

RESEARCH ARTICLE

A stakeholder-based review of the building inspection system in Turkey: The case of Yalova

Huseyin Erol¹, Mehmet Salih Dede²

¹ Hacettepe University, Department of Civil Engineering, Ankara, Türkiye

² Yalova Provincial Directorate of Environment and Urbanization, Yalova, Türkiye

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Abstract

Due to the recent natural disasters and the rapidly increasing need for construction, the concept of building inspection has gained considerable importance in Turkey. However, the literature lacks a stakeholder-based review of the building inspection system despite the fact that its success depends largely on the performance of the actors involved. In order to fill this gap, a survey was conducted with 110 participants representing six stakeholder groups that take an active role in the inspection process. The results of the study revealed that the system has problems in terms of overall performance and employee satisfaction, the stakeholders, especially the contractors and construction managers, do not fulfill their responsibilities, and the sanctions stipulated in the law are insufficient. Moreover, a significant positive correlation was found between the performance of the stakeholders and the sanctions imposed on them. Based on the research findings and synthesis of best practices, it has been suggested to strengthen the penal provisions in the law, increase the qualification and competence of the stakeholders, standardize the inspection procedures, improve communication, and use innovative technologies. Policymakers and practitioners can benefit from the findings of this study to enhance the building inspection system in Turkey.

1. Introduction

The quality performance of a construction project is one of the traditional measures of its success [1]. Quality refers to the totality of features required by the project output to meet its intended use [2]. Projects that comply with the quality requirements provide social, environmental, and economic benefits. For this reason, project management teams use various techniques to assess construction quality [3]. One of these techniques is regular inspections. Inspection is defined as the “examination of a work product to determine whether it conforms to documented standards” [4].

Accordingly, building inspection serves as a means of ensuring that minimum requirements set by the law, specifications, and project owner are satisfied [5].

One of the main purposes of building inspection is to discover and record the types and frequencies of defects [6]. According to Gordon et al. [7], rework caused by defects accounts for 6-12% of the construction cost. An effective building inspection system can minimize these defects and thus increase project performance. More importantly, it can prevent the construction of structures that endanger public health and safety. It is a well-

known fact that many buildings damaged or destroyed in natural disasters are not constructed in accordance with the standards [8]. In addition to the recent natural disasters, the construction needs arising from population growth have made the concept of building inspection more important than ever before in Turkey.

From this point of view, the aim of this study is to review the current state of the building inspection system in Turkey to identify the issues that need to be improved. Although the effectiveness of the building inspection system depends considerably on the performance of the parties involved, previous studies lack a stakeholder-based review. In this respect, a survey was conducted with 110 participants representing different stakeholder groups to draw a holistic picture of the system. The results were analyzed to identify the shortcomings of the system, compare the performance of the stakeholders, and evaluate the suitability of the sanctions imposed on them. Based on the research findings and synthesis of the best practices, recommendations to improve the building inspection system were provided.

The remainder of the paper is organized as follows. Section 2 summarizes the responsibilities of the main stakeholders involved in the building inspection system in Turkey. In Section 3, the domestic and foreign literature on building inspection is reviewed. Section 4 describes the methodology used in the research. The findings of the study and their discussion are presented in Section 5. Finally, Section 6 concludes the paper with recommendations for enhancing the building inspection system in Turkey.

2. Building inspection system in Turkey

Many countries have building inspection systems operated with the participation of different stakeholders. For example, in the European Union (EU) countries, public authorities are responsible for setting the regulatory framework, controlling inspection plans, issuing building permits, conducting final inspections, granting completion certificates, and supervising the operation of the system, whereas private companies involve in

checking technical requirements and performing site inspections [9]. In the USA, construction inspection tasks are undertaken by freelance experts, project designers, or inspection companies [10]. The buildings in Japan are inspected by specialized engineers who have the qualification for examination and inspection [11]. In some countries, such as France, insurance companies also take an active role in building inspection [12].

The building inspection system in Turkey, on the other hand, is regulated by Law No. 4708, enacted in 2001. The law is enforced by the Ministry of Environment and Urbanization. Inspection activities are performed by the inspectors of the building inspection companies authorized by the Ministry. The company that will undertake the inspection works of a project is appointed by the Ministry through an electronic system. Then, a service contract is signed between the project owner and the building inspection company. The inspectors initially examine the drawings and technical documents prepared by the designer. The design approved by the inspectors is also reviewed by the relevant local authority (Municipality or Special Provincial Administration), and if deemed appropriate, the project is licensed. Following the signing of the construction contract between the contractor and the project owner, site operations are carried out under the supervision of the construction manager appointed by the contractor. The inspectors are also responsible for the examination of the construction process. Another responsibility of the building inspection company is to ensure that the required experiments are performed by the test laboratories authorized by the Ministry. When the building inspection company approves that the construction has been completed in accordance with the standards, a building occupancy permit is issued by the local authority. Consequently, the success of the building inspection system is closely associated with the performance of the stakeholders involved. There are sanctions stipulated in the law for the stakeholders who do not fulfill their responsibilities outlined above.

3. Literature review

There are several studies in the literature on enhancing building inspection practices employed in different parts of the world. For instance, Pedro et al. [9] provided a global picture of the building control practices in the 27 EU countries by reviewing their regulatory systems and analyzing a questionnaire answered by the national experts. Based on survey responses and interviews with domain experts, Yuan [13] prioritized inspection checklist items to optimize resources used for inspection by the Indiana Department of Transportation. With a similar purpose, Kim et al. [14] analyzed 1598 projects of the Texas Department of Transportation to estimate their staffing needs and improve the efficiency of construction inspection. By integrating the Analytic Network Process (ANP) and fuzzy set methods, Fan [3] developed a construction quality index model that serves as an objective standard for construction inspections in Taiwan. Through an empirical survey of 340 participants, Chan [15] identified the recommendations or good practices to improve the Mandatory Building Inspection Plan in Hong Kong.

There are also some studies that specifically investigated the building inspection system implemented in Turkey. Atabay and Bozdoğan [16] conducted a survey of the building inspection companies to evaluate the difficulties encountered in the implementation of the new building inspection law. Erdiş and Gerek [17] compiled the problems that the control engineers of the Ministry identified during the audits they carried out for the building inspection companies to suggest corrective measures. In the study of Kural and Ünal [18], the results of a questionnaire directed to the employees of the building inspection companies were analyzed to find out the problems in the building inspection system. Ömürberk et al. [19] used different multi-criteria decision-making methods to compare the building inspection companies by weighting their selection criteria. With a survey covering the Southeastern Anatolia Region, Pala and Demir [20] identified the shortcomings of the system from the point of view of the building inspection companies. In another survey-based study, Çelik and Ünal [21]

discussed the root causes of the problems that the building inspection companies experience and developed practical solutions for building inspection. More recently, Bayram et al. [8] reported ethical issues in building inspection based on a questionnaire answered by the technical staff working for the building inspection companies.

Although these studies have made significant contributions to improving the building inspection system, they mainly reflected the perspective of the building inspection companies only. Considering the views of all stakeholder groups involved in building inspection may shed more light on understanding the causes of the problems in the system. In order to fill this gap, this research presents a stakeholder-based review of the building inspection system in Turkey. Accordingly, the questionnaire data collected from diverse stakeholder groups were analyzed to have far-reaching results about the system and propose solutions for the identified problems.

4. Research methodology

In order to develop a holistic perspective on the building inspection system, a survey was conducted with the stakeholders taking an active role in the inspection process. The target participants were selected as the stakeholders registered in the city of Yalova, as they were directly accessible by the authors. Yalova is one of the pilot cities where the new building inspection law was implemented for the first time. Due to its proximity to major industrial cities, such as İstanbul, and its tourism potential, it has rapidly urbanized. Moreover, it is located in one of the most active seismic zones in Turkey, where the building stock was severely damaged in the 1999 Gölcük earthquake. For these reasons, the building inspection concept is of great importance for Yalova. Hence, it is believed that the findings of this research could realistically reflect the state of the building inspection system in Turkey.

An online questionnaire created in Google Forms was sent to the registered stakeholders with an introductory email explaining that the research complies with ethical requirements. The

participants answered the questions on a voluntary basis, and a total of 110 valid responses were obtained. Table 1 summarizes the profile of respondents. The majority of the sample consisted of male participants. Most of the respondents were under the age of 40. Despite their diversity in educational background and profession, they mostly had bachelor's degrees in civil engineering and architecture. Sixty percent of the participants had less than ten years of experience. The distributions given for the participant profile of this research are considered to be in line with the industry norms. It should also be noted that the participants represented the main stakeholder groups in the building inspection system, including the Provincial Directorate of Environment and Urbanization (PDEU) affiliated with the Ministry, local authorities (LA), test laboratories (TL), designers (D), building inspection companies (BIC), and contractors (C). Among them, BIC and D groups had the highest number of participants.

The questionnaire provided in the Appendix involved three main parts. Questions in the first part served to construct the respondent profile given in Table 1. The second part consisted of questions for a general overview of the building inspection system in Turkey. With the purpose of investigating the current state of the system, the participants were asked to rate their level of agreement with several propositions using a five-point Likert scale. This part also included a question about the job satisfaction levels of the participants, answered on a dichotomous scale. While the frequency distributions were used to assess the Likert scale answers, the last question was analyzed by the chi-square test, which allows determining whether responses have a significant difference [15]. The third part, on the other hand, was related to the stakeholder analysis. It included two separate sets of questions to compare the relevant stakeholders in terms of both their overall performance and the suitability of the sanctions imposed on them. Similar to the second part, the participants answered the questions on a five-point Likert scale.

Table 1. Profile of respondents

Item	Category	Frequency (%)
Gender	Male	76 (69.1)
	Female	34 (30.9)
Age	20-29 years	32 (29.1)
	30-39 years	47 (42.7)
	40-49 years	20 (18.2)
	50-59 years	5 (4.5)
	> 60 years	6 (5.5)
Educational background	High school	8 (7.3)
	Associate's degree	11 (10.0)
	Bachelor's degree	77 (70.0)
	Master's degree	14 (12.7)
Profession	Civil engineer	40 (36.4)
	Architect	38 (34.5)
	Technician	15 (13.6)
	Other	17 (15.5)
Years of experience	1-5 years	37 (33.6)
	6-10 years	29 (26.4)
	11-20 years	25 (22.7)
	> 20 years	19 (17.3)
Stakeholder group	PDEU	13 (11.8)
	LA	17 (15.5)
	TL	12 (10.9)
	D	28 (25.5)
	BIC	30 (27.3)
	C	10 (9.1)

The internal reliability of the responses in each set was measured by the Cronbach's alpha test, which assesses whether the scales used for the questions are fit for purpose [22]. For both sets, the stakeholders were analyzed by the mean score ranking method, commonly used for the Likert-type data [1, 15]. In addition to the overall mean scores, the rankings determined by six stakeholder groups given in Table 1 were listed separately. Moreover, correlation tests were conducted for the stakeholder groups analyzed in both sets to provide more insight into the possible relationship between the performance and sanctions. Since the Likert-type data are not continuous, a nonparametric test should be selected for the correlation analysis in this study [5]. Thus, Spearman's rho correlation coefficient (r_s) was used to measure the relationship between performance and sanctions. It is an appropriate

nonparametric test for analyzing the degree of association between a pair of random variables [23]. In order to organize the data and perform the analyses described here, the IBM SPSS statistics version 23 was utilized. Results and discussion of the statistical analyses are provided in the next section.

5. Results and discussion

5.1. General overview of the building inspection system

First of all, the participants rated their level of agreement on the adequacy of the building inspection system in Turkey in terms of fulfilling the requirements stipulated in the law. As shown in Fig. 1, the number of participants who considered the system adequate was less than half. Although several amendments have been made over the years to enhance the building inspection system, these results suggest that there is still room for improvement.

The subsequent propositions addressed whether the design and construction inspections were adequate. According to the results given in Fig. 2, many participants were not satisfied with the adequacy of the inspections. In comparison with the construction phase, the number of negative responses to the design phase was higher. Nonetheless, the overall quality needs to be improved for both design and construction inspections.

Then, it was examined whether the types of issues encountered during the construction inspections were comfort-related or structural. Fig. 3 depicts the distribution of problems in the buildings. Accordingly, most of the participants did not agree that there were structural issues in the buildings. Although the building inspection system seems successful in this regard, the opposite was true for the comfort-related problems. Only a small number of participants stated that the buildings do not have any issues in terms of comfort. Since one of the aims of the building inspection system is to construct quality structures, more effort is needed to increase the comfort of the end-users.

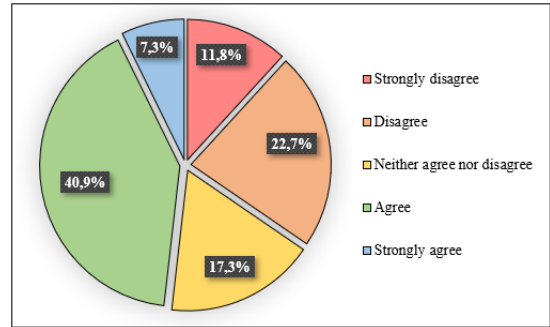


Fig. 1. Adequacy of the building inspection system

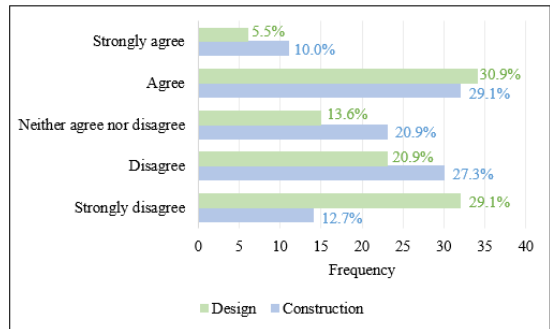


Fig. 2. Adequacy of the inspections

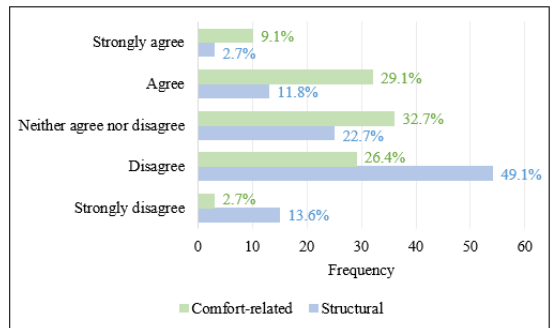


Fig. 3. Distribution of problems in the buildings

In the last question of this part, the participants were asked whether they were satisfied with the income they received in return for their labor. Only 21.8% of the participants selected the “yes” answer. According to the chi-square goodness of fit test, there was a significant difference in the selections, with more people preferring the negative answer, $\chi^2(1, N = 110) = 34.945, p < 0.001$.

Consequently, the findings obtained from this section revealed that the building inspection system in Turkey has certain problems. It has been

concluded that the system is insufficient in terms of both overall performance and employee satisfaction. The following section elaborates on the stakeholder analysis to determine the parties more closely associated with problems in the system.

5.2. Stakeholder analysis

The first set of questions in the stakeholder analysis served to rate the overall performance of the Ministry, local authorities, test laboratories, designers, building inspection companies, contractors, and construction managers in terms of fulfilling their responsibilities in the legislation. Although the construction managers are working for the contractors, they were included in the analysis as a separate group due to their active role in the construction process. The Cronbach's alpha coefficient of the first set was 0.74, which shows high reliability [22]. The mean score rankings of the stakeholders are demonstrated in Table 2.

According to the overall mean scores in Table 2, the test laboratories ranked at the top, while the contractors and construction managers took the last two places. However, the performance of neither group was found satisfactory. When the individual assessments of the stakeholders were examined, almost all groups considered their performance superior to others. For example, the building inspection companies evaluated their own performance as the highest even though they were not ranked first by any other group. This finding

points out the possible communication problems between the stakeholders. The performance of other groups may be considered inadequate in case their inspection activities are not fully known. Nonetheless, there was an overwhelming consensus among other stakeholders about the poor performance of the contractors and construction managers. As the stakeholders with a vital role in minimizing defects during the construction, they had the worst performance in fulfilling their responsibilities. This finding may be one of the reasons explaining the inadequacy of the building inspection system in Turkey. On the other hand, the performance of the test laboratories was ranked in the top two by many stakeholders. As a result, when the assessments they made for themselves were not taken into account, there was a reasonable agreement among stakeholders on the performance rankings.

In the second set of questions, the suitability of the sanctions imposed on the stakeholders when they do not fulfill their responsibilities was evaluated. Since the sanctions applicable to public institutions are beyond the scope of the building inspection law, unlike the previous set, the Ministry and local authorities were not included in the analysis. With a Cronbach's alpha coefficient of 0.83, the internal reliability of the second set was fairly high [22]. Table 3 ranks the stakeholders according to the suitability of the sanctions.

Table 2. Ranking of the stakeholders in terms of fulfilling their responsibilities in the legislation

Stakeholders	Overall		PDEU		LA		TL		D		BIC		C	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Test laboratories	3.15	1	2.62	4	2.59	2	3.92	2	3.25	2	3.27	2	3.20	2
Ministry	3.14	2	3.46	1	2.35	4	4.08	1	3.04	3	3.27	2	2.80	4
Building inspection companies	2.85	3	2.69	2	2.41	3	3.50	3	2.29	5	3.57	1	2.50	6
Designers	2.79	4	2.69	2	1.94	5	3.25	4	3.39	1	2.47	5	3.10	3
Local authorities	2.71	5	2.00	5	3.00	1	3.00	5	2.79	4	2.63	4	2.80	4
Contractors	2.20	6	2.00	5	1.65	6	2.33	6	2.25	6	2.03	6	3.60	1
Construction managers	1.94	7	1.92	7	1.35	7	2.08	7	2.11	7	1.87	7	2.50	6

Table 3. Ranking of the stakeholders in terms of the suitability of the sanctions imposed on them

Stakeholders	Overall		PDEU		LA		TL		D		BIC		C	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Building inspection companies	3.26	1	3.08	2	3.00	1	4.08	2	2.86	3	3.80	1	2.50	5
Test laboratories	3.23	2	3.31	1	2.47	4	4.33	1	3.04	1	3.47	2	2.90	4
Construction managers	2.81	3	2.46	3	2.82	2	3.58	3	2.61	4	2.73	3	3.10	3
Designers	2.78	4	2.31	4	2.59	3	3.42	5	2.96	2	2.53	4	3.20	2
Contractors	2.65	5	2.23	5	2.06	5	3.58	3	2.57	5	2.50	5	3.70	1

The overall mean scores in Table 3 revealed that sanctions were not generally considered sufficient by the participants. The building inspection companies and test laboratories were ranked in the first two places in terms of the suitability of the sanctions, whereas the contractors took the last spot on the list. Except for the construction managers, there were similarities with the previous set regarding the rankings of the five stakeholders. The reason why the order of the construction managers was different may be due to the fact that the participants thought the sanctions on the institutions should be more severe. On the other hand, the separate analysis of the stakeholder groups also showed some similarities with the previous set. The stakeholders tended to position themselves higher than other groups. However, there was a general agreement that the sanctions imposed on the contractors were inadequate, which may explain their poor performance. As a result, the findings from the second set showed that the sanctions foreseen in the legislation might impact the performance of the stakeholders.

Finally, Spearman's rho test was conducted to measure the correlation between performance and sanctions. For this purpose, the ratings given for each stakeholder group in both sets were correlated separately, and five correlation coefficients were calculated. The test results are summarized in Table 4. Accordingly, there was a significant correlation between the performance and sanctions for all stakeholders, which implies that the sanctions imposed on the stakeholders affect their performance positively.

Table 4. Correlations between the performance and sanctions for each stakeholder

Stakeholders	r_s	Sig.
Test laboratories	0.457	<0.001*
Building inspection companies	0.517	<0.001*
Designers	0.432	<0.001*
Contractors	0.471	<0.001*
Construction managers	0.500	<0.001*

* $p < 0.01$ (Significant at the confidence level of 99%)

Based on the findings of this section, it can be concluded that the stakeholders who do not completely fulfill their responsibilities, especially the contractors, might be one of the reasons for the problems in the building inspection system. Furthermore, the participants of this study did not consider the sanctions foreseen in the legislation sufficient in general. All tests performed to determine the positive correlation between the performance of the stakeholders and the sanctions imposed on them yielded statistically significant results. Thus, strengthening the penal provisions in the law can help improve the system by enforcing the stakeholders to perform better.

6. Conclusion and recommendations

This study presented a stakeholder-based review of the building inspection system in Turkey through a survey of 110 participants representing different groups. According to the research findings, the number of participants who thought the current system adequate was less than half. The design and

construction inspections, especially the former, were considered unsatisfactory. Although the structural problems encountered during the inspections were not common, only a few participants shared the opinion that buildings do not have comfort-related issues. Besides the problems related to the system, many participants were also dissatisfied with their income levels. On the other hand, the stakeholder analysis demonstrated that most of the groups involved in the system fail to fulfill their responsibilities thoroughly. Even though many stakeholders found their performance superior to others, there was a general agreement about the poor performance of the contractors and construction managers. In contrast, the test laboratories had the best overall mean score of performance. Additionally, the sanctions foreseen in the legislation were not generally considered sufficient by the participants. In terms of the suitability of the sanctions, the rankings of the stakeholders showed similarities with the previous one, which points out the relationship between the performance and sanctions. The correlation tests showed a significant positive relationship between the performance of the stakeholders and the suitability of the sanctions imposed on them.

In conclusion, the building inspection system in Turkey is not functioning properly. The research findings suggested that the penal provisions in the law should be strengthened to improve the system. For instance, provisions could be added to the building inspection law to impose fines on contractors who fail to meet their responsibilities [21]. However, increasing fines alone is not enough to improve the current situation. Systematic and new approaches are needed to enhance the building inspection system in Turkey. Recommendations for such practices, compiled by reviewing recent studies on the building inspection topic, are provided in the subsequent paragraphs.

First of all, it is necessary to take some actions to increase the qualification and competence of the stakeholders. For example, the construction inspection grading system can be utilized to objectively evaluate the quality of work performed by the contractors [3, 6]. Records of grades from

past projects may encourage the contractors to perform better to protect their business reputation. Moreover, the list of eligible contractors could be published by government agencies so that the project owners can work with qualified contractors [15]. The contractors with good performance records may also be granted some privileges for undertaking public construction projects. An incentive system may aid in enhancing the quality of construction works [24]. On the other hand, the competence of the building inspection companies and their employees could be audited by an independent accreditation body on a regular basis [25]. The inspection activities should be performed by approved personnel who have participated in extensive training and certification programs [26]. According to the participant profile of this research, the building inspection system in Turkey mainly consists of inexperienced employees who are not satisfied with their income levels. The salaries need to be improved in order to include people with the necessary experience and expertise in the system [21]. However, sometimes there may be a minimum number of competent inspection staff due to budget or resource constraints. In such cases, a risk-based prioritization approach could be applied to maintain the quality of inspections. Accordingly, inspection-related risks should be analyzed to optimize the number and type of activities by allocating the available resources to the critical inspection items [13, 27].

Standardization of inspection procedures can also contribute to improving the system. Performing the activities in an organized way assists the inspectors in minimizing subjectivity as well as ensuring accuracy and reliability [28]. For this purpose, a formal construction inspection planning approach could be utilized to set the objectives and select the required measurements, actions, and resources [7, 29]. Inspection planning also allows for more efficient use of time and budget [11]. Establishing checklists, detailed guidelines, and standard codes of practice are other useful ways to standardize inspection procedures [15, 26]. The practitioners may also benefit from global inspection systems to record the steps of

inspections, defects identified and their causes, recommended diagnosis or repair techniques, and inspection reports [30]. Such systems could be supported by computer tools that store the relevant information in a database environment to facilitate the dissemination of lessons learned [11, 12]. Hence, standardization also provides a common language that helps different stakeholders to understand each other [30].

As mentioned above, communication is another important aspect in terms of the functionality of the building inspection system. However, the findings of this research affirmed the literature that points to possible communication problems in the construction industry [31]. Ensuring the trust and confidence among the stakeholders would improve the inspection procedure and thus the overall quality of the buildings [5]. For this purpose, inspection review meetings could be held [3, 6]. For instance, in Taiwan, the public construction quality audit teams responsible for the inspections organize meetings so that project teams can discuss inspection-related issues [6]. It is believed that such practices, which enable the stakeholders to come together and exchange ideas, will contribute to the enhancement of the building inspection system in Turkey. Moreover, the stakeholders can use information and communication technology tools for data and knowledge sharing [28].

Besides improving the standardization and communication, the use of innovative technologies can also provide significant benefits for the inspection activities. Reality capture technologies make it possible to collect inspection data in an efficient and rapid manner. For example, embedded sensors can provide detailed information about a specific structural element, while laser scanners allow simultaneous measurements in a huge construction area [7]. Unmanned aerial vehicles (UAV) have also recently become a popular construction monitoring tool [32]. Furthermore, Building Information Modeling (BIM) may facilitate the inspection and documentation processes by storing the field data in a 3D digital environment [33]. 3D/4D BIM can also be used with the UAV and other reality capture tools to

optimize the inspection procedure [32, 34]. Integrating cloud-based systems and mobile technologies into BIM or developing mobile applications for activity tracking are other innovative practices to improve inspection quality [33].

To summarize, the existing problems in the building inspection system could be minimized by strengthening the penal provisions in the law, increasing the qualification and competence of the stakeholders, standardizing the inspection procedures, improving communication, and using innovative technologies. For the success of building inspection, these issues should be taken into account by policymakers and practitioners. Last but not least, with the help of different media, public awareness should be raised about the importance of inspection not only for new constructions but also for existing building stocks [15].

This research can make theoretical and practical contributions to the body of knowledge. While the existing studies on the building inspection system in Turkey have mainly focused on the problems from the viewpoint of the building inspection companies, this research presents a holistic picture of the system. The data collected from all stakeholder groups taking an active role in the inspection process offer more insights into the dynamics of the system and the root causes of the problems. The research methodology can be replicated by other researchers to draw further implications on the building inspection systems used in different parts of the world. In addition to the theoretical contributions, recommendations compiled in this study serve as a practical guideline for the enhancement of the system. Practitioners can incorporate the tools and techniques mentioned above into their inspection-related activities. Policymakers, on the other hand, can utilize the proposed regulations to increase the effectiveness of the building inspection system.

Despite its contributions, this research also has some limitations. First of all, the findings reflect the subjective view of 110 participants. Moreover, the sample is limited to a single region in Turkey. Another limitation is the unequal sample size across

different groups, which may affect the generalizability of the stakeholder rankings. Future studies that will equally represent the stakeholder groups with more participants may be carried out in different regions for comparative purposes and to provide more general findings. Finally, the validity of the recommendations listed in this paper can be tested with future case studies.

Ethics Committee Permission

The authors acquired ethics committee permission for surveys implemented in this paper from the Hacettepe University Ethics Commission (Date: 20/12/2021; No: E-35853172-900-00001926704).

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix

Table A1: Questionnaire

Part 1 (Respondent profile)					
What is your gender?					
What is your age?					
What is your degree of education?					
What is your profession?					
How many years of experience do you have?					
What is your role in the institution where you work in?					
Part 2 (General overview of the building inspection system)					
Please rate your level of agreement with the following propositions. (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree)					
The building inspection system in Turkey fulfills the requirements stipulated in the law.	1	2	3	4	5
Inspections for the construction works are sufficient in number and quality.	1	2	3	4	5
Inspections for the project design are sufficient in number and quality.	1	2	3	4	5
Issues encountered during the construction inspections mostly affect the comfort of the end-user.	1	2	3	4	5
Issues encountered during the construction inspections mostly affect the structural properties of the building.	1	2	3	4	5
Are you satisfied with the income you receive in return for your labor?	Yes	-	No		
Part 3 (Stakeholder analysis)					
Please rate the overall performance of the following stakeholders in terms of fulfilling their responsibilities in the legislation. (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high)					
The Ministry of Environment and Urbanization	1	2	3	4	5
Local authorities	1	2	3	4	5
Test laboratories	1	2	3	4	5
Designers	1	2	3	4	5
Building inspection companies	1	2	3	4	5
Contractors	1	2	3	4	5
Construction managers	1	2	3	4	5
Please rate the suitability of the sanctions imposed on the following stakeholders when they do not fulfill their responsibilities. (1 = very low, 2 = low, 3 = medium, 4 = high, 5 = very high)					
Test laboratories	1	2	3	4	5
Designers	1	2	3	4	5
Building inspection companies	1	2	3	4	5
Contractors	1	2	3	4	5
Construction managers	1	2	3	4	5