

The methodology of technical due diligence report preparation for an office, residential and industrial buildings

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Abstract. The methodology of a technical due diligence preparation is presented in this paper. It comprises actions that have to be undertaken prior to formal agreement with party ordering due diligence preparation, building a team of consultants, data collecting, preparing analysis and handing over the report to the client. All important issues were described and supported by examples. As there are many types of building objects this paper is limited to office, residential and industrial buildings.

1 Introduction

The term *due diligence* has been primary applied, with its literally meaning, to describe the set of rules, requirements and good practices applied by every party engaged in signing insurance contracts in United States [1]. By the time it was extended for all cases where a detailed analysis (prior to signing a contract) is required by law or by a party engaged in a transaction. The aim of due diligence analysis is to limit the risk i.e. protect a buyer from any unexpected costs arisen from facts that can be disclosed after finalizing the transaction, when the ownership rights could not be returned.

2 The term of technical due diligence

The other reason is to recognise business opportunities related to the property being bought. The higher value of a transaction, the higher risk and willingness for preparing a due diligence. Hence due diligence is a natural and desired process, the immanent part of transactions on a property market. The change of landlord can arise from the change of the owner of a company possessing the property too. Usually, due diligence prepared for aforementioned purposes comprise three detailed analysis focused on following aspects of property: law, technical, financial [2]. This technical part is called technical due diligence (TDD) and it refers to a building together with the lot it is located in. The Roman rule of law *caveat emptor* (let the buyer beware) is widely applied nowadays. It means that the seller is not responsible for undisclosed defects of a good. In practice, a seller is not responsible for defects at all, they don't have to show all of defects known for , but is

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obliged to make the building accessible for potential buyer in order to check its technical condition. Due to experience and educational background of authors this paper is limited to the methodology of preparing technical due diligence report for office, residential and industrial buildings.

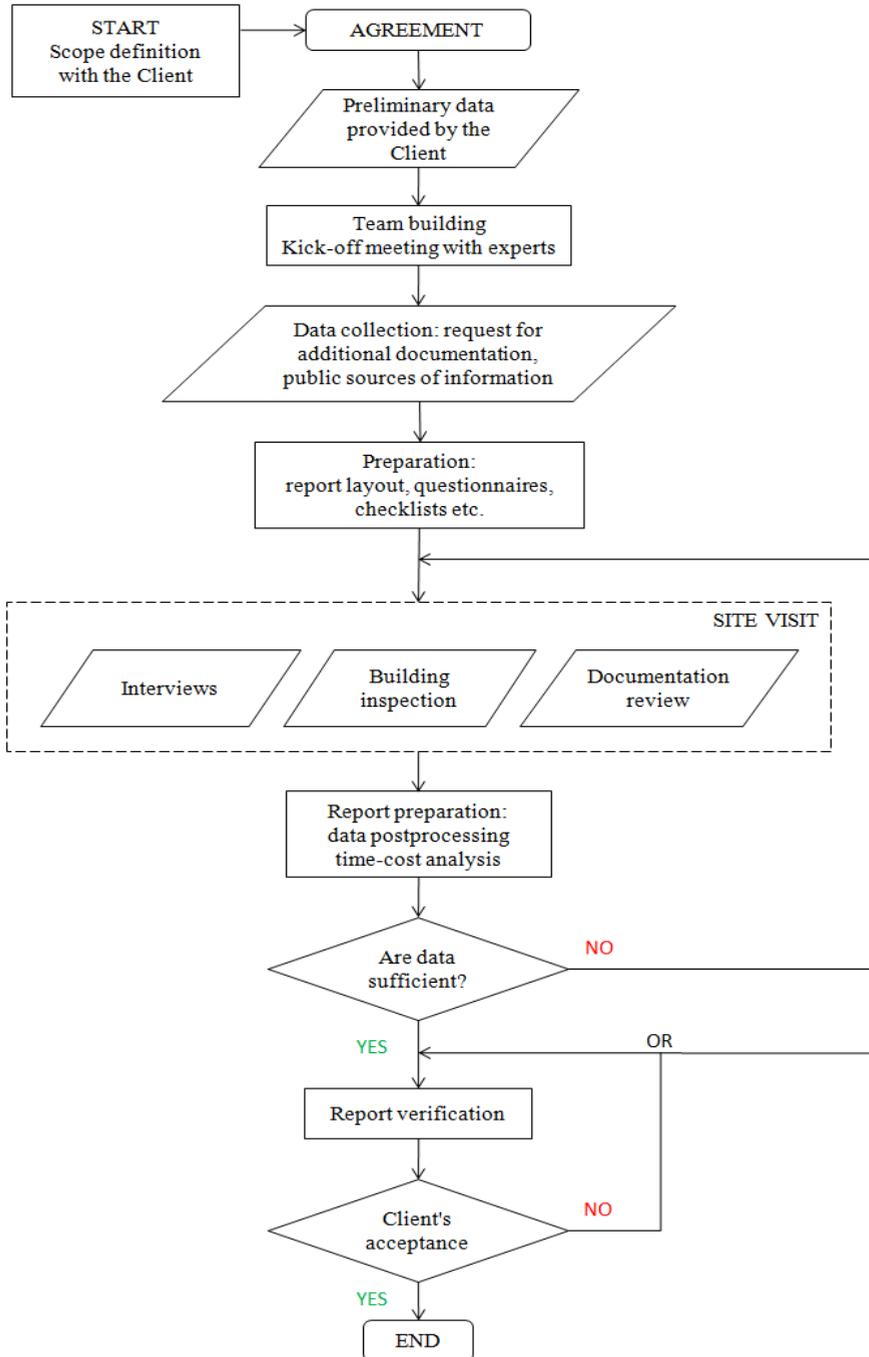


Fig. 1. The complete process of technical due diligence.

3 Methodology of TDD preparation

The complete process of technical due diligence analysis is presented in fig. 1. and its most important parts are described below.

3.1 The scope of TDD

There are no legal requirements for TDD in Poland. If they exist in other countries, they must be fulfilled. The basis for defining the scope of technical due diligence are the client (the buyer of a building) needs, in any case. Prior to signing the contract between client and consultant following technical matters should be clarified [3]:

- detailed scope of TDD,
- address of property to check,
- present and planned function of a building together with planned schedule of the change,
- sources of information known for the client and their reliability (if known),
- if the client hires branch experts for TDD or is it a matter of consultant,
- other important issues arisen from planned usage of the building (health and safety, environmental, fire safety etc.) that can influence analysis for TDD,
- form of TDD report,
- limitations (e.g. arisen from availability of sources of information, limited time for checks and analysis etc.),
- the total time for preparing TDD report.

It is strongly recommended to prepare a questionnaire (shortened example is shown in tab. 1) when clarifying the scope of due diligence (and TDD too, as a part of it). It helps to protect consultant from problems during handing over TDD report, as well as it is very useful during TDD analysis to systemize the process.

Table 1. Shortened example of a questionnaire [3].

service / scope	Yes	No	by third party	remarks / details
General description of a building				
Description of the construction				
Building materials				
Description of ventilation system				
Description of heating system				
...
Legal status				
- owners' rights				
- rental agreements				
- service agreements				
Tax analysis				
Analysis of construction process				
...

3.2 The consultant team

Irrespectively from the organizational scheme chosen by the client, (three exemplary solutions are shown in fig.2) there are two recommendations for the team preparing technical part of due diligence i.e. TDD. An expert, apart from their core competence, should be familiar with subjects covered by other team members. It helps a lot at every stage of TDD analysis, but especially during inspection of a building so as not to omit any defects and their influence on elements of other building systems (e.g. services defects

influencing state of construction elements). Secondly, strong analytical skills should be required from team members as well as cost estimation skills in every technical branch being analysed (or at least ability to estimate scope of works to be carried out to restore particular element of a building to proper condition).

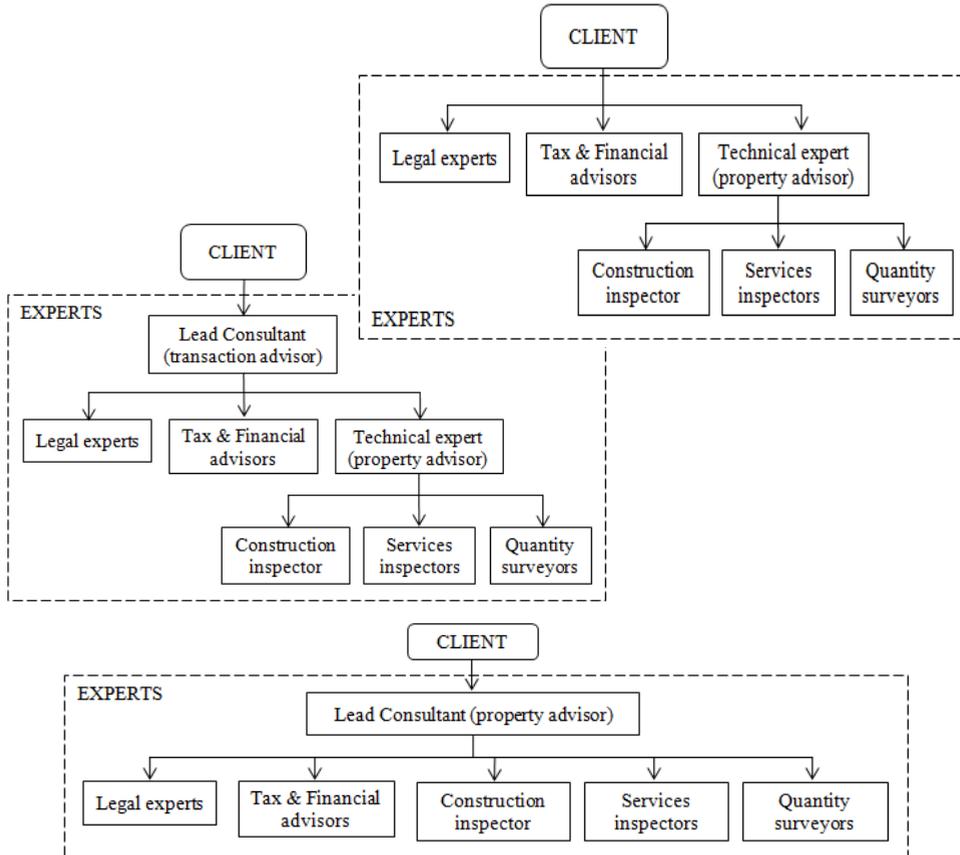


Fig. 2. Possible organisational schemes of consultant team.

Coming back to the name of report i.e. due diligence, experts engaged should present scrupulousness, reliability, impartiality. The feeling of team spirit is required from experts too.

3.3 Information collecting

There are three main groups of data sources concerning any building:

- interviews with people who know the building, were involved in its design, construction, maintenance, and with its neighbours,
- inspection of the building
- documentation concerning the property.

3.3.1 Interviews

The deepest knowledge about the building object (especially about problems arisen during operation) is possessed by facility manager and the staff/service providers. hired by them.

Comparing the interview with documentation checks, it is very time-saving process of data collection. Acquired information should be verified using the other data sources. If it is possible and if consultant would recognize the need, interviews with designer, construction site manager, construction supervisor (Engineer), neighbours, users of the building can be helpful too. As for preparation process, the set of questions (matters to be clarified) should be prepared. Questionnaire form is useful.

3.3.2 Inspection of the building

There are some key areas that consultants should pay attention to during inspection.

Overall impressions is important to evaluate the standard, aesthetics and prestige of the building, as well as its comfort (thermal comfort, freshness of air, time of waiting for warm water from a tap etc.).

The fire safety and evacuation ways (required by law) are important part of the checks, as lack of them is a subject of penalization [4]. Any inconsistency with the fire protection plan should be noticed.

Utilities for handicapped people are necessary part of public buildings (required by law in Poland). The list of required conditions to fulfil and utilities to install is enumerated in the relevant ordinance.

Soil subbase (its type, water content, underground water level and flow), weather conditions, internal environment (humidity, steam condensation, aggressive gas, fluid and dust), biological environment (plants, algae, insects, birds, microorganisms), mechanical loads, extreme situations (e.g. fire, serious damages) are agents influencing the building much [5], so naturally these influences are a subject of inspection.

The most often examples of improper operating the building are [6]:

- lack of maintenance and repairs of internal systems,
- cursory periodic checks of the building,
- overloaded floors,
- changes made to structural elements of the building without prior analysis,
- changes of a function of the building without checking the influence of the change to the structure or services,
- installing utilities – a source of vibrations – without protecting the structure from vibrations.

Visual evaluations of recognized defects. These tasks of consultant require taking into account the age of the building, so the evaluation should differ depending on age of the building. The diagram of visual evaluation of defects shown on fig. 3 can be helpful [7].

		Importance of visual impression			
		very important	important	moderately important	not important
Visual effect of recognised defect	highlighted	REPAIR			DECREASE IN VALUE
	very visible				
	visible	OMISSION			
	hard to notice				

Fig. 3. The diagram of visual evaluation of defects

3.3.3 Documentation

Legal side of investment process in construction sector should be studied prior to searching documents for technical analysis. There are several kinds of documents required by Polish law at different stages of investment process.

Following documents are being prepared during pre-construction stage:

- conceptual design,
- construction design,
- detailed branch designs (plus workshop drawings),
- local plan,
- report on influence of the building object on environment,
- building permit,
- detailed specification of executing and handing over building works.

When it comes to construction phase, another set of documents is required to create or to collect and keep:

- construction log,
- assembling works log (if performed),
- time schedule (not required by law, but commonly prepared),
- hand-over protocols,
- as-built documentation,
- certificate of energy efficiency of the building,
- building operation permit.

A contractor is obliged to hand over all these document to a client (investor) and a client should keep them for the time a building physically exists. All aforementioned are followed by the required record of operating a building consisting of:

- the log book of operating a building with enclosures as
 - reports from periodical checks of a building (required by Polish law too),
 - reports of experts (if periodical check recommended preparing them),
 - documentation of modernisation, maintenance and refurbishment works,
- operation and maintenance manuals of utilities installed,
- protocols from periodic official controls of utilities installed (e.g. of elevators);
- contracts with water supplier, electricity supplier etc.

The number of documents and their volume make it almost impossible to analyse them in a short time. It is one reason why the other sources of information are equally important. The second one is the fact that even for newly built objects lacks in documentation happen.

3.4 Necessary analysis to include

Collected data should be included in a final TDD report. Without experts' comments it is still set of information not very usable for the client who is usually also an expert, but in business area. It is necessary to make analysis that converts collected data to usable information and recommendations.

Risk analysis of problems detected. Probability of incident can be matched with the level of negative impact on client needs [8]. Showing the result of analysis in a risk matrix (the example shown in fig. 4) makes the risk easy to read for the client. Here is the next important matter when the client needs should be well recognized by a consultant. Otherwise TDD will not be accepted by a client. Following risk assessment the cost estimation should be prepared. Every recognised defect should be analysed taking into account client's needs as well as real (technical) necessity of the repair.

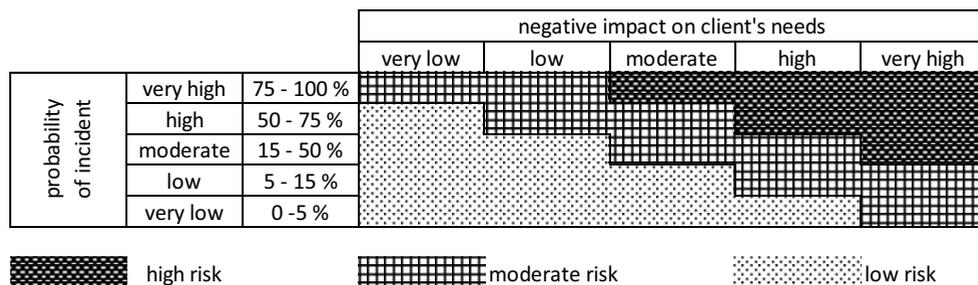


Fig. 4. The example of risk matrix]

Again the table form is suitable. Every defect or problem that cannot be omitted (see fig. 3) should be photographed, labelled and described. Labels of photos should be given as well as proposed solution, evaluation of risk associated with the problem and the cost of fixing it. The example is shown in tab. 2.

Table 2. Shortened example of a table for risk-cost analysis [3].

#	Defect / Problem	Photo #	Recommendation	Risk	Cost [PLN]
...
23	Too low pressure in a sprinkler system	17	Sprinkler pumps to be changed	high	150 000
24	Anti-smoke roof flap doors are not remote operated	21, 25	Change of the flap doors to remote operated	moderate	40 000
25	Lack of operating and maintenance manuals for utilities of sewage system	n/a	Collecting manuals	low	2 000
26	Windows in the front elevation do not have sound insulation properties and they are not aesthetic	from 30 to 41	Change of windows on the elevation	moderate	650 000
...

Having tab. 2 prepared consultant can concentrate on a time schedule for fixing problems and repairs of defects together with a plan of expenditures necessary for above mentioned purposes. The client may need some scenarios of repairs, depending on different functions of the building planned by prospective owner of a building.

3.5 General remarks

Irrespectively from placing a given defect in the table (see tab. 2) every defect or problem should be presented to the client, even if it was evaluated as to be omitted (see fig. 3) – it is due diligence. Every information gathered from interviews, inspection of a building or from documentation should be written down and labelled. The same is with the data that was not collected. If any room or any place, or any archive stayed closed for consultant, the statement about that should be written down in TDD and presented to the client. This is what really scrupulousness, reliability, impartiality of a consultant mean.

4 Summary

Presented methodology of technical due diligence preparation may vary between countries, as their legal systems differs. However the differences will concern the details (e.g. set of

documents required by law in a building investment process, legal requirements concerning TDD itself, legally required utilities for handicapped people, scope of the design of a building etc.). General rules, necessary sequence of activities, possible organisation scheme of consultant team will remain unchanged and are applied worldwide. The reason is simple. The set of good practises, scrupulousness, reliability, impartiality of a consultant combined with deep and interdisciplinary knowledge of consultant team members allow to create their expert opinion about building object called technical due diligence.

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