CE 4002

Homework 3

Question 1:

There are some crucial advantages of model-based cost estimation. BIM tools provide us to study more clearly and easy, and to deduce more specific and reliable solutions with identified quantities of buildings.

Model based cost estimation of buildings give the chance to have high level of details since every single part of the building is included in the model. Complexity of the structure is the main problem for the traditional way of estimation but not for the model since it includes very specific details including the ones necessary for the cost estimation. Another crucial feature of the model based estimation is the time. Quantification part is done just by exporting an excel file from the model which includes detailed spatial and material quantities information. Just by adding unit prices to the same excel file will give the result in no time.

The level of details is strong side of the model based estimation however it is also a limitation. If the detail is not enough to make cost an estimation the model has to be changed and this is a time-consuming task and must be done every single time. Another limitation is the naming which differs from country to country and it is not compatible for every language. Due to this difference, exactness of the estimation is reduced significantly because not all unit price list has the same name and format. Another limitation is that one cannot integrate the unit price list to the programme to make a fully automated estimation.

Question 3

Navisworks make cost estimation quicker and more systematic since it enables us to choose which format will be used. Also, since it works on model based cost estimation all the advantages mentioned in question one can be sad in this aspect as well. Quantification tool give too much detailed data which is hard to work on. If the data can be simplified according to the need it becomes far easier to work. For example, if one would have a chance to exclude the unnecessary data the excel or xml file will be less complex.

Question 4

It is known that quantity take-off calculation is done with 1% error in Autodesk Navisworks Quantification compared to manual quantity take-off. Therefore, it is thought that all the information in the building model should be exported so that such a small error can be obtained. Moreover, when selection tree part in Autodesk Navisworks is investigated it can be seen that all the details are there such as door types, structural framing and columns, windows, etc. There should be more error in cost estimation unless all the information is wholly exported while saving the building model as an .NWC file. On the other hand, it is observed that properties of the items cannot be seen in Autodesk Navisworks such as dimensions of the frames and the columns, and it is seen as a disadvantage of Autodesk Navisworks. However some information can be lost during the file format change from .rvt to .nwc.

Question 5

It can be sure that the model based quantity take-off is correct because of the fact that human related errors are perfectly reduced up to 1%. Additionally, all details can be seen in model based quantity take-off compared to traditional way; thus, technical staff can immediately interfere the process and the errors can be corrected if exists.

Some considerations are made in Autodesk Navisworks Quantification so as to obtain appropriate results. To exemplify, units should be reliable for the items such as m3 for concrete, m2 for the facades; moreover, all the items that are desired to calculate should be located in associated group; for example, structural foundations should be under substructure group in order to estimate quantities in a correct way. In addition, unit prices are imported to excel file after exporting quantities to that excel file.

This method does not cover all the cost estimation of a construction project because a construction project also includes excavation works and other types of foundation works such as site investigation etc. However, in this method, cost estimation of a superstructure is mainly focused including its doors, windows, structural framing and columns.

However, all the above depends on the correctness of the model. Since it is also done by human model can have some errors too.

Question 6

When estimating the unit prices of the members of structures, we mostly use the web-based source and unit price table prepared by Ministry of Environment and Urbanisation. Also edcated guess are used since the material specification did not match exactly the with unit price tables. Unit price tables is not prepared for an inexperienced person on cost estimation. Due to this, it should be considered that unit prices should be combined with navisworks database.

Question 7:

One convention employed by estimators in the traditional process is in identifying the expected accuracy range of an estimate based on the level of project definition. In the traditional process, the project plans and specifications were the primary means by which this was determined, and as such, there was a direct correlation between the project's level of definition and the expected accuracy of an estimate. It is reasonable to expect a similar convention exists in BIM, and that as a BIM contains more project definition, it also impacts the potential accuracy of an estimate. The difference in BIM, though, is in how a designer creates the objects for project 'plans,' and specifications now have an impact on the estimate.

Question 8:

At any stage of the design, BIM technology can extract an accurate bill of quantities and spaces that can be used for cost estimation. In the early stages of a design, cost estimates are based primarily on the unit cost per square foot. As the design progresses, more detailed quantities are available and can be used for more accurate and detailed cost estimates. It is possible to keep all parties aware of the cost implications associated with a given design before it progresses to the level of detailing required of construction bids. At the final stage of design, an estimate based on the quantities for all the objects contained within the model allows for the preparation of a more accurate final cost estimate. As a result, it is possible to make better informed design decisions regarding costs using BIM rather than a paper - based system.