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Current Procurement Processes of Subcontractors

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Abstract

This paper is focused on current procurement processes of subcontractors within the construction industry in the Czech Republic. Methodology of this paper is holding semi-structured qualitative interviews with general contractor’s quantity surveyors and cost estimators, who are responsible for procurement processes of subcontractors. The paper analyzes current procurement processes by stating questions and answering to them. Stated questions throughout this paper are a categorization of questions, which were given to respondents during the interviews, and are therefore not identical. Answers of respondents were first written down during the interviews, but were later analyzed, to understand what current procurement processes are and what documentation is required to manage them. Obtained information were synthesized and interpreted in this paper.

Keywords

common data environment; Design-Bid-Build; e-procurement; procurement

Introduction

The aim of this paper is to analyze, describe and present current procurement processes of subcontractors within the construction industry in the Czech Republic. The main reason to focus on this topic is that even nowadays there is still risk of losing data and information during the procurement processes as well as, there exists possibility to standardize and optimize those procurement processes. One of many reasons why loss of data and information during procurement processes occur, is that most of project participants do not use a standardized digital tool for managing procurement processes of subcontractors. Few project participants use a standardized digital tool, known as e-procurement platform, however those tools are generally used to procure services and materials to run company’s offices not to procure subcontractors for construction projects. Another fact, which speaks against existing tools is that they are not implemented into common data environment [1], [2], which leads to use of several specialized tools on construction projects that most project participants are not willing to do. Current common data environments are meant for designing purposes, coordination of design, sharing of data and cooperation of project participants. However, they are not meant for procurement of subcontractor, where project participants need to interact with external bidders. Which means that project participants need to share data and communicate with external bidders, of which can be hundreds of them. That is why, it is not reasonable to grant full permission to every external bidder as well as, external bidders might not be willing to work within the common data environment. Hence, the common data environment should be able to send and receive e-mails from external e-mail clients. Another possible cause of loss of data and information during procurement processes is a transfer of project between its phases and due to fluctuation of employees. For example, loss of data and information from procurement processes can occur when a project is transferred from bidding phase into execution phase. Because, general contractors have specialized employees (cost estimators), who focus on preparing a bid for the investor and specialized employees (quantity surveyors), who focus on tendering subcontractors during execution phase. Both general contractor’s specialized employees have to tender subcontractors, but their processes are different, and if they do not both work in the same tool, then data and information could get lost. At the same time, if an employee stores data on his local device and proceeds correspondence with subcontractors through his personal business e-mail client, then all data and information will be lost, if he decides to leave the company.

Aim of this paper is to map current procurement processes of subcontractors within construction industry in the Czech Republic

Methodology

As was already stated in the introduction chapter, this article tackles current procurement processes of subcontractors within the construction industry in the Czech Republic. To better understand current procurement processes of subcontractors semi-structured qualitative interviews were held with specialists from the construction industry, who are responsible for procurement of subcontractors. Questioned specialists are working as quantity surveyors or cost estimators in following companies: GEOSAN GROUP a.s. and STRABAG a.s. in the Czech Republic and also in the Slovak Republic. This paper is based on questions, which categorize questions that were given to specialists during semi-structured interviews and their answers are interpreted.

The semi-structured interviews consisted of 33 predefined questions, which were given to each specialist from the construction industry. Each interview took about 45 to 60 minutes, because many predefined questions prompted further discussion and lead to sub questions, which were related to predefined questions. Predefined questions can be categorized into following categories:

* Questions about specialist’s job position and company were given, to verify, if respondents work for general contractors, and if they are responsible for procurement processes.
* Questions regarding company’s clients were given, to understand, if described processes relate to private or public projects.
* What type of construction projects does company execute, was a necessary information, to understand, if described processes relate to for example building or road construction projects.
* What type of delivery system does company usually use, was a crucial information, to understand, to which delivery system does described processes relate to.
* Questions regarding necessary tender documentation and division of tender documentation were given, in order to identify important tender documentation and its management.
* Utilization of a classification system was a fundamental question, to understand, if a standardization of procurement process already started, and created data from past tenders could be used in future tenders.
* Questions how tender documentation is stored, were given, to understand, how do general contractors store their data.
* Question related to an application for managing procurement processes were given, to understand, if an application for managing procurement processes is being used.
* Questions regarding planning of procurement processes were given, to understand, if procurement processes are being planned in advance, or if they occur ad hoc, as is required by progress of construction.
* Questions about how bidder’s contact information are managed, were given, to understand, if a centralized database or a list of bidders is available.
* If a company uses interactive template forms was asked, to get to know, if forms are standardized and filled in from other databases or they have to be filled in manually for each tender separately.
* Questions related to how data and information are being shared during tenders were asked, to understand, if a common data environment is being used.
* How is tender correspondence managed was asked, to understand, if a e-mail client or a common data environment is being used for managing tender correspondence.

Results

Which factors do influence procurement processes of subcontractors?

Factors, which influence procurement processes of subcontractors within the construction industry are stated below:

* If client is a private or a public institution
* What type of construction project is being developed (building project, infrastructure project, railway project or else)
* If tendering institution is a client or a general contractor
* Project’s phase, if a general contractor is bidding for the project, or he is already executing the project
* Selected delivery system for example Design-Bid-Build (DBB) [3], Design-Build (DB) [4], Integrated Project Delivery (IPD) [5]

Which type of procurement process is being considered in this paper?

This paper considers building construction projects, where client is a private institution and procurement processes of subcontractors are being managed by general contractor during the execution phase of the project. Design-Bid-Build delivery system was selected, due to the fact, that it is the most widely used delivery system within the construction industry in the Czech Republic [6], which was confirmed during the semi-structured interviews.

How are data and information being transferred from client to general contractor?

Generally, it can be said, that data from clients are currently being transferred to general contractors via shared storage (e.g. cloud storage like Dropbox). Data, which clients do send to general contractors consist of for example bill of quantities, 2D design documentation, required standards, specifications etc. For the purposes of this paper design documentation and bill of quantities are considered the most important documentation for procurement processes. Without this documentation it would be almost impossible to manage procurement of subcontractors within the DBB delivery system.

What does general contractor’s employee, who is responsible for procurement of subcontractors, do with received data from client?

Most of general contractor’s employees who are responsible for procurement of subcontractors (further on marked as quantity surveyors) do divide received documentation into work packages. Those work packages represent individual tenders of specific type of work or material. For example, there might be a work package for tendering ground works as well as, there might be a work package for tendering steel structures. Each work package should have its own specific documentation, time schedule and list of bidders, which will be invited into tender.

Currently there is an increasing pressure on low cost of construction projects and at the same time those construction projects are becoming technically more complex and challenging [7]. Therefore, it is not in general contractor’s capacities and capabilities to prepare a competitive bid for the client for such complex projects, as well he is not able to prepare specialized technical solutions for such complex structures and mechanical, electrical and plumbing (MEP) parts of the construction project. That is why, quantity surveyors are assigned with the task to procure subcontractors, who specialize in certain part of the construction project, and are therefore able to work out a competitive bid and prepare a technical solution reflecting client’s requirements.

Because specialized subcontractors are generally small to mid-size companies, they are unable to go through complete documentation, which was handed over by the client. That is an important reason, why quantity surveyors shall divide complete tender documentation into work packages, which correspond to each individual subcontractor’s portfolio of work and material that he can deliver.

What shall quantity surveyors do with received design documentation?

Based on above stated it is highly advisable for quantity surveyors to divide complete design documentation into partial design documentation, which correspond to identified work packages that will need to be tendered. This leads to a situation, when all subcontractors receive relevant design documentation to their scope of work during tender phase. Some quantity surveyors do send complete design documentation as well, for subcontractors to get a better understanding of project’s scope. At the same time, they could possibly find different works and materials, which they could deliver, but were not initially tendered for.

What shall quantity surveyors do with received bill of quantities?

The same procedure shall quantity surveyors do with client’s bill of quantity. That is why, quantity surveyors shall divide client’s bill of quantity into partial bill of quantities that correspond with tendered works and materials. This way subcontractors will receive only positions of bill of quantity that correspond with his scope of work and, hence he will be more willing to participate in the tender.

How is the division of complete documentation into partial documentation worked out?

Currently the division of complete documentation into partial documentation is done manually by quantity surveyors, who receive data from clients. First, they have to download complete documentation onto their local storage device. Then, they have to divide complete documentation into partial documentation by saving it into created folder structure. Due to the fact, that usage of classification system (internal or external) for procurement processes is not widely used, partial documentation will be stored in various folder structures throughout multiple projects. This is going against the logic of standardization of processes and hence, shall be changed.

How shall quantity surveyors plan their procurement process?

In the beginning of procurement process shall quantity surveyors answer following questions for themselves. What shall be tendered? Who shall be invited into tendering process? What documentation shall be provided for each tender? What is the procurement time schedule?

What shall be tendered is defined by identifying work packages that need to be constructed on the construction site. Those work packages can be identified from investor’s bill of quantity or from complete design documentation by dividing complete documentation into partial documentation as was described in previous chapter.

Because at the time of writing this article it was not common for general contractors to have centralized database of subcontractors, which is connected to application for managing procurement processes, quantity surveyors have their own list of subcontractors or a centralized list of subcontractors, which they usually invite into tender. Quantity surveyors then have to select subcontractors from this list, who will be invited into tenders of identified work packages.

Process identifying required documentation was described in previous chapter.

As shall quantity surveyors identify work packages and select corresponding subcontractors, who will be invited into tenders of those work packages, shall quantity surveyors define procurement time schedule of individual work packages. Procurement time schedule shall be based on project’s execution time schedule and shall take into consideration duration of tender processes, manufacturing processes, transportation duration, assembly duration etc. as well as technological and execution processes, which will define procurement chronology of identified work packages.

Currently definition of procurement time schedule is done by quantity surveyors, who meet with project managers and discuss planned dates of procurement. Quantity surveyors will write down those dates of procurement into Excel spreadsheet and merge them with identified work packages. Because this is manual work, quantity surveyors have to manually update actual terms of procurement. For example, quantity surveyors have to manually fill in date, when bidders sent their offers or refused to participate in the tendering process. This information is needed for comparison of planned and actual dates, to understand, if procurement process is on schedule or behind schedule.

How do quantity surveyors work with lists of bidders?

In order, for quantity surveyors to send an inquiry to bidders, they need to have a list of bidders that they would like to invite into tendering processes of corresponding work packages. It is therefore desirable that quantity surveyors have a list of bidders they usually send inquiries to, in addition they should add new bidders, they find, or they are recommended. It would be practical that this list of bidders is centralized, and all quantity surveyors would have access to it, so they all don’t have to create and manage their own lists.

At the time of writing this article some general contractors had a centralized list of bidders that they usually invite into tenders. As this list is created and managed in an Excel spreadsheet, which is stored on an internal server, it has no connection to application for managing procurement processes. That is why, all data have to be manually transferred from this centralized list into a specific list for a particular project. Some general contractors didn’t have a centralized list of bidders therefore each quantity surveyor has his own list of bidders.

Do quantity surveyors use standardized forms for procurement processes?

Based on answers of questioned quantity surveyors, they do not have standardized forms for procurement processes. The only standardized form, they can use during procurement process is an award form, which is sent to a winning bidder to confirm his selection in the end of each tender. This form is usually stored on general contractor’s intranet and is again not connected to application for managing procurement processes. That is why, it has to be filled in manually each time a bidder is awarded.

How do quantity surveyors share data and information with bidders?

The most frequent mean of sharing data and information at the time of writing this article is via e-mail. Design documentation is shared via link to shared storage and bill of quantity is usually sent as an attachment of an e-mail. That means that quantity surveyor sends an e-mail with text of inquiry in the body of an e-mail with required documentation to selected bidders. It is currently not common that text of an inquiry is standardized, therefore every quantity surveyor has to compose his own text of inquiry. This may lead to stating wrong tender or business conditions as well as some important details can be forgotten. Because storage of data is independent from the correspondence, it can happen that outdated documentation is sent with the inquiry or, if an update of documentation is done, then quantity surveyors may forget to inform all bidders about this update. If a bidder with an offer that does not reflect updated documentation wins the tender, then it is sure that issues at the construction site will occur as will the relationship between general contractor and subcontractor be affected.

How do quantity surveyors inform bidders about updates of tender documentation?

If an update of tender documentation occurs, then quantity surveyors shall inform bidders about this update. Because currently no application for managing procurement processes is used, information about updates has to be sent manually via e-mail to every involved bidder. Due to the fact, that this is a manual work, there is a risk that quantity surveyor will totally forget to send this information, or he will forget to send this information to some involved bidders. This leads to a situation, when all or some bidders are preparing their offer based on outdated tender documentation. This will result whether in issues at the construction site or bidders reworking their offers.

How are data handed over from subcontractors to general contractors?

As do quantity surveyors send inquiries to subcontractors via e-mails with attachments and links to shared storage, do subcontractors send their offers via e-mails with attachments and links to shared storage. Possibly the only difference currently between quantity surveyors sending data and subcontractors sending data is the type of shared storage. Where general contractors usually have a paid company approved shared storage, subcontractors usually use free shared storage of their choice.

How are data handed over to clients?

As do clients send their data via e-mails with attachments and links to shared storage, do general contractors send their offers via e-mails with attachments and links to shared storage. One of disadvantage of this process is that every project participant has to download documentation locally onto his storage and into his own folder structure. At the same time, if data are sent via e-mail, they are not simultaneously updated, that is why, they have to be sent every time an update occurs.

Conclusion and discussion

Aim of this paper, stated in the introduction chapter, was to map current procurement processes of subcontractors within construction industry in the Czech Republic. This was achieved by analyzing answers of specialists responsible for procurement processes during semi-structured interviews. A summary of current general contractor’s procurement process of subcontractors is provided in bulletin list below:

* General contractors receive e-mail from a client with documentation in attachment or as a link to shared storage.
* Quantity surveyors divide documentation into work packages, which will be tendered.
  + Currently it is not common for quantity surveyors to use a classification system to classify work packages.
* Quantity surveyors create his procurement plan. Procurement plan typically consists of what shall be tendered, who shall be tendered, when shall it be tendered and what documentation is required.
  + Quantity surveyors who create procurement plan, do create it in an Excel spreadsheet.
  + It is necessary to fill in planned and actual dates into procurement time schedule manually.
  + It is not common, that work packages within procurement plan have dependencies between themselves.
  + There is a lack of centralized database of bidders, which is connected to application for managing procurement processes.
  + There is a lack of standardized forms for procurement processes.
* Quantity surveyors send inquiry via e-mail to bidders with attached documentation or as a link to shared storage.
  + Because currently quantity surveyors use their personal business e-mail addresses to process procurement correspondence, every quantity surveyor does formulate an inquiry in his own way. This may lead to stating wrong tender or business conditions as well, if a quantity surveyor gets seriously ill or leaves the company, then all correspondence is saved on his personal business e-mail address.
* If an update of tender documentation occurs, then quantity surveyor shall inform all bidders about this update.
  + Because correspondence is done via e-mail and is in no way connected to data of tender documentation, information about any update in tender documentation has to be manually send via e-mail to all bidders. If a quantity surveyor totally forgets to send this information or he forgets to send it to some bidders, then all offers, or some offers may not reflect updated tender documentation. This imposes a risk, that a winning offer may not reflect updated tender documentation, which will lead to issues at the construction site and will worsen relationships between project participants.
* Subcontractors work out their offers and send them to quantity surveyors via e-mail with attached documentation or as a link to shared storage.
  + That is why quantity surveyors have to download sent offers onto their local storage into their own folder structure and possibly to other storages. This leads to duplication of data and higher risk of making changes in a file saved locally when it shall be done in a shared file.
* General contractors usually send their offers to clients via e-mails with attachments and links to shared storage.

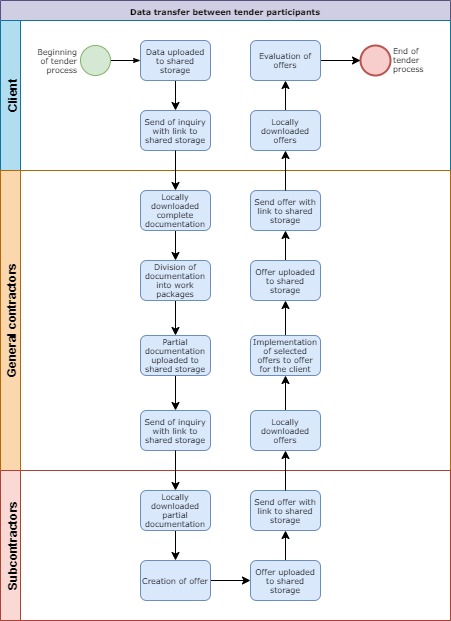


Figure 1: Diagram of data transfer between tender participants

This diagram is a representation of data transfer between tender participants as is described in the results chapter and summarized in the conclusion and discussion chapter.

This research will continue by holding semi-structured interviews with general contractor’s specialists again, but this time they will focus on possible improvements and innovations of the procurement process. Based on those semi-structured interviews a solution to specific requirements of procurement processes shall be proposed and provided. It is highly supported that a process map representing new solutions is provided with a description of how this system should work.

Summary of data transfer between tender participants

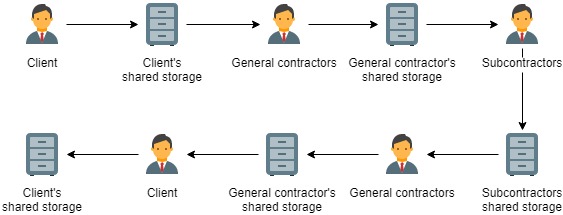


Figure 2: Simplified diagram of data transfer between tender participants

This diagram is a simplification of data transfer between tender participants through various shared storages.

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