



# THE ROLE OF THE TECHNICAL DUE DILIGENCE PROCESS AT THE STAGE OF LAND ACQUISITION FOR CONSTRUCTION INVESTMENT

## ROLA PROCESU TECHNICAL DUE DILIGENCE NA ETAPIE ZAKUPU NIERUCHOMOŚCI GRUNTOWYCH W CELU REALIZACJI INWESTYCJI BUDOWLANYCH

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### Abstract

*The process of planning the implementation of a construction investment is usually preceded by a decision on the purchase of land property, which in turn is typically accompanied by a process known as technical due diligence (TDD). During this process, the feasibility of the planned construction project is verified. The preliminary design concept of the building, prepared at the request of the buyer – a potential investor, is analysed in detail. Legal, technical, environmental, social, or economic obstacles that may prevent the planned investment may already be apparent at the stage of issuing the early finding TDD report. In such cases, purchase negotiations are then typically broken off immediately. In the absence of such obstacles, a final TDD report is issued, containing recommendations for the implementation of the project. There is a lack of research in the scientific literature on the preparation of TDD reports for land properties. This article develops a proprietary algorithm for the TDD process based on the authors' professional experience and interviews with experts. This algorithm is adapted to the TDD process for land property acquisition. The purchase of a plot of land, along with the preparation of a TDD report, marks the initial step in the planning process for construction investment, which can significantly impact its success.*

**Keywords:** technical due diligence, building plot, construction investment

### Streszczenie

*Proces planowania realizacji inwestycji budowlanych jest przeważnie poprzedzony decyzją dotyczącą zakupu nieruchomości gruntowej, której z kolei zazwyczaj towarzyszy proces technical due diligence (TDD). W trakcie tego procesu weryfikowana jest możliwość zrealizowania planowanej inwestycji budowlanej. Szczegółowej analizie poddawana jest wstępna koncepcja projektowa budynku, przygotowana na zlecenie kupującego, potencjalnego inwestora. Już na etapie wydawania raportu wstępnego TDD są sygnalizowane ograniczenia prawne, techniczne, środowiskowe, społeczne czy ekonomiczne, które uniemożliwiają zrealizowanie planowanej inwestycji. W takim przypadku już na tym etapie zwykle przerywane są negocjacje zakupowe. W przypadku braku takich ograniczeń wydawany jest raport końcowy, który zawiera rekomendacje i zalecenia przydatne do realizacji projektu. W literaturze naukowej brakuje badań dotyczących przygotowania raportów TDD dla nieruchomości gruntowej. W artykule został opracowany autorski algorytm procesu TDD na bazie własnych doświadczeń zawodowych oraz wywiadów przeprowadzonych z ekspertami, który dostosowuje proces*

*TDD na potrzeby zakupu nieruchomości gruntowych. Zakup działki wraz z opracowaniem raportu TDD jest pierwszym etapem w procesie planowania realizacji inwestycji budowlanych, który może zadecydować o jej powodzeniu.*

**Słowa kluczowe:** technical due diligence, działka budowlana, inwestycja budowlana

**ABBREVIATION:**

- TDD – technical due diligence
- AHP – analytic hierarchy process
- DD – due diligence
- RICS – Royal Institution of Chartered Surveyors
- Q&A – question and answer
- VDR – virtual data room

**1. INTRODUCTION**

According to [1], the investment process in construction is a challenging endeavour that requires multiple skills, a lot of time, and significant financial resources. The actions undertaken during this process encompass purely technical aspects related directly to the implementation of projects, as well as planning, design, and logistical tasks associated with preparing for the realization of these investments.

The investment process in construction generally consists of three stages: preparation, implementation, and utilization of the investment. The beginning of the investment preparation stage for buildings is typically considered the purchase of a building plot. According to the regulation of the Council of Ministers [2], a building plot is understood as a land property or land plot whose size, geometric characteristics, access to public roads, and provision of technical infrastructure facilities meet the requirements for the construction of buildings as stipulated by regulations, separate provisions, and local laws.

In accordance with market practice, the purchase of a building plot is preceded by a due diligence (DD) process. According to the American Legal Dictionary [3], due diligence is a process of critical analysis that companies undertake prior to making business decisions in such areas as corporate mergers/acquisitions or major product purchases/sales. The due diligence process is in essence an attempt to provide business owners and managers with reliable and complete background information on proposed business deals so that they can make informed decisions about whether to go forward with the business transaction. According to an article [4], the aim of due diligence analysis is to limit risk, that is, to protect the buyer from unexpected costs resulting from facts that may be revealed after the transaction is finalized, when the transaction cannot be reversed. The DD process may involve various aspects (e.g., legal, environmental, or technical).

The TDD process, which is the subject of this article, primarily focuses on technical issues related to a specific real estate plot, while also verifying legal, environmental, social, and economic aspects. The investor’s expectations are compared with the technical condition of the real estate plot, zoning decisions, and all other documents provided by the seller of the building plot. The feasibility of implementing the planned construction investment in accordance with the prepared preliminary design concept is also assessed. According to market practice, the successful completion of the TDD process is a necessary condition for carrying out the purchase transaction of the specific real estate plot.

The preparation of technical due diligence (TDD) reports concerning the technical condition of buildings has become an important new area of practice for consulting firms. Prior to the financial crisis that began in the fall of 2008, the preparation of TDD reports was the fastest-growing activity in some consulting firms [5]. Currently, the market for preparing TDD reports continues to evolve, with a significant portion of it consisting of reports prepared for building plots.

The primary goal of the article is to analyse the state of knowledge in the literature on TDD.

The second goal of the article is, based on interviews with experts, to adapt a well-known algorithm from the literature for conducting the TDD process for buildings, for the purpose of land acquisition. Additionally, these interviews aim to identify the demand for a tool that could assist investors in making decisions regarding the purchase of land.

**2. MATERIALS AND METHODS**

**2.1. Selection of literature for analysis**

To search for scientific publications, the Scopus database was utilized. The primary criterion applied was the search term “technical due diligence”.

This search encompassed titles, abstracts, and keywords. Literature from the years 1998-2023 was examined. A total of 41 publications were found, with 11 related to the mining industry, 10 directly addressing commercial real estate sales, 9 discussing issues related to renewable energy sources, 3 concerning electrical infrastructure, 2 relating to building renovations, 2 to ecological issues of CO<sub>2</sub> emissions, and the remaining 4 describing mergers and acquisitions of companies as well as the history of the TDD formulation, maintenance of gas turbines, pharmaceutical product assessment, and production processes. Ultimately, one article describing the history of TDD formulation and 7 articles regarding the application of the TDD process for construction investments and the real estate market were selected.

## 2.2. Interviews with experts

To adapt the TDD process algorithm for land properties based on the algorithm described in the literature for building properties, interviews were conducted with experts involved in carrying out TDD processes. Two basic criteria for selecting experts were adopted: professional experience of at least 10 years and location of employment (one expert was chosen from each city). The experts came from 7 cities: Warsaw, Krakow, Poznań, Katowice, Wrocław, Łódź, and Gdańsk, where the highest number of TDD processes are conducted. Therefore, the research results can be considered representative for the entire area of Poland. Seven experts comprised the purposive sample of this study. The subject of the conducted interviews was the process of carrying out TDD for building plots.

## 2.3. Review of Literature

The term DD [6] originates from the 1930s in the United States of America, where it referred to the obligation of sellers of financial instruments to provide the necessary documents required by local legislation. This obligation served as a mechanism to protect buyers of financial instruments, ensuring transparency in various business activities and helping to prevent investors from being misled by dishonest actions and information.

In the 1970s, the term DD meant a legal process of document analysis, ensuring the accuracy of information in financial, capital, and securities markets, attesting that commercial activities conducted by the business and industrial sector were entirely legal.

Currently, in business practice, the term DD is used to verify various areas of business activity, such as financial, commercial, tax, operational, technical, environmental, technological, human resources, and legal. This verification ensures transparency in various transactions that are to be conducted.

In the article concerning the construction of a hydroelectric power plant [7], the TDD report was prepared for the bank as a decisive criterion for making a decision on financing the project. The analytic hierarchy process (AHP) method was applied in the article, which ultimately allowed for the selection of investments that meet the required financial criteria. Based on interviews with experts, 11 key criteria were identified (e.g., feasibility study quality, geological and hydrological conditions, designed turbine specification, local power grid parameters) that directly impact the success of planned investments. Three hydroelectric plant locations were analysed, out of which two locations received a positive recommendation, enabling the financing of the investment.

In article [8], an attempt was made to optimize the transactional process of real estate purchase at the TDD preparation stage in German-speaking countries. The process of purchasing a new property and transferring it to a new owner was described in detail. Special attention was paid to the process of transferring necessary property documents from the selling party to the buying party. Document exchange typically occurs on a virtual data room (VDR) platform, which is a key element of the transaction and TDD process. The authors emphasized the importance of preparing documents in a suitable manner, ensuring they are useful, structured, and standardized. They also suggest defining a clear organizational structure with responsibilities divided on the buyer's side. Improving document accessibility and communication, especially on the buyer's side, will positively impact the transaction process.

In another article [9], TDD utilised the AHP, which was applied in evaluating mergers and acquisitions of power plants in the Chinese market. In this case, four criteria were identified concerning equipment assessment, environmental protection, energy savings, and management. The applied method enabled effective resolution of issues related to difficulties in quantification in the TDD reports previously issued.

A comprehensive description of the TDD process for buildings can be found in article [4]. The process includes defining the scope of the TDD report

with the client, engaging experts, site visits, report preparation, and its final acceptance by the client. The article describes the typical scope of the TDD process, general principles of report preparation, the necessary sequence of actions, and the organizational structure of the consulting team. The conclusions indicate that a set of good practices, thoroughness, reliability, and impartiality of auditors combined with deep and interdisciplinary knowledge of team members allows for the creation of a survey of the building, which it calls the TDD, which according to market practice is essential for property sales.

Another comprehensive description of the TDD procedure can be found in the 2020 RICS guidelines [10]. The document covers four types of TDD reports for commercial properties, assigned to the following building life cycles (acquisition, operation, sale, renovation or development). The document includes guidelines for document verification, process schedule, engaging experts, building inspection, and report preparation. According to the TDD guidelines, the aim is to identify significant physical defects or non-compliance with local regulations before selling the property, which may impact the property value in the commercial market.

A detailed description of the DD process can be found in the book “Real Estate Due Diligence” [11]. The final chapter edited by Sebastian Reich focuses on TDD. Despite the absence of formal requirements for the TDD process, the author provides a very detailed description of the entire process from the perspective of both the buyer and the seller. The author pays particular attention to identifying issues that may lead to the termination of the transaction within the TDD framework. The entire process is divided into four phases: preliminary, documentation verification, on-site inspection, and contractual. The

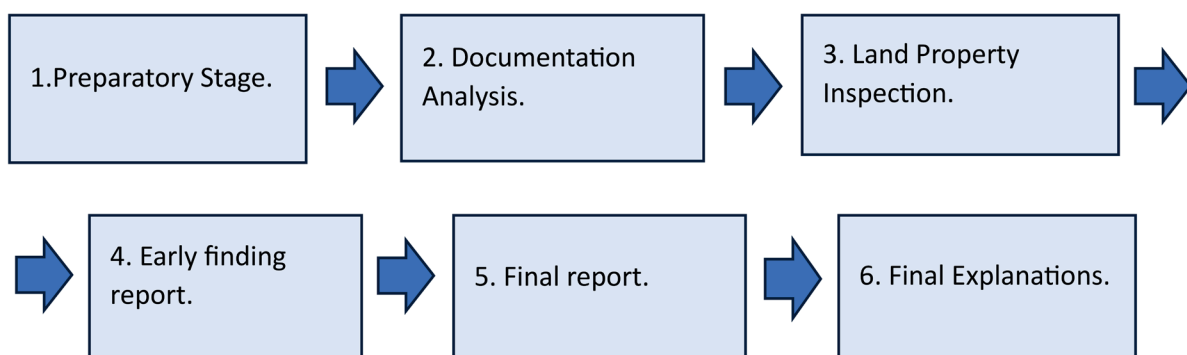
publication includes specific examples of organizing documentation into catalogs for a given property, as well as examples of conflicts of interest.

In article [5], a case study analysis of TDD processes conducted in Denmark and Italy was carried out. The research was conducted using a survey method. Surveys were sent to companies involved in TDD processes. The article compared market practices with international guidelines. It was found that the applied market practice varies between the two countries and in many cases could be improved through a more structured approach and stricter adherence to international guidelines.

In summary of the literature review, we can conclude that building purchase transactions or financing approvals for specific projects are typically associated with the TDD process. This process involves the engagement of experts and conducting an analysis of the technical condition of the property. In many cases, TDD is prepared using the AHP, which is widely discussed in the literature, e.g. [12]. The literature describes the course of the TDD process itself and its staging depending on the best practices prevailing in the market. It can be observed that scientific literature lacks publications regarding the development of a TDD process algorithm for building plots.

**3. RESULTS**

The TDD process algorithm described in the literature has been adapted for the implementation of TDD for land properties. The scope includes: obtaining the assignment, organizing a team of experts/consultants, acquiring necessary documents, conducting inspections of the land property, preparing preliminary and final reports, and delivering the final version of the report to the client. Figure 1 illustrates the main stages of the TDD process implementation.



*Fig. 1. Stages of implementing the TDD process for land properties. Own development*

1. Detailed description of actions taken in the preparatory stage of implementing the TDD process for land properties.
  - Sending requests for proposals to consulting firms (auditors) regarding the preparation of the TDD report for the building plot.
  - Verification whether there is any conflict of interest. In most cases, this verification boils down to checking whether the consulting firm does not have business relationships with the company selling the land property.
  - Submission of a proposal by the consulting firm to carry out the service of preparing the TDD report for a specific building plot.
  - Acceptance of commercial terms by the client interested in purchasing the land property, which are attached to the proposal (e.g., hourly rates for additional work, or required insurance coverage).
  - Approval by the client of submitted proposal.
  - Determining the confidentiality status of the process. In cases where the process is confidential, the auditor is obliged to sign a non-disclosure agreement to maintain confidentiality of all information regarding the planned transaction.
  - Agreements between the client and the auditor on the following issues:
    - Establishing the precise scope of the reports. Identifying the issues that are most important to the client for analysis.
    - Agreement on the templates for the early findings and final reports, as well as the language in which the reports will be prepared. According to market practice, report templates are most commonly presented in tabular or descriptive form.
    - Agreement on the potential scope of examinations, inventories, or measurements to be conducted on the land property. Based on market experience, it can be observed that geological surveys are typically conducted, including environmental tests to check for contaminated soil on the subject plot. Additionally, a decision is made on the potential need for greenery inventory.
    - Confirmation of the address where the land property is located, as well as agreement on access to the plot and determination of how the plot is used.
    - Determination of whether non-standard analyses are needed (e.g., regarding mining damage).
  - Establishing the potential scope of cost calculations and the significance threshold, i.e., the minimum value of works included in the cost calculations. Based on the mentioned significance threshold, significant cost-related issues can be identified (e.g., land contamination requiring costly remediation works).
  - Engagement of a standard team of experts, typically consisting of a project manager, electrical specialists, and plumbing installation specialists.
  - Agreement with the multidisciplinary consulting team engaged by the client on the schedule of activities related to the TDD process (e.g. setting the schedule for regular online meetings).
  - Preparation of a list of required documents necessary for TDD preparation, with particular emphasis on preliminary design concepts or absorption analysis.
  - Agreement on the method of transferring documents related to the plot and access to documentation.
  - Confirmation of whether the documentation is available electronically on a VDR platform or in paper form at the location indicated by the plot seller.
  - Determination of the method of asking questions regarding the provided documentation within the online Q&A platform.
  - Establishment of the plot inspection schedule and access rules to the land property.
  - Confirmation of deadlines for issuing early finding and final reports and meeting other deadlines agreed upon between the auditor and the client.
2. Detailed description of actions undertaken as part of the documentation analysis stage in the implementation of the TDD process for land property:
  - Obtaining access to the VDR by the auditor in case the documentation is available electronically.
  - Verification of the provided documentation.
  - Review of the preliminary project concept or absorption analysis.
  - Posting any questions regarding the provided documentation on the Q&A platform.
3. Detailed description of actions taken during the stage of on-site inspection in the implementation of the TDD process for real estate:

- Conducting inspections by a standard team of experts.
  - Performing necessary tests, inventories, or measurements by specialists from various fields (e.g., by geologists regarding soil conditions and potential site contamination [13], environmental specialists).
  - Conducting greenery inventory.
  - Verifying the following issues:
    - Location and general information about the property,
    - Immediate and extended surroundings of the property,
    - Existing buildings on the plot, if any,
    - Existing underground infrastructure,
    - Connections to public roads.
  - Taking photographs of the plot and its surroundings to document the condition of the real estate.
  - Conducting interviews with the manager of the subject plot and, if necessary, with the users of neighbouring plots in order to obtain all information related to the use of the subject plot (e.g., information regarding soil conditions).
  - If the plot is developed, conducting a detailed inspection of existing buildings and infrastructure, verifying whether hazardous materials to the environment have been used in the construction of existing buildings.
  - Reviewing available documentation and conducting interviews with individuals knowledgeable about the property to verify its previous use, which is crucial for assessing the risk of soil contamination (e.g., with petroleum derivatives or heavy metals).
4. Detailed description of actions undertaken in the early findings report stage of the TDD process for real estate properties.
- Verification of legal, technical, environmental, social, or economic constraints to identify potential obstacles that may prevent the transaction from taking place. For example, provisions in the local zoning plan allowing only residential development on the real estate property where the buyer intends to construct an office building would be an obstacle preventing the investment and purchase of said real estate property. All mentioned constraints are described by the auditor in the early findings report, which is then submitted to the client for approval. If any significant obstacles are discovered and prove
- to be dealbreakers, the procedure is terminated at this stage.
5. Detailed description of actions undertaken as part of the final report stage in the implementation of the TDD process for real estate properties.
- At this stage, all information relating to the issues raised in the early findings report is supplemented and thoroughly described in the final report, which typically includes: an abstract, introduction, technical, environmental, economic, legal, and social findings. It also contains a summary, limitations, reservations, an appendix with photographic documentation, and a list of documents on the basis of which the report was prepared.
- Technical issues typically relate to the following matters:
- General description of the land property.
  - Detailed description of the plot's location in local and global terms.
  - Description of the property's surroundings, analysis of neighbouring buildings.
  - Verification of the property's use.
  - Verification of access to public roads.
  - Verification of provisions in planning decisions regarding the required number of parking spaces,
  - Examination of geological conditions and assumptions regarding the building's foundation method.
  - Description of technical aspects regarding the potential investment (e.g., the proposed investment implementation method).
  - List of potential demolition objects.
  - Mining damages and other geotechnical hazards.
  - Installation connections:
    - Sanitary sewer,
    - Storm sewer,
    - Water supply,
    - Electrical,
    - Telecommunications,
    - Heating,
    - Gas.
  - Verification of the preliminary project concept.
- Environmental issues typically pertain to the following matters:
- Environmental conditions,
  - Ground environmental status, identification of potential soil contamination,
  - Flood risk,
  - Greenery inventory,

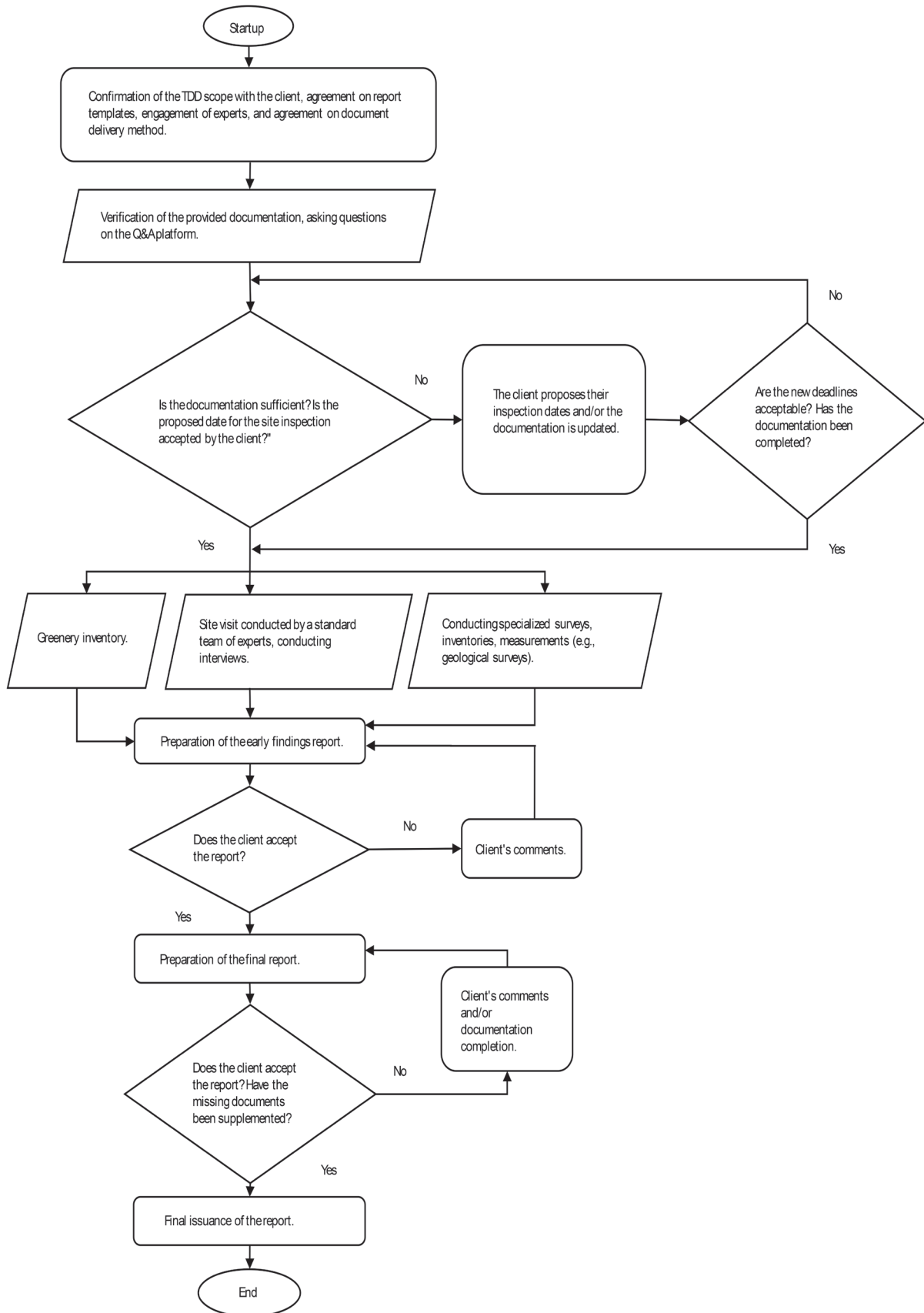


Fig. 2. TDD Process Algorithm for Real Estate. Own development

- Verification of materials used in the construction of existing buildings (if the plot is built-up),
- preliminary verification of the impact of the future investment on the environment, in case of potential or significant impact [14], recommendation to obtain an environmental decision,
- Preliminary assessment of the possibility of obtaining BREEAM or LEED certification.

Legal issues typically pertain to the following matters:

- Analysis of local zoning plan or zoning decisions,
- Conservation protection of the area,
- Analysis of potentially established easements, verification of whether any administrative decisions or rulings issued for the subject property have been subject to appeals or challenges.

Regarding social issues, typically, based on interviews with experts and residents of neighbouring properties, the social attitude toward the investment is verified. A negative attitude increases the risk of appeals or challenges to administrative decisions and rulings, which ultimately translates into extended project implementation timelines or, in some cases, complete project blockage.

As part of economic considerations, typically, an analysis is conducted regarding the impact of raised concerns during the TDD process on the costs of future investment.

After analysing the mentioned issues and confirming that all key documents have been submitted, the final report is prepared and sent to the client for approval.

6. Detailed description of actions taken in the final explanations stage of implementing the TDD process for land properties.

Upon delivering the final report, in line with market practice, the following actions are taken: participation in several explanatory meetings, making amendments to the final report, and delivering the final version of the document.

The adapted algorithm for the TDD process for a building plot is presented in Figure 2.

**4. DISCUSSION**

This research adapted the TDD process algorithm for buildings described in the literature for the purpose of land property purchase transactions. The presented algorithm identifies potential obstacles to investment realization in the initial phase of the TDD process, which may lead to the termination of land property purchase negotiations and help avoid additional costs in this regard. The final report prepared according to the described algorithm takes into account all information influencing further investment planning, although it is primarily based on experience of experts as opposed to scientific methods. An additional unresolved issue is whether or not it is viable to create a budget for the potential investment which reflects all reservations identified in the final TDD report. Currently, in the construction market, investors expect clear recommendations based on scientific methods rather than suggestions developed based on the experience of individual auditing firms. The aim of further research by the authors is to apply scientific methods that would enable the inclusion of all reservations raised in the final TDD report in the planned investment budget.

**5. CONCLUSIONS**

The purchase of a plot along with the TDD assessment constitutes the first part of the investment preparation stage, which can help determine its success. Any discrepancies detected during the TDD process between the investor’s requirements and the technical condition of the land property should be included in the final report and discussed in detail with the investor.

The lack of legal regulations regarding the preparation of TDD results in their lack of standardization. TDD reports are prepared based on the market experience of individual auditing firms and the good market practice specific to a particular country/region rather than an uniform set of principles.

The preparatory phase of the construction process is typically initiated by the purchase of a building plot, often accompanied by the TDD process. This is the earliest stage of investment implementation, which in most cases determines its final financial success. Making a decision to purchase a plot without conducting the detailed TDD process can have an adverse effect on the ultimate economic success of the investment and, in extreme cases, may even hinder or significantly delay the project’s realization



schedule. Based on the professional experience of the authors, it can be concluded that there are currently no perfect building plots available in the real estate market that meet all investor expectations. Drawing from professional experiences and interviews with experts, considering the complexity of the TDD process and the amount of data required for analysis, as well as the evolving investor requirements, there is

an observable need for developing a decision support system at the stage of purchasing land properties. The proposed future research, based on decision tree methods or random forests, would fulfil investor requirements concerning recommendations for future buildings, contributing to the ultimate success of investments.

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