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Ethical analysis of architecture on structural irregularities in major earthquakes in Turkey

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Abstract

Purpose – The aim of this study is to question the relationship between architectural ethical codes and faults in earthquakes. Earthquakes have devastating effects on all societies in history and today. And the relationship and importance of the architect and building, one of the most important roles of these destructive effects, is once again revealed in every earthquake. Although there are some restrictions or warnings for architects and the architectural profession to reduce this destructive effect in many regulations and ethical codes, it is possible to see the defects caused by architectural design and the destruction caused by these defects in every new earthquake.

Design/methodology/approach – In this study, the most destructive earthquakes in Turkey in the past 20 years (Bingöl, Van, Elazig and Izmir) and the 1999 Marmara earthquake, which was the most destructive earthquake in Turkey's recent history, and the damages occurred in these earthquakes and their causes were examined. Although the scope of the study is "destructive earthquakes that have occurred in the past 20 years in Turkey", the Marmara Earthquake, which occurred in 1999, when the destructive effect of the earthquake was seen the most and architectural design errors were intense, was also included in the scope of the study. And to have a more comprehensive understanding of how these defects are examined in terms of ethical codes and to make a more comprehensive comparison, ethical codes from different countries in the world have been researched and a review has been made on topics such as public welfare, human rights and raising the standard of the profession.

Findings – This study concludes by reviewing the key factors learned from the examined ethical codes of different countries. Finding ethical codes of different countries was challenging to gain approval. In addition, the study ends with recommendations in terms of questioning the regulations and education curriculum relations on a country basis.

Originality/value – This study, which targets architect candidates who carry out the profession of architecture and continue their architectural education, evaluates the architectural design flaws seen in earthquakes through ethical codes and forms a basis for further studies.

Keywords Major earthquakes in Turkey, Architectural design flaws, Structural irregularities, Earthquake resistant design, Ethical codes, Architecture and ethic

Paper type Research paper

1. Introduction

Architecture is one of the oldest professions in history. Although its definition has changed over the years, its content has remained the same. As in every profession, there are ethical codes that determine the relationships between professionals, employers and customers in architecture. Even in the laws of Hammurabi, one of the oldest written laws in history, it can be seen these codes from examples:

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- Article 229: If a builder builds a building for any person and does not properly build it, and the building he built collapses and kills his owner, the builder shall be killed.
- Article 230: If the building kills the son of the owner, the son of the builder shall be killed.
- Article 231: If the destroyed building kills the owner's slave, the builder pays the owner of the house for the slave.
- Article 232: If part of the building is destroyed, the builder compensates for the entire dilapidated part and rebuilds the destroyed building properly.
- Article 233: If a person is building a building for someone else, even if the building has not been completed yet, if the wall is destroyed, the builder makes the wall stronger by his own means.

On the other hand, Earthquake is one of the natural phenomena that have been seen since the beginning of the world and that affect people the most. Especially with the emergence of the building concept after the transition to settled life and the establishment of the first cities, the effect of the concept of earthquake on humanity has increased. As the concept of earthquake is related to buildings, one of the professions most associated with this concept is architects. There are features architects should or should avoid making buildings more earthquake resistant.

As Vitruvius stated, architecture should include the following three properties: aesthetics, function and durability. The most important of these is durability. Because if one structure cannot survive, the other two will have no meaning. For this reason, the architect should know the regulations and technical details very well and be qualified to carry them to the design. It should not treat regulations in an approach that restricts its design. In the design of the carriers, especially in the reinforced concrete system, the places and directions of the curtains should be resolved in constant dialogue with the civil engineers from the very first moment. Irregularities in the design, unstable gaps and protrusions in the floors should be interpreted by the architect with a very conscious approach (Akıncıtürk, 2003).

To cope with the devastating effects of natural disasters such as earthquakes, it is especially an issue a country such as Turkey should take into account, which face all the time with this concept. Understanding how the "structural irregularities", which will be mentioned in the rest of the study, affect the building in the face of an earthquake and avoiding these errors is the most basic issue expected from architects and engineers. Because taking precautions and avoiding structural errors against a concept that has a destructive effect such as an earthquake and is related to human life is both the most basic duty and the most important ethical responsibility of the architect and engineer.

The aim of this study is to examine the recent earthquakes in Turkey and to examine the ethical understanding of the architectural profession and architects in the light of architectural design errors and structural irregularities seen in these earthquakes.

2. Literature review

In the literature, the studies on earthquakes and irregularities are in the majority, whereas the studies on earthquakes and ethics are quite few. For this study, the losses in Marmara Earthquake and earthquakes in the past 20 years were examined (Özmen, 2000; Düzgün, 2001; Akıncıtürk, 2003; Kalafat, 2003; Dirik, 2003; Karaşin and Karaesmen, 2005; Alan *et al.*, 2011; Güney, 2011; Nurlu, 2012; Koç, 2016; Çağlayan, 2020a, 2020b; Mertol, 2020). Structural damages were taken into account among the damages encountered in these earthquakes. Among these structural damages, the damages arising from the architectural design were

compiled, and it was observed that they were common in the five major earthquakes examined.

It is seen in the general results of earthquakes that the damages encountered generally occur due to the decision taken during the architectural design process. In general, all regulations and earthquake regulations of Turkey, it has been explained under the heading conceptual design flaws and examined in other studies as Structural Irregularities (Ambrose and Vergun, 1985; Valmundsson and Nau, 1997; Gönençen, 2000; Özmen, 2004; Mendi, 2005; Döndüren *et al.*, 2007; Charleson, 2008; Kirac *et al.*, 2011; Harmankaya and Soyluk, 2012; İnan and Korkmaz, 2012; Öztürk *et al.*, 2015; Darshan and Shruthi, 2016; Alecci and De Stefano, 2019; İlerisoy, 2019). In these studies, these structural irregularities generally examined under six main headings formed for different reasons. These six main titles are Torsional Irregularities, Floor Discontinuities, Projections In Plan, Soft Storey (Stiffness Irregularity), Weak Storey (Strength Irregularity), Mass Irregularity, Vertical Lateral Force-Resisting Elements Irregularity and Vertical Geometric Irregularity. These irregularities are generally the main cause of architectural damage seen in earthquakes, and they were also observed in the earthquakes examined in this study.

On the other hand, it is an important problem that the irregularities are seen even in the latest earthquakes. Because, while the regulations clearly state these design errors, encountering these errors even in the newest structures create a legal problem, also it is against ethical values at the same time. In the ethical codes that are examined, it is clearly explained that the people who carry out the architectural profession should avoid breaking the law, consciously or unconsciously avoiding the threat of human life or improving themselves professionally [Royal Institute of British Architects (RIBA), 2019; AIA, 2020; ACE, 2016; UAP, 2004; New Zealand Registered Architects Board (NZRAB), 2018; The Royal Australian Institute of Architects (RAIA), 2017; TMMOB, 2008].

3. Major recent earthquakes in Turkey

Turkey, because of its location, often encounters earthquakes. Some of these earthquakes are small and some are large and cause destruction. In this study, large-scale earthquakes that occurred in the past 20 years and the Marmara earthquake that occurred in 1999 were examined:

- Marmara earthquake (1999).
- Bingöl earthquake (2003).
- Van earthquake (2011).
- Elazığ earthquake (2020).
- İzmir earthquake (2020).

3.1 Marmara earthquake (1999)

On August 17, 1999, at 03:02 local time, an earthquake with Magnitude Md: 6.7 (duration size), Mw: 7.4 (moment magnitude) occurred on the North Anatolian Fault Zone, 12 km southeast of Kocaeli (Izmit) city centre. The cities of Bursa, Bolu, Eskişehir, Tekirdağ and Zonguldak, especially Istanbul, Sakarya and Yalova, were also affected by this earthquake. The total number of deaths in the cities affected by this earthquake is 17,479 and the total number of injured is 43,953 (Özmen, 2000).

According to the information received from AFAD, In total; 66,441 residences and 10,901 workplaces were severely damaged, 67,242 houses and 9,927 workplaces were moderately

damaged, 80,160 residences and 9,712 workplaces were slightly damaged due to the Marmara earthquake (Özmen, 2000).

3.1.1 Types of damages. Damages caused by the earthquake are generally similar to typical earthquake damages in Turkey. Types of damage caused by architectural design are common in reinforced concrete buildings with severe or moderate damage (Figure 1). Weak floor formation, few curtain applications that increase lateral displacement rigidity, plastic hinge formation in columns, soft storey formation, etc. Also, architectural design and structural system arrangement were not suitable for earthquake effect (Koç, 2016).

3.2 Bingöl earthquake (2003)

On Thursday, May 1, 2003, at 03.29, an earthquake of about 6.2 Richter magnitude happened in Bingöl. This earthquake occurred slightly north of Bingöl city centre according to United States Geological Survey (USGS), Earthquake Research Department and Kandili Observatory and Earthquaqe Reasearch Institute records. The outer centre of the earthquake was determined as 38.94 North and 40.51 East, and its depth was determined as 10 km according to USGS (Dirik, 2003).

In the earthquake, a total of 177 deaths and 520 injuries were revealed, 84 of which were due to the collapse of the Çeltiksuyu YİBO (Boarding Primary School) dormitory block (Kalafat, 2003). According to the General Directorate of Disaster Affairs, the total of the damaged buildings was determined to be 17,429. According to these examinations, it shows that 55% of all buildings, 56% of residences and 65% of workplaces were damaged. Again, according to these examinations, the severely damaged or collapsed buildings show a very high damage rate of 17%. In other words, one of every six buildings in Bingöl province has become completely unusable (Karaşin and Karaesmen, 2005).

3.2.1 Types of damages. Structural damage caused by the earthquake struck mostly buildings established on areas with weak ground strength properties, low quality material (concrete, brick, pile, etc.), insufficient and inappropriate reinforcement and workmanship defects, strong beam-weak column, weak-soft floor irregularity (Figure 2), and it has been observed that it stems from lack of supervision (Dirik *et al.*, 2003; Kalafat *et al.*, 2003).

3.3 Van earthquake (2011)

On October 23, 2011, at 13:41 local time, an earthquake with a moment magnitude (Mw) varying between 7.1 and 7.3 according to different organizations, caused significant damage in the city centre of Van as well as in Erciş and the surrounding area. The centre of the earthquake that occurred is the north of Van provincial sound and its exact position is listed according to different institutions. Along with the aftershocks, the Van-Edremit



(a) **(b)**

Source: Koç (2016)

Figure 1.
Overlap damage due to soft storey (a) and collapse damage of a section due to articulation in the corner column (b) in 1999 Marmara Earthquake

Earthquake, which was caused by a different fault with a size of Mw 5.7 on November 9, 2011, increased the loss of life and property.

According to the statement made by AFAD on November 21, 2011, 604 people died in the October 23, earthquake and 222 people were injured. In the November 9 earthquake, 40 people lost their lives and 30 people were rescued with injuries. As a result of the studies, 12,236 of the buildings were found to be severely damaged, 3,244 of them were moderately damaged, 15,510 of them were slightly damaged and 13,277 of them were undamaged (TMMOB, 2012).

3.3.1 Types of damages. Structural damage caused by the earthquake, mostly buildings established in areas with weak ground strength properties, low quality material (concrete, brick, pile, etc.), insufficient and inappropriate reinforcement and workmanship defects, strong beam-weak column, weak-soft floor irregularity (Figure 3), and it has been observed that it stems from lack of supervision (Alan *et al.*, 2011).

3.4 Elazığ earthquake (2020)

On Friday, January 24, 2020, at 20:55 local time, a very severe shallow earthquake of Mw 6.8 (ML 6.6) with epicenter Elazığ-Sivrice occurred. Due to the strong ground motion effect of this earthquake, there were loss of life and property in Elazığ-Merkez and Sivrice, Malatya-Kale, Pütürge and Doğanyol districts due to demolition and damage. After the main shock that occurred at 20:55, 23 aftershocks with magnitudes ranging from 4 to 5.1 were recorded.

According to the statement made by AFAD as a result of the earthquake, a total of 41 people died and approximately 1,600 people were injured in Elazig and Malatya provinces. After the earthquake, a total of 14,366 buildings were damaged, including 10,059 in Elazig and 4,307 in Malatya (Mertol, 2020). Elazig city centre is the residential area with the highest loss of life as a result of the earthquake. According to the information given by the Ministry of Environment and Urbanization, there are 263 collapsed, 7,698 heavily damaged, 1,540



(a) (b)

Source: Kalafat *et al*. (2003); Dirik *et al*. (2003)

Figure 2.
Full floor collapse damage due to weak floor examples (a and b) in 2003 Bingöl Earthquake



(a) (b)

Source: Alan *et al*. (2011); Nurlu (2012)

Figure 3.
Damage of acerdeon collapse due to lack of lateral stiffness examples (a and b) in 2011 Van Earthquake

moderately damaged buildings in Elazig, and 558 buildings to be demolished have been identified (Mertol, 2020).

3.4.1 Types of damages. Damages caused by the earthquake are generally similar to typical earthquake damages in Turkey. Types of damage caused by architectural design are common in reinforced concrete buildings with severe or moderate damage (Figure 4); weak floor formation, few curtain applications that increase lateral displacement rigidity, plastic hinge formation in columns, soft storey formation, architectural design and structural system arrangement are not suitable for earthquake effect (Çağlar *et al.*, 2020a).

3.5. İzmir earthquake (2020)

On October 30, 2020, at 14.51, an earthquake with a magnitude of Mw 6.6 (AFAD), Mw 6.9 (Kandilli Observatory and Earthquake Research Institute) occurred in the Aegean Sea (17.26 km) off the epicenter of Seferihisar, İzmir. After the main shock at a depth of 16.54 km, there were many aftershocks. The earthquake was felt in a wide geography from Western Anatolia such as İzmir, Aydın, Muğla, Balıkesir, Manisa, Uşak, Çanakkale, İstanbul and even to the eastern coasts of Greece.

According to the information released by AFAD, the earthquake caused loss of life and property in Bayraklı location in the city centre of Izmir, especially due to ground effects and structural problems. As a result of the earthquake, 117 people lost their lives and 1,032 people were injured. After the earthquake; A total of 4,968 damaged buildings were identified, including 376 heavily damaged, 410 moderately damaged and 4,182 slightly damaged (Çağlar *et al.*, 2020b).

3.5.1 Types of damages. Destroyed structures are generally 8–10 floors and most of them completely collapsed and some partially collapsed. In the sandwich-type collapses (caused by the floorings sitting on each other) seen in the collapsed buildings, it is seen that one or more of the reasons such as not applying the strong column-weak beam principle,



Source: Çağlar, (2020a)

Figure 4.
Damage due to soft floor irregularity floor in 2020 Malatya Earthquake

insufficient bearing element strength, weak floor, soft floor formation (Figure 5), insufficient concrete strength and application error caused collapse (Çağlar *et al.*, 2020b).

4. Ethical codes and review

In the earthquakes investigated, in all earthquakes, from the Marmara Earthquake to the last earthquake, the Izmir earthquake, all plan irregularities, soft-weak storey irregularities, soft ground irregularities and structural irregularities were encountered. It has been observed that most of these damages caused by earthquakes and loss of life in Turkey are caused by the structural irregularities arising from the aforementioned design. Because the whole adventure of a building; whether it is aesthetic, functional or durable starts at the design stage. In this context, the starting point of the mentioned irregularities is the design stage, namely, the architects. Although the literature mentions them to prevent irregularities, one of the reasons why buildings are damaged during an earthquake is the irregularities in architectural design, which means that architects do not knowingly or unknowingly comply with these regulations and irregularities.

In some cases, architects consciously or unconsciously make design decisions that go beyond the regulations, and thus ethical codes. Architects may make these wrong design decisions in the light of cost, functionality or aesthetic concerns, as well as in some cases, because they do not know technical issues such as structure, building knowledge, earthquake resistant building design, they cannot master the technical details of the regulations, in other words, because of professional inadequacy. Being professionally incompetent is also among unethical behaviours.

In every country, there are professional organizations established to ensure that architectural activities remain in law, to supervise, maintain and advance their responsibilities to the profession itself, society, employers or colleagues. Some of these organizations are Architect's Council of Europe in European countries, Royal Institute of British Architects (RIBA) in the UK, American Institute of Architects (AIA) in USA, Chamber of Architects and Engineers of Turkey (TMMOB) in Turkey, The United Architects of The Philippines (UAP) in Philippines, New Zealand Registered Architects Board (NZRAB) in New Zealand and Architectural Institute of Japan (AIJ). These organizations publish and update ethical codes to regulate these professional issues and to better maintain the dignity of the profession and its responsibilities to society. These code of ethics, when it comes to earthquake, includes concepts such as the welfare of the society, obeying the rules, protecting the standard of the profession and the person performing the profession and human rights. They find a place for themselves within the ethical codes published by these organizations.

According to the ethical codes given (Table 1), as long as an architect is practicing, he must maintain his aesthetic, artistic, scientific and technical standards and always try to



(a) **(b)**

Source: Deniz, (2020); Çağlar, (2020b)

Figure 5.
Damage of accordion collapse due to lack of lateral stiffness (a) and damage of accordion collapse due to lack of lateral stiffness (b) in 2020 İzmir Earthquake

Code of ethics and professional conduct of countries	Knowledge and skill/standard of excellence
AIA	E.S. 1.1 Knowledge and Skill: Members should strive to improve their professional knowledge and skill Rule 1.101 In practicing architecture; Members shall demonstrate a consistent pattern of reasonable care and competence and shall apply the technical knowledge and skill which is ordinarily applied by architects of good standing practicing in the same locality E.S. 1.2 Standards of Excellence: Members should continually seek to raise the standards of aesthetic excellence, architectural education, research, training, and practice
RIBA	1.1 Skill, knowledge, care, ability: Members shall act competently, conscientiously and responsibly and are expected to apply reasonable standards of skill, knowledge and care in the performance of all their work
ACE	1.1 All providers of architectural services shall ensure that they continually maintain and develop their professional knowledge and skill in all areas relevant to their practices 1.2 All providers of architectural services shall continually seek to raise the standards of excellence in all relevant areas including architectural education, research, training, design, technology, construction methods and practice
TMMOB	1.1. The architect should have a systematic body of knowledge and theory that covers the art, science and service of architecture and develops through education, examination, internship, continuous professional development and experience. This process should assure the public that the architect meets the required standards 1.2. The architect should not lose and advance his knowledge of architectural art and science, respect and contribute to the development of the achievements of architecture as a whole, and prioritize informed and impartial professional evaluations above all other purposes while dealing with architectural art, science and service 1.4. The architect should strive to continuously improve his professional knowledge and skills in areas related to the practice of his profession
UAP	Section 1. Traits of Architects. - The profession of Architecture calls for men and women of the highest integrity, responsiveness, business acumen, sensibility, as well as artistic and technical ability
NZRAB	49. (a) A registered architect must perform the architect's professional activities with reasonable skill, care, and diligence 49. (b) A registered architect who becomes aware that the architect's professional advice has not been followed, and considers that a failure to follow that advice may lead to significant harm, damage, or financial loss, must advise the recipient of the advice of the potential consequences
RAIA	2.1 Standard: Members must perform their professional work with due skill, care and diligence

Table 1.
Ethical codes and professional conducts about knowledge and standard of excellence of AIA, RIBA, ACE, TMMOB, UAP, NZRAB, RAIA

raise those standards. He must always develop himself in research, practice and education and see it as a goal to advance architecture as a whole.

Architecture, by definition, is a profession where aesthetics and technique come together. However, sometimes the training given to the architect during his/her education is inadequate. It can be said that the mentioned "professional inadequacy" is actually an inadequacy caused by the insufficiency of the education period. This situation causes architects to design buildings with some irregularities in the subject of earthquake resistant building design, and thus to act in violation of regulations and

ethical codes. Sometimes this situation leads to confrontation with civil engineers and negative situations due to the difference of understanding between the two professionals.

Considering the architectural education in the world and in Turkey, the ratio of courses on structures to other courses in the architecture curriculum of sampled universities is very low. This indicates that not only more seismic education is needed, but also that adequate teaching strategies may help to integrate this knowledge into architectural education (Morales-Beltran and Yildiz, 2020). This situation may cause architects to have insufficient knowledge in technical and structural terms. In addition, as mentioned above, it causes architects to design buildings that contain structural irregularities and violate regulations and therefore act against many ethical codes of conduct.

However, taking precautions against this disaster that directly affects human life such as an earthquake, to make durable buildings, is not only an ethical duty for an architect but rather a responsibility. Therefore, the architect should develop himself on these issues regardless of the lack of education.

Because under all circumstances, it is one of the ethical duties of the architectural profession for the architect to educate himself and cover the issues he/she lacks. On the other hand, it is another ethical duty to know that the profession of architecture requires working for the benefit and welfare of the society and that it should consider these goals before everything else (Table 2).

On the other hand, because the concept of earthquake is a concept that directly threatens the lives and property of people, an architect who does not design an earthquake-resistant building is in a position that indirectly prevents the "right to live", which is the most fundamental right of humanity. However, architects should uphold the fundamental rights of community members above all else. For the ethical codes given by four organizations; The primary duty of an architect is to serve society responsibly. These concepts should always be designed in the first place for human health, safety and well-being.

As with the codes given, the architect must prioritize the rights of society and people above all else. Of course, many things can be included in these rights, but the most fundamental responsibilities for an architect should be to design earthquake-resistant buildings and avoid design errors, which destructively affects the "right to live", the most fundamental right of humanity, as well as the "welfare of society" (Table 3).

As a result of the ethical codes given, the regulations examined and the irregularities that occurred during earthquakes, the following can be said; Architects cannot violate or oppose laws and regulations, regardless of the circumstances and conditions. Designing a structure that does not comply with the regulation has a legal equivalent and is also against ethical codes. However, when evaluated in the light of the given ethical codes, laws and regulations again exist for the peace, health and safety of the community. And that is why the architect must cooperate with these laws and regulations and protect these laws and regulations in all conditions. For the architect, it is an ethical duty as well as a legal requirement (Table 4).

5. Conclusion

Earthquake is one of the natural phenomena that have existed since the beginning of history and have brought the greatest destruction to humanity. A good architecture should be examined under three main headings, as Vitrivius said. These are aesthetics, function and durability. The most important of these three is durability. This is because if a building cannot survive, its other features will have no meaning. It is a very important concept that the building can survive a destructive natural event such as an earthquake.

One of the professions most associated with concepts such as earthquake resistance and survivability is architecture. However, the prevailing general belief is that the structural concepts

Code of ethics and professional conduct of countries	Public welfare/obligations to report on risk
AIA	E.S. 1.5 Design for Human Dignity and the Health, Safety, and Welfare of the Public: Members should employ their professional knowledge and skill to design buildings and spaces that will enhance and facilitate human dignity and the health, safety, and welfare of the individual and the public
RIBA	1.11 Skill, knowledge, care, ability: Members must continue to develop and update their skills, knowledge and expertise to maintain and improve their competence throughout their careers for the benefit of the public, their clients, the natural environment and the quality of the built environment 6.1 Health and safety: Members shall have reasonable knowledge of, and abide by, all laws and regulations relating to health and safety as they apply to the design, construction and use of building projects 6.4 Health and safety: Members must take reasonable steps to protect the health and safety of those carrying out, or likely to be directly affected by, construction work for which they are providing professional services. This includes clients and members of the public 13.1 The environment: Members should consider the environmental impact of their professional activities, including the impact of each project on the natural environment
AIJ	II. Construction of secure buildings and a good quality urban environment The Members shall make utmost efforts for the construction of secure buildings and a good quality urban environment which eases the anxiety of and reassures all people, by anticipating disasters and accidents which may jeopardize human life III. Creation of a functional and beautiful living environment The Members shall aim for the creation of a beautiful living environment with attention given to functionality, by taking full advantage of their wisdom and acquired technical abilities, for the sake of the prosperity and welfare of humankind
TMMOB	1.3. The architect should serve the society, employers, colleagues and those who use what they produce with their knowledge and experience, professional responsibility and sense of duty 2.3. By achieving the highest possible design quality, the architect should strive not only to improve the environment, but also to sustainably improve the quality of life and living environment within this environment, and the work they do has the widest possible range of people who can be expected to use or benefit from the products provided by this work. must fully consider their effects on their respective interests
UAP	Section 3. Relations with the Public. - The Architect is engaged in a profession which carries with it civic responsibilities towards the public, whether such responsibilities are the natural outcome of good citizenship or of his/her professional pursuit, or whether they partake of informative and educational matters or of his/her normal interest in public welfare; and, accordingly, he or she 3.1 shall respect and help conserve the systems of values and the natural, historic, and cultural heritage of the community in which he/she creates architecture. He/she shall strive to improve the environment and the life and habitat within it in a sustainable manner, fully mindful of the effect of his/her work on the widest interests of all those who may reasonably be expected to use the product of his/her work
NZRAB	50. If a registered architect has reasonable grounds to believe that an architectural matter with which the architect is professionally involved could put the safety of any person at risk, the architect must bring the matter to the attention of the appropriate person or authority
RAIA	1.1 Standard: Members must respect and help conserve the systems of values and the natural and cultural heritage of the community in which they are creating architecture. They must strive to improve the environment and the quality of life and habitat within it in a sustainable manner, being fully mindful of the effect of their work on the interests of all those who may reasonably be expected to use or enjoy the product of their work

Table 2.
Ethical codes and professional conduct about knowledge and skill/obligations to report on risk/public welfare of AIA, RIBA, TMMOB, UAP, NZRAB, RAIA, AIJ

of the building are not very related to architecture. Although this general opinion is quite wrong, as seen in the earthquakes and damage causes examined in the study, the majority of these damages are caused by design, design-based decisions and consequently by the architect.

As exemplified in the introduction, building-architect-user relations have always been an important concept, as can be seen in the Hammurabi laws, the first written law in history. Today, many countries have regulations for earthquake resistant building design, as is general about buildings and structures. The purpose of these rules is to minimize the consequences of an earthquake disaster and to create measures against the causes of damage seen in previous earthquakes.

Code of ethics and professional conduct of countries	Human rights
AIA	E.S. 1.4 Human Rights: Members should uphold human rights in all their professional endeavors Rule 1.402 Members shall not engage in conduct involving wanton disregard of the rights of others
RIBA	14.1 Community and society: Members shall have proper concern and due regard for the effect that their professional activities and completed projects may have on users, the local community and society

Table 3.
Ethical codes and professional conduct about human rights of AIA and RIBA

Code of ethics and professional conduct of countries	Laws and regulations
AIA	E.S. 2.1 Conduct: Members should uphold the law in the conduct of their professional activities Rule 2.101 Members shall not, in the conduct of their professional practice, knowingly violate the law
RIBA	11.1 Law and regulations: Members shall not knowingly violate the law or advise or assist clients in any conduct or actions they know to be illegal, in performing professional services
ACE	2.6 All providers of architectural services shall observe and comply with this Deontological Code and also the deontological codes and laws applicable to the architectural services being provided or to be provided in a host State
TMMOB	2.7. The architect must examine and comply with this Code of Ethics, as well as other codes of conduct and laws regarding the services he or she is intended to provide
UAP	3.3 as a good citizen shall abide by and observe the laws and regulations of the government and comply with the Code of Ethical Conduct and the Standards of Professional Practice. He/she shall at all times endeavor to properly observe the laws on the practice of architecture and on the planning and design of buildings and their environs. He/she shall at no time act in a manner detrimental to the best interest of the architectural profession
NZRAB	46. A registered architect must abide by the laws and professional codes of ethics and conduct in force in the countries and jurisdictions in which the architect performs professional activities
RAIA	1.4 Standard: Members must uphold the law in the conduct of their professional activities

Table 4.
Ethical codes and professional conduct about laws and regulations of AIA, RIBA, ACE, TMMOB, UAP, NZRAB, RAIA

However, as encountered in the review, these errors based on architectural design occur in the same way, although they are also mentioned in the regulations. As mentioned in the ethical review section, these errors can be caused by architects deliberately due to aesthetics, function, cost, customer-employer requests, etc., as well as completely unconsciously, lack of technical knowledge, inability to understand regulations and inexperience. These errors mean that an architect willingly or unwillingly goes against the law. It also means not complying with ethical behaviour and not acting ethically. As mentioned in the ethical codes mentioned in the ethical review section; For the architect, they have ethical duties such as professional competence, obeying and not going against the law, always considering the rights of people, putting the welfare and safety of the society in the primary order, being in a position that always observes the customer–employer–colleague relations. It is expected to comply with these ethical codes and behaviours to make the architectural profession in the best way.

Performing the architectural profession in the best way, the architect's conscious or unconscious non-violation of the law, the emergence of an architect who is competent in technical details and sufficient in terms of architectural and building knowledge can be revealed by the provision of these perceptions, information and education starting from undergraduate education. During architectural education, it is very necessary for the candidate architect not to be inadequate in these areas in the future, to be an architect who understands and applies the regulations and to become an architect who takes the concepts very seriously, together with the increase in the ratio and intensity of technical, structural structure, earthquake resistant building design, etc. On the other hand, it should be taught that he should not engage in all these unethical behaviours in his professional life by providing training on ethical codes.

To summarize, the place of the earthquake in human life, its destruction and effects are definitely not discussed. It is necessary to have an understanding that necessitates learning to live with it, not fighting against the earthquake. In the relationship between earthquake and building, the duties that the architect took and should take cannot be discussed in the same way. In this context, the architect is expected to take part in structural design by collaborating with close professional groups and to produce projects in accordance with the regulations by always improving his professional competencies. Thus, both the safety of humanity and society will be provided with the earthquake-resistant building design, and an architecture that is worthy of the ethics and dignity of the architectural profession will emerge.

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