Introduction to seismic forecast and basics rules for seismic risk prevention and management

Malik Tigziri

The University of Geneva, Geneva UNIGE, Switzerland
The Technical University of Catalonia UPC, Barcelona, Spain

ABSTRACT: If the way of prediction of seismic phenomena is very small, the way of prevention can be the only solution to avoid a disaster. When the countries at risk don't apply the orders and educations prevention it makes them in large probability that a disaster and a catastrophe occur. Although these tools prevention are applied, when the magnitude of the phenomena is very high the catastrophe could happen. To minimize the event we must prepare the society on the good management of crises.

1. Introduction

"Since the man, reflective with what surrounds it, wants to find the reason of the things and to be explained the universe, no natural phenomenon had nothing any more but the earthquakes the gift to move it and excite its curiosity, undoubtedly in consequence of the terror witch accompanies them…" (Montessus de ballore, French seismologist, 1907)

The earthquake is the most dangerous natural phenomena that could happen anytime and with any intensity in slides tectonics plates regions. The scientists couldn't predict the earthquake even if at the moment some precursory signals and some forecast long, medium and short terms methods could alert them.

2. Prediction of earthquake:

Initially, it is impossible of our time to predict an earthquake in a precise way, but there are methods of forecast with:

Long term: that is done by the definition of the seismic risk.

Medium term: by the technique of pattern recognition, applied by a Soviet team to the variations in the space and the time of the seismic activity of an area.

Short term:
a- Precursory phenomena.
b- Method VAN: it is based to the electrotelluric measures of the currents. The analysis of the fluctuations of the potential difference measured between two impolarizable electrodes buried and distant of ten to a few hundreds meters, makes it possible to identify signs abnormal, known as "ITS" (seismic electric signal).

3. The seismic prevention

The seismic prevention remains the best means of protection against this natural phenomenon. A good prevention is defined by different points that could be defined on urban level, than on work level and finely on social standing. We will start with the first level that is the urban level.

Urban level:
- A good evaluation of the seismic risk.
- Installation and occupation of the territory and the grounds by establishing a seismic zoning and it micro zoning.
- To conceive great free and virgin faces as well as circuits of regrouping for to evacuate the inhabitants of the city in the event of unverifiable fire.
- To design broad roads which constitute firebreak.
- To decentralize constructions and the occupancy rate of the population on the level of the city.
- To uncouple the principal circuit and the secondary circuits from gas. [1]

In second time we focus on Work level:

It is summarized with a construction of the works according to earthquake resistant rules' which are in a fact the must important points to prevent a catastrophe, " Good work mean humans life's saved" these one can be define as follows points :

- The good study of the nature of the grounds. [1]
- The good choice of the structure compared to nature of the ground. [1]
- The good choice of the type of foundation compared to the nature of the ground.
- Installation of the insulators and the shock absorbers for the works with great importance. [1]
- The good choice of building materials.
- To conceive simple forms in plan and of rise.
- To establish the rupture and expansion joints in the necessary sites.

- To avoid distort them symmetries and constructions overhanging.
- To design staircases so as to balance the efforts. [1]
- To avoid the short posts. [1]
- To build with creaseable materials, which absorb seismic energy.
- To conceive independent masonries compared to the structure of the work.

Finally, on the social standing:

It is important to propose formations of quality for the professionals who later will build works which must resist in the event of earth tremors. We should educate the population with reacting well at the time of these crises by formations in the schools and other publicly, and owned establishments. It is also important, to inform the population in connection with this natural phenomenon by the realization of video, the leaflets and by mobile units (mobile library).

4. Management of the crisis

If prevention part doesn't success for many different reasons, we have to think and to work about strategy and methodology of management crises. It is the last opportunity to a void the human tragedy 'because we run against the time.

For a good management of the crisis it is necessary of: [2]

- To establish a plan of evacuation and help suitable for the seismic risk

- A good awakening of the persons in charge and authorities for the extent of the crisis.

- A fast decision-making by the political system.

- A good preparation of the services of interventions, authorities, population, with standard of crisis.

- A good psychological assumption of responsibility of the population.

- The re-housing of the population in worthy, at a cheap rate and economic dwellings.

The management of the catastrophe passes by the following stages: [4]

- Alarm: the seismic inspection network makes it possible to immediately locate the area and the magnitude of the phenomenon.

- The mobilization: in the event of catastrophe major the Prime Minister activates the plan ORSEC which mobilizes average soldiers, these allow:
a. Air recognitions,
b. Reinforcement of the transmission resources
c. The provision of personnel and heavy machines.

- Coordination: the Minister of Interior Department is in charge of the coordination of the operations and each government department delegates one or more representatives to the centre of civil safety.

- Priority actions:
a. the gathering of the specific means of help, and routing of those towards the zones disaster victims, to inform the populations and to diffuse instructions with the populations disaster victims.

b. the regrouping of the information and their synthesis must make it possible to measure the width of the damage and especially the state of the telecommunication and communication networks.

In spite of a good planning of the management of crisis that one can prove to be ineffective by the bad turning of the events.

The management of crisis also passes by a good psychological assumption of responsibility of the population which can react as follows: [5]

- Reactions of panic.
- Hysteriform Reactions.
- Neurotic Depressions.
- Depressive Psychoses maniacs.
- Schizophrenic Psychoses.
- Mental Confusions.
- etc.

The behaviour of people in these situations can be separate in two groups:
- A group which reacts to the earthquake in a manner panics, showing to behaviour either egocentric person thereafter or autistic.
- A group of people who react to the earthquake in a manner more or less without fear, showing later to behaviour either altruist or actively negative

In the management of catastrophe the promotion of hygiene is a paramount element followed by the drinking water supply: [7]

This first is carried out by:
- A good exchange of information and knowledge.
- The mobilization of the communities.
- Supply of material and essential installations.

This second is carried out by:
- Provisioning of a quantity of water established with 15 litres per anybody and day. This quantity includes consumption, the cooking of food and personal hygiene in each hearth.

To maintain hygiene in the camps of disaster victims, it is important to eliminate solid waste and the excrements like establishing a good drainage of worn water.

5. The reparation of the works:

With regard to the last phase "the repair of the works", it is to be retained that that one passes by the following stages: [3]
- The investigation into the damage and their origins.
- Immediate repair.
- The long-term repair of the works.

The phase of the investigation consists in gathering all information on the antecedents of construction, its design, its construction, and finally its use. This information makes it possible to the professionals to eliminate the causes from the damage and then to repair the latter. After having subjected constructions to these investigations, one carries out immediate repair by:
- The partial or total demolition when that represents a danger to the population.
- The rapid reduction in the overloads.
- The bracing of duly studied fortune.
- The clearing of the debris.

This phase of repair enables us to carry out new structural analyses for reinforcement or a restoration, as well as the decision-making of repair or replacement which depend on the following criteria:
- Considerations of a structural, functional and aesthetic nature.
- Costing.
- Facility of operation.
- Embarrassment brought to the operation of the building.
- The time and financing.

And of the possibilities of repair from the point of view:
- Technique:
a. Availability of the equipment, tools, and materials necessary
b. The qualification of the labour.
- Economic: the cost of repair does not exceed the cost of the replacement.
- Importance of the building (Hospital, bridge.).

After having decided possibility of repair of the work one passes at the stage of the choice of the techniques used for this one. These techniques differ from a material with another and a damage to another. This choice depends much on the intelligence and the spirit of reflexion of the professional.

6. Conclusion

In spite of the fact that we put all the energies and society tools, to avoid this kind of catastrophe and crises, it is impossible up until now to reduce the risk of catastrophe at nought. The only way is the preventions measures witch is represented by a good evaluation of seismic risk and also the good occupation of territory, and finally, the application of earthquake resistant rules. This part of prevention is improved by the social standing that is defined by formations of quality for the professionals who later will build works, and educate the population with reacting well at the time of these crises by formations in the schools and other publicly.

The efficiency and success of prevention part depend on the force of the network witch binds them together, between government, scientists, and services of intervention and population. When these means doesn't give us the result waiting, we have to set going the management part whose the success depend on the good communication between politics, scientists, services of intervention, radio ham, population.

After disaster, the good reparation will be the security for us that another disaster doesn't occur in future, and this, by choosing good methods and techniques with using an adequate material.

"Which can not support the evil will not live to see the good." Proverb

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