for Damage, Loss and Needs Assessment, 3 volumes, The World Bank, Washington, D.C., 2010), and now expanded and adopted by the PDNA. Application of the methodology enables the assessment of disasters' economic and social impact on the Telecommunications sector, and the estimation of post-disaster needs for recovery and reconstruction.

The Telecommunications sub-sector may sustain destruction of its physical assets—which may include buildings and equipment as well as telephone lines and switchboards—as well as changes in its production flows, which may involve both decline in sales through interruption or slowdown in transmissions and/or increases in the costs of operation and production. These telecommunications services may be owned and operated by private enterprises, in many cases part of transnational companies, and/or by government agencies.

As for other sectors of economic activity, the value of destroyed telecommunication assets (damage) is estimated by first identifying the physical items that may have been destroyed and then multiplying those quantities by the unit reconstruction costs of infrastructure or unit replacement costs of equipment prevailing at the time the disaster struck, and assuming that the pre-disaster physical and technical characteristics are to be maintained. Should it be necessary to replace equipment with improved capacities because only improved technologies are being manufactured at the time of the disaster, any higher replacement costs are to be factored in at the time of estimating reconstruction requirements or needs. The value of damage, however, is to be estimated on the basis of unit reconstruction or replacement costs prevailing at the time of the disaster for the destroyed assets.

Production flow changes caused by the disaster in the Telecommunications sub-sector may include both a decline in the value of telecommunication services provided to the consumers, and an increase in the cost of operation of the systems. The flow of telecommunications may be either fully interrupted for a limited period of time, due to the destruction of the physical assets of the system, or may only sustain a temporary decline while partially damaged system components are under repair. Typical examples of the latter are the full interruption of fixed-line telecommunications after floods damage switching equipment or earthquakes destroy poles and telephone lines. An example of the second scenario is wind storms causing dis-alignment in wireless antennas, requiring time to promptly re-align such facilities and restart telecommunications via cellular phone systems.

It is to be noted that persons, households and enterprises may sustain production losses after a disaster due to the temporary absence of telecommunication services, and that such production flow losses are to be quantified and accounted for under the specific sector of economic activity in which they are incurred. Any production losses in the sales of telecommunication services that are sustained by the communication enterprises affected by the disaster are to be accounted for under the Communications sub-sector.

In order to carry out an assessment of disaster effects, impact and needs in this sub-sector, the Telecommunications Assessment Team must include civil and electronic engineers for the estimation of the value of destroyed assets (damage), as well as economists with relevant experience in the sub-sector for the estimation of telecommunication services flow changes.

PRE-DISASTER SITUATION

The following information is essential for the estimation of disaster effects and must be collected as the first stage of the assessment, as it will provide the basis for the estimation of damage and production flow changes:

- Geographical location and capacities of each system and sub-system of telecommunications, including possible redundancies for the provision of communication services;
- Historical information on the evolution of telecommunication services in each division (wired, wireless, satellite and other telecommunications), including coverage by type of user, range of charges depending on volume or type of user, etc.; and
- Annual reports to shareholders in private and public enterprises of the sector, including financial statements of revenues and costs of operations.

Such information is usually available in ministries of communications, in countries where they exist, as well as in regulating bodies for the sector. Annual statistics on the quantity and value of production for the sector are normally available in the National Statistical Office, as part of the national accounts for the country.

In order to ascertain the effects of the disaster on the sub-sector, the sectorial assessment team should conduct detailed field visits to obtain first-hand information on the possible extent of damage to telecommunications infrastructure and equipment and the possible post-disaster performance of the sub-sector. However, before undertaking any field visits, the sectorial assessment team should meet with representatives of the different public and private enterprises that operate in the sector and in the affected areas, in order to obtain from them an overview of the main problems they are facing and to elicit their full and wholehearted cooperation in the assessment. This is very important especially in the case of private enterprises that may not wish to make public their limitations in operating the affected systems, since their public image and reputation may be at stake. Based on the results of these initial meetings, the sectorial assessment team should plan and carry out field visits to the most affected points of the communications system to make its own observations and estimations.

ESTIMATION OF DISASTER EFFECTS

EFFECTS ON INFRASTRUCTURE AND PHYSICAL ASSETS

The Telecommunications Sector Assessment Team should be well aware that wired telecommunications systems are very vulnerable to disasters caused by hydro-meteorological and geological phenomena. Aerial telephone lines and poles often get destroyed by wind and rainstorms, earthquakes, landslides and floods, while electronic switching equipment is often damaged by both rain and floods.

However, most telecommunications enterprises normally have relatively large stocks of electronic equipment in their warehouses for replacement of damaged assets, reducing the downtime and service interruption for the system after a disaster occurs. In addition, these enterprises have in their records the unit replacement costs of these electronic equipment and components, which are to be used for the estimation of the value of damage.

The Telecommunications Sector Assessment Team members should also ascertain information on the age of the destroyed assets, data which is not to be used for the estimation of the value of damage but instead should be delivered to the Macroeconomic Assessment Team for subsequent use in the estimation of global disaster impact.

For the estimation of the value of damage, it is recommended that separate lines or divisions be made to include the value of destroyed assets for the case of wired or land-based telecommunications, wireless telecommunications, satellite telecommunications, and other telecommunications activities. It is further required to indicate the ownership of the destroyed assets, by either public or private sector.

In addition to the above, care should be exercised to determine whether some of the destroyed equipment or assets is unavailable in the warehouses of the sector enterprises, and must be imported from abroad, in which case the time required to order, manufacture and transport such assets may be of significance: it may extend the downtime of the telecommunications system and may increase the value of lower communications service sales.

EFFECTS ON THE PRODUCTION OF TELECOMMUNICATION SERVICES

In order to estimate possible changes in the telecommunication services flows, the assessment team must use as a basis for comparison the foreseen level of services expected for the current and subsequent years, and their associated production costs. Such baseline data must be obtained from projections made by each sector enterprise and/or from the regulating body overseeing the telecommunications sector.

After directly estimating the degree of destruction sustained by the individual telecommunications system components, the length of time for complete interruption of the services, and the requirements to operate the system under partial or alternative conditions of delivery, these are to be used to estimate the value of sales of telecommunications that will not be possible because of the damage in the systems. Furthermore, the consumers of these services may have also sustained significant destruction on their premises and production processes, resulting in a temporary decline or interruption of their demand for communications services. Should that be the case—i.e. after an intensive earthquake that may destroy parts of a large city, including homes and productive activities that utilise telecommunications services—the Communications Sector Assessment Team should closely consult with the assessment teams covering the Telecommunications-Consumer sectors and ascertain the time

that will be required to achieve recovery and reconstruction of those sectors, and estimates are to be made of the resulting sales losses due to consumer demand decline.

The value of any production losses sustained by Telecommunication-Consumer sectors are to be estimated by the assessment teams of such sectors; the Telecommunications Assessment Team should only estimate the decline in demand for telecommunications services, and thus ensure no duplication of disaster effects.

In many cases, if the telecommunications infrastructure and services have not been affected significantly by a disaster, there is a sudden increase in the utilisation of these services, due to the need to locate and assist relatives of the users, coordinate search and rescue operations, and coordinate and supervise recovery and reconstruction activities. This increase in sales of the telecommunications enterprises is in fact a benefit arising from post-disaster activities, and may offset some of the losses in communications services sales due to the destruction of the system. This possible increase in sales may be short-lived but significant, and the Telecommunications Sector Assessment Team should estimate such positive effects by discussing the matter with the financial or commercial divisions of the sector's enterprises.

In addition to possible losses in sales of telecommunications services, the Telecommunications Sector Assessment Team should estimate possible higher costs in the service that may arise through the temporary use of alternative systems or facilities when the normal ones have sustained damage, and over the entire time period required to replace or rebuild the destroyed assets in the sub-sector. One example of possible higher cost in the sub-sector is the temporary utilisation of portable communications equipment when the fixed systems have sustained damage and are under repair.

Another scenario is one in which electricity supply for the operation of telecommunications equipment is interrupted due to extensive destruction of the electrical system, and portable power plants are used instead until the electrical system is restored or rebuilt. The use of portable power plants would normally involve higher unit costs of electricity, which would raise the value of intermediate consumption for the telecommunications sub-sector. The Telecommunications Assessment Team must make estimates of such temporary higher cost of inputs.

After those changes in the flows of the telecommunications service have been estimated, an aggregation of the five possible components must be made:

- Losses in sales of telecommunications services due to the time required to replace or rebuild the system assets in the sub-sector;
- Possible brief increases in sales of telecommunications services due to increased demand during the post-disaster emergency, recovery and reconstruction stages;
- Losses in sales of telecommunications services due to decline in consumer demand from the communications-consuming sectors while their assets are being rebuilt;
- Higher operational costs due to the temporary utilisation of alternative systems of telecommunications, such as portable transmission equipment; and
- Higher costs of operation due to the temporary utilisation of alternative sources of electricity whenever the electrical system has been destroyed or otherwise affected.

In the case of the disruption of normal operation of the telecommunications services, each of the five components of service losses mentioned above may occur within a different time frame, and the Telecommunications

Sector Assessment Team should prepare a calendar showing such required timeframes and provide it to the Macroeconomic Impact Assessment Team. Furthermore, these production and sales changes may be owned by either privately or government-owned enterprises, and specific indications of such ownership must be furnished to the Macroeconomic Impact Assessment Team.

While the penetration of insurance is not very widespread in the case of developing countries, some of the telecommunications enterprises may in fact have insurance against destruction of assets and losses of revenue. In order to factor in this possibility into the assessment, the Telecommunications Sector Assessment Team should obtain relevant information on the existence of disaster effect insurance that may be available in the sub-sector's enterprises, and on their coverage and extent. In addition, visits to the local insurance companies would clarify details on the coverage and possible level of insurance proceeds to be obtained, and also on whether re-insurance from abroad may be available. Such information on possible insurance availability and proceeds is not to be used to decrease the value of estimated damage and production or sale losses for the sector; rather, it will be essential for the estimation of recovery and reconstruction requirements.

EFFECTS ON GOVERNANCE AND DECISION-MAKING PROCESS

The Telecommunications Sector is normally owned by both public and private sector entities. Typically, postal services belong to the public sector, while other activities—such as telecommunications—are in the hands of private enterprises. Disasters usually disrupt the function of governance, and the assessment should analyse this outcome.

Governance is affected in five possible areas:

1. Knowledge and skills: technical expertise and institutional information for the sector;
2. Resources: human, material and financial, including availability of skilled labour, raw materials for processing, cost and price structure, etc.;
3. Systems, information management, communications and basic inputs; and
4. Legal authority, monitoring, oversight and reporting.

As part of the assessment, analyses are to be made to ascertain how the capacity of the public sector to oversee the normal functioning of the Telecommunications Sector (including the availability of registries, etc.) may have been compromised, how the disaster may have modified the structure of costs for telecommunications that may require modification of tariffs for telecommunication services, and also the availability of skilled labour for the sector.

EFFECTS ON RISKS AND VULNERABILITIES

After a disaster, it is necessary to analyse risk for telecommunication services. It is possible that pre-existing disaster risk of some telecommunication system components may not have been evident, as they may have been located in disaster-prone geographical areas due to the absence or insufficiency of land-zone mapping and other urban planning standards. In addition, the disaster may have increased risk and vulnerability through instability of sloping terrain that may cause further landslides, the occurrence of aftershocks following an earthquake, increased fire risk after droughts, etcetera. Such higher risks need to be fully analysed and schemes for reducing or eliminating them must be devised as part of recovery and reconstruction with risk reduction.

ASSESSMENT OF DISASTER IMPACT

In addition to estimating the value of destroyed assets and of changes in the production and availability of telecommunications services, the Telecommunications Sector Assessment Team is required to conduct other estimations and deliver those results to the Macroeconomic Impact Assessment Team and the separate team that deals with the estimation of disaster impact on human development.

For the estimation of disaster impact at the macroeconomic level, such additional estimations include the possible impact on the country's gross domestic product (GDP), on the country's balance of trade (BoT) and of payments (BoP), and on the fiscal budget. Such estimations are to be made regardless of whether the telecommunications service providers are privately or government-owned.

The Telecommunications Sector Assessment Team must carry out estimations of the value of imported components of destroyed assets (including construction materials and equipment) that are not manufactured in the affected country and must be imported from abroad, since they will have a bearing on the country's balance of trade and of payments. This is often called the "imported component" of damage.

In addition, there may be cases where damage to the Telecommunications Sector infrastructure and equipment, especially in cases where flows of telecommunications may traverse the affected country, may impede or limit the international flow of information and telecommunications. The country may lose part of the foreign exchange it earns under normal or non-disaster conditions. Such losses in foreign exchange need to be estimated by the Telecommunications Sector Assessment Team and communicated to the Macroeconomic Impact Assessment Team.

The Telecommunications Sector Assessment Team must also estimate the possible impact of the disaster on the country's fiscal position, and communicate this to the Macroeconomic Assessment Team. This may include any lower tax revenues arising from the decline in telecommunications sales to the consumers, and/or any possible increase in government subsidies required after the disaster. Furthermore, for government-owned telecommunications enterprises, any possible losses or decline in sales of services and possible higher costs of operation must also be reported to the Macroeconomic Impact Assessment Team, for its analysis of fiscal impact.

The Telecommunications Sector Assessment Team must also consider the possibility that the damage caused by the disaster may be so intensive and widespread that an upward revision of telecommunications service rates be required for the continued operation of the system. Should this case arise, the assessment team would need to analyse whether it is desirable to introduce a (further) government subsidy instead of having the consumers bear an increase in telecommunications services rates.

In addition to these estimations for use in the macroeconomic impact assessment, the Telecommunications Sector Assessment Team should estimate any possible increases in service rates arising from the disaster that are to be transferred to consumers. Such additional costs for Telecommunications sub-sector service individual or household consumers are to be delivered to the team in charge of estimating disaster impact on human development.

CROSS-SECTORAL LINKAGES AND ISSUES

During the assessment, several cross-cutting issues such as the differential impact of the disaster on gender and the possible impact on the environment must be given due consideration.

For the Telecommunications Sector, the gender breakdown of the labour force—whether skilled or not—is an essential part of the baseline information gathered at the start of the assessment, together with information on wages and salaries. Once the estimated values of production losses for the Telecommunications Sector have been made, separate estimates are to be made of the number of jobs temporarily or permanently lost due to the disaster for both men and women, together with how their personal incomes may have declined.

The Telecommunications Sector usually uses raw materials from the natural environment. Due to a disaster, the availability of such raw materials may be negatively affected and overuse of the environment may arise. Any such changes must be quantified by the assessment team with assistance from environmental economists, and expressed in monetary terms for inclusion in the assessment.

ESTIMATION OF POST-DISASTER ECONOMIC RECOVERY AND RECONSTRUCTION REQUIREMENTS OR NEEDS

It is essential for the Telecommunications Sector Assessment Team to be aware of the fact that the estimation of post-disaster financial requirements to achieve economic recovery and reconstruction under disaster-resilient characteristics cannot be undertaken until the estimation of the value of destroyed assets (damage) and the value of telecommunications service flows changes have been completed, and after these values have been delivered to the assessment team in charge of estimating disaster impact at the macroeconomic level. Completing the delivery of such estimations before undertaking the estimation of post-disaster needs is required to ensure the accuracy and consistency of the entire assessment, and to guarantee the absence of any undue influences in the estimation of post-disaster financial requirements or needs.

Economic recovery financial requirements in the Telecommunications Sector are defined as the amounts of financing required to ensure the return of the service (in quantity and quality) to normal or non-disaster conditions. They may involve the cost of some of the following activities:

- Setting up portable or mobile alternative facilities to ensure an adequate flow of telecommunications services and their operation until the existing systems have been rebuilt or repaired;
- Conducting urgent repairs or realignment of wireless system components that may have been slightly affected to ensure minimum flow of telecommunications;
- Provision of soft-term financing of working capital to private telecommunications enterprises—channeled through the private banking system—or to facilitate rescheduling

of disaster-induced non-performing loans, especially if the enterprises were not adequately insured in their operation; and/or

- Provision of temporary tax relief for the above as a way to alleviate financial difficulties arising from the disaster.

The amount of soft-term credit for working capital or loan rescheduling purposes of the telecommunications enterprises may be estimated on the basis of a fraction of the value of unearned revenues or sales caused by the disaster. Experience indicates that a range of between 20 to 35 per cent of the value of unearned revenues or sales may be adequate to meet such working capital requirements, but the Telecommunications Sector Assessment Team should analyse and discuss these amounts with the management of the affected enterprises before deciding on the value to be adopted.

After estimating recovery needs in the manner indicated above, use is to be made of possible insurance proceeds for unearned revenue or sales for each telecommunications enterprise that may have had insurance coverage. The actual recovery need would be the estimated amount minus the expected insurance proceeds.

Disaster-resilient reconstruction requirements are to be estimated taking as a basis the replacement value of destroyed assets and increasing it by a certain factor to accommodate for the improved design standards that reflect modernization, technological innovation and disaster-risk reduction features that may have been defined in the reconstruction strategy. In this regard, the degree of improvement would be defined by the manner in which disaster resilience is to be introduced; and the value of reconstruction requirements would be higher than the estimated value of damage.

In that respect, the Telecommunications Sector Assessment Team should bear in mind that it is possible that at the time of the disaster, some telecommunications equipment may have already been obsolete in the markets, and that to estimate reconstruction requirements it may be necessary to adopt more modern and slightly costlier standards for their replacement. Another possible consideration—specifically for land-line telecommunications systems—is that after disasters caused by windstorms or cyclones a decision may be made to replace aerial wiring and poles by using subterranean cabling, or to use cables and poles having more wind-resistant features, both of which may involve higher unit costs. Lastly, the location of antennas and other equipment for wireless systems may need to be shifted to safer locations after a disaster, which would involve the acquisition of land in alternative locations. The resulting additional cost should be added into reconstruction needs.

In some recent cases of disaster in different parts of the world, it has been found that an increase of between 15 to 25 per cent over and above the value of damage is sufficient to estimate reconstruction requirements for the Telecommunications sub-sector. However, since the systems are usually very different in each country, the Telecommunications Sector Assessment Team needs to conduct an in-depth analysis for each case of disaster and use their own judgment and experience.

After reconstruction needs have been estimated in the manner described above, use is to be made of possible insurance proceeds on destroyed assets that each affected telecommunications enterprise may have had. The net value of reconstruction needs will be equal to the estimated gross value minus the expected value of insurance-on-assets proceeds.

ESTIMATION OF POST-DISASTER HUMAN DEVELOPMENT RECOVERY REQUIREMENTS OR NEEDS

In the Telecommunications sub-sector, human development recovery needs are equivalent to the amounts of higher costs of telecommunications services that may occur due to the disaster, and which the individual or household user of telecommunications services may have to pay through temporary increases in rates. These higher costs of living would temporarily affect overall living conditions of the affected population with access to telecommunications services until normalcy has been achieved.

Since it is not possible to determine a list of individual or household users that will face such higher costs of living and to issue cash grants to each of them, the typical solution to the problem may be to have the government issue temporary subsidies to the telecommunications enterprises to cover such higher costs, provided that the recovery strategy envisages such temporary arrangements to limit any possible increases in costs of living. For several months after the Mexico City earthquake in 1985, the government temporarily waived all charges for public telephones.

Therefore, the Telecommunications Sector Assessment Team must analyse the issue, quantify the value and duration of the subsidy if and when needed, and deliver the results of its estimations to the team in charge of estimating human development recovery needs.