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Procedural Uncertainty in Earth Building Production: Post-2010 Approval Processes in Türkiye

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Abstract

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Earth buildings in Türkiye are constructed using contemporary methods similar to global practices. However, since 2010, legislation has limited how this material can be used in construction. This study aims to identify the uncertainties and challenges faced during the approval process for both public and private earth buildings built in Türkiye after 2010. A sample of earth buildings completed after 2010 and officially approved was selected for this research. Data were collected through semi-structured interviews with designers and representatives of approval institutions and analyzed using thematic analysis. The findings indicate that uncertainty mainly arises from vague definitions of earth buildings in standards and regulations. Consequently, technical evaluation criteria are often unclear and applied inconsistently across different institutions. This leads to longer project timelines, approval delays, and less predictability in production. Therefore, this study emphasizes the need for more standardized procedures and clearer evaluation criteria in the earth-building approval process.

Keywords: Earth Building; Approval Process; Procedural Uncertainty; Earth Building Legislation; Thematic Analysis.

1. Introduction

The global climate crisis and the increasing frequency of environmental disasters in recent years have necessitated more sensitive and sustainable approaches to the use of natural resources and building production processes. In response, many countries and international institutions have introduced policy frameworks to reduce carbon emissions and improve resource efficiency. The European Green Deal, published by the European Commission in 2019, sets the objective of achieving net-zero carbon emissions by 2050 and proposes a comprehensive transformation in energy, production, and economic systems (European Commission, n.d.). Within this transition, the building sector is identified as a priority area due to its high levels of energy consumption and carbon emissions (Sameh, 2014). Accordingly, the environmental impact of building materials has become a critical concern in architectural production. The selection of materials that require low energy input, are natural, and recyclable plays a significant role in promoting environmental sustainability and supporting human well-being.

Given the significant impact of the construction sector on environmental sustainability, the need to investigate natural building materials that can reduce resource consumption and carbon emissions has become increasingly evident. Among these materials, earth stands out as one of the most widely used building materials with a long historical continuity. Earth, which has been widely used since prehistoric times, gradually lost part of its significance with the emergence of new building materials and the rapid production processes introduced by the Industrial Revolution (Solhan E. & Arpacioğlu, 2021). Although interest in earthen construction has increased in recent years due to its environmental and sustainability advantages, its application in mainstream building production remains limited (Carcassi et al., 2024; Pelé-Peltier et al., 2022). One of the main reasons for this limitation is that these construction systems are not adequately defined within standards and regulatory frameworks (Koç & Ekşi Akbulut, 2017). Indeed, standards and regulations are key inputs to the approval processes for earth buildings in Türkiye.

An examination of Turkish standards indicates that the Turkish Standards Institute published the “TS2514 Adobe Blocks and Construction Rules” (Turkish Standards Institute, 1977), “TS2515 Adobe Construction Rules” (Turkish Standards Institute, 1985a), and “TS537 Cemented Adobe Blocks and Walls” (Turkish Standards Institute, 1985b) standards. However, the “TS2514 Adobe Blocks and Construction Rules” and “TS2515 Adobe Construction Rules” standards were repealed in 2011, and the mandatory enforcement of “TS537 Cemented Adobe Blocks and Walls” was canceled in 2010. Moreover, a review of current regulations reveals that the existing Planned Areas Zoning Regulation (2017) contains no provisions on earth buildings, whereas the Ankara Metropolitan Municipality Zoning Regulation (2018) and the

Unplanned Areas Zoning Regulation (1985) include limited provisions. In the 2007 Regulation on Buildings to Be Constructed in Earthquake Zones (2007), adobe buildings were evaluated within the category of masonry structures. However, in the annex titled “Principles for the Design of Buildings Under Earthquake Effect” of the 2018 Türkiye Building Earthquake Regulation (2018), which is currently in force, it is stated that adobe may only be used as an infill material and cannot be used as a load-bearing wall material.

When these regulatory changes are considered together, it becomes evident that significant restrictions on earth buildings have emerged in Türkiye since 2010 across both standards and regulatory frameworks. Despite the growing body of research on the material properties, environmental performance, and design potential of earth construction, research on its institutional and procedural dimensions remains limited. In particular, the approval stage, during which public authorities evaluate design proposals, constitutes a critical threshold for the applicability of alternative construction techniques, yet it has not been sufficiently examined.

Accordingly, this study focuses on the approval processes of publicly and privately owned earthen buildings constructed in Türkiye after 2010 that have completed official approval procedures. The aim of the research is to identify the sources of uncertainty and the constraints shaping this phase, thereby providing a clearer analysis of the institutional context of contemporary earth-building production.

2. Approval Processes for Conventional Building Production in Türkiye

The building production process constitutes a part of the holistic building lifecycle, encompassing phases such as design, construction, use, and demolition, beginning with the emergence of the need for a building and continuing until the end of its lifecycle. Within this cycle, the design and construction phases form the core of production, while the most critical threshold connecting these two phases is the approval process. For a building to be realized, the prepared projects must be reviewed and approved by the relevant administrative authority in accordance with the current Building Law (1985) and related regulations. This compliance is formally certified through the issuance of a building permit.

A building permit is an official document issued by the relevant administration upon the approval of projects prepared for a specific parcel, together with the documents required under the Planned Areas Zoning Regulation (2017). During the approval process, the designer is expected to prepare a project that complies with the applicable zoning plan, plan notes, and relevant legislation. The approval of the design and the issuance of the building permit are therefore directly linked to the project's conformity with legal regulations. In conventional building production processes, the approval mechanism varies according to ownership type. For this reason, the process is examined separately for privately owned and publicly owned buildings.

In **privately owned buildings**, the approval process begins with the submission of the preliminary project to the relevant authority. If the preliminary project is reviewed and found appropriate by the control units, the preparation of construction projects, including architectural, structural, mechanical, and electrical drawings, proceeds. If the project is not approved, necessary revisions are made, and the project is resubmitted. This cycle continues until approval is obtained. Once the construction projects are completed, the inspection phase begins. The inspection model varies depending on the building's location and size. For buildings subject to the Planned Areas Zoning Regulation (2017) and exceeding 200 m² in urban areas, and for buildings subject to the Unplanned Areas Zoning Regulation (1985) and exceeding 500 m² in rural areas, the appointment of a building inspection firm is mandatory (Construction Inspection Law, 2001). For smaller buildings, separate technical responsible persons are appointed for each discipline. After the inspection is completed by building inspection firms or technical responsible persons, all projects and required documents are submitted to the relevant administration. The administration conducts a final review; if the documents are complete and compliant with the legislation, the projects are approved, and a building permit is issued (Planned Areas Zoning Regulation, 2017).

Although the approval mechanism for **publicly owned buildings** follows a structure similar to that for privately owned buildings, it differs in terms of the timing of the building permit. In public buildings, a building permit may be issued after the approval of the preliminary project, before the completion of the construction drawings (Planned Areas Zoning Regulation, 2017). This difference directly affects the progression of the process and allows the preparation and review of construction projects to continue after the permit has been obtained. Following the issuance of the permit, construction projects are prepared and submitted to the relevant authority for review. If deficiencies are identified, revisions are required, and the process continues until approval is granted. In this respect, the control mechanism resembles that applied in privately owned buildings. Another significant distinction concerns the appointment of technical responsible persons. While privately owned buildings may involve building inspection firms or externally appointed technical supervisors, in publicly owned buildings, this responsibility is generally undertaken by technical staff within the institution. These staff are responsible for ensuring that the projects are implemented in accordance with the approved documentation. External consultancy services may also be procured when necessary (Construction Inspection Law, 2001; Planned Areas Zoning Regulation, 2017).

In conclusion, although both privately and publicly owned buildings in Türkiye are subject to a regulatory approval framework grounded in legal compliance and permit issuance, the structure and operation of the approval process vary according to ownership type. These variations stem from differences in institutional organization and the distribution of responsibilities and constitute a fundamental distinction within conventional building approval mechanisms.

3. Materials and Methods

This study employed a qualitative research method to examine the uncertainties that emerged in the approval processes for earth buildings constructed in Türkiye after 2010. A case study approach was adopted because it enables analysis of the multi-actor structure of the process (Figure 1). Within the scope of the study, only earth buildings constructed after 2010 and that had completed their official approval procedures were evaluated. The year 2010 was determined as a

threshold, as it marks the period when the Turkish Standards related to earth building materials were repealed and their mandatory enforcement was terminated.

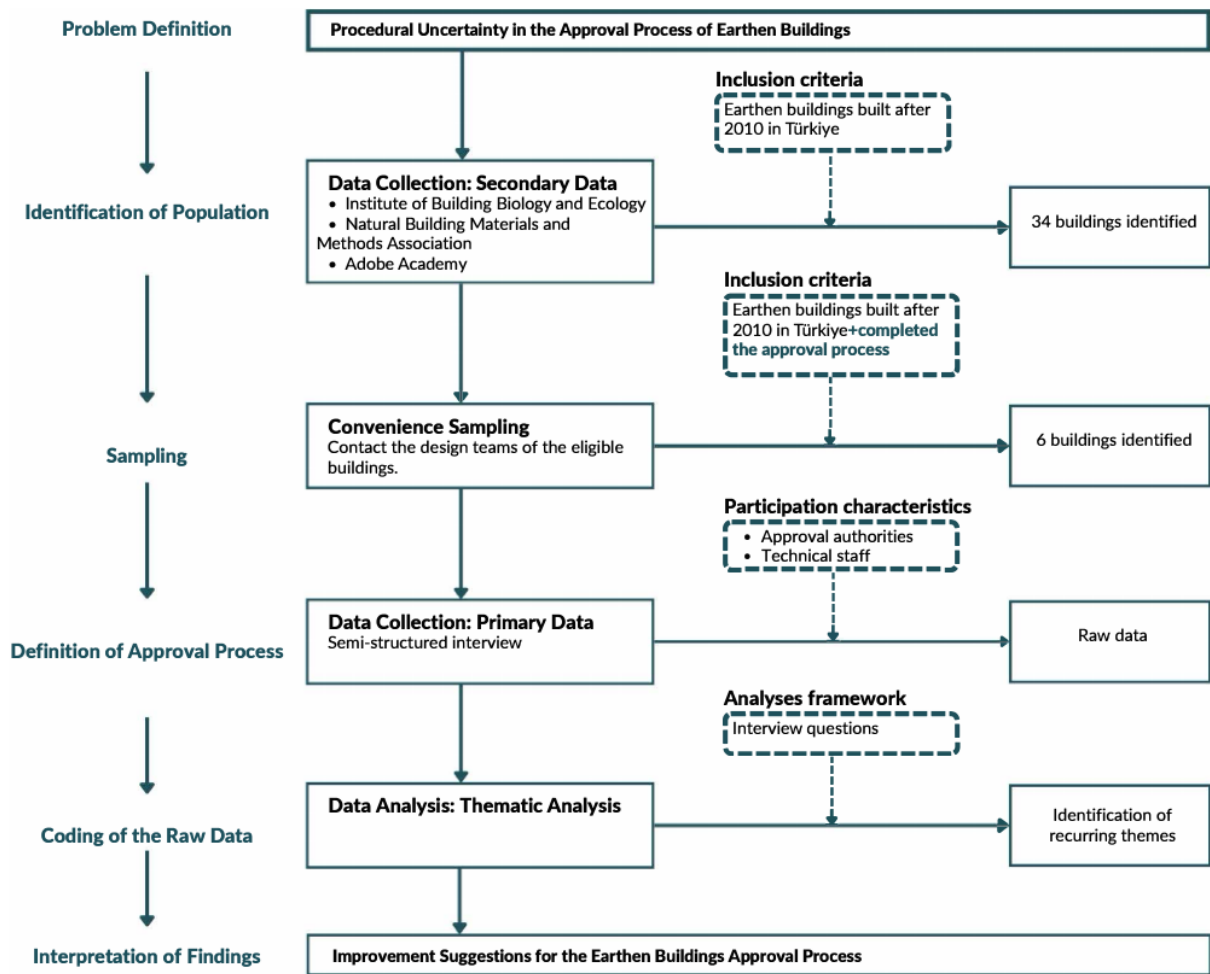


Figure 1. Case Study Framework (Developed by the Authors).

3.1. Research Population and Sampling

Within the scope of the study, data on earth buildings constructed in Türkiye after 2010 were collected by examining associations, research groups, and institutes that operate voluntarily in this field. Publicly available information from the Institute of Building Biology and Ecology (n.d.), the Natural Building Materials and Methods Association (n.d.), and the Adobe Academy (n.d.) was reviewed. Data were collected from content published on the official websites and social media accounts of these institutions. As a result of this review, earth buildings constructed in Türkiye after 2010 were identified, and the research sampling population was established.

The identified buildings were classified by ownership type as public or private and further categorized by criteria such as year of construction, construction technique, and ownership status. Through this screening process, 34 earth buildings constructed after 2010 were identified. Of these, nine were built on publicly owned land, while twenty-five were constructed on privately owned parcels. The identified population was evaluated using a non-probability sampling approach, specifically convenience sampling (Pace D.S., 2021; Pandey & Pandey, 2015; Roy, 2020). This method was preferred to obtain first-hand data in the most accessible and time-efficient manner.

Following ethics committee approval, the designers of the buildings listed in the earth-building inventory were contacted to verify whether they had completed their official approval processes. As a result of this process, 6 buildings were confirmed to have completed the approval stage. After obtaining information about the approving institutions from the designers, representatives of those institutions were contacted and interviewed. Detailed information regarding the sample group is presented in Table 1.

Table 1: Characteristics of The Case Study Buildings.

Building Code	Ownership Status	Construction Year	Earth Construction Techniques	
			Wall	Render/Plaster
1		2019		
2	Private	2020	Timber Frame with Adobe Infill	Clay Render/Plaster
3		2023		
4		2018	Adobe	Earth Render/Plaster
5	Public	2019		
6		2022	Rammed Earth Wall	-

3.2. Interview Design and Data Collection

Because this research focuses on the characteristics of the approval process for earthen buildings, it requires a qualitative data collection approach. Qualitative data can be drawn from primary or secondary sources. However, because detailed information on earth-building production processes is scarce in secondary sources, the study relies primarily on primary data.

Primary verbal data are typically gathered through surveys or interviews (Aydın, 2022). Surveys are generally used when seeking widely generalizable information or working with large sample groups. Given that this study examines a limited number of earthen buildings constructed in Türkiye after 2010 that have completed their approval procedures and seeks comprehensive qualitative insights, the survey method was considered unsuitable. Consequently, in-depth interviews were chosen as the principal data collection technique.

In-depth interviews are widely used to investigate personal and institutional experiences, allowing researchers to obtain rich, detailed information from a relatively small group of participants (Showkat & Parveen H., 2017). Interview formats may be structured, semi-structured, or unstructured, with hybrid variations also present in the literature. The semi-structured format enables participants to express their views freely while allowing the researcher to pose probing questions based on their responses (Morse, 2012). A critical aspect of this method is the formulation of the questions. They should be open-ended, unbiased, and designed to elicit comprehensive explanations rather than short affirmative or negative answers (Kvale, 1996).

Accordingly, the interview questions in this study were developed in a semi-structured format and specifically prepared for representatives of institutions involved in the approval stage of earthen building production. As the study seeks to examine how the approval process for earthen buildings differs from that for conventional buildings, the questions were formulated with reference to the approval phase in the conventional building production process.

After completing the interview design, pilot interviews were conducted with relevant stakeholders. Feedback on the clarity of the questions, the flow of the interviews, and their duration was assessed, and necessary revisions were made to finalize the interview framework.

3.3. Data Analysis

Within the scope of the study, verbal data obtained from interviews with stakeholders involved in the approval process for earthen building production were analyzed using thematic analysis. Thematic analysis is a qualitative and independent data analysis method that enables the identification of recurring patterns of meaning within the data and their interpretation through specific themes (Braun & Clarke, 2006, 2013; Guest et al., 2012). Within thematic analysis, coding plays a central role in breaking down complex datasets into meaningful units. Researchers assign codes to significant portions of the data according to their content, facilitating the identification of recurring topics and the development of an organized thematic structure (King, 2004). The flexible nature of this approach enables researchers to investigate the perspectives of participant groups, identify convergences and divergences among them, and generate novel insights from extensive and unstructured data (Maguire & Delahunt, 2017). Consistent with these advantages, McIntosh & Morse (2015) indicate that this method is particularly suitable for systematically classifying and analyzing data obtained from semi-structured and focus group interviews under thematic categories.

Accordingly, thematic analysis was preferred in this research due to its process-oriented nature and reliance on participants' experiences. Within the research framework, seven themes corresponding to the interview questions related to the approval process were established. In the first stage of the analysis, data obtained from all stakeholder groups were categorized under the relevant themes and coded accordingly. To strengthen the accuracy and richness of the findings, the manual coding process was complemented with ChatGPT-assisted validation. Subsequently, recurring expressions and shared patterns of experience were examined to develop a comprehensive understanding of the approval process. Based on the findings derived from these analyses, several recommendations were proposed to improve the process.

4. Results

The interview questions developed for institutional representatives were organized around defined themes, with each question corresponding to a specific theme. In line with these themes, the responses from the interviewees were systematically collected and interpreted.

Within the scope of interviews focused on the approval stage, data were collected for six buildings in total. For three of these cases, Building-1, Building-2, and Building-3, interviews were conducted with representatives from the institutions directly responsible for managing the approval process. In contrast, for Building-4, Building-5, and Building-6, it was not possible to reach the individuals directly responsible for the approval procedures; therefore, interviews were conducted with the technical staff involved in these projects. Accordingly, the themes and the associated findings derived from the interviews are presented and discussed below.

The first question addressed to participants as part of the approval process was evaluated under the theme of “**Stakeholder Profession.**” This theme focuses on identifying the professional and institutional backgrounds of the stakeholders involved in the approval procedures. Understanding the participants' areas of expertise and professional experiences is significant for interpreting which viewpoints shape the assessment of earth-building projects. The responses gathered under this theme are presented below:

- The representative of Building-1 is an architect who has been employed by the municipality for nearly 8.5 years. She/He is responsible for supervising regulatory compliance and conducting architectural control procedures. This long-term municipal experience reflects a strong familiarity with regulatory processes and a predominantly control-oriented perspective.

- The representative of Building-2 holds a master's degree in architecture and has worked for the municipality for 14 years. After serving in the urban planning department for almost a decade, she/he became responsible for controlling architectural projects, particularly during the pre-permit stages. This background provides substantial experience in identifying the technical and bureaucratic challenges that may arise during the approval process of earth buildings.
- The representative of Building-3 is an architect with 14 years of professional experience in both the private sector and municipal institutions. This combination of experiences enables her/him to approach approval processes from multiple institutional perspectives, considering both public procedures and market conditions when evaluating earth-building projects.
- The interviewee providing information on Building-4 is an architect who began her/his career in building inspection before working in the municipality for approximately 10-11 years. Currently employed in another public institution, she/he has experience in both implementation and regulatory processes. This background enables a comprehensive evaluation of administrative procedures, regulatory compliance, and bureaucratic mechanisms related to earth-building approvals.
- The representative of Building-5 is an archaeologist who has worked in public institutions since 2010, mainly in conservation implementation and inspection units. Her/His professional focus includes archaeological sites, historic buildings, and restoration projects. Accordingly, she/he contributes a distinct perspective by approaching earth buildings in relation to cultural heritage and conservation values.
- The interviewee regarding Building-6 is a landscape architect who has been working for the municipality for 10 years. In addition to prior private-sector experience, she/he has extensive knowledge in plant production. This interdisciplinary background, particularly in landscape and ecology, supports an environmentally oriented approach to projects involving natural materials such as earth building.
- The second question, directed to participants within the scope of the approval process, was evaluated under the theme of **“Documents for Building Permit.”** This theme aims to identify similarities and differences between the documents required for building permits for privately and publicly owned buildings, while also revealing procedural variations that arise under specific conditions, such as forest areas or archaeological sites. The responses obtained regarding this theme are presented below:
- Since the approval procedures for Building-1 and Building-2 were conducted by the same institution, the related questions were answered jointly by the two participants. During the building permit process, a comprehensive file referred to as the “Technical Application Responsible File” is prepared. This file includes documents such as title deeds, zoning status certificates, application drawings, building site plans, and code-compliance drawings. In addition to the architectural project, structural, electrical, and mechanical projects, together with thermal insulation reports, are also submitted. The file further contains registration certificates of the project authors, contracts between contractors and designers, and parcel-based commitments. The submitted documents are reviewed step by step, and the building permit is issued once all required documents are complete.
- According to the interviewee regarding Building-3, the approval process consists of three main stages: preliminary approval, building permit, and building occupancy permit. During the preliminary approval stage, documents including the architectural project, zoning plan, title deed, land application records, ground survey report, and road elevation record are required. Following submission, the project is reviewed for approximately 15-20 days, and any required revisions are communicated to the architect. After the revisions are complete, calculations for the construction area, parking requirements, and related issues are checked. The building permit stage then proceeds to review architectural, structural, electrical, and mechanical projects. Once all projects and related documents are approved, the building occupancy permit is granted.
- The approval process for Building-4 was carried out by the municipality. According to the interviewee, the process generally started after the tendering phase, when control engineers were assigned to the project. Although the participant could not clearly recall all the details of the documents, it was stated that infrastructure-related documents, such as road elevation and canal records, were requested during the process.
- Building-5, located within a third-degree archaeological site, followed a distinct approval procedure due to its protected status. The participant explained that archaeological excavations are initially conducted in cooperation with the General Directorate of Cultural Heritage and Museums. The excavation results are then evaluated by the Cultural and Natural Heritage Conservation Board. If the results are approved, the project documents for the proposed building are submitted to the relevant district municipality together with the site-related documentation. Following municipal approval, the projects are forwarded to the Conservation Board. At this stage, various materials, including project drawings, reports, photo albums, and supplementary documents, are submitted for evaluation, and their completeness contributes to a smoother decision-making process. Construction begins only after the Conservation Board grants final approval.

- Since Building-6 is located on forest land, its approval process differed from those of the other cases. The interviewee stated that an allocation procedure must first be completed before any development can take place in such areas. This process begins with determining the site boundaries and preparing an area use plan. The plan is initially approved by the Regional Forest Directorate in the relevant city and subsequently by the Ankara Regional Forest Directorate. Afterward, a development management plan is prepared that defines the building types, dimensions, material specifications, and intended uses. Landscape projects and related reports are added to the file, and the process continues in accordance with the relevant provisions of the Forest Law. Following completion of the allocation process, the municipal control department requests the architectural, structural, electrical, mechanical, and infrastructure projects. The building permit process is finalized once all required projects have received approval.
- The third question directed to the participants focused on whether they had previously been involved in the approval process of a building constructed with earth materials and the challenges they experienced during this process. Accordingly, the related theme was identified as “**Experience Level on Earthen Buildings.**” This theme aims to reveal the level of experience that institutional representatives have with earth-building projects, the difficulties encountered during the process, and how the use of earth materials influences approval procedures. The responses obtained under this theme are presented below:
- During the interview regarding Building-1, the participant stated that she/he had not previously been involved in the permitting process of a building constructed with earth materials. According to the interviewee, the submitted project documents did not explicitly specify the use of adobe blocks or rammed-earth panels, although alternative applications may have been implemented during construction. The only clear indication of earth-related applications within the project was the green roof system.
- The interviewee explained that the infill walls of Building-2 were shown on the drawings as clay brick walls, and that adobe bricks were not explicitly identified in the project documents. Similarly, the use of earth materials was only indirectly reflected through the green roof application. The participant also noted that the thermal insulation report did not include any statement indicating the use of adobe in the wall system. Responsibility for the calculations in this report was attributed to the project designer, and they were not re-evaluated by the institution.
- In the interview concerning Building-3, the participant described the project as her/his first experience with an earth-building approval process and stated that the greatest difficulty was interpreting and evaluating the drawings. According to the interviewee, the projects were prepared using the conventional drawing language for reinforced concrete structural systems, which limited the clear representation of material-specific details such as adobe and timber. For this reason, the institution held additional meetings, particularly with civil and mechanical engineers, to evaluate the project more effectively.
- The interviewee stated that Building-4 represented her/his first direct encounter with adobe construction. Prior to this project, she/he had mainly worked on restoration projects and on buildings designed with reinforced-concrete structural systems. Through this experience, the participant became more familiar with adobe construction practices.
- During the interview regarding Building-5, the participant explained that she/he had not previously participated in the approval process for a newly constructed earth building, although she/he had experience restoring another earthen structure. The interviewee emphasized that the main difficulty encountered during the process was the shortage of skilled craftsmen capable of constructing earthen buildings, necessitating the learning of certain construction techniques through trial and error.
- The interviewee stated that the municipality experienced difficulties during the permitting process for Building-6 because the project site was located on forest land. At the initial stage, the absence of architectural and structural projects created challenges in obtaining the building permit. However, these issues were resolved through the allocation procedures carried out by the Regional Forest Directorate. Following the completion of the allocation process, the building projects were prepared through outsourced professional services. The municipal planning department subsequently reviewed and approved the projects, allowing the permit process to be finalized.
- The fourth question, related to the approval process, was evaluated under the theme “**Earth Material Impact on Approval Documents.**” This theme examines whether earthen building projects require additional documents or project submissions beyond standard approval and permit procedures. In this context, the influence of earth materials on bureaucratic processes and their potential to create differences within existing practices are assessed. The responses obtained regarding this theme are presented below:
- During the interview regarding Building-1, the participant stated that the institution did not request any documents beyond the standard permit requirements. The only additional request concerned a detailed drawing illustrating the implementation of the green roof system.
- The interview conducted for Building-2 revealed that the use of earth materials was not explicitly reflected in the project documents. For this reason, the interviewee stated that no additional documentation was requested and that the approval process proceeded in accordance with the standard submission procedures.

- According to the interviewee, the use of earth materials in Building-3 did not result in any extra document requests during the permitting stage. As with reinforced concrete, timber, or steel buildings, routine submissions, such as structural, mechanical, and electrical projects, were requested, and the approval process was completed in accordance with standard procedures.
- The participant stated that no special distinction was made for Building-4 during the permit process and that the standard approval procedure was followed. In this context, earth material was not evaluated as a separate or exceptional category.
- The interviewee regarding Building-5 explained that, due to her/his professional role, she/he was only involved in the archaeological site survey stage of the project. Therefore, the participant did not have information regarding any additional documentation related to the use of earth materials during the permit process.
- During the interview concerning Building-6, the participant stated that the absence of a structural system project at the initial stage prevented the municipal engineers from approving the proposal. This issue was later resolved through the outsourced preparation of both the architectural and structural system projects, which were subsequently approved by the municipal planning department.
- The fifth question related to the approval process was evaluated under the theme of **“Regulatory Compliance.”** This theme seeks to identify the legislation, regulations, and standards referenced during the permit and approval processes of earthen buildings. The responses obtained regarding this theme are presented below:
- Since Building-1 and Building-2 are located in unplanned areas, the approval procedures were conducted in accordance with the Unplanned Areas Zoning Regulation. In addition, regulations and standards, including the Energy Performance Regulation, Fire Regulation, Türkiye Building Earthquake Regulation, and relevant TSE standards, were considered throughout the permit process. The interviewees stated that responsibility for ensuring material compliance with these standards rested with the project designers, while the institutions primarily focused on document review and compliance monitoring within the regulatory framework.
- The approval process for Building-3 was carried out in accordance with the Planned Areas Zoning Regulation and the Metropolitan Municipality Zoning Regulation. According to the interviewee, no additional documentation specifically related to earth-building materials was requested, and no separate regulations or legal provisions were evaluated for the use of earth materials.
- For Building-4, the approval process was conducted in accordance with the Planned Areas Zoning Regulation, the Türkiye Building Earthquake Regulation, the Fire Regulation, and the related regulations governing parking areas and shelters.
- No detailed information regarding the applicable regulations for Building-5 could be obtained from the interviewee.
- During the interview concerning Building-6, the participant stated that she/he could not provide detailed information about the regulations referenced in the process because she/he was not directly involved in the building permit department.
- The sixth question directed to the participants was evaluated under the theme of **“Project Drawings and Documents Audit.”** This theme seeks to identify how project drawings and documents are reviewed during the permitting process, the criteria considered during inspections, and the interdisciplinary structure of the evaluation procedures. The responses obtained regarding this theme are presented below:
- The project review process for Building-1 and Building-2 was described primarily in terms of the technical criteria defined by the regulations. According to the interviewees, the initial evaluations focused on issues such as compliance with zoning plans, dimensional requirements, code conformity, area calculations, setbacks, and roof heights. Material-related assessments were conducted in later stages, particularly during the review of structural, mechanical, and installation systems. At this stage, technical documents, including thermal insulation and acoustic reports, were also examined.
- In the interview regarding Building-3, it was stated that projects submitted to the project control department are generally reviewed within approximately 15-20 days. During this period, identified deficiencies and required revisions are communicated to the project designer, and the project is reassessed after the necessary corrections are completed. The interviewee emphasized that calculations related to total construction area, parking requirements, and other planned-area criteria constitute a significant part of the control process. Once these calculations are verified, the project proceeds to the building permit stage, where the architectural, mechanical, electrical, and structural projects undergo further review.
- The interviews concerning Building-4, Building-5, and Building-6 were conducted with technical personnel employed at the relevant institutions. However, since these participants were not directly involved in the projects' approval procedures, they were unable to provide detailed information on this issue.
- The seventh question, related to the approval process, was evaluated under the theme **“Project Inspection for Occupancy Permit.”** This theme aims to identify how inspections are conducted during the construction phase,

which actors are involved in these inspections, and the experiences gained throughout the process. In this way, the functioning of construction and occupancy inspections in both privately and publicly owned buildings can be better understood. The responses obtained regarding this theme are presented below:

- According to the interviewees, the municipality conducted two main inspections during the construction of Buildings 1 and 2, specifically at the foundation and sub-basement stages. The participant explained that earlier practices also included inspections of thermal insulation and roof applications, although these were later removed from the municipal control process. As a result, responsibility for these inspections was transferred to the technical responsible persons or building inspection companies. After construction is completed, a final on-site inspection is conducted before the building occupancy permit is issued.
- The interviewee regarding Building-3 stated that she/he was not directly involved in issuing the building's occupancy permit. According to the participant, final inspections are generally conducted by the occupancy permit department. This indicates that various units and stakeholders within the municipality participate in the inspection and approval process.
- During the interview concerning Building-4, it was stated that the technical responsible persons appointed by the municipality remained involved throughout the construction stage. Stakeholders, including civil engineers, electrical engineers, and landscape architects, conducted inspections within their respective areas of expertise. This demonstrates that the construction control process was carried out within a multidisciplinary framework.
- No direct information about the inspection procedures for Building-5 was obtained during the interview. The participant explained that the personnel who had previously approved the project had left the institution for various reasons. This situation indicates that personnel changes and institutional fragmentation in public projects may make it difficult to clearly trace inspection processes.
- The inspection process for Building-6 differed from the other cases because it was located on forest land. In this case, the Regional Forest Directorate conducted annual site inspections to assess whether the construction was progressing in accordance with the approved project documents and prepared related monitoring reports.

5. Discussion

The findings on the approval process for earth buildings were discussed within the framework of the seven identified themes, as presented below:

- The findings related to the **“Stakeholder Profession”** theme indicate that the professional backgrounds and areas of expertise of the participants involved in the approval process of earth buildings vary considerably. While architects and architects with master's degrees are more commonly involved in the control procedures for privately owned buildings, stakeholders from other professional fields, such as landscape architects and archaeologists, also participate in the approval processes for publicly owned buildings. The collaboration among experts working at different institutional levels, including municipalities, central administrations, and supervisory bodies, demonstrates both the diversity encountered in earth-building approval processes and the differing perspectives from various areas of expertise.
- The examination of the **“Documents for Building Permit”** theme demonstrates that the approval process includes both common procedures and differentiated practices. Regardless of whether the building is privately or publicly owned, land-related documents such as zoning plans, title deeds, and application records, together with project documents, are required as part of the process. However, the presence of specific conditions on certain publicly owned lands, such as forest areas or archaeological sites, adds additional layers to the approval process. In these cases, the involvement of multiple institutions leads to variations not only in the required documents and drawings but also in the approval process itself. This situation indicates that approval procedures, particularly for publicly owned areas, involve a more specialized and multi-actor structure.
- The responses evaluated within the scope of the **“Experience Level on Earthen Buildings”** theme indicate that, despite participants' extensive professional backgrounds, many encountered earth-building projects for the first time through these approval processes. This situation posed various challenges, ranging from evaluating project drawings to interpreting technical details. The participants particularly emphasized difficulties in understanding material properties, identifying appropriate standards, and clarifying administrative procedures in projects that differed from conventional construction systems. Overall, the interviews demonstrate that earth-building approval processes are generally carried out through adaptations to the existing regulatory system, and that institutional experience in evaluating this construction technique remains limited.
- The data obtained on the **“Earth Material Impact on Approval Documents”** theme indicates that the use of earth materials generally does not create additional requirements beyond the standard documentation requested during the permit process. Additional detailed drawings were requested only for certain applications, such as green roof systems, while the overall procedure was carried out in a manner similar to that used for conventional buildings. These findings demonstrate that there is no standalone document framework specifically for earth-building projects and that approval procedures continue to operate under existing standards and conventional practices.
- The observations derived from the **“Regulatory Compliance”** theme indicate that existing zoning regulations and technical standards serve as the primary references in the permit and approval processes for earth buildings. The Planned Areas Zoning Regulation served as the primary regulatory framework in planned areas, while the

Unplanned Areas Zoning Regulation was primarily applied in unplanned areas. In addition, technical regulations and standards, such as the Türkiye Building Earthquake Regulation, Fire Regulation, Energy Performance Regulation, and relevant TSE standards, were considered across all projects. However, the findings also demonstrate that there is no specific legislation directly addressing the use of earth materials, and that approval procedures are generally carried out under existing general standards. This situation suggests that earth buildings are not legally evaluated as a separate construction category and that their permit processes continue to operate through adaptation to conventional regulatory systems.

- Insights obtained from the “**Project Drawings and Documents Audit**” theme indicate that the processes concerning privately owned buildings could be described more clearly, as the interviews for these cases (Building-1, Building-2, and Building-3) were conducted with individuals directly involved in the approval procedures. In contrast, the approval processes for the publicly owned buildings (Building-4, Building-5, and Building-6) appear more complex due to the involvement of multiple institutions and departments. While privately owned buildings generally follow more clearly defined stages, similar to conventional approval procedures, the participation of numerous stakeholders in public projects creates a more fragmented structure and complicates tracking approval stages.
- The interview findings concerning the “**Project Inspection for ‘Occupancy Permit’**” theme indicate that inspections in privately owned buildings are generally carried out within a more regular and standardized framework, particularly under the supervision of building inspection companies and technically responsible persons. In contrast, inspection mechanisms in public projects appear to be more complex, as the involvement of multiple institutions and numerous stakeholders leads to fragmented control processes. In addition, institutional changes over time create gaps in information regarding inspection procedures. This situation demonstrates that, compared to privately owned projects, public projects have a weaker structure for maintaining continuity and ensuring comprehensive monitoring throughout the inspection process.
- Overall, the findings demonstrate that the approval processes for earthen buildings in Türkiye are generally conducted using procedures developed for conventional construction systems, as there is no specific legal framework that directly defines or regulates earth materials. The involvement of professionals from different disciplines, such as architects, landscape architects, and archaeologists, reflects the multi-layered character of these processes; however, it also contributes to differing interpretations and institutional practices. Because many participants encountered earth-building projects for the first time, their limited institutional experience made it difficult to evaluate material performance and identify suitable standards. In addition, because earthen buildings are not recognized as a distinct category in national legislation, these projects continue to be assessed under existing planning, zoning, and technical regulations. While privately owned buildings generally proceed through more clearly defined and standardized control mechanisms, public projects tend to involve more fragmented and less transparent procedures due to their multi-institutional structure. Taken together, these findings emphasize the need for a clearer legal definition of earth materials, the development of project-specific approval criteria, and the strengthening of institutional knowledge and experience in order to support more consistent and reliable approval processes for future earthen building practices.

6. Conclusions

This study examined the approval mechanisms for earthen buildings constructed in Türkiye after 2010 and completed through official approval procedures, in both public and private ownership contexts. The findings reveal significant differences between privately and publicly owned projects in their approval processes. In particular, publicly owned projects often involve special conditions such as forest areas or archaeological sites, which require the involvement of additional institutions. This results in a more complex, multi-layered, and fragmented approval mechanism. The multi-stakeholder structure and institutional diversity in public projects contribute not only to longer procedures but also to more difficult coordination and less transparent approval pathways.

The findings further demonstrate that many of the institutional representatives involved in the approval mechanisms encountered earthen building projects for the first time through these cases. Although the participants generally had extensive professional experience in municipalities, supervisory bodies, or public institutions, their limited prior exposure to earthen construction posed challenges in interpreting project drawings, evaluating material properties, and identifying appropriate technical references. In several cases, earth-based construction systems were not explicitly represented in the project documents and were instead evaluated using conventional reinforced-concrete or masonry-based drawing systems. This situation indicates that existing approval procedures continue to rely heavily on conventional construction approaches, even when evaluating alternative building materials and techniques.

Moreover, a considerable number of the interviewed public employees were not directly involved in all stages of the approval process, which limited the comprehensiveness of the information conveyed. This finding reflects the fragmented institutional structure and distributed responsibilities characterizing public approval mechanisms. Compared to privately owned buildings, where approval and inspection stages were generally more clearly traceable, public projects involved more fragmented procedures due to the participation of multiple institutions, changing personnel structures, and varying administrative responsibilities.

For both privately and publicly owned buildings, approval procedures are conducted in accordance with existing legislation. No specific regulations, technical frameworks, or additional documentation systems are provided exclusively for earthen buildings. Consequently, earthen structures are evaluated under general building legislation, which lacks material-specific technical clarity, contributing to interpretative variability in practice. Existing regulations, such as the Planned Areas Zoning Regulation, Unplanned Areas Zoning Regulation, Türkiye Building Earthquake Regulation, Fire Regulation, and related technical standards, continue to serve as the primary legal references throughout the process.

However, because earthen construction is not formally defined as a separate construction category within national legislation, approval procedures largely depend on institutional interpretation and adaptation to conventional systems. Overall, the findings highlight the need for clearer legal and technical definitions concerning earthen construction in Türkiye. The study demonstrates that the absence of material-specific approval criteria and standardized technical guidance creates uncertainties for both designers and approval authorities. In this context, developing technical guidelines, improving institutional knowledge and interdisciplinary capacity, and establishing more transparent and coordinated approval frameworks may contribute to more consistent and reliable evaluation processes for future earthen building practices.

Considering the issues identified within this study, several institutional, technical, and legislative areas that may support the improvement of earthen building approval processes in Türkiye can be identified:

- **Awareness and dissemination of information:** Enhancing knowledge of earthen building techniques and construction methods among approval authorities, designers, and employers would contribute to a more informed approval process.
- **Development of standards and technical regulations:** Establishing up-to-date, applicable standards for earthen building techniques would provide greater legal and technical clarity in approval processes.
- **Strengthening legislative and institutional coherence:** Providing a clearer definition of earthen buildings within the legislative framework and reducing inter-institutional interpretative differences would improve consistency in approval procedures.
- **Addressing multi-stakeholder complexity in public projects:** Developing more integrated and coordinated approval mechanisms would help reduce the fragmented, multi-actor structure that complicates coordination and transparency.
- **Capacity building and training:** Enhancing the technical knowledge and experience of personnel involved in approval processes would contribute to more consistent and informed evaluations of earthen building projects.

Building on the findings of this study, several future research directions emerge regarding the approval processes for earthen buildings in Türkiye. Since the scope of this study is limited to a restricted number of buildings that have completed official approval procedures, future research could expand the sample size and examine how regional and institutional contexts influence approval mechanisms. Furthermore, monitoring buildings during their use phase to assess maintenance requirements and long-term performance may provide valuable insights into how technical decisions made during the approval stage affect the building lifecycle. Further research focusing specifically on the fragmented, multi-stakeholder approval mechanisms for public projects could also contribute to the development of improved coordination models among institutions. Taken together, these findings indicate that the primary barrier to the wider implementation of earthen buildings in Türkiye stems more from institutional and regulatory ambiguities than from technical inadequacies. Clarifying and systematizing approval processes will be decisive in positioning earthen construction as a recognized and applicable component of sustainable architecture.

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Conflicts of Interest

The authors report no conflicts of interest.

Data Availability Statement

The interview transcripts supporting the findings of this study are not publicly available due to privacy and confidentiality considerations but may be available from the corresponding author upon reasonable request. All findings and analyses derived from these transcripts are included in this study.

Institutional Review Board Statement

Ethical approval for the interviews conducted as part of this research was granted by the Ethics Committee of Abdullah Gül University under decision number 116241, dated February 4, 2025.

CRedit Author Statement

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