

Construction Industry Ignorance to Disaster Risk Reduction

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Abstract— Although experts have identified ignorance as one of the problems in implementing disaster risk reduction, studies on this subject are still relatively small. This paper aims to explore the concept of ignorance about disaster management and construction project management. Ignorance arises as a result of differences in characteristics between disaster management and infrastructure project management about disasters. Disaster management focuses on the issue of uncertainty while construction project management is accustomed to ensuring everything through detailed calculations to optimize limited resources. In contrast, construction project management handles problems through short or medium-term solutions while disaster management usually talks about long-term and continuous programs. These differences lead to different perspectives and create mental-blocked for construction industry players to implement disaster risk reduction. Ignorance is also influenced by personal factors, namely motivation and intention. Motivation can be either internal or external. The internal motivation is related to personal pleasure, interest, comfort, and satisfaction while the external one is related to somebody's efforts to achieve specific goals, getting awards, avoiding punishment or other negative consequences. This paper shows that currently, the relationship between the construction industry management and disaster management focuses more on technical and policy aspects. That is the reason why this paper suggests that construction industry player also needs to learn about human behaviors in order to understand the conflicts that might arise between the two due to the personal factors of the actors. These three subjects are similarly essential and complementary to each other. Ignorance of disaster risk reduction is a product of human behavior. Therefore, ignoring the human-interest subject will make the construction industry player having difficulties in implementing disaster risk reduction concepts.

Keywords— ignorance; disaster risk reduction; construction industry.

I. INTRODUCTION

The contribution of the construction industry to disaster management is unquestionable, especially during emergency response and post-disaster rehabilitation and reconstruction phase. However, many scholars like Witt *et al.* [1] thought that the involvement of the construction industry should be extended not only in reactive but also in proactive actions. That means pre-disaster preparation activities.

In line with that statement, Bosher and Dainty [2] believe that the modern disaster management paradigm has to focus more on preparedness, hazard mitigation and vulnerability reduction rather than crises and relief measures. According to Balamir [3], the shift of disaster paradigm will ask the society to change its characteristics from the Fatalist Society

to the Self-Relying Society. Table I shows the attributes of these two models of strategy in disaster policy.

In 2015 the United Nations launched the global action for disaster risk reduction attempt called The Sendai Framework [4], named after the city in Japan where the conference was held. This framework states that although the primary role of disaster risk reduction lies in the government's hand, all parties should also bear the responsibility including local governments, the private sectors and all related stakeholders.

However, the implementation of disaster risk reduction is still facing an obstacle. The problem is related to human behavior called ignorance. Even Robert Glasser, the UN Secretary-General's Special Representative for Disaster Risk Reduction, asked the world to end 'the tyranny of ignorance'

on disaster risk [5]. This statement shows how serious the problem is.

TABLE I
ATTRIBUTES OF TWO MODELS OF DISASTER POLICY [3]

Fatalist Society		Self-Relying Society	
Saving Strategy	Disorganized information; Post-disaster intervention;	Information system; Pre-disaster conduct;	Protection Strategy
Healing Discourse	Political operation; Extraordinary responses;	Technical issue; Routine procedures;	Preparedness Discourse
Crisis Planning	Umbrella funds; Risk minimization/sharing	Specialized funds; Risk avoidance	Contingency Planning

Even though that ignorance is considered as one of the problems in disaster risk reduction implementation, but Dorniok [6] found that there still little works that have been done in elaborating this issue. Dorniok added that most of the studies are at the theoretical level and only a few based on empirical research.

II. MATERIAL AND METHODS

This paper tries to explore the conception of ignorance and its relationship with efforts to integrate disaster management into construction project management. This subject becomes more significant for the construction industry since its product characterized by massive structures that, if collapsed by a disaster, will cost people's life and property.

To obtain the expected results, literature research is conducted on related articles. By tracing the relationship between existing theories and relating it with current problems, an analysis of the phenomena that occur can be done to understand it more comprehensively. In this case, it is a phenomenon of ignorance behavior to disaster risk reduction.

III. RESULTS AND DISCUSSION

A. Construction Industry and Disaster Management

Although until now there has not been a uniform definition about the construction industry [7], according to Moavenzadeh [8] the construction industry is classically defined as a part of the economic sector that transforms resources into buildings through planning, design, development, scheduling, operation and maintenance process. Verjanovienė et al. [9] wrote that the construction industry plays a significant role in the economic and social development of any country since it employs 28% of industrial workers and accounts for 10% of the world's GDP.

Stakeholders of the construction industry, according to Newcombe [10] are employers, project managers, planners,

subcontractors, suppliers, funders, users and the public in general while Zhang and El-Diraby [11] grouped them into individuals, organizations and other actors.

The individual group contains professions involved in the construction industry such as engineers, accountants or lawyers; the organization group contains government, profit-oriented organizations (contractors and consultants) and non-profit organizations; whereas the other actor group accommodates actors who cannot be incorporated into the two previous categories.

Project management always tries to optimize all of its resources within the available timeframe. In the construction industry, these resources are often called as 5Ms namely Men, Materials, Machines, Money and Methods.

In managing the 5Ms, traditional project management teaches that a project is always limited by cost allocation, desired product quality standards and implementation deadlines. A reliable project manager is required to be able to manage the resources available within these three limits.

In term of disaster management, the Sendai Framework [4] mentions that the infrastructure sector plays a vital role in developing disaster resilience (*Priority 3*) and responding to disasters (*Priority 4*). The mention of the infrastructure sector by the Sendai Framework naturally will strengthen the shift of the disaster paradigm in the construction industry. This factor will encourage the construction industry for getting involved in the pre-disaster phase by applying the concept of disaster risk reduction into the project cycle.

Currently, disaster management consists of 4 (four) main components, which are: [12]

- Mitigation, also called Disaster Risk Reduction (DRR), includes efforts to reduce or eliminate the possibility or consequences of a hazard.
- Preparation, including efforts to equip people who might be affected or people who might be able to help people affected by disasters with tools that increase their chances of survival and minimize financial losses or other losses.
- Emergency response, including efforts to reduce or eliminate the impact of disasters that have occurred in order to reduce financial suffering and losses.
- Recovery, including efforts to restore the victim's condition to "normal conditions" after the disaster. This stage takes place immediately after the emergency response phase is completed and can take place in a monthly or even annual period.

Bosher *et al.* [13] thought that one of the vital construction industry contributions to the disaster agenda is securing vital infrastructure at the time of disaster. Hence, Spence and Kelman [14] suggested that disaster mitigation must be one of the determining factors in every planning, design, construction, operational, maintenance and supervision of infrastructure development. This effort will maximize the contribution.

Henstra and McBean [15] said that in general there are several aspects considered as obstacles in implementing disaster mitigation strategies. They include the uncertainty of hazard and vulnerability levels, uncertainty of costs and benefits, lack of public concern, lack of well-organized assistance, small incentives, lack of resources and lack of political will.

Specifically, there are some identified problems in integrating disaster management into the construction industry. *First*, problems created by the nature of the construction industry itself. Unlike other industries, construction industry products are made based on the client's order and are customized. Consequently, every construction project is unique and specific by its characteristics and complexities. According to Balamir [3], this condition will bring difficulties in creating a uniform approach. More specifically, Adomah Bempah and Olv Øyhus [16] and Martinez et al. [17] state that behavior to disaster management is influenced by knowledge, culture, norms, and experiences of the actors.

The other nature of the construction industry is the type of organization developed in construction projects is temporary with a relatively short working period. Moreover, the organization consists of people from different backgrounds who have never been interacted before. Related to this condition, Cherns and Bryant [18] found that each project member will bring his understanding of an article or procedure based on his knowledge and experience from his previous projects.

In line with that, Dubois and Gadde [19] considered that a temporary organization like construction project does not support the process of adding knowledge to its members. In other words, the construction industry organization type favors the *status quo* rather than transformation.

The next construction industry's nature is the working culture that focuses on careful and detailed calculations of cost, quality and time. Kerzner [20] explained that a project manager must be able to manage all resources within the cost allocation, product standards and deadlines constraints as well as satisfy customers while Ingringe [21] noted that a project manager should work in details since the evaluation of a construction project such as performance indicators, periodic reports, short-term targets and financial expenditure based on quantitative data.

All these natures are very different from the nature of disaster management. The latter usually works in general and normative considerations within the scope of uncertainty and long-term expectations, as Table II shows.

TABLE II
CONSTRUCTION INDUSTRY VS. DISASTER MANAGEMENT

Nature	Construction Industry	Disaster Management
Project Type	Specific, with own complexities	General
Working Period	Short, with the temporary organization	Long-term approach
Working Culture	Qualitative, detail calculations	Normative, uncertainty

Second, the construction industry itself seems unconcern about the aspects of the disaster. Ofori [22] expressed his thought about this condition by writing that the crucial missing element in disaster prevention and response is the construction industry awareness. While Palliyaguru et al. [23] said that ignorance is one of the main difficulties in implementing disaster risk reduction policies in the construction industry. Palliyaguru added that this condition

is influenced by a low level of awareness, unsupportive attitudes and behavior and lack of experience in disaster issues of the actors. In this case, Weichselgartner and Pigeon [24] provide examples of how stakeholder ignorance behavior to disaster aspects can lead to community suffering and considerable economic losses.

Moreover, Bosher and Dainty [2] assumed that there is a possibility of institutional resistance to bring the construction industry becomes more proactive to disaster risk reduction. In accordance, Bosher *et al.* [25] found that in many cases the building codes are often ignored and the enforcement against its violations committed by contractors, developers or building owners is very weak.

Benson and Twigg [26] argued that disaster risk is often ignored whenever it is perceived to complicate the work stages or affect the financial issue. Another opinion from Chmutina and L. Bosher [27] said that ignorance of disaster risk reduction is also related to the low willingness of construction industry actors to take proactive actions.

That is why Bosher *et al.* [13] concluded that the primary challenge is to convince the construction industry players that infrastructure resilience to disasters has a far more significant advantage than just calculating the 'lowest price' or the profit margin. Jamieson [28] added that the construction industry's actors have to realize that they can control the impact of natural disasters by taking actions to risk reduction.

B. Ignorance

Ignorance comes from the Latin 'in' (not) and 'gnarus' (knowledgeable). So ignorance can be interpreted as 'lack of knowledge' [29]. However, Smithson [30] said that the most common definition of ignorance is "the absence or distortion of 'real' knowledge and uncertainty in the form of incomplete information or knowledge".

According to Bishop and Phillips [31], there are two kinds of ignorance: ignorance of what can be learned and ignorance of things that cannot be known. The examples for the latter are destiny or the future.

However, until now there is still no comprehensive definition of ignorance, so discussion related to ignorance refers to many things. As written by Croissant [32] that he found over 35 words were used to define ignorance, which started from illiteracy, blindness, dumbness, stupidity, naiveté, innocence, lack of education, unscholarliness, mental incapacity, shallowness, unfamiliarity until unawareness and unconsciousness.

Smithson [33] argued that ignorance relates to one's perspective on knowledge possessed by others. B will see A is an 'ignorant' if A disagrees or does not care about what B considers 'true.' On the other side, Smithson also argued that ignorance is not due to the absence or lack of knowledge only, but also can arise due to social interaction or linguistic factors. Therefore, he reckoned that ignorance could be negotiated, created or manipulated.

Smithson also distinguished between the ignorance known by a person himself and the ignorance known only by others. If a person does not know that he does not know about something, then he is in the state called meta-ignorance or ignorance of ignorance. But, if a person already knows that he does not know about something, then he is in

a state of conscious ignorance. Conscious ignorance is believed as a precondition for the learning process.

Sometimes conscious ignorance can come in the form of willful ignorance. Grossman [34] considers this intentional ignorance based on personal interests as dangerous social behavior. Grossman concludes that selfish behavior can come from intentional ignorance in order to hide the real reason and give the impression that someone will be able to act better if they have complete information.

The most important thing from Smithson's work is the distinction between 'ignorance' and 'being ignorant'. According to Smithson [30] 'being ignorant' can be attributed to 'irrelevance' while 'ignorance' is related to 'errors'. 'Irrelevance' is defined as something associated with the unreal and uninteresting thing, prohibited or taboo or cannot be decided. Smithson also described that 'errors' could take place because of the distortion or the incompleteness of knowledge. The distortion could come from knowledge inadequacy or inaccuracy while incompleteness of knowledge is associated with uncertainty and the absence of knowledge. (see Figure 1)

In the field of ignorance, there is a condition called 'knowledge-ignorance paradox'. Bauer [35] defined it as a situation where the development of the knowledge will automatically increase the ignorance of some others who do not have or do not yet know about the knowledge. According to Ungar [36], this paradox is related to a lack of rewards as a motive for increasing knowledge. From this point, the discussion of ignorance evolves from the debate on meta-ignorance into willful ignorance.

Ungar [36] implied willful ignorance as to the refusal to know about something. It occurs because of personal desire rather than pressure from others. Dilley [37] added the factor of intention, attention, sense of representation and awareness into willful ignorance definition. In the social and cultural context, Wieland [38] argued the two reasons that generate willful ignorance: no formal regulation prohibits it and the impulse to do something after seeing other people do the same thing.

Peels [29] revealed why a person becomes ignorant to a subject in five ways:

- The subject is wrong;
- He does not believe, even if the subject is true;
- He has not yet decided, even if the subject is true;
- He is not sure, even if the subject is true;
- He believes that the subject is true, but also believes that it is not too important.

Meanwhile, Abbott [39] studied ignorance from a different perspective. He elaborated 'the profession ignorance'. Abbott's definition of the profession as "a work that has characteristics: education, licensing, testing, codes of conduct, etc." shows us that what Abbott considers as ignorance here is not in the form of the absence of knowledge.

Abbot categorized profession ignorance into three groups: amateur ignorance, professional ignorance, and expert ignorance. Abbotts explained that amateur ignorance is not an ignorance related to lack of facts or literature, but it is associated with the inability to structuring facts and literature as the basis of an argument. Meanwhile, professional ignorance refers to the failure to evaluate and

facts and literature for encountering the problems whereas expert ignorance associated with the habits of using formulas at any opportunity.

From his thesis, Abbot believed that ignorance is more about quality rather than quantity. That is why he pointed out that expert ignorance is the most dangerous one because it will prevent a person from learning and knowing about new things.

C. Discussion

From the previous works, we can see that ignorance has been one of the experts' main concerns in the disaster study area. It was considered an obstacle to the implementation of disaster risk reduction concepts.

In particular, the existence of ignorance among construction industry practitioners should be recognized as a serious concern. Ignorance conducted by ordinary people who do not have any knowledge about disaster risk still can be understandable. But ignorance by an architect or project manager is unacceptable due to the knowledge they have.

As an industry that used to work in detail calculations, the ability to evaluating risk probability is one of the construction industry players' standard competencies. They are used to deal with various risks ranged from risk in design, construction risk, financial risk until operation and maintenance risk. It looks very peculiar if an architect or engineer ignores a very potential risk such as disaster threat.

Whether it categorized as Abbott's amateur, professional or expert ignorance, but one thing for sure is the ignorance of the construction industry to disaster risk reduction will worsen the effect of the disaster. Benson and Twigg [26] give an example from the Bhuj earthquake in India in 2001. This earthquake destroyed 461,593 rural houses of rubble masonry construction and damaged 179 high-rises reinforced concrete buildings and resulted in approximately US\$ 5 billion of losses. This considerable loss was not due to poor seismic codes, but because of their non-enforcement combined with poor inspection procedures. We can guess right away that this is a form of ignorance.

If hitherto the disaster management study is focused more on disaster policy analysis and technical aspects, then the study about human behavior should be added to complement both in order to get a holistic understanding. For example, why cheap land price becomes the primary option for the developer rather than disaster risk considerations in choosing the development site? Or why the construction industry tends to cut disaster mitigation aspects to get lower construction costs? Or why disaster aspects should be the first to sacrifice in front of the financial problem or to maximize the profit? These are related more to human behavior rather than policy making or technical considerations only.

Generally, the construction industry sees human as one of the project components and calculates them as a variable of profit gaining effort. They are rated through their working capacity as their contribution to the project. Inside the construction industry temporary organization constrained by cost, quality and time, there will be no time for project managers to think about individual's uniqueness and behavior differences.

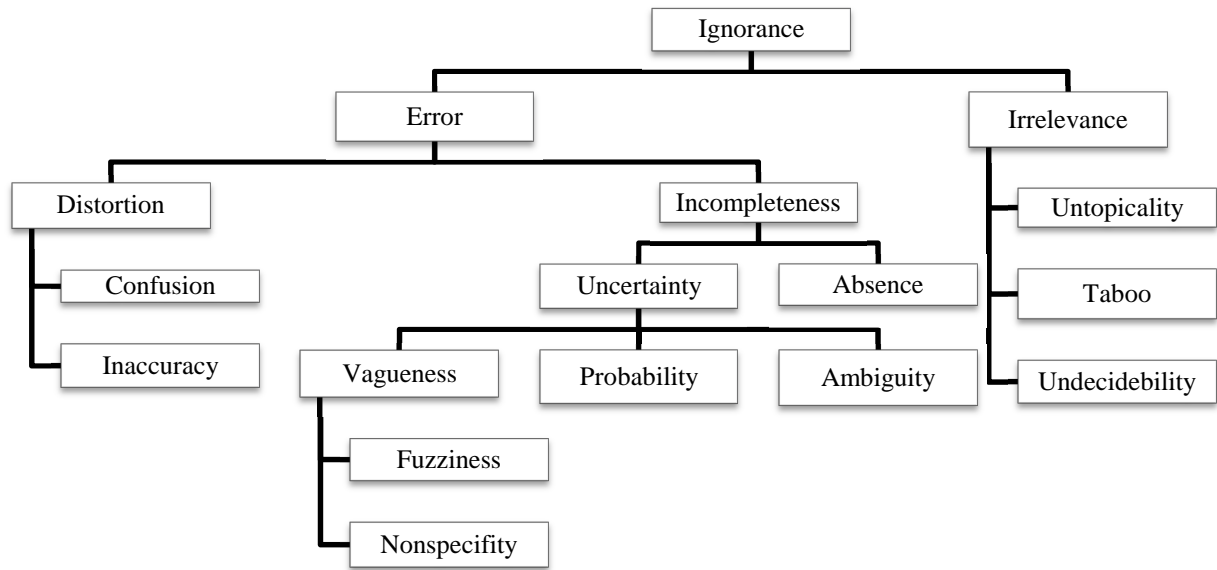


Fig. 1 Taxonomy of ignorance [30]

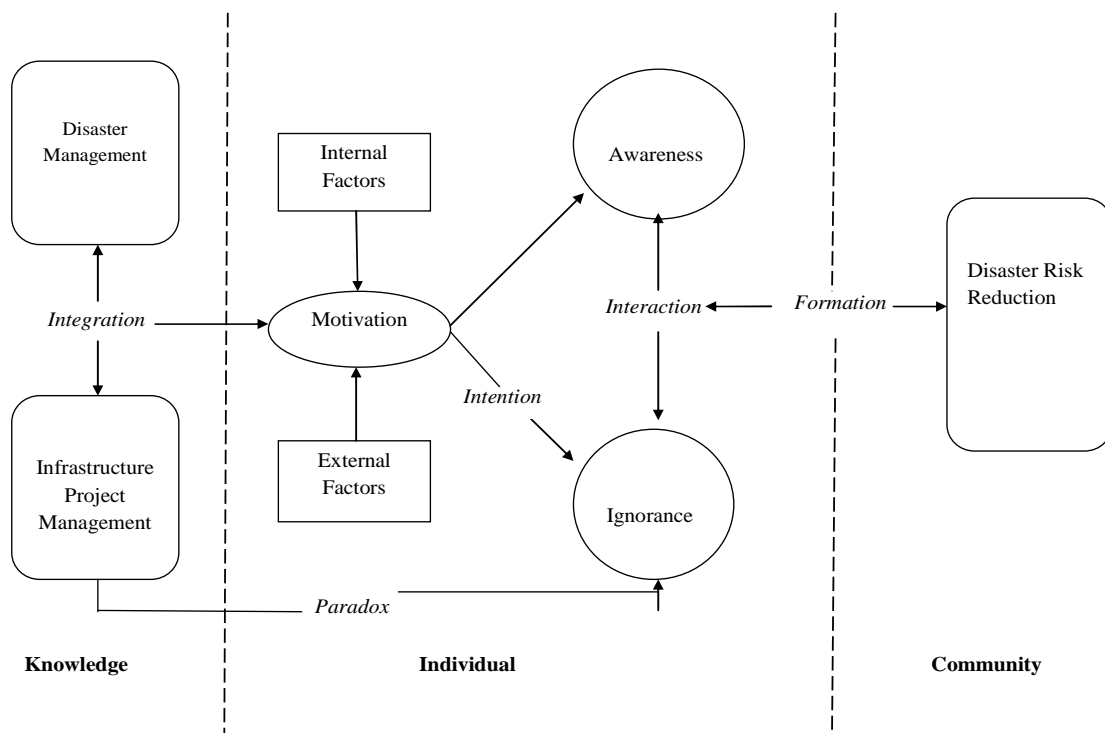


Fig. 2 Knowledge, Individual Behaviour and Community Attitude

In order to integrate disaster risk reduction concepts into construction industry practices, construction project managers should start to think about human behavior. Knowledge about disaster subjects is a good starting point, but it is not enough.

Figure 2 shows that the step from knowledge towards disaster risk reduction as a targeted community attitude is hampered by individual behavior in the middle. Knowledge

itself must struggle inside first to integrate disaster management and infrastructure project management.

If knowledge integration succeeds, then the result will feed the player's motivation. Then, the motivation will drive a person to act as a result of internal and external factors combination. According to Levesque *et al.* [40], the internal factors are related to an individual's pleasure, interest, comfort and satisfaction whereas external factors are related

to a particular goal, getting rewards, avoiding punishment or other negative consequences.

As a result of motivational factors combination, a person will have a sense of awareness or being ignorant of disaster strategies. Besides that, ignorance can also appear due to a lack of knowledge as the result of the knowledge-ignorance paradox theory. The more advance the knowledge is the more people who do not understand or do not know about it.

After that, the people who have awareness and the people who are ignorant interact with each other. They see how other people respond to disaster risk reduction and try to understand why other people react differently. This interaction is done in a reciprocal process and will strengthen or weaken each party's proposition. Gradually it will form a typical attitude. This is what Giddens [41], a sociologist, called "The Theory of Structuration." According to Giddens, structuration is a continuing process where individual behavior forms society behavior and vice versa; society behavior shapes individual behavior. From this description, we can recognize that the successful implementation of disaster risk reduction depends on how we can manage individual behavior.

In eliminating ignorance as a problem to disaster risk reduction, the construction industry needs to identify about individual's motivation and intentions, including the driving factors. They also must understand the type of action considered as ignorance and its consequence, as well as identify who the actor is.

By understanding the aspects of ignorance and the environment and motivation surrounds it, the behavior can be mapped, and the root of the problem can be identified. The rest is problem-solving.

IV. CONCLUSION

The discussion indicates that the construction industry needs more than just having disaster knowledge to implement disaster risk reduction concepts. The construction industry must convince its stakeholders to realize that disaster mitigation strategy is a collective need. In gaining the successful result to integrate disaster risk reduction in every construction project stage, construction industry practitioners should value human behavior like they worth their technical expertise. Understanding the human's way of thinking will be a step forward towards implementing disaster risk reduction and reducing ignorance. As a product of human behavior, we cannot underestimate the ignorance. It is related to many aspects such as knowledge, motives, intentions and actors. Ignorance due to lack of knowledge can be handled by providing knowledge, but ignorance in the form of willful ignorance can only be solved by understanding human behavior. More studies are needed to get a comprehensive understanding of ignorance in the construction industry field, especially empirical studies as a complement to the previous theoretical studies.

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