

Complex Societal Problem related to the Internet Access and Electricity access in DRC

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Abstract: Democratic Republic of Congo (DRC)'s current situation is characterized by a catastrophic very poor access to both Good Quality Electricity (GQE) and High Speed Internet (HSI) which are natural rights and primary needs. If the limited access to GQE and HSI are established fact we are concerned about how it affects the individuals in particular and the country in general and what parts of DRC are affected by this problem. In this paper we describe this identified societal problem in "natural language" through some stages towards the comprehensive understanding and perception of our core hypothesis: "The access to GQE and HSI for all DR Congolese localities/towns/villages of at least 1,000 families is a complex societal problem". We give a solution to part the problem. The current part consists of the global understanding of the problem by the stakeholders. It is a first brick that will contribute to solving a global problem. This paper does implement the first step/layer of a much broader methodological framework, having 9 layers, which is called COMPRAM (Complex Problem HANDling Methodology). The first layer of COMPRAM does involve three core steps: (1) personal consideration and observation by the analyst(s) (named M1), (2) information retrieval from literature and other sources (called M2), and (3) discussions with selected relevant experts and stakeholders (called M3).

Keywords: COMPRAM methodology, Complex Societal Problem, access to High-Speed Internet, access to Good Quality Electricity

1. Introduction

Access to both Good Quality Electricity (GQE) and High-Speed Internet (HSI) is extremely poor in DR Congo and it undoubtedly constitutes a real and sensible complex societal problem for DRC. In this paper, we use the first layer of the COMPRAM (COMplex PROblem hANDling Methodology) [1] to describe this complex societal problem in "natural language" through some steps towards a comprehensive understanding and perception of these societal problems. COMPRAM is multi-disciplinary, interdisciplinary, multi-level and multi actor(s) related [1] and is based on societal complexity theory. It gives a part of solution by defining the problem globally. That is an entry in Conceptual Model. In fact the good understanding of this societal problem leads to a major economic and societal impact. Used in different domains, COMPRAM has already proven its effectiveness in assisting the handling process of complex societal problems since its beginning in 1994 [2].

The first layer COMPRAM is divided into 9 sub-layers or phases of the layer 1's analysis process. We name them from P1 up to P9. For each of these 9 phases three methodological steps are used: the personal thoughts of the analyst (named M1), the documentary research (named M2), and the discussions with relevant selected experts and/or stakeholders (named M3). This paper does concentrate of on phase 1 (that is P1) of the layer 1 of COMPRAM while targeting our above identified two complex societal problems in DRC. The two primary services under consideration in this paper are defined as following. Good Quality Electricity is understood as an electric energy supply with the following characteristics: stability of the voltage value around 220V, sufficient installed power capacity, and overall high availability

(higher than 90%). Similarly, High Speed Internet (HSI) is understood as a universal access to the Internet via broadband and high-availability media (cabled and/or wireless) at relatively low/acceptable prices. Hereby, each individual user does access the Internet with effective data rates of multiple Kb/s up to more than 1 Mb/s.

2. Objectives

The main objective is to understand the problem related to the poor access to Good Quality Electricity (GOE) for each village/city community of more than 1,000 families in DRC. The application of the 3 steps of COMPRAM's layer 1, namely personal thoughts and observations, the documentary investigation, and the discussions, does result in three respective sub-sections named L1P1M1, L1P1M2, and L1P1M3 respectively. The other objective is to understand the societal problem related to the poor access to High Speed Internet (HSI) towns/cities/villages of more than 1000 thousands families in the DRC.

3. Methodology: synoptic diagram describing the COMPRAM

Figure 1 presents a global diagram, which shows in a synoptic way the global methodology called COMPRAM was used. Thereby, only the first Layer, which is considered in this paper, is described with more details. The effective handling of the two complex societal problems under investigation does require the preliminary deep analysis of all fundamental aspects of the problems while involving the various perspectives of both internal and external stakeholders. This has motivated the choice of the COMPRAM as a methodology to lead our research in this context. In the following sections of this paper we do present the results of the very first step of our analysis of both societal problems under consideration. We use layer 1 of COMPRAM related to access in DRC. This figure was adapted from [1]. The layers as in Fig. 1, are: problem description, defining concepts and phenomena, theories hypothesis assumptions experiences, intuitions, Knowledge Island, sematic model, casual model and system dynamic model [1].

The main target of this work is to contribute to the understanding of the societal problem related to the access to both electricity and broadband Internet for all localities with more than 10000 inhabitants (that is all villages and cities where more than one thousand families are living) in the DRC. DRC is located in the heart of Africa with an area of 2, 345,000 km². This work does need, amongst others, relatively precise statistics regarding a series of relevant areas: demography, macro economy, sociology, geography, energy, and telecommunications. In a project entitled "Sustainable energy for all in 2030 or SUSTAINABLE ENERGY FOR ALL (SE4ALL)", the DR Congo, in its national program and strategy of August 2013 with the UNDP, planned to move from an access rate to electricity of 9% national average and 1% average in rural areas to a rate of 100% access to electricity in 2030 [3]. Three years later, this situation does not seem to have changed.

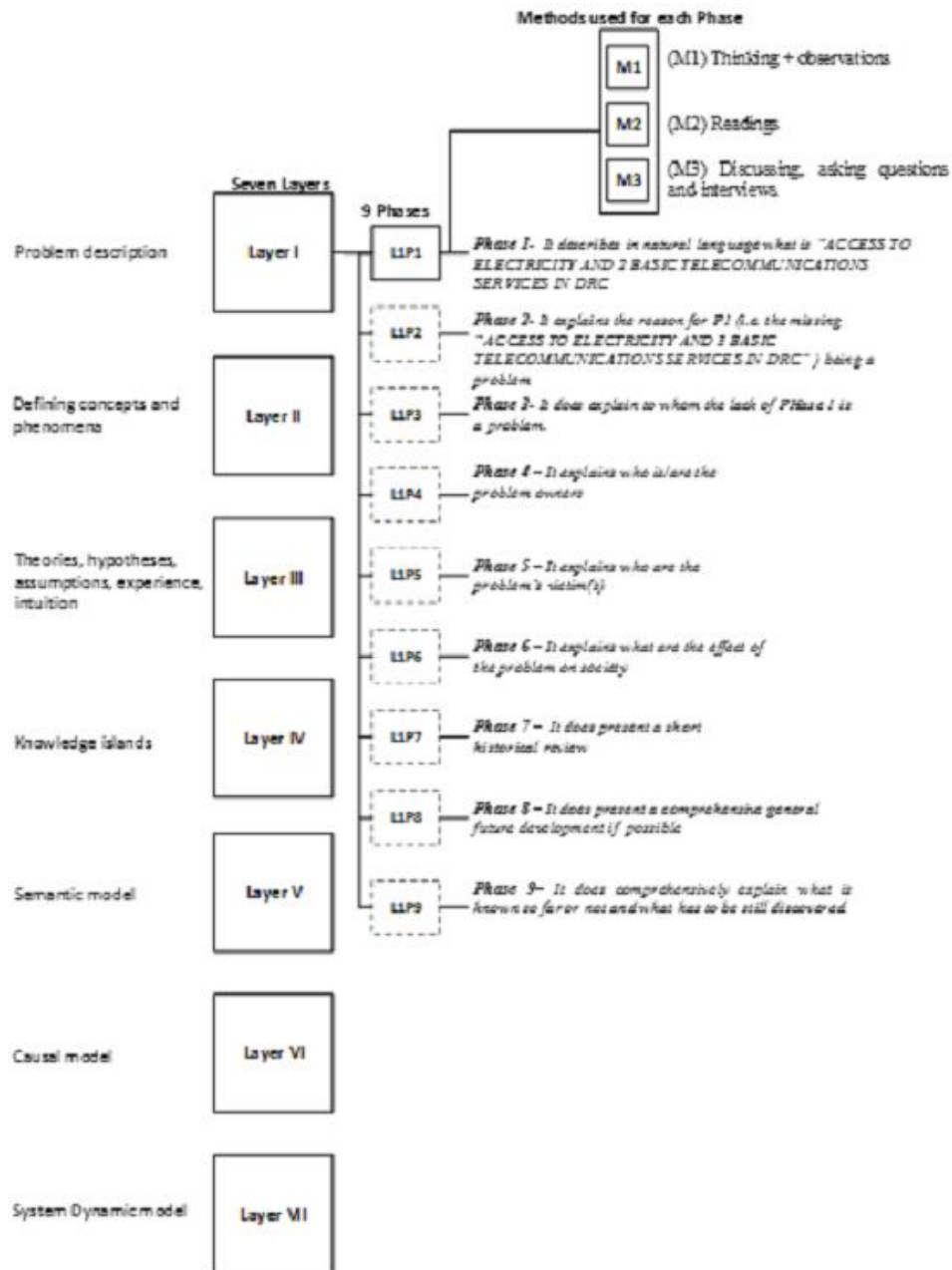


Figure 1: General structure of the COMPRAM methodology and details of the steps related to “Layer 1 of COMPRAM”, which is the focus of this paper.

4. L1P1M1 – Applying the analyst’s personal thoughts/knowledge and observations

4.1. Access to Good Quality Electricity service

Failure to have a sufficient access to Good Quality Electricity has negative consequences in short, middle and long terms in different domains for human and nations’ life: deficits in human development, poor and weak macro-economy, low or no industrialization, deficits in infrastructures for health, education, public security, etc. Another worthwhile impact is the revolution that telecommunications and computers science bring to modern society. These two technological bricks cannot work without electric energy.

In the same way, electricity is needed in various areas: e-learning, health infrastructures and hospitals, big and small production companies, churches. All the preceding application examples of electric power show clearly how important electricity is for the DR Congolese society at all levels. The lack of good access to both GQE and HSI due to technical, political and other reasons is a big disadvantage for humankind. The crucial and chronic lack of a suitable electricity supply is a serious restriction to the integral development of nation and a severe community problem. Unfortunately, DR Congo is still persisting in such a bad situation since several decades.

4.2. The access to High Speed Internet (HSI) in DR Congo

High-Speed Internet refers to a broadband access to the Internet, either over wireless or landlines. A good understanding of the variety of services, which become accessible to families, corporations and committees due to the high-speed Internet, helps for a better assessment of the HSI urgency. Let us briefly introduce three universal and natural needs to be satisfied by the means of HSI: (1) multimedia communication (including sound, images/video, and text); (2) access to knowledge under diverse multimedia forms; (3) telecommunications to reduce/cancel the need for physical mobility.

Access to good information is helpful for taking right decisions: at work, in business, in spirituality, and in several other sectors of common life. Indeed, there are many Internet services which require a high-speed data rates: emails with big files attached, the access to online videos (e.g. YouTube), video conference services such as skype, the use of online archives (e.g. cloud services such as G-Drive, Dropbox, etc.), the numerous Cloud services, the social networks, electronic commerce, banking services, etc. The impact on families while using High-Speed Internet can be expressed in these terms: multimedia communications at an extremely reduced cost with a subsequent increase of the life quality. The good/better life quality is seen through various facts, e.g.: a good management of social and business relations thanks to the social networks, an opening of minds ameliorated thanks to the boundless electronic information, enormous possibilities of self-training and electronic-supported leisure times. Schools, universities and other education institutions get enormously profit of the Internet.

Also, all other areas of relevance for a modern economy get a significant benefit from a good access to the High-Speed Internet (HSI): agriculture, mines, business, industry, transportation, NGO’s, local churches, political parties, the press, etc. Therefore, the crucial and chronic lack of HSI in a community, in DR Congo in particular, does have evident observable negative consequences in nowadays reality.

5. L1P1M2: Applying Documentary Research

5.1. The Access to Good Quality Electricity in DR Congo

Like water, electricity is a universal and natural need. Access to industrial and domestic electricity is an undisputed right. The accessibility, reliability, stability and availability are four properties, from our humble point of view, that characterize GQE. But often, the World Bank [5] [9] and other organizations recommend its accessibility as one of the development indicators. The electrification of urban and rural regions remains a lasting concern and a debate of development. The literature as in [10] [11] [12] and other sources have expert opinion on that. Paraphrasing Olivier Coutard [6], electricity, water and telephones constitute the essential networks of life. Having access to that is an important aspect of the quality of life. To itself, the electricity is a generating activity for the economy by its production, its transport, its distribution and its consumption. All these qualities rely on the networks, which carry this service (production, transport, distribution) [7].

By itself, the electrical energy is the economical resource which lead to the research of the liberalization market of independents producers [8]. But in the same way, it is a development energy in all the sectors of life. The lack of electricity due to the insufficiency of energy or by the lack of infrastructure has the same effects on the concerned areas. Having access to the electric service in DR Congo looks like a luxury, even in the capital town Kinshasa [9]. Despite the fact that the law of DR Congo recognizes the importance of electricity for development, this looks like theoretical. Talking about the lack of access to electricity in this town (Kinshasa for illustration) sounds like this: it is missing or poor regarding all aspects related to its availability, its reliability, and its stability. Overall, this is a serious problem for families and corporations/companies in both urban and rural areas.

5.2. The access to the service High-Speed Internet in DR Congo

Technically, according to the International Association of Telecommunications (ITU) in 2010-2011, the High-Speed Internet (HSI) refers to an access with a reference data rate of minimum 256 Kbps. But this value changes with time and targets fixed by the countries in terms of high-speed access. Its architecture relies on different access technologies: 4G, WiMAX and commonly the optic fibers [10]. At the user sides, it is often supplied in architectures for triple- or quadruple-play convergence of services. The final user of the telecommunications does access at the same time 3 to 4 services: Internet, television, and data [11]. The HSI is subscribed in the fixed-mobile convergence network architecture [10] [11].

The HSI power has significant influences on the social, the science, industry and economy. It makes a community go from the Internet of information to the Internet of relations. The industry gets developed in the economic strategies [12]. For instance, it has revolutionized the music industry, where the disc industry has changed unto online music files selling [13]. For some years, HSI has been one of the vectors of change in companies thanks to the evolution in the information systems [14]. Consequently, it is one of the vectors of economic growth for poor countries. In that perspective, it has favored the markets in the area of MENA region in Middle East AND North Africa) [15]. These countries are opened to be adapted to the developed countries politic of concurrences [10]. The new technological parameters brought by HSI make that its penetration in economy and industry has the effect of increasing employment [16]. The HSI technology enables companies to take their economic activities into the Internet. In the world of new millennium learners, the HSI contributes largely to the development of educative resources for both family and schools [17]. Statistics show that the diffusion and the innovation of HSI are high in developed countries. In France for instance, in 2008, 96% of young men in the ages from 12 up to 17 years had access to HSI [18]. Therefore, the access to HSI has become a measure of good conditions of French life as well as for the other countries.

The literature shows in summary that the access to HSI is a factor of development for a country and its citizens. Its lack is nowadays an indicator of bad conditions of social life in

the country. This means that the lack of access to HSI is a sign of bad conditions. The diffusion and the innovation of the HSI does almost not exist. The major project for deploying a fiber optics based national backbone remains a yard. The good benefits that HSI brings in other developing countries are fully absent in DR Congo. DR Congo shows a low rate of access to both fixed and mobile HSI. The rate is practically of 0.001% [5]. It is a serious problem. We can thereon imagine the bad conditions of social life for numerous families in that country.

6. L1P1M3: Applying discussions with selected Experts and Stakeholders

6.1. The access to the service of Good Quality Electricity in DR Congo (P1M3)

6.1.1 The persons to be involved in the discussions (experts and actors) and the questions for the discussions.

The following questions were posed to experts/ staff at Power Company who provide electricity in Lubumbashi area, DRC. Similar questions were posed (related to Internet Access).

1. Do you believe that every family in the DRC with a community of at least one thousand inhabitants has the right to access electricity available 90% of the time?

1.1 Are you aware of the problem above that this access is not guaranteed in the DRC?

1.2 Do you think that the general public has a sufficient awareness of this problem?

2. What does it mean for you to have access to electricity?

4. The few people who have access, however, suffer from very poor availability of the electricity grid. Do you see in this situation a breach of the social contract between SNEL and its customers?

5. How much KWh need to be sold per family in the DRC in the light of the general economic context of the country and the available energy potential?

One of the reasons to use the COMPRAM methodology is to guide towards a comprehensive understanding of all aspects related to the severity of the lack of access to GQE in DR Congo. In this part of the process, i.e. the step M3 of Layer 1 of COMPRAM (see Fig.1), the activities consist of discussing a series of selected appropriate questions with relevant experts on the one hand and with relevant actors on the other hand.

We have therefore distinguished 2 categories of people to be questioned for our discussions and interviews: « the experts » and « the actors ». The experts are the people supposed to have a clear and precise knowledge and an understanding of the problem without forcedly being concerned by it. They come from different domains of knowledge (e.g.: technology, economy, law, geography, sociology, journalism, the religion, human rights, management of companies, statistics, energy ministry, etc.).

The actors are composed of institutions and people supposed to be directly or indirectly concerned by the problem. We have 4 sub-categories of actors:

(1). Those having the decision power, for example the following ones: companies involved in production, transport and distribution of electric energy (SNEL is the biggest state-owned company of that kind in DR Congo); law and policy makers (e.g. parliament, government, etc.); the common people; the press, the economical operators, etc.

(2). Those who get profit of the situation, for instance those companies selling either diesel/gas power generators or solar panels or firewood, charcoal sellers, the oil men, etc.

(3). Those who denounce the problem in one way or another, for example the churches, the press, the public, the common people, and

(4). The victims of the problem, for example the families, the industries, the small-scale industries, the common people, the State under all its forms.

Globally, the quintessence of the questionnaire conceived for this section, and which was answered by the selected experts and actors, aimed at contributing to defining the following respective points: the respective level of understanding and perception of the

problem under investigation and the identifiable mechanisms of its denunciation. In the following, we will present the result of the discussions.

6.1.2 Comprehensive presentation of the results obtained from the different discussions

The fundamental and natural right for families, the electricity for which the SNEL (National Company of Electricity) has the monopoly, is accessible to only less than 10% of the population. It is the government's responsibility to create good conditions for a guaranteed energy supply. Other small sources of electricity such as private small generators or solar panels are just palliative solutions, as they are expensive and cannot provide more than 1% of the needed energy. For all villages/towns/communities of more than 1000 families, the possibility of access to electricity ranges from 0 to 10% in the majority of cases. Even in the electrified localities this service is available for only 5 to 30% of the time. Apart from the poor availability of the electricity supply consequently to numerous cuts, one should also notice the harmful fluctuation of the voltage at the electric outlet. The lack of good access to GQE is a proven complex societal problem. It has been perceived and confirmed by both the common people and/or by the expert/actors we have met in the interviews. It is an unsatisfied natural right for a large part of the country. The economic, social, intellectual, and psychological impacts are enormous. The experts and actors we've met converge in their understanding and the perception of this problem.

6.2. Access to High-Speed Internet in DR Congo (PIM3)

6.2.1. The experts, the actors and the questions of the discussion

The problem of lack of access to the High-Speed Internet (HSI) of good quality is a societal complex problem in DR Congo. As mentioned above, one of the steps of the COMPRAM methodology consists in understanding the complex societal problem throughout a discussion with selected relevant experts and actors. Thereby, we have based our discussions on a questionnaire elaborated in good way, and from which we present the results in the following paragraphs. We understand under HSI an access to the Internet network, for which the connection data rate is high, stable and inexpensive.

Our hypothesis is that such type of Internet should be accessible to all families dwelling in a city/village/town of more than ten thousand inhabitants (i.e. thousand families) in the DR Congo.

Here too, we have distinguished 2 categories of people (entities) to be questioned for our discussions: « the experts » and « the actors ». The experts are persons supposed to have the clear and precise knowledge related to the understanding of the problem without being forcedly concerned by the problem. The experts are from different relevant areas of society which are: Telecommunications Engineering, Computer Science, Network Operators, Statistics, Regulation Authority for Post and Telecommunications, etc. The actors are composed of relevant institutions, and other moral and physical persons supposedly concerned directly or indirectly by the problem.

Four sub-categories of actors have been retained:

- (1). Those having the power of decision, for example the following ones: the government (i.e. the ministry of post and telecommunications), the operators of telecommunications networks, the suppliers of internet services, the regulation authority (ARTC), the banks and SNEL (the Power company).
- (2). Those who get profit from the situation generated by this problem: some politicians, some ideologists, the government (a non-fully democratic government does visibly/often restrict the access to various services and parts of the internet; this has been observed in many countries like China, Turkey and DR Congo), etc.;

(3). Those who denounce the problem in one way or another for instance: the press, the public, the common people, the universities, etc.

(4). The victims of this problem: In fact all members of DR Congo's society are victims: the families, the industries, the small and medium enterprises, the common people, the state under all its forms, the security services, the schools, the universities, etc.

Globally, the quintessence of the questionnaires conceived for this section aimed at surrounding the following points: the level of understanding and the perception of the problem, and the identifiable denunciation mechanisms. In the following of the text, we will present the results obtained from of the discussions.

6.2.2. Results of different discussions and interviews (for HSI)

The lack of access to HSI is a critical factor in DR Congo. As vague as it can be perceived, from a networks engineering perspective, we can state that HSI is merely non-existent in DR Congo. The sustained promises of implementing an optic fiber based national backbone and the connection to it of all parts of the country have not yet been realized. Although some first project phases in that direction are in progress, but too slowly.

The access problem to the narrow-band Internet is yet an old problem since nearly 18 years in the DRC. The narrow-band Internet is offered nowadays in DR Congo via wireless cellular networks and some local loops technologies (WiMAX) in some urban and sub-urban centers. Therefore, wherever it exists, it is mostly slow, instable and expensive. The mobile Internet service with a maximum data volume of 1 GB does cost already some dozens of USD. Hereby, the observed effective data rate generally varies between 128 and 256 Mbps. The Internet has become an important means of communication and sharing information, a right for any person, mostly for young people. Besides water, electricity and health, the access to Internet is nowadays on the list of the first natural rights to any individual. In DRC, it is not unfortunately no yet pervasive for everyone. The access to mobile internet (offered over 3G networks) is more common nowadays in the DR Congo. Moreover, the effective cost per GB of data is relatively much higher than in the neighboring countries. The gravity of this societal problem is better perceived by the minority of prudent intellectuals, who knows advantages of using the Internet while a large part of the population remains ignorant. The common people know about the Internet mostly only through the social networks accessible through their mobile phones. They do not know anything about HSI. The industry, schools, universities and other educational bodies know what the Internet is and its importance.

The pervasive ignorance of what HSI is by a big majority of the population of DR Congo restrains the quantity of alerts and denunciations. Sometimes, some timid public manifestations are organized whenever the access to the mobile Internet is suspended for political reasons. In general, there is almost no denunciation strategy of the crucial societal problem related to a decent Internet access and especially the need of a high speed Internet. To finish, let us notice that there is a link between electrical energy supply and HSI. We cannot have HSI if the problem of electricity is not solved yet. The operation and the extension of HSI is conditioned by the availability and the extension of electricity supply. Let us further notice that modern electrical networks become intelligent (see smart grids) and integrate from now, on an advanced Internet technology to operate. The strong interdependence of the infrastructures for HSI and GQE is a positive fact which can motivate a series of synergies when it comes to develop appropriate and cost-effective efficient strategies for addressing both critical societal problems of DR Congo's society.

7. Conclusion and Future Work

The current situation of the Democratic Republic of Congo (DR Congo) is characterized by a catastrophic and very poor access to both Good Quality Electricity (GQE) and High Speed Internet (HSI). These two telecommunications services are nowadays considered as parts of both NATURAL rights and primary NEEDS. Their lack makes a Complex Societal Problem in DR Congo. Today, in 2016, this situation has not changed. Through our first step in Layer 1 of COMPRAM, we have described this Complex Societal Problem in “natural language”. Personal considerations and observations by the analyst(s), information retrieval from literature and other sources and discussions with selected relevant experts and stakeholders on how numerous people in DR Congo don’t have access neither to a stable, sufficient and permanent Electricity service and nor to a speedy, stable and permanent Internet have been extensively analyzed.

COMPRAM was used to describe a Complex Societal Problem and part of the solution given to this problem. Hence our research is a first step towards the solution to be found in later stages of COMPRAM in order to solve the core problem at stake. Indeed, this first understanding of the problem sheds light on the next stage of research in the construction of the Conceptual Model of the problem posed. The bulk remains to be done (see Fig.1). The next step of this research will be focus on why the lack of Good Quality Electricity and High Speed Internet is a Complex Societal Problem. In that work, we will have to find the causes that justify the problem mentioned, the phenomena they generate and the relationships that relate to the actors to the phenomena. Thereby following P1, this future work, named P2 (see Fig.1), further develops the definition of the problem and the conceptual completeness of the problem. Knowledge of the causes of the problem, of the phenomena that arise from it or that result from it, makes it possible to understand the dynamic nature of the problem and to envisage an effective solution to be adapted in the future.

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