Outsourcing VDC Workflows

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In an increasingly demanding world for infrastructure, technological methods have been found to assist construction project's. As innovative construction methods are constantly increasing, so is the demand for technological needs within the architecture, engineering, and construction (AEC) industry. To ensure technological adoption, many countries have started to mandate higher levels of building information modeling (BIM) documentation beyond the 2D construction documents traditionally required throughout construction review and permitting. Some companies have capitalized on this change to the extent of making BIM their primary business. These companies focus solely on virtual design and construction (VDC) and determine whether clients lacking this specialty should outsource their technological needs or invest in their own VDC department. Through attitudinal research, three interviews were conducted to understand contractors' response to the implementation of a platform that links contractors to freelance modelers specializing in VDC. This research aims to better understand if the use of a third-party platform is effective for contractors that are unwilling to adapt to mandated BIM requirements.

Keywords: Outsourcing, VDC, Freelancers, Construction, Model-based

Introduction

Virtual design in construction (VDC) is the process of utilizing BIM tools to assist construction projects from start to finish. This process is relatively new and carries a large presence in the western part of the United States. The growth in VDC has called for a high demand of building coordination programs to mitigate potential problems, resulting in cost and schedule savings(Azhar, Nadeem et al. 2008). As these tasks grow, so does the job market in this specialized area of construction. Many of these tasks are coordination orientated, many general contractors have taken it upon themselves to create a VDC department that conducts all related tasks in-house. Creating a platform that links freelancers to contractors takes away some of the stress for contractors that need to constantly adapt to new technologies. Many companies choose to invest in themselves, solving their VDC needs

in-house. This paper focuses on an alternative method for VDC workflows, which is through the use of a third party platform linking contractors to freelancers. As many tasks in this area of construction can be automated, time consuming, and cost deficient, the research explores whether outsourcing these tasks increases quality and productivity. If so, outsourcing these tasks on an international level may change the way in which we operate within our local teams.Tasks done in-house are repetitive, time consuming, and lack automation, exploring efficiency within these departments using a third-party platform can assist design coordination on high demanding projects. The result is a collaborative model space for all parties involved to reduce the amount of rework in a time strenuous environment. This paper looks to examine the existing issues within the adoption of construction technology and to explore the possibilities of freelance BIM modelers having a lasting impact on projects for years to come.

Background

When exploring the world of VDC, a study conducted by a researcher and engineer in Sweden aimed to discover how recent advancements in information, and communication technology (ICT) can enhance the technological barrier that lies in construction by introducing outside parties to a contractor (Wikforss et al., 2007). As ICT processes are rooted in aiding secondary construction processes such as design and production procedures, this article explores the ways in which ICT can be used to enhance trade coordination issues faced in the construction industry with the assistance of freelancers. Simple means of technological implementation has been long ignored in the industry, "In many of the industrialized lean construction efforts in the construction industry today, collaborative communication and its supporting ICT have been reduced to a secondary issue in favor of rationalizing the physical design and production processes, as if effective project communication practices and technologies are taken for granted" (Wikforss et al., 2007).

Prioritizing the enhancement of a cross collaborative platform for construction teams, multiple employees in various regions of the world can work on multiple projects at one time. The collaborative environment enriched by freelancers and contractors can provide substantial results from the cost and time saved using BIM tools prior to building construction. This allows for all parties involved on a project to coordinate a project and comprehend the complications that may arise when systems will be installed by trade contractors. According to the study (Wikforss et al.,2007), innovative measures may impact other parties involved on a project. If owners and contractors are able to utilize tools that can be used to increase information access in real time on a project, savings in both time and money can be accomplished on a construction project. VDC has allowed design phases that were once isolated within the various trades to now be used throughout the entirety of construction and updated in real time. This rapid relay of information to trades provides workers increased knowledge prior to installation, resulting in increased construction productivity rates.

Technical Requirements

Current industry technology solutions address technological adaptations in construction but also explore innovative tools to increase construction efficiency by means of global communication. To uphold the previously stated research attributes, it was found most effective if the researcher's subjects interviewed were qualified contractors that were presumed to have a presence in the construction industry.

Methodology

A qualitative research approach was chosen for this project, as well as attitudinal research. Attitudinal research is defined as, "....the gathering of data to measure consumers' attitudes to a product or brand in terms of their knowledge and opinions ot it (cognitive approach), their overall impressions of it (affect approach) and their degree of loyalty to it (behavioural approach)" (Monash Business School et al., 2018)

For this research, three contractors were interviewed. The contractors all operated in various markets, of different scales, and operating in different locations around the U.S. This process resembled the case study approach because the people interviewed gave the researcher an in depth analysis of how they use outsourced freelancers. Majority of my questions began asking how often they use freelancers on projects. Additional research included follow ups asking how many projects operate with freelance modelers.

Attitudinal Research

To gain a better understanding for how a platform would be implemented and introduced to contractors, three contractors were interviewed with a few basic questions that guided how they would respond to the introduction of a website that could link them to freelancers around the world. For more context as to what kind of contractors were being examined, the bullets below outline their attributes, excluding their names to ensure they remained anonymous.

- Contractor A is a smaller sized specialty contractor that operates in VDC services with three offices.
- Contractor B is a medium sized commercial contractor that operates in many offices around the U.S.
- Contractor C is a large contractor in multiple markets that operates in the Americas.

The charts below outline some of the questions asked that assisted an understanding of how the platform can be applied within the industry.
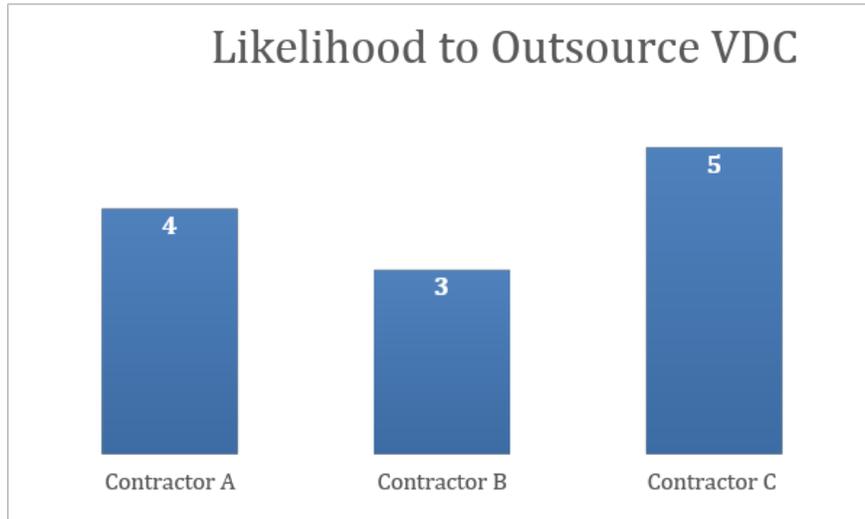
Figure 1. Likelihood for contractors to use freelance models to assist projects.

By asking the contractors to rate their response to my question of, "What is the likelihood you would outsource VDC services to a freelance contractor" the researcher was able to measure their responses as 1. Highly Unlikely 2.Unlikely 3.Unsure 4.Likely 5.Highly Likely.

Results and Analysis

To explore how contractors can connect with freelancers more effectively, this researcher created an entity relationship diagram that would store information from both parties, the project, and their skill sets on a platform. This relationship is detailed in Figure 2.
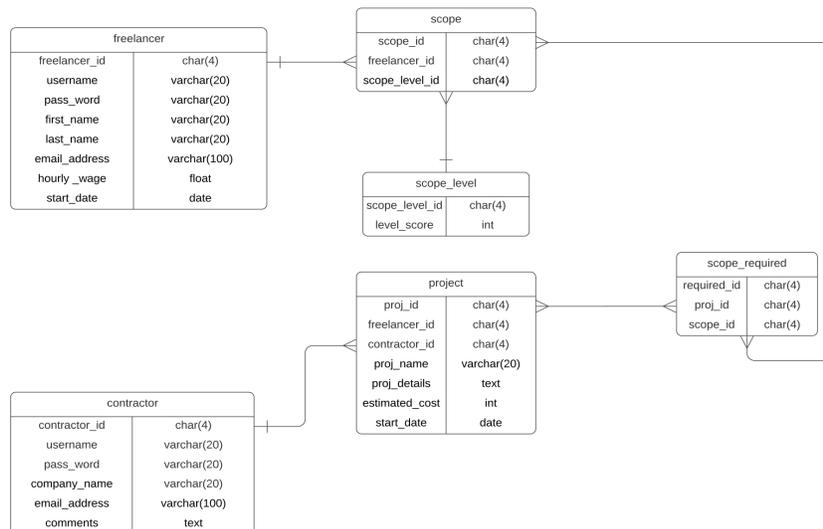

Figure 2. Entity Relationship Diagram for platform linking contractors to freelancers.

To link the freelancers to the contractors and a project, Figure 2 depicts the necessary relationships that would need to occur on the communication platform. The platform would operate as a website that links the two parties. The platform will be used to assign freelancers to projects, allow contractors to upload projects, and allow contractors to select freelancers on an open bid network. The diagrams, models, and database below were created to provide an understanding as to how the freelance modelers will sign up for the platform and be assigned to projects posted by contractors.

All users that sign up for the platform will be required to provide a unique username, password, and a valid email address. The database will consist of freelancers and contractors that are linked on a project. The freelancer is to provide their first and last name, hourly rate, account creation date will be recorded. The contractor is to provide their company's name, and a brief comment outlining the scope of work they wish to have performed by a freelance modeler. The freelancers are assigned a project and linked with a contractor after their skill requisites have been analyzed. Their skills are analyzed by identifying the skills they possess whether it be in the world of 2D design detailing, 3D modeling, 4D model simulations, scheduling, or model estimating. Their work is rated on a scale of 1-100 for each scope category. The contractors' comments correspond with the project details, outlining the scope required for the job. The freelancer availability is then filtered by the scope required after drawing results from the scope table. All projects posted to the platform by the contractor must be assigned to at least one freelancer. One freelancer can work on many projects at one time and one project can be worked on by many freelancers. The need for many freelancers may depend on the multiple scopes required on one project.

Efficiency of individual projects can be increased through global communication through a platform where contractors communicate with freelance modelers. Taking the technological adoption off the contractor so all they must do is upload 2D documentation and in return are issued a model issued by a freelancer. Finding someone to model for the freelancer is found by visiting the platform that carries a pool of freelance modelers. The freelancers all will be required to upload prerequisite qualifications to ensure they are fit for the job. The qualifications would reflect the scope required table in the Figure 1 and the rating system of prior work from contractors would reflect the rating of an Uber driver. The freelancer acts as the driver, the contractor is the customer, and the rating is based on the drive, in this case the assigned project. Additional qualifications would resemble those issued on a platform like Linkedin, showing for instance that a freelancer is Revit or AutoCAD certified.

Aside from the proposed platform, the responses from those interviewed were not what was expected, as it was assumed Contractor A would be very responsive to be linking with other freelancers around the world. As for Contractor B, they claimed that their reason for uncertainty was due to lack of knowledge in this field and uncertainty of desired results. This should support initial findings as the assumed lack of awareness in this market would arouse some degree of skepticism for this kind of work, especially if all the VDC services for a project are already being satisfied. Notes were made to remind Contractor B that the reason for this platform was not to achieve satisfaction, instead to exceed expectations and result in time and cost savings. Responses from Contractor C suggested that with them being so large and operating in so many areas, they would have high centralization within the company and be reluctant to outsourcing. Contractor C replied and said that they have already experienced cost savings from freelance assistance and have implemented this work environment on many projects.

After analyzing these results, the best solution to implementing a freelancer platform would have to start by increasing awareness for the potential savings that results from outsourcing VDC needs.

Increased awareness of the benefits can aid group thought around this area of specialization and provide opportunities for people around the world who never thought it to be possible.

Conclusion and Application

Stated by previous researchers, "Construction projects are assembled by gathering different professions and areas of expertise under one "flag" (Söderholm in Wikforss, 2006). Typical of such assemblies is that each professional group also bears with it a set of principles, rules, knowledge domains and professional skills formulated in a certain manner. At the same time as this helps make the profession strong and successful, it also explains why they cannot cooperate with other professions particularly well" (Wikforss 3). Granted the United States is very expensive in outsourcing work, it may be worthwhile to explore foreign affairs in assisting a company through a remote work environment. For any company to seek success, they need to possess the same values within their organization to thrive, prohibiting this will lead to inevitable failure. Some problems that often exist with the use of international work is the consideration of a potential language barrier as well as the barrier of metric and imperial standards used for construction. All tasks performed by the outsourced partners need to follow the standards created by the general contractor, ensuring accountability and uniformity of work. If the platform is effectively responsive with the contractor, the research suggests the results from the survey supporting the platform could be a viable option. The information found from the research allowed the researcher to better understand the functionality of the platform and be conscious of where issues would arise amongst the parties of interest.

When a company can utilize VDC on an international platform, the potential benefits are immeasurable. BIM tools enhance design documentation and technological utilization on construction projects and has recently been explored to enhance a cloud based collaborative work environment where all employees can collide in a model of a proposed building and communicate ideas and issues they assume may arise soon. One model form called a hybrid BIM model can integrate various trades into one model for a more collaborative work environment with multiple teams all collaborating on one project. The hybrid process aims to escape a narrow BIM project that is created by one company or firm and not issued to other trades. Using the hybrid model within a third-party platform can suggest that the integration of multiple trades on a construction model enhances communication. This collaborative environment supersedes problems that limited knowledge through one company could achieve by allowing an influx of new knowledge that can solve any existing issues with design or construction.

To ensure that the platform remains reliable, we will have to make sure contractual risks are protected through the platform and not result in poor project outcomes. One example of this is when, "Contractual risks also affect parties involved in BIM use because it is a new technology, and laws are not in place for the protection of those who use it. One problem lies in the complexities associated with model ownership after project completion" (Fountain 5).
Communicating the technological and legal limits that exist within a company is crucial to understanding the work one can take on in attempting to maintain a good reputation and provide a great level of quality work. When exploring a digital environment, it is essential for all project data information to be properly provided. If freelancers are held accountable and contractors can remain eager for innovative technological methods, many problems that exist within the construction industry may be countered using a third-party platform that can link the two.

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