SOCIAL MARKETING FOR NATURAL DISASTER PREVENTION: A GROUNDED THEORY OF EARTHQUAKE THREAT AWARENESS-RAISING[1]

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ABSTRACT

Despite severe damage experienced in recent years, social marketing associated with natural disaster receives scant attention. This paper reports a qualitative exploration of consumers' threat perceptions toward earthquakes and adaptive intention of seismic-resistant housing in the Southern region of Spain. Prior research on earthquake-related social marketing is almost non-existent. Thus, we employ a grounded theory approach. Eight focus groups reveal that earthquake threat is not a sufficient driver to stimulate adoptive intention due to a lack of information and distrust of the construction industry, unless the local Government is firmly involved in awareness-raising campaigns and housing subsidy.

KEYWORDS

Adaptive behavior, earthquake, natural hazard, threats, seismic design structure

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1. Introduction

On April 6, 2009, a terrible earthquake devastated a medieval town in central Italy, L'Aquila. Thousands of buildings either were damaged or collapsed, including university dormitories, churches and bell towers, leaving 287 people dead, approximately 1,500 injured, and close to 40,000 homeless (BBC News, 2009). Analysts underlined that some buildings in Italy are particularly vulnerable due to old seismic codes (Financial Time, 2009). A similar situation may be observed in many Mediterranean countries, including Spain, where seismologists warn that an earthquake of similar characteristics could occur in the south-eastern coastal region, around Murcia or Granada. However, general residents in these regions seem to be poorly informed and ill-prepared for such a potential natural disaster. There is little awareness about the fact that, nowadays, technology exists that can provide old buildings with the required additional seismic resistance.

Even in advanced industrial nations, the building environment is susceptible to earthquakes. Structural design engineers have been working on new and innovative concepts of structural protection to resist destructive environmental forces. Among them, the so-called passive energy-dissipative devices are considered to be more effective than traditional solutions for seismic design, minimizing possible structural damage. Specialized technology for natural disaster prevention has seldom been an object of social marketing research, however. In fact, our literature review in this discipline identifies only two conceptual studies, which examined natural disaster and Hurricane Katrina, but not earthquakes (Baker, 2009; Guion et al., 2007).

The objective of this study is to examine general consumers' perceptions toward earthquake hazard and their adoptive intention of seismic-resistant housing as a result of a public awareness-raising campaign. The site of study is the Southern region of Spain, which has historically demonstrated moderate seismic activity. Due to our lack of knowledge, grounded theory is employed as a qualitative methodology. We believe our study makes significant contributions for three reasons. First, the socially responsible behavior of local policy makers against an eminent earthquake has been a completely neglected area in the literature. Second, there is an equally important research gap in terms of the consumers as well as public policy makers' preparedness regarding earthquake hazard (Duval and Mulilis, 1999). Continuous warnings by the scientific community about earthquake management must be properly translated into relevant variables for social marketing communications. In this sense, we believe that our qualitative approach can be considered a very legitimate method to be explored. Finally, this study is fundamentally interdisciplinary, the fruit of efforts by experts in civil engineering, social marketing, and local Government policy making. We believe that such synergy from different fields—beyond the borders of natural and social sciences—is indispensable for substantive advances in social marketing research.

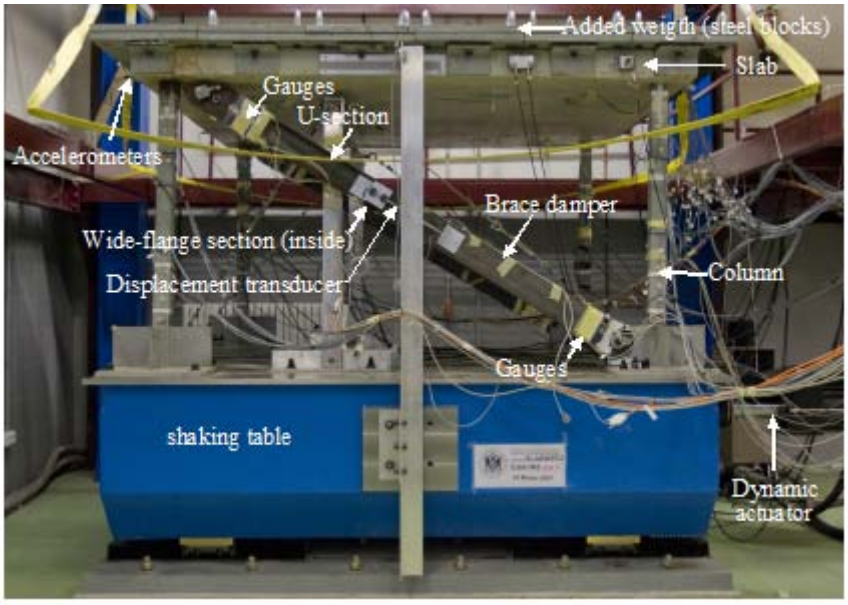
2. Background

2.1. Development of seismic resistant structures

In civil engineering, earthquake risk mitigation through structural control has achieved significant progress over the last three decades. Structural control can be broadly classified into three categories: passive, active and semi-active. Passive control systems are structures equipped with energy-dissipating devices that do not require an external source of power. Active control systems are those structures equipped with real-time processing sensors and force delivery devices that require an external source of power. Semi-active control systems use little power to change the control force opposed by certain elements of the structure. One of the authors of the present study launched a R&D team in 2007, when the Andalusian Autonomous Government granted financial support for the project. The researcher installed a research laboratory equipped with a large-scale seismic shaking table for vibration tests (Figure 1). He eventually succeeded in the development of a simple, effective and inexpensive energy-dissipating device, which is feasible for massive application. This kind of seismic energy-dissipative devices for passive control is increasing exponentially in recent years, aimed at

protecting both new and existing buildings against severe earthquakes. In 2009, the device became patented and was made technically available for public construction projects, in particular, seismic-resistant housing. Because of the research grant, the R&D team now seeks support from the Andalusian public policy makers in order to disseminate information about the device, which would significantly help in the prevention of future seismic disasters. The focus of this study is therefore to propose functional social marketing programs for awareness-raising regarding seismic-resistant housing, to strengthen the earthquake preparedness of regional residents.

FIGURE 1
Research laboratory with seismic shaking table tests



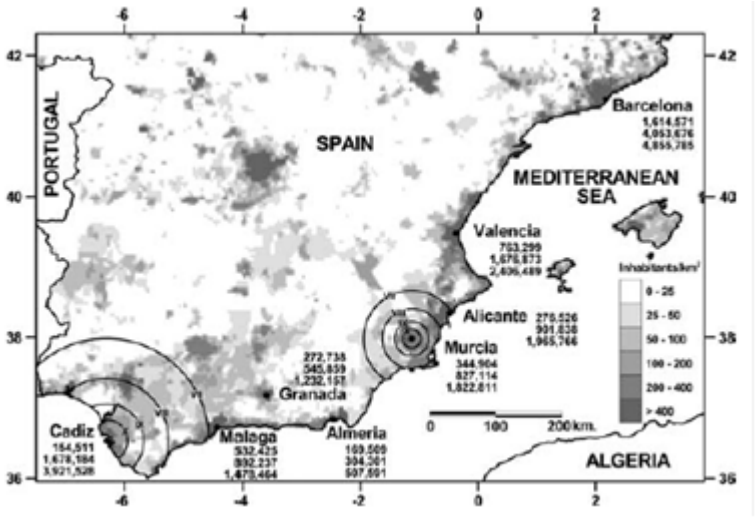
Source: University of Granada

2.2. Earthquake hazard preparedness in Spain

Despite the substantive R&D in seismic-resistant housing, unless consumers are psychologically prepared and willing to adopt its usage, cutting-edge technology may be useless. In this regard, consumers' earthquake preparedness has been examined and published in the natural hazards and disaster prevention literature. While most studies in the 1970's and 80's were exploratory and based on post-hoc data, the study by Mulilis et al. (1990) was unique in that they attempted to assess earthquake preparedness before and after the disaster occurred. Their scale, an extension of Mulilis's (1985), is essentially a behavioral scale, and assesses earthquake preparedness and its levels of difficulty. Research has been extended in other contexts (e.g., Spittal et al., 2006; Hurnen, 1997; McClure et al., 1999). These studies appraise not only how prepared one is over a wide range of preparatory activities and safety information, but also the individual behavioral involvement in earthquake preparedness.

In Spain, Southern regions such as Andalusia and Murcia are deemed to constitute a moderate seismic area in the world. For example, in Andalusia, several earthquakes with M5 or more have occurred in the last 20 years, including ones in Ayamonte (Huelva) in 1989, Berja (Almería) in 1993, Adra (Almería) in 1994, and Gérgal (Almería) in 2002. In this regard, Badal et al. (2005) conducted a seismic hazard analysis for the Eastern and Southern regions of Spain. Figure 2 indicates three important figures: (1) population of the urban nucleus, (2) the population of the entire province that would be affected by an earthquake of M6.0 and (3) the population that would be affected by M6.5.

FIGURE 2
Hazard analysis for the seismic regions of Spain



Source: Badal et al. (2005, p. 365)

However, because storms and floods are more common, earthquake hazard has received scant attention (Gaspar-Escribano and Benito, 2008). As a result, only four Spanish regions developed formal seismic risk plans: Catalonia (Plan SISMICAT), the Balearic Islands (Plan GEOBAL), the Region of Murcia (Plan SISMIMUR) and the Basque Country. The plans of Extremadura, Valencia, Andalusia and Galicia are still in a preparatory stage (Gaspar-Escribano and Benito, 2008). Much further research is necessary not only in hazard assessment, but also in public policy perspectives. In social marketing literature, research on the effectiveness of public policy programs for earthquake disaster prevention is practically nonexistent in an international context. Our study aims to bridge this research gap by applying qualitative social marketing techniques to a yet unexplored context.

3. Methodology

3.1. Grounded theory

The literature in persuasive communications reveals that threat communication has been used to increase adaptive person-to-environment interactions by persuading a person that he or she is at risk regarding the occurrence of a potentially harmful event. A person convinced that their well-being is threatened will presumably choose activities designed to avert the dangerous situation. However, the literature related to earthquake threat communication is practically non-existent, requiring us to adopt an interpretive—rather than constructive—inquiry method. This study employs the grounded theory approach. As the name suggests, the theory is grounded on the words and actions of those individuals under study (Goulding, 2005). Here, the researcher sets aside theoretical notions to allow a 'substantive' theory to emerge, while rigorously seeking a plausible relation between concepts and sets of concepts. The procedures of grounded theory are designed to develop a well-integrated set of concepts that provide a thorough theoretical explanation of the phenomena under study. Grounded theory seeks not only to uncover relevant conditions, but also to determine how the actors respond to changing conditions and to the consequences of their actions. The data collection procedures involve interviews and observations as well as other sources (Corbin and Strauss 1990, p. 5). Concepts are developed through constant comparison with additional data. This constant comparison constitutes the heart of grounded theory as a method: the process of repeatedly comparing instances of data that have been labeled as a particular category with other instances of data, to determine if these categories fit and are workable. If they are, and the instances mount up, then we have what Strauss (1987) and Glaser (1992) call 'theoretical saturation', which is the ultimate goal of grounded theory. Additional data are collected by theoretical sampling, meaning that

researchers seek "people, events, or information to illuminate and define the boundaries and relevance of the categories" (Charmaz, 2006, p. 189). After reaching theoretical saturation, researchers should begin sorting, diagramming, and integrating the categories (and subcategories), closely inspecting how these categories could be reconstructed into theoretical conceptions.

3.2. Procedure

In this study, eight focus groups were conducted, with five to eight general consumers participating in each. The background of the participants varied from housewives to University professors who reside in the city of Granada or Murcia. The "theoretical" or intended sampling criterion "for theory construction, not for representativeness of a given population" (Charmaz, 1995, p. 28) was that subjects should have lived over a two or three-decade period in these regions. Candidates were told that (1) this study was undertaken for the sake of the engineers, who developed a new seismic-resistant structure, and (2) the content of the interviews would be used only for academic purposes, and their complete anonymity was guaranteed. Participants were told that their responses would be taped. Also, they were informed that they could obtain a summary of the study upon its completion.

Open-ended questions were employed to encourage a detailed but also flexible discussion of the topics (Charmaz, 2006). In order to maximize interaction between the moderator and the participants, we incorporated the projective methodology by showing (1) three photos of L'Aquila's earthquake, and (2) two videos of seismic-resistant structure experiments in the University of Granada's laboratory. The projective method has been proven to be a useful qualitative technique in observing spontaneous reactions of the respondents (Churchill, 1991).

3.3. Coding

Each time a focus group performed, two levels of coding were undertaken: initial coding and focused coding. During the first stage of coding, we conducted a "detailed line-by-line analysis" (looking for words and sentences in the text that have meaning) necessary at the beginning of a study to generate initial conceptual categories, and to suggest relationships among categories (Strauss and Corbin, 1998, p. 57). The constant comparison method was used to find similarities and differences in the interviewees' responses to our questions. This comparison led to focused coding. At this level, we attempted to synthesize the initial coding and determine the most significant and frequent categories. We continued this process—focus group, coding, and constant comparison—until we reached theoretical saturation: the point where a new focus group no longer sparked new insights (Glaser, 1978). We reached this point of theoretical saturation with all eight focus groups. Core categories were then constructed. A core category pulls together all the concepts in order to offer an explanation of the phenomenon. It is impossible to provide a complete overview of the focus groups in this brief paper; however several excerpts from the transcripts have been organized around the core themes described below.

4. Results

Our focus groups reveal that the residents of the major seismic regions in Spain, namely the greater Granada and Murcia areas, do not perceive any eminent threat toward earthquake due to **lack of interest or concern**. Some are openly but **unintentionally indifferent to the potential danger of a large-scale earthquake**. Although they are accustomed to small vibrations on a daily basis, they tend to consider any destructive earthquake similar to L'Aquila's to be rather unlikely. One company worker (male, 42) claims:

> "Well, we are used to small earthquakes since childhood, but nothing ever really happened to our house. Spain is not like Japan. When we look back over the last decade, there was no big earthquake."

On the other hand, older generations did experience large seismic movements in the 1950s in Granada. A few participants who were over 60 years old did indeed acknowledge the destructive power of earthquakes. For example, one housewife (71) responded:

> "When I married my husband and had our first baby, Granada had a large earthquake. The building we used to live in was severely damaged. It was really scary… But I don't know if anything has changed since that earthquake. Nobody has told me if our houses are safer now than before. I just don't have any information."

Our group discussion reveals a **complete absence of earthquake preparedness** among the participants. As one taxi driver (male, 62) puts it:

> "Here in Granada, people just don't think about any future disaster. It sounds so unrealistic, or like nothing serious would happen. A big earthquake may come someday but so what?"

A young housewife agrees:

> "We are used to earthquakes here in Granada…I am not scared, or let´s say, I don't feel any danger. It may happen, but the possibility just seems so remote."

A company executive (male, 52) points out **a lack of information** from political or scientific authorities. He implies that a lack of interest might stem mainly from an absence of systematic alert from the public institutions:

> "I believe we simply don't have enough information about these things. Who can know for sure if a big earthquake will come to Granada? Politicians? Scientists? How can anyone be certain, and if so, know exactly when it's going to happen? Nobody can. Earthquake prediction is extremely difficult and nobody can tell you anything for sure. So in this case, why should I worry about it?"

A young engineer (33, male) expresses his concern:

> "Somebody must inform us about the danger of earthquake. But who is really responsible? The Official Association of Architects? Of course, architects are responsible for building and designing houses, and I suppose we can trust what they say. Right? But they don't say anything. How about the city council? They are supposed to be our representatives but they don't pass on this kind of information. Or the construction companies? No way!"

Probably the most striking finding is **a lack of trust** in the construction industry. A nurse (59, female) says:

> "Who believes what construction companies say? They never keep their promises and do whatever they can to reduce costs. I am sure many construction companies cheat. Few companies respect building codes and standards. Most of them use cheaper materials to save money…"

The participants are almost unanimously **skeptical** regarding the adoption of seismic-resistant housing. A housewife (28) notes:

> "I don't know what it looks like. I have never seen it. But even if I know it's available, I am sure we couldn't afford it because it must be very expensive. Unless the Andalusian Autonomous Government subsidizes this kind of housing, we won't pay any attention."

A school administrator (male, 45) agrees:

> "Even if some builders are promoting construction reinforced with this new technology, I´m not going to buy it. You know what happened to most construction firms during the last decade. They built so many defective houses. Who would trust

> what they say? They can use cheap materials to save costs, so there is no guarantee that they are really using a seismic-resistant structure."

The **coping strategy** seems to vary according to the level of consciousness among the participants. Consumers must cope with the future disaster in some way, but need to be convinced to do so. That is, coping comes after **persuasion**, which in turn depends on the right **information**. A taxi driver (male, 62) argues:

> "How can we deal with an unforeseen earthquake? We can´t cope with something we are not well informed about. I mean, we don't have enough information, or economic resources, to prepare for an earthquake of this magnitude. It would be extremely expensive."

Also, coping should be directed by a public authority that is capable of providing correct information. In this regard, many participants call for **local Government awareness-raising campaigns** as well as the support programs. This can be seen as the flip side of the same coin: the enormous distrust of the private sector makes necessary the support from public institutions. For example, a computer salesperson (male, 29) observes:

> "I think this kind of information should be provided by trustworthy professionals. But personally, I don´t even trust architects. So maybe the local Government should tell us what kind of technology is available to protect our houses. Then, they might motivate us to use that technology by providing some kind of economic aid. They could do this for buying a new house or for reforming our current house."

Given the serious economic stagnation at present, a mere awareness can by no means persuade consumers to change or reform their housing. Economic support is a must—one must face the harsh reality of everyday life. In the opinion of one housewife (52):

> "I won't trust anybody except the local Government. They should educate us about what kind of danger we are facing in the near future, and what kind of protective measures we should adopt. For example, they can use TV spots or street handouts, announcing the importance of seismic-resistant housing. And if the local Government provides subsidies, people may take it seriously."

5. Toward a grounded theory

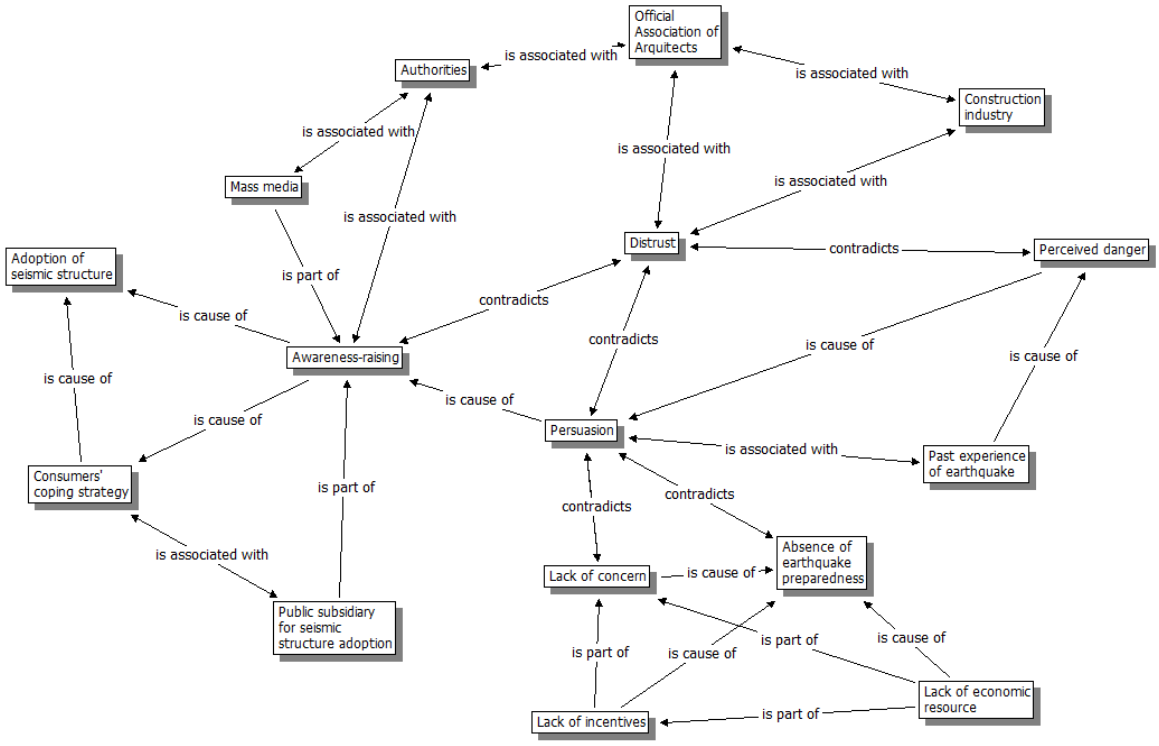
Results from the eight focus groups reveal a useful set of key concepts that should be conceptualized around a social marketing framework. Figure 3 shows a conceptual diagram that is aimed to foster "seeing possibilities, establishing connections, and asking questions" so as to visually depict an emerging theory of earthquake public awareness campaign effectiveness (Charmaz, 2006, p. 135).

Among the types of claims that we identified during the focus group sessions, the following terms hold the key to understanding the general perceptions of earthquake hazard among consumers: a lack of interest, a lack of incentives, distrust, and skepticism. All of these factors determine a complete absence of earthquake preparedness—and interest thereabouts. Yet it could be that authorities' efforts to build trust through awareness-raising campaigns may revive motivation as to seismic resistant housing, either in terms of new homes or reforms. We believe the key factor would be consumers´ coping strategies. This factor focuses on the psychological stress and difficulty in coping with natural hazard due to a lack of public awareness-raising efforts. In this regard, the literature generally suggests two processes as critical mediators of stressful person-environment relationships and their immediate and long-term outcomes: cognitive appraisal and coping (Lazarus, 1966). Cognitive appraisal is a process through which the person evaluates whether a particular encounter with the environment is relevant to his or her well-being and, if so, in what way. Cognitive appraisal entails two phases, primary and secondary. In primary appraisal, the person evaluates whether they have anything at stake in a given encounter. A range of personality characteristics including values, commitments, goals, and beliefs about oneself and the world helps to define the stakes that the person identifies as

bearing relevance upon one´s well-being in specific stressful transactions. In secondary appraisal, the person evaluates what, if anything, can be done to overcome or prevent harm, or else to improve the prospects of some benefit. Various coping options are evaluated, such as changing the situation, accepting it, seeking more information, or holding back from acting impulsively.

The results of our grounded theory may be more meaningful, taking into account the fact that coping has two major functions: dealing with the problem that causes distress (problem-focused coping) and regulating emotion (emotion-focused coping) (Folkman and Lazarus, 1984). Within our focus groups, participants expressed concerns—that is, focusing on problems—as well as frustration—focusing on emotions. Previous research studies (e.g., Folkman and Lazarus, 1980, 1985) have shown that people use both forms of coping in virtually every type of stressful encounter. We believe these two coping functions are very relevant in the context of public earthquake awareness-raising campaigns, which are essentially trust-building efforts.

FIGURE 3
Conceptual map based on grounded theory



6. Conclusion

Despite the potential disaster of a large-scale earthquake, research surrounding consumer protection in natural hazards within Mediterranean countries falls far behind the levels achieved in other counties in seismic regions, such as Japan or the U.S. Our grounded theory based on eight focus groups with Spanish consumers reveals their overall psychological resistance to the adoption of seismic-resistant housing, mainly due to a lack of interest and information, and distrust of construction professionals. In order to overcome such pessimism, the local Government should be involved in awareness-raising campaigns while providing economic support for new housing or structural reforms of existing places of residence. In the next phase of our research, we will propose a theoretical model based on the present study, and validate it by quantitative surveys. In doing so, we plan to collaborate with the pertinent authorities of the

Andalusian Autonomous Government, and launch a pilot campaign of awareness-raising about seismic-resistant housing.

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