PROCESS MAP OF CURRENT TENDER PROCESSES OF SUBCONTRACTORS

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Abstract

This paper is focused on current tender processes of subcontractors within construction industry in the Czech Republic. It identifies those tender processes as a vital part of general contractor's bid preparation for a client. Other processes related to working out general contractor's bid for a client are also presented, but not in detail. This paper is a continuation of a paper, which was published at a Construction Maeconomics Conference 2019. Therefore, it is based on obtained information from semi-structured qualitative interviews with general contractor's employees, who specialize in general contractor's bid preparation processes as well in tender processes of subcontractors. Their answers were analysed and synthesized back in a process map visualizing general contractor's bid preparation and tender processes. Process map is an attachment of this paper and text of this paper describes its parts in detail.

Keywords

Bid preparation, process, procurement, subcontractors, tender

JEL Classification

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Introduction

This paper is a continuation of a research paper Current Procurement Processes of Subcontractors [1], which was published at a Construction Maeconomics Conference 2019. Main research goal of this article is to visualize current working processes related to general contractor's bid preparation for a client by a process map. Collateral goal of this paper is to describe those working processes by a text of this paper to better understand what tender participants have to do, to work out their bids. The process map's container is divided into three lanes, which do represent individual tender participants. Those three tender participants are a client, general contractors and subcontractors, who together form a supply chain in the construction industry. Client in this paper is understood as an investor, who has an intention to build a building project and is therefore searching for a general contractor to build this building project. Logically general contractors are tender participants tendering for the execution of this building project and have to, therefore provide their bids for a client. Due to the fact, that building projects are becoming more technically complex and challenging [2] it is not in general contractor's capabilities to work out their bids only by themselves, that is why, they have to request subcontractors to support them in their bid preparation. General contractor's bid preparation in this paper is divided into four types of cost estimations, which can be summed up as follows:

- Cost estimation of indirect costs
- Cost estimation of internal costs
- Cost estimation of risks and opportunities
- Cost estimation of subcontractor's costs

Because the aim of this paper is to describe current general contractor's tender processes of subcontractors only cost estimation of subcontractor's costs is described in detail in the text as well in the process map. Other types of cost estimations are described briefly in paper's text and visualized in the process map.

Methodology

Methodology of this paper is based on analysing answers from semi-structured qualitative interviews with general contractor's specialists, who specialize in procurement processes of subcontractors. Their answers were analysed and synthesized back into a process map representing general contractor's bid preparation for a client. Because tender processes of subcontractors are a vital part of general contractor's bid preparation for a client, those tender processes had been implemented into the bid preparation process and visualized in a process map, which is an attachment of this paper.

The semi-structured interviews consisted of 33 predefined questions, which were given to each general contractor's specialist. 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. Interviewed 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 in the Slovak Republic.

For detailed description of given questions and provided answers refer to this article [1], which describes those interviews and current procurement processes of subcontractors.

Results

This chapter is divided into subchapters, which represent parts of general contractor's bid preparation process. This process includes tender processes of subcontractors, who are requested to provide their bids for specific parts of a construction project, in this paper those requested parts of the construction project are called work packages.

Numbers in angle brackets are a connection between paper's text and tasks in attached process map.

Client sends request for proposal to general contractors <1>

At the beginning of this process a client has to prepare his request for proposal (RFP) [3] and send it to selected general contractors. That is why, client uploads complete tender documentation onto shared storage, nowadays cloud storages are being commonly used. At the time of writing this paper, it is common for major clients to have an approved enterprise cloud storage available, that they tend to use on every project. Therefore, used cloud storage to transfer data to general contractors from client is quite often unified. Then client sends his RFP via e-mail with attachments and links to shared storage to selected general contractors.

General contractors receive client's request for proposal <2>

When general contractors receive client's RFP, they often have a system of acquisitions, that is why they should first check, if this project has been already created in their system of acquisitions. If, it hasn't been created yet, then it should be created. If it was already created, then it should be found and gathered information shall be checked with actual information provided by the client. Of course, if general contractor does not use a system of acquisitions, then this step shall be skipped. This step is common for major general contractors, who have more business units. That is why, it is necessary to assess, if another business unit is not already preparing a bid for this project. If, more business units want to participate in the tender process, then it shall be decided, if only one business unit is to prepare the bid, or multiple business units are going to work together on the bid preparation.

<3> At the same time general contractor's managers can decide that they will not prepare a bid for this client or for this particular project due to any reason. In that case shall general contractor inform the client, that they will not participate in the tender process. If managers decide, that they will prepare a bid for this client and this project, only then should managers appoint a cost estimator to work out their bid.

<4> Appointed cost estimator should check, if tender data were implemented into internal systems, which are used during bid preparation process. As Design-Bid-Build (DBB) is the most commonly used delivery system in the Czech Republic at the time of writing this article [4], bill of quantity and design documentation are considered as an essential tender documentation, which has to be managed. Hence, cost estimator should create a project in a cost estimation system and a project in design documentation management system.

General contractor divides complete tender documentation into partial tender documentation

It is advisable that cost estimator divides complete tender documentation, which was sent by a client into partial tender documentation, which will be send to subcontractors. That is why, cost estimator should divide complete bill of quantity into partial bill of quantities as well as he should divide complete design documentation into partial design documentation, that corresponds to work packages, which have to be tendered by general contractors.

Division of bill of quantity <5>

When tendered project is created in the system of acquisitions, should cost estimator create a corresponding project in a system for cost estimation, if he has such a system available. As was already mentioned DBB delivery system is taken into consideration in this paper, therefore, it is expected that bill of quantity is provided by a client to selected general contractors. That is why, it is expected that cost estimator will import or manually insert bill of quantity into a cost estimation system. When complete bill of quantity is implemented in the cost estimation system, should the cost estimator divide it into partial bill of quantities, which represent all works, materials, etc. that will have to be build and delivered to the construction site, further on called work packages.

Division of design documentation <6>

As is expected that a client provides complete bill of quantity, it is also expected that a client provides complete tender design documentation to selected general contractors. That is why the cost estimator should also create a corresponding project in a system for managing design documentation. As did cost estimator divide complete bill of quantity into partial bill of quantities, should he divide complete design documentation into partial design documentation, which corresponds with identified work packages from complete bill of quantity. This way will the cost estimator obtain specific documentation for tendering subcontractors.

Use of a classification system

Identified work packages representing works, materials etc., which will have to be executed, assembled and delivered to the construction site, should be classified by a selected classification system (internal or external). That means, that partial bill of quantities and partial design documentation should be classified by a classification system. In practice it means that for example partial bill of quantity containing items of steel structures and partial design documentation containing drawings of steel structures should be classified by unique and identical ID. This will standardize the process of tendering and procuring subcontractors and make management of data systematic and structured. However, classification system for classifying tendered work packages is not widely used at the time of writing this paper, therefore will not be further described in this article.

General contractor works out his bid <7>

General contractor's bid does generally consist of following parts:

- Cost estimation of indirect costs <7a>
- Cost estimation of internal costs <7b>
- Cost estimation of risks and opportunities <7c>
- Cost estimation of subcontractor's costs <7d>

Focus of this paper is mainly kept on cost estimation of subcontractor's costs and partially on cost estimation of internal costs. However, cost estimation of indirect costs and costs of risks and opportunities are not covered in this paper and will hence not be described in detail.

Cost estimation of indirect costs <7a>

It can be said that indirect costs are costs that general contractor has, to build the project, but are not directly accountable for a particular facility, product or function. Indirect costs typically include administration, supervision, personnel, insurance, taxes and security costs. These are costs which are not directly related to production and do not directly result in work products that become a part of the permanent facility. [5]

Cost estimation of internal costs <7b>

Internal costs do represent costs of planning, management, construction materials and works, which can general contractor provide by himself and will therefore not be executed by subcontractors. However, at the time of writing this article do most general contractors, who specialize in building construction, not have many construction workers and machinery, so they can't execute construction works on their own. That is why they have to tender and procure most of construction materials and works from subcontractors.

However, if they can provide construction materials and works, then it is advisable that they use internal database of historical costs, to work out the cost estimation of those items from bill of quantity. In order to do so, some kind of classification system shall be used, to be able to match detailed cost estimation from internal database with items from the bill of quantity. Generally speaking, this classification system should be external, because it is unlikely that client's bill of quantity will be classified according to an internal classification system of a specific general contractor. Detailed description of this process can be found in past author's paper [6].

Cost estimation of risks and opportunities <7c>

Costs of risks represent costs of events that can occur with some degree of probability and can have a negative cost impact on the project, for example extra costs for risk of bad weather can be accounted into the price offer [7], [8]. On the other hand, costs of opportunities represent costs of any opportunities where general contractor can save money, for example he found out while carrying out quantity take-off, that there will be most likely less material needed or he will manage to procure some materials cheaper then stated in the price offer.

Cost estimation of subcontractor's costs <7d>

When cost estimator starts tender processes of subcontractors, he shall answer to himself onto following questions:

- What shall be tendered?
- Which documentation shall be sent?
- Who shall be tendered?

What shall be tendered is answered by identifying work packages, which were identified during the division of complete bill of quantity into partial bill of quantities. It can occur that not all work packages were identified from the division of complete bill of quantity into partial bill of quantities, but more work packages could be identified by dividing complete design documentation into partial design documentation. For example, complete bill of quantity is divided into partial bill of quantities representing following work packages: ground works, foundations, reinforced concrete structure, façade, roof, doors and windows. The same work packages were identified after the division of complete design documentation into partial design documentation, but fire protection elements had been identified as a new work package from the process of division complete design documentation. Therefore, should the cost estimator not only create work packages that were identified from the division of complete bill of quantity but also those identified from the division of complete design documentation. It is also highly advisable that the cost estimator creates new partial bill of quantity with items representing fire protection elements, so he can send this partial bill of quantity with corresponding partial design documentation to subcontractors as well in his request for quotation (RFQ) [9].

Question which documentation should be sent with the RFQ, is mainly answered by partial bill of quantities and partial design documentation corresponding to each tendered work package. However,

any documentation, which cost estimator considers important for the tender processes should be included in the RFQ.

Question who shall be tendered is answered by list of subcontractors, to which the cost estimator usually sends requests for quotation. This list of subcontractors should correspond with tendered work packages, so the right subcontractors are tendered for the right work packages. Otherwise, subcontractors might be requested for quotation for construction materials, works etc. that they don't provide. Currently most cost estimators have their own list of subcontractors that they usually invite into tender processes in a locally saved Excel spreadsheet. However, some general contractors have a centralized database of subcontractors that they usually invite into tender processes.

Therefore, what shall be tendered is answered by identified work packages, which documentation shall be sent is answered by partial bill of quantities and partial design documentation related to identified work packages and who shall be tendered is answered by list of subcontractors related to identified work packages.

When all these information are put together, then can a cost estimator send a RFQ to selected subcontractors with corresponding partial tender documentation. Partial tender documentation is generally stored on a shared storage, to which a download link can be created, to grant access to these files to requested subcontractors. As is common for major clients to have an approved enterprise shared storage, it is also common for major general contractors to have such approved enterprise shared storage. Therefore, used shared storage by one general contractor is unified. It is highly advisable, that a list of sent partial design documentation is sent with files of partial design documentation, so both sides know, which drawings were sent with the RFQ. Partial bill of quantity is generally send as an attachment of an e-mail, however, it can also be stored on a shared storage. Practical reason to send partial bill of quantity in an attachment of an e-mail, is an easy access of the attachment for the subcontractor to open it. That is why, bidders might be more willing to work out their bids. Text of RFQ is generally written in an e-mail's body. When everything is put together, then a complete RFQ of subcontractors is created and can be send to selected subcontractors.

Subcontractors work out their bids <8>

Because this article does not focus on processes of subcontractors, their processes will be described only briefly. First of all do subcontractors open sent RFQ and decide, whether to download documentation and further prepare their bids. If they decide not to prepare a bid for the general contractor, then they usually sent an e-mail with a refusal to prepare a bid. If they decide to prepare a bid, then they will download sent documentation and start working out their bid. Once subcontractors finalize their bids, they upload them onto shared storage or attach them into an e-mail and send a complete bid to the general contractor. It is not common for subcontractors to have an approved enterprise shared storage, therefore used shared storages of subcontractors will vary. It starts to be more common that general contractors send a request link onto their approved enterprise shared storage, where subcontractors shall upload their bids.

Cost estimator finalizes complete bid for a client <9>

Cost estimator will then download subcontractor's bids from a shared storage, in case subcontractors used shared storage of their choice, or he will receive a notification that bid was uploaded via sent request link or he will download it from an e-mail's attachment. Then does cost estimator evaluate received bids from subcontractors, if they comply with sent partial tender documentation. If bids do not comply with sent partial tender documentation, then has the cost estimator to inform corresponding subcontractors that their bids do not comply with sent partial tender documentation to rework their bids. If received bids do comply with sent partial tender documentation, then has the cost estimator to decide, which subcontractor's bids he will use as a basis

for general contractor's bid for a client. Selected subcontractor's bids are then implemented into the cost estimation system to finalize complete bid for a client.

To finalize complete bid for a client does cost estimator need all those costs:

- Indirect costs
- Internal costs
- · Costs of risks and opportunities
- Subcontractor's costs

When cost estimator has all those costs estimated, then can he prepare a documentation for general contractor's managers, who will make business decisions to optimize their bid for a client.

General contractor's business decisions <10>

When cost estimator finalizes a complete bid for a client, will then usually general contractor's managers organize a meeting with responsible cost estimator to evaluate their bid and make business decisions to optimize their bid to be more competitive. Managers do usually need some indicators, e.g. unit cost, cost per quantity and cost per required labor hours. When business decisions are made, has the cost estimator to edit his bid, to be in compliance with made business decisions. When this is done, then will the general contractor send his bid to a client for his evaluation via a shared storage. General contractor's approved enterprise shared storage or client's approved enterprise shared storage can be used.

Client's decision <11>

Firstly, will a client download received general contractor's bids, in case general contractors used their shared storage. Or he will receive a notification that general contractors uploaded their bids, in case client sent a request link to general contractors to upload their bids onto his shared storage.

Then will client evaluate received bids and decide, if they do comply with sent complete tender documentation, and if they are within client's budget.

<11a> If bids do not comply with sent complete tender documentation or they are not within client's budget, then will client start a new tender round, where he will send general contractors new RFP to rework their bids according to his evaluation of their bids. General contractors have the possibility to decline their participation in a new tender round, in that case they can send a message, where they refuse their participation. If a general contractor agrees to participate in a new tender round, then he has to rework his bid, however this time, he will most likely not have to divide complete tender documentation into partial tender documentation, which was described earlier, because complete documentation might be the same. However, if new sent complete tender documentation does alter from the old complete tender documentation, then shall cost estimator divide newly sent complete tender documentation into work packages and start his cost estimation processes again.

<11b> If general contractor's bids do comply with sent complete tender documentation and are within client's budget, then may client decide to award project to one selected general contractor or to several contractors, where they will cooperate in a joint venture [10]. In any case, shall client inform awarded general contractor or general contractors in joint venture about their selection. At the same time, shall client inform unsuccessful general contractors, about his decision to award project to another general contractor or contractors in joint venture.

Conclusion and discussion

Both aims of paper were fulfilled, because process map was created, and its parts were also described in paper's text.

Current general contractor's tender processes of subcontractors are predominantly done manually without a guidance of a digital application for managing tender and procurement processes of subcontractors and are not structured either standardized. That is why, only little know-how can be transferred between project teams and across general contractor's employees. This leads to poor knowledge management of general contractors, who do generally have a lot of information about subcontractors, but not in a structured and standardized way to make further business analysis of those information possible. For example, to make selection of subcontractors during project's execution phase based not only on price but also on other factors, also known as best value or other award methods [10]. That is why, further research in this field should focus on structuring and standardizing general contractor's tender and procurement processes of subcontractors both during project's bid phase and execution phase. Author of this paper considers as a first assumption to structure and standardize those processes introduction of a classification system of tendered work packages.

Paper's topic is becoming increasingly more important with the high demand on digitalisation of industries and especially of construction industry, which is one of the least digitally developed industry in the world [11]. Main stream, which is supporting standardization of construction industry among project participants is Building Information Modelling (BIM) [12], which as indicates in its name is based on BIM models [13]. Hence, further research shall take into consideration tender and procurement processes of subcontractors with the aid of BIM models, that will be part of tender documentation and have to be processed by general contractor's cost estimators to support those processes.

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