



Regulations and Responsibilities for a Mature Society

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1. Introduction

Buildings are containers for activities and lives of people but at the same time they provide the profit expected by those who made the investment. There are different stakeholders in the situation, often with widely different aims: it is a complex situation. One stakeholder is the user/occupier, who is physically in the building for much of the day and who has a primary need for safety. Other stakeholders are: the civic authority who would represent both users and other stakeholder interests through the legal system; the client wants the structure built; the developer, who may sell the structure once built, would simply want to maximise his profit; and the architects and engineers have roles in providing a functional structure which is safe and serviceable.

Regulations for structural safety have been established for years in many countries to provide minimum safety requirements. People in general do not query safety standards specified in regulations. Nevertheless regulations tend to lag far behind the frontiers of scientific knowledge. In any case authorities find it difficult to change safety regulations, explaining that the current regulations are appropriate because they were justified by experts among both engineering practitioners and academics.

The aim of this paper is to discuss the basic problems related to regulations and engineering responsibilities and to explore a possible societal system for achieving more appropriate structural safety for a mature society.

2. Development of regulations

Engineering regulations are developed to assure structural safety for the benefit of society by taking a balance between the economic growth and social welfare. These rules have been developed for practical use and have contributed to significant reductions in earthquake failures. When economic competition forces engineers to minimise design cost, they have to minimize material quantity under the constraint of regulatory specifications. If an earthquake disaster reveals some weak points in the structure, they blame the building authority, believing that the regulations did not take care of the issue. Thus specifications have gradually grown to cover many details. Current standards of structural safety in developed countries are generally satisfactory as a minimum standard. The quality of a design from the point of view of safety and health cannot be easily recognized from an outside view. For this reason, if the client has no specific idea of the need for such quality, he/she will accept the lowest cost. In a market economy the target quality tends to be



the minimum requirements. Nevertheless regulations cannot cover every aspect of the safety and health of individual buildings in various locations and with various uses.

3. Role of professionals

Professional engineers are those who can make their own decisions on safety. Although regulations provide basic rules for structural design, there are still many issues the rules do not cover regarding the physical conditions of both structures and environments. The regulatory authority is only concerned with conformity to the rules.

Professional ethics require that the responsibilities of engineers must include consideration of underlying principles beyond merely following rules. Because of the limitations of time and fees, there is usually insufficient communication between the client and the engineer. Typical individual features influencing safety demand, though the importance differs between stakeholders, are:

1. Site conditions including geological conditions and natural hazards
2. Availability of specific structural materials
3. The consequences of various damage stages including collapse
4. Intended period of service life

Engineers should explain to the clients the safety decisions to be made related to seismic performance for the various level of earthquake motions. Decision-making is an essential task of an engineer.

4. Elegant Structural Engineering

Giorgio Agamben discusses the difference between power and law in his famous book, *Homo Sacer* [1], which refers to the distinction between constituting power (the power of the people) and constituted power (the legal authority). He attempted to reconsider the sense of classic definition of the polis as the opposition between life and good life, as mentioned in the book's introduction. Although rules for life may be effective for efficient economic activities, the uniformity of life is also regulated. Now we need a law for good life.

Structural engineering itself can provide the required quality for buildings and can explain that a level of safety is appropriate by exhibiting the safety measures, failure consequences and economic considerations for various stakeholders. If this is done then regulations can be minimized.

Science provides information regarding the nature, and engineering makes models based on the scientific findings for the safe design of buildings. Engineers have to accept there are differing opinions about future events among scientists. Professional engineers may know better than clients and so can provide rational solutions based on their best knowledge. We can propose a system for ideal building approval with the client and the professional engineer once information is sufficiently disclosed.

5. Concluding remarks

Professional engineers should take responsibilities for safety quality not only for the clients/owners but also for society. Minimum requirement regulations have developed with more and more specific clauses but these discourage engineers' motivation for creative work. A system where an agreed safety level is determined between stakeholders after receiving sufficient information from professional engineers may be considered for a mature society.

6. References

- [1] AGAMBEN G. translated by Heller-Roasen D. *Homo Sacer*, Stanford University Press, 39-40, 1998.