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PERCEPTIONS OF REMOTE WORK WITHIN THE CONSTRUCTION INDUSTRY IN THE
CURRENT PANDEMIC ENVIRONMENT

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PERCEPTIONS OF REMOTE WORK WITHIN THE CONSTRUCTION INDUSTRY IN THE
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Abstract

Working remotely has become increasingly popular over the past year, given organization's need to rapidly adjust to changing conditions as a result of the Coronavirus. It allowed companies to more easily adapt to stay-at-home orders and create a safer environment for their employees. While working remotely can bring a positive impact to employees, there are also challenges to overcome for both employees and their organization. Thus, this study focused on understanding both the prevalence and implementation of remote work within the commercial Construction industry to face the personal and professional challenges resulting from the Coronavirus. This paper provides insight into companies that have implemented remote work procedures as well as the positive or negative experiences from both an employee and managerial perspective. Through descriptive statistics and an independent t-test of the study variables, the findings suggest that employees have strong positive and negative experiences with remote work whereas managers have not had an overwhelmingly positive experience. Furthermore, when comparing pre-construction and operations, employees within these two departments have statistically different views on their experience as well.

Perceptions of Remote Work within the Construction Industry in the Current Pandemic Environment

Introduction

The emergence of the novel Coronavirus (SARS-CoV-2) in the Spring of 2020 has created an unprecedented impact on people's personal and professional livelihoods. In order to maintain employee productivity and allow businesses to continue to survive, companies across all industries have been forced to adapt to rapidly changing conditions. As such, there has been a tremendous increase in the implementation of widespread remote work procedures. According to the July 2020 Jobs Report released by the U.S. Bureau of Labor Statistics, an estimated 26.4% of employees were teleworking due to the Coronavirus pandemic (U.S. Department of Labor, 2020). As of the January 2021 Jobs Report, that number has decreased only slightly to 23.2% of employed persons teleworking (U.S. Department of Labor, 2021).

Prior to investigating the impact of these remote working procedures, it is important to understand the environment that prompted them. On January 7, 2020, Chinese researchers announced the discovery of the novel Coronavirus in Wuhan, China. By February, the Centers for Disease Control and Prevention (CDC) had confirmed the first instances of community spread in the United States, and by Mid-March, the United States had declared a national emergency (Council of Economic Advisers, 2020). According to the CDC, between March 1st and May 31st, 42 states and territories issued mandatory stay-at-home orders, affecting 73% of all U.S. counties (Moreland, Herlihy, Tynan, et. al, 2020). In order to continue moving forward on current projects and pursue future work, construction companies were forced to re-imagine their work environment following the issuance of these stay-at-home order, especially given that different states were under different guidelines; for example, construction was considered essential business within Texas and Oklahoma whereas it was shut down entirely in Pennsylvania and New York (Dodge Research, 2020).

As a result, we have seen greater use of virtual meetings and online platforms throughout all functional areas in an industry not typically known for this. In a survey completed among over 400 Architecture, Engineering, and Construction companies, Clear Seas Research found that 71% of companies had eliminated face-to-face meetings and nearly half of the companies that were either allowing or requiring their employees to work from home (Grinapol & Blair, 2020). As reported in previous studies, researchers have found that both men and older employees tend to view working remotely more negatively. This is especially challenging within the construction industry, given it is estimated that it is over 90% male (Perrenoud, Bigelow, and Perkins, 2020), and as an industry, and it has continued to see an increase in the average age of workers (Schwwatka, Butler, & Rosecrance, 2012).

This research aimed to expand the understanding of the current state of the construction industry as it pertains to remote work. Specifically, this study sought to answer four main questions:
- How prevalent is remote work and would employees, regardless of whether they have direct reports, like for their companies to retain remote work procedures when the situation allows for a return to normal working conditions?

- What are the positive and negative experiences of remote work from an employee's perspective?
- What are the positive and negative experiences of remote work from a manager's perspective?
- How are these perceptions of pre-construction and operations employees different?

This study is significant as it helps to establish a baseline on how the use of these remote work environments have altered working conditions within the construction industry. Understanding these perceptions will play an important role in organizational development for construction companies into the future.

Review of Literature

While the Coronavirus has accelerated the growth of remote work substantially, there was already growing popularity in this area within the United States. Between 2005 and 2017, the U.S. saw a 115% growth in working from home (Razif, Miraia, Persada, et al., 2020). A review of the literature explored the broad nature of remote work as well as the impact that the Coronavirus has had on the work environment overall. However, no academic articles investigating remote work within the construction industry specifically could be found. The only available literature identified was published through online news publications, and thus not peer reviewed. This study begins to fill the gap in the body of knowledge on the subject of remote work in construction while also acknowledging the role of the Coronavirus as a catalyst that forced organizations to adopt remote work strategies.

Remote Work Procedures Overview

Working remotely can take on a variety of forms; although there is no universally accepted definition, the International Labour Organization defines telework as the use of information and communication technologies for work that is performed outside of the employer's main location (Messenger, 2017). It can generally be carried out in three different forms: (1) from home at least several times per month; (2) at least several times per week in at least two locations other than the employer's main location; (3) less frequently or at fewer locations than the other two options (Belzunegui-Eraso & Erro-Garces, 2020). In a review of data from the Occupation Information Network and U.S. Bureau of Labor Statistics, it was estimated that within the United States, 37% of jobs, accounting for 46% of all wages, could be performed entirely at home. Yet, a review of the 2018 American Time Use Survey found that less than 25% of full-time employees work from home on an average day, and even those workers spend less than half of their working hours at home (Hicks, 2020).

Research has identified several areas where working remotely is more advantageous than a traditional work environment, both for employers and their employees. According to a survey completed in 2019 by Airtasker, telecommuters averaged 1.4 more days of work every month, or 16.8 days every year, over their in-office counterparts (Caramela, 2020). In addition to this increase in working time, a survey of nearly 400 workers found that those who work remotely have both a stronger organizational commitment and a lower turnover rate (Golden, 2006). Furthermore, working remotely allows employers to attract and hire employees from anywhere

in the world and extend their work hours to a 24-hour work day. Working remotely also benefits employees, giving them greater independence and flexibility over working time and working place. Additionally, it also saves employees time by removing their need to travel to and from work as well as allows employees to maintain better health and productivity (Raisiene, Rapuanu, Varkuleviciute, & Stachova, 2020). The Airtasker survey further corroborated this, finding that employees who work remotely save an estimated $4,500 per year on fuel and spend an additional 25 minutes per week exercising (Caramela, 2020).

Studies among employees regarding remote work have also revealed several drawbacks. According to the Airtasker survey, 29% of participants reported they had a hard time maintaining a healthy work-life balance as compared to 23% of office workers. On top of that, approximately half of those surveyed felt overly stressed and anxious during the work day and more than a third procrastinated on a task until its deadline, all of which outpaced their office counterparts (Caramela, 2020). Furthermore, a study by Raisiene, et al. (2020), found that working remotely tends to be viewed more negatively by both men and older workers, given their feelings that there are more distractions by other members of the household and more difficulty related to self-organization and work accomplishment. This is especially challenging to the construction industry given that the industry is dominated by both of these demographics. The average age of workers has continued to increase, rising from 37.9 years in 2000 to 40.4 years in 2010 (Schwatka, Butler, & Rosecrance, 2012). Additionally, construction-related jobs are on average 98% male and considered among the most male-dominated occupations (Catalyst, 2013).

Coronavirus & Remote Work Procedures

As Bynjolfsson, et. al (2020) write, the Coronavirus has rapidly transformed both how and where people work. A Pew Research Center analysis found that the number of adults between 18-64 who reported they were working from home as a result of the Coronavirus by late March was nearly 40%, and this trend could become a permanent shift (Kochhar & Passel, 2020). A survey of more than 300 CFOs revealed that nearly 75% will move at least 5% of their previously on-site workforce to remote positions permanently, with nearly a quarter of participants saying they will move at least 25% of their workforce to remote positions (Goodman, 2020). Yet, a study conducted in April and May of more than 25,000 survey participants found a significant geographic variation among the impact of the Coronavirus. Those in the South showed substantially lower levels of remote work and higher levels of commuting than their counterparts in the Northeast (Brynjolfsson, Horton, Ozimek, Rock, et.al, 2020).

Of those companies that have increasingly introduced remote work procedures, a study by Belzunegui-Eraso and Erro-Garces (2020) found that a majority of those companies who had implemented these procedures were large or multinational; in addition to that, they were also shown to have Human Resource professionals within the company disaster planning committees. Many of those companies already had work-from-home procedures in place, but had to expand them to all personnel and provide additional software and hardware for their employees in response to the Coronavirus.

As previously stated, no academic publications regarding the impact of the Coronavirus on the use of remote work within the construction industry could be found; however, several news publications and organizations have conducted surveys among their readers and published the results. The Associated General Contractors of America conducted a survey in both March and April to better understand how the industry had been impacted. Among their members, 53% reported that project owners had halted or canceled current projects as a result of deteriorating economic conditions; in addition, nearly 40% of firms were forced to lay off employees (The Associated General of America, 2020). Of those employees who were able to continue working, many had to adjust for alternate work environments. A survey completed by Clear Skies Research, the parent company of Engineering News-Record, found that more than 40% of the companies who responded were requiring their employees to work from home by the end of March. In addition to that, nearly a third of employers reported they were more focused on investigating new technologies for their business today than they were six months ago (Grinapol & Blair, 2020).

As a result of the Coronavirus, the implementation of remote work has seen a dramatic increase. Although there is debate over whether working remotely is more or less beneficial than working in a traditional office environment, feedback from company executives illustrates that this shift could be permanent. This change in work environment extends to all industries within the United States, including the construction industry. Unfortunately, there is a lack of knowledge regarding the use of remote work procedures within the industry; thus, the purpose of this study is to understand the level at which remote working procedures are being implemented and their overall perception among employees.

Methodology

According to Creswell (2018), surveys provide a strong description of trends, attitudes, or opinions of the sample population, which is why it creates a strong foundation to better understand this evolving trend of working remotely. To identify which factors might influence participants positively or negatively, the literature review explored experiences previously studied in individuals who were working remotely. Utilizing this information, a Likert scale survey was created to pinpoint which of these experiences also impacted employees within the construction industry, specifically.

The data for this study was collected from both Pre-Construction Managers and Project Managers via the online survey. The two groups were targeted given their technological needs when working remotely can vary as a result of their job roles and responsibilities. As such, the goal was to better understand both the positive and negative experiences working remotely among these two functional areas.

On average, the survey required less than 15 minutes for all participants to complete. Sampling was originally intended to be purposive given the focus on obtaining data from specific employee types as well as companies within a specific location; in order to achieve that, recruitment was conducted through relationships with members of the local professional

associations in both Texas and Oklahoma to ensure the right participant profile was achieved. However, following the initial outreach to companies, snowball sampling was also used as participants were encouraged to share the survey link with other industry professionals. Multiple employees within a specific company were able to participate in the study; however, no single company represented more than 13% of the survey responses. The sample size consisted of all commercial general contractors who are members of local professional associations, such as the Associated Builders and Contractors of Central Texas, TEXO, and the AGC of Oklahoma. Gliner, Morgan, & Leech (2009) indicated that groups of 30 are the minimum size required for comparison; thus, 30 Pre-Construction managers and 30 Project Managers were needed in order to make comparisons between the two groups. Therefore, recruitment for the study included a strong focus on ensuring adequate representation from both of these areas for data analysis.

For the majority of questions, the survey was focused on qualitative responses towards working remotely. Demographic questions were also included to learn more about the socio-demographics of the participants, such as their level of education, their typical commute time, and whether they had children living in their home. With respect to internal validity, there was a concern given participants may not interpret questions in the same way. As such, the survey was beta tested by a small group of faculty members to ensure questions were appropriately worded.

The quantitative data measured participants' demographic information, previous experience with remote work, and what their positive or negative experiences had been. Drawing on previous research conducted for remote work procedures overall, this survey provided pre-determined answers for participants to rate on a Likert scale of 1-4, with an additional option for "Does Not Apply". Furthermore, one of the initial questions within the survey asked whether remote work procedures were currently being used, to ensure participants who were not currently working remotely did not answer questions pertaining to experiences with it.

Both descriptive and analytical statistics were used to analyze the data. In particular, descriptive statistics such as the average number of employees who report adoption of remote work procedures were measured as well as role they occupy and the annual revenue of the company they work for. In addition, to determine which benefits and drawbacks were most influential to participants, a mean was calculated using the Likert scale data. This will better inform employers of how their employees view this alternate work environment. Following this, an independent samples t-test was utilized to review the data and compare the positive and negative experiences among the two departments, pre-construction and operations.

Research for this study was delimited to commercial general contractors operating in North Texas, Central Texas, and Oklahoma. Restricting participants based on location could pose a threat to external validity and generalizability. As a result, given only companies located in these two states were targeted for participation, generalization beyond this region should be done with caution.

Furthermore, this study was carried out under rapidly changing environmental conditions. As such, there was a threat to reliability as it could influence the participant's answers. Had this study been conducted in March or April when stay-at-home orders were first being issued and remote work procedures first put in place, participant's answers could have been different than

they were when the surveys were conducted in December 2020 after companies had time to work through remote work implementation issues.

Results and Discussion

The total sample collected consisted of 163 responses, made up of 40 different companies across varying revenue sizes and locations. Of the original 163 responses, three participants chose not to participate in the study. Another 17 responses were not fully completed and were excluded from the sample. As a result, after filtering, the total number of analyzed responses was 143.

The location breakdown of the 143 responses provided a broad geography. 52 participants were from Dallas/Fort Worth, 14 came from Austin, 59 responses were from Oklahoma City, and 18 were located in other various locations such as Tulsa and San Antonio. Although there is a smaller sample size from Austin, specifically, the breakdown between the states of Oklahoma Texas overall is fairly even for comparative analysis as shown in Figure 1. Three participants did not specify their work location; as such, their responses are labeled "Other" in the figure below.
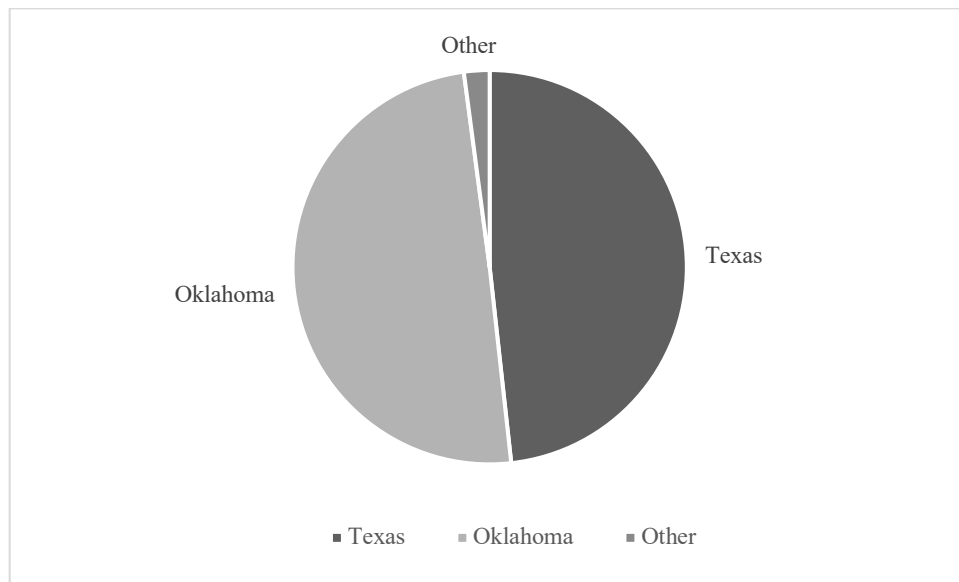

Figure 1. Work Location of Participants

Further demographic analysis of the survey participants revealed that nearly 83% were male. As such, women were overrepresented in the population sample as they typically only make up about 10% of the construction industry overall. The overwhelming majority (87.5%) had at least a Bachelor's Degree and there was a broad range of industry experiences. Approximately a third of the sample had between 0-10 years of experience, 10-20 years of experience, and more than 20 years of experience. Figure 2 illustrates the full breakdown of each experience level of the sample.
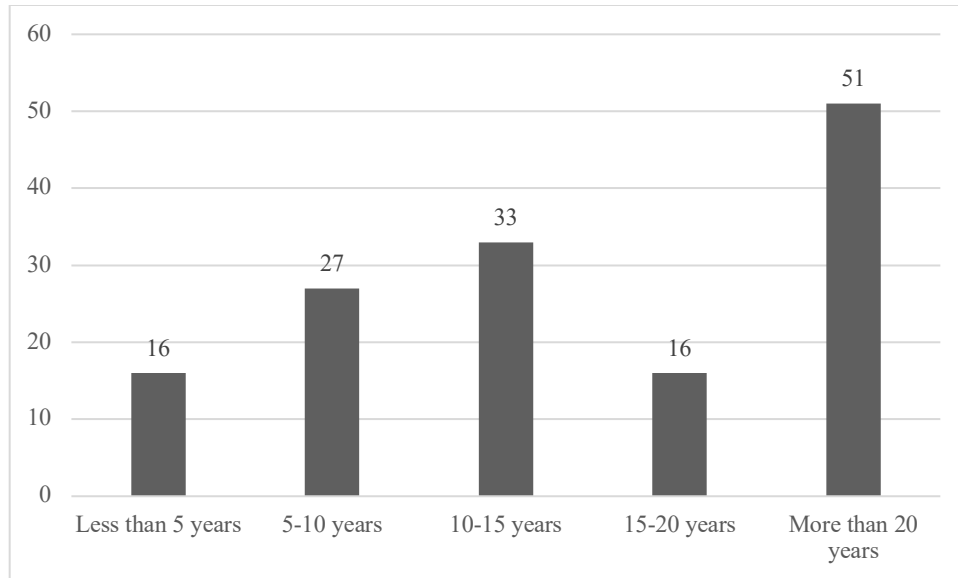
Figure 2. Work Experience of Participants

Of the companies represented in the sample, over two-thirds have an annual revenue of more than $100 Million. The remaining one-third was fairly evenly divided between the remaining four revenue segments. Figure 3 displays the revenue distribution of the participant's companies.
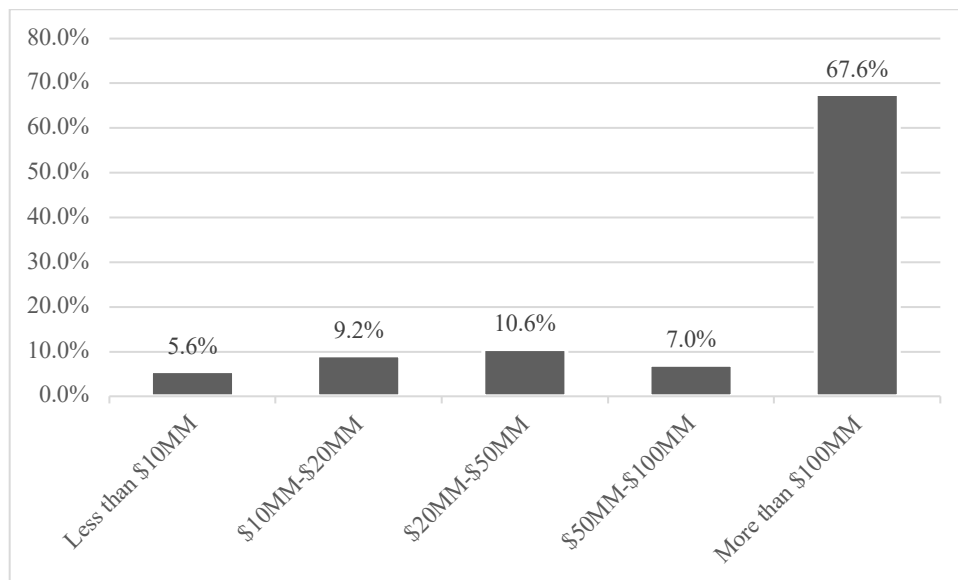
Figure 3. Annual Company Revenue of Participants

Although not part of the original focus for this study, further analysis was done to compare responses from employees based on their company's annual revenue. For this, companies were separated into two categories: more than $100MM and less than $100MM. A statistically significant difference was found between companies in these revenue sizes on interactions with colleagues and managers, workplace unity, and communication with other employees and/or trade partners. Companies earning less than $100MM in annual revenue (M=3.21, SD=.686)

reported a significantly more positive outlook towards interactions with colleagues and managers than companies with more than $100MM in annual revenue (M=2.79, SD=.873), t (94) = -2.27. With regards to workplace unity, there was a significant difference; however, both companies earning less than $100MM in revenue (M=2.76, SD=.872) and companies earning more than $100MM in revenue (M=2.40, SD=.910), t (96) = -1.81 felt this has been a negative experience in working remotely. Finally, employees at companies earning less than $100MM (M=2.89, SD=.832) felt less negative towards communication with other employees and/or trade partners than employees working at companies earning more than $100MM (M= 2.51, SD=.853). Given that larger companies would likely have a larger technology budget and be better prepared for transitioning to a remote work environment, it was unexpected that employees at these companies would rate their experiences significantly more negative than their counterparts at companies earning less than $100MM in annual revenue.

As can be seen in Table 1 below, an independent samples t-test compared all experiences between companies earning more than $100MM in annual revenue and companies earning less than $100MM in annual revenue. The remaining 15 experiences did not present a statistically significant experience.

Table 1. Comparison of Experiences Working Remotely by Annual Revenue: Independent Samples t-test

Experience	t	p-value	Mean Difference
Choosing Work Place	-1.76	.861	-.026
Choosing Work Time	-.634	.528	-.090
Organizing Work	-.167	.868	-.026
Working Individually	.726	.469	.135
Work and Personal Life Balance	.482	.631	.082
Commuting Time	.995	.323	.110
Unnecessary Interactions	-.448	.656	-.090
Required Interactions	-.202	.840	-.038
Interactions with Colleague/Manager	-2.27	.015**	-.420
Building Trust with Employees/Manager	-1.26	.209	-.235
Health and Wellness Programs	.103	.918	.020
Commitment to Organization	.072	.942	.012
Identifying Start/End Point of Tasks	-.144	.886	-.024
Workplace Unity	-1.81	.073*	-.360
Communication with other Employees/Trade Partners	-2.03	.045**	-.386
Access to Work-Related Information	-1.34	.183	-.262
Other Household Members	-1.59	.115	-.327
Performance Feedback	-.271	.787	-.046

*Significant at the 0.1 level
** Significant at the 0.05 level

The majority of participants worked in a Project Management type role. Figure 4 displays the job-type breakdown, with nearly three-fourths working in Operations. Although a large portion of the responses came from Operations, it is consistent with the breakdown of the construction industry where companies typically have considerably more operations employees than pre-construction employees. While a large number of participants worked in operations rather than

pre-construction, nearly two-thirds of participants reported that they worked in the main office for their company, not on a specific job site.
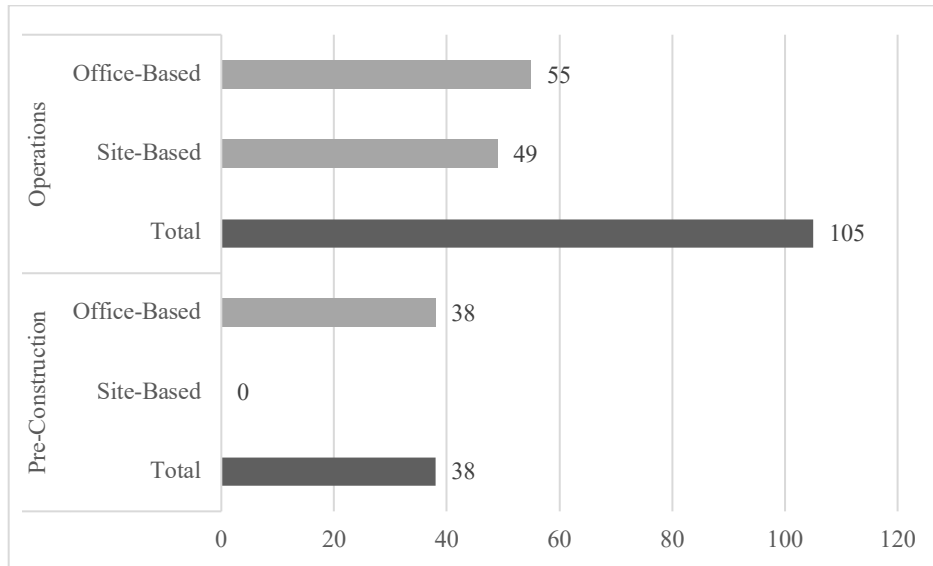

Figure 4. Job Role of Participants

When looking at employee responses, there was a noticeable difference among employees who worked in their main office location and employees who worked on a specific job site. In all instances, employees who were located in their main office had a more positive experience working remotely than their job site counterparts. Most notable were employee's experiences with unnecessary interactions, interactions with a colleague and/or manager, health and wellness programs, identifying start and end point of tasks, and other household members. In all instances, employees working in the main office location rated their experiences moving to remote work positively whereas employees working on a job site rated their experiences negatively. It is important to note that the responses from employees located on a job-site did not meet the recommended 30 responses; therefore, the data should be interpreted cautiously as there is a threat to reliability. That being said, given the hands-on nature of the built environment, there is an on-site requirement in the construction industry that cannot be addressed remotely. As such, it is unsurprising that job site employees would have a more negative experience in a remote environment than their main office counterparts.

Table 2 below shows the full output for the independent t-test, which compared employees working in a main office location against those working on a job site. The remaining eight experiences did not present a statistically significant experience.

Table 2. Comparison of Experiences Working Remotely by Working Location: Independent Samples t-test

Experience	t	p-value	Mean Difference
Choosing Work Place	1.89	.062*	.271
Choosing Work Time	2.81	.006**	.408
Organizing Work	1.11	.272	.408
Working Individually	.237	.813	.046
Work and Personal Life Balance	1.07	.285	.189

Commuting Time	.364	.717	.041
Unnecessary Interactions	1.86	.066*	.365
Required Interactions	1.91	.060*	.345
Interactions with Colleague/Manager	2.58	.011**	.473
Building Trust with Employees/Manager	2.60	.011**	.470
Health and Wellness Programs	3.19	.002**	.584
Commitment to Organization	2.03	.046**	.339
Identifying Start/End Point of Tasks	1.79	.078*	.295
Workplace Unity	1.12	.266	.231
Communication with other Employees/Trade Partners	.843	.402	.164
Access to Work-Related Information	.483	.630	.097
Other Household Members	2.30	.024**	.466
Performance Feedback	.080	.932	.014

*Significant at the 0.1 level
** Significant at the 0.05 level

Regarding the first research question: How prevalent is remote work and would employees like for their companies to retain remote work procedures when the situation allows for a return to normal working conditions? More than 72% of participants (103 out of 143) reported they were currently working remotely in some capacity and 43% would like to continue doing so.

One goal of this study was to understand how prevalent working remotely is in the commercial construction industry. Of the 143 responses, 103 participants reported that they were currently completing either some or all of their work remotely. These remote procedures were put into place a result of the ongoing pandemic, with less than 18% of participants working remotely prior to the onset of the Coronavirus.

Participants were also asked whether they would like to maintain their current remote work environment when the situation allows for a return to normal working procedures. A majority (57%) reported that they did not want to continue working remotely. Of the 103 participants in the survey that are currently completing some or all of their work remotely, 58 did not want to continue working remotely. A major contributing factor of this could be employee's negative experience communicating among trade partners within the remote environment. Furthermore, the inability to physically be on job sites and oversee progress may also be contributing to this, given the importance of ensuring that work is being completed according to plans and specifications. Both of these, in addition to the general isolation created by the Coronavirus pandemic given the amount of time spent with coworkers, may be creating the feeling of wanting to return to normal working conditions.

The next research question was: What are the positive or negative experiences from an employee's perspective? To gain a better understanding of the attitudes that employees and managers hold towards remote work environments, a mean was calculated on a range of statements using Likert scale responses (4 = "Extremely Positive", 3 = "Somewhat Positive", 2 = "Somewhat Negative", 1 = "Extremely Negative"). Participants were also able to answer "Does Not Apply"; however, to ensure those answers did not skew the data, they were excluded from the mean calculations for both the second and third research questions. As a result, the number of responses (n) in Table 3 and Table 4 can vary for each question given some participants rated that experience as not applicable. It is also important to note that participants who were not

currently completing remote work were automatically directed to the end of the survey; as a result, of the 143 responses, 40 were not asked their perceptions regarding remote work.

There were several factors that influenced employee's perception of remote work in both positive and negative ways. A higher mean score indicates a stronger positive influence on their experience. Of the participants surveyed, the most overwhelming positive takeaway was the reduction in their commuting time, with 90 of the 103 participants responding positively (76 extremely positive, 14 somewhat positive) to this question. Consistent with previous research, employees also felt positively towards being able to choose their own work place, with an average score of 3.44, and their own work time, with an average score of 3.41. Beyond that, seven other experiences also resulted in mean scores above three. Specifically, participants responded that working remotely had a positive impact on reducing unnecessary interactions and their ability to balance work and personal life. See Table 2 below for a full breakdown on the responses regarding experiences towards working remotely.

Eight experiences had mean scores below three, indicating a negative inclination towards working remotely. The experience with the most negative response was a reduction in workplace unity. Additionally, the ability to both communicate with other employees and trade partners as well as the ability to build trust within workplace relationships.

Table 3. Rating of Experiences Working Remotely (Employees)

Rank	Experience	N	Mean	Standard Deviation
1	Commuting Time	94	3.78	0.48
2	Choosing your Work Time	89	3.44	0.62
3	Choosing your Work Place	95	3.41	0.64
4	Commitment to Organization	93	3.37	0.73
5	Work and Personal Life Balance	97	3.30	0.77
6	Organizing your Work	93	3.26	0.69
7	Working Individually	95	3.23	0.83
8	Unnecessary Interactions	95	3.16	0.88
9	Other Household Members	87	3.14	0.86
10	Health and Wellness Programs	85	3.09	0.81
11	Access to Work-Related Information	94	2.99	0.87
11	Performance Feedback	82	2.99	0.71
13	Identifying Start and End Point of Tasks	90	2.98	0.71
14	Interactions with Colleagues and/or Managers	96	2.92	0.84
15	Required Interactions	96	2.88	0.82
16	Building Trust with Other Employees/Manager	95	2.83	0.82
17	Communication with Other Employees/Trade Partners	96	2.62	0.86
18	Workplace Unity	98	2.51	0.91

The data in the table above reinforced previous research within the literature review regarding working remotely. As such, although the industry's needs may vary, employees still perceive the positive experiences of working remotely in similar way as employees of other industries. This reflects a greater need for clear guidance and deadlines within a remote environment across all sectors.

The third research question was: What are the positive or negative experiences from a manager's perspective? Of the 103 survey participants who reported working remotely, 72 had employees that they managed. Surprisingly, managers did not feel overwhelmingly positive towards any of

the experiences presented to them. Six experiences had mean scores greater than three, but none were higher than 3.16.

Those that were viewed most favorably among managers were the reduction in operation costs as well as the positive impact working remotely had on the company image. Managers also felt that working remotely had a positive impact on staff turnover, which is consistent with previous studies found in the review of literature. Of the remaining experiences provided within the survey, the one that was rated most negatively was training for employees. Managers also felt they had less oversight of employees in a remote work environment. Table 4 displays all of the results for this question.

Table 4. Rating of Experiences Working Remotely (Managers)

Rank	Experience	N	Mean	Standard Deviation
1	Operation Costs	59	3.16	0.78
1	Company Image	61	3.16	0.63
3	Staff Turnover	49	3.15	0.79
4	Data Security	56	3.10	0.75
5	Employee Satisfaction	71	3.03	0.68
6	Company Communications	67	3.01	0.80
7	Employee Efficiency	71	2.96	0.72
8	Availability of Staff Support	68	2.91	0.84
9	Company Culture	67	2.81	0.86
10	Impact on Project Costs	51	2.75	0.88
11	Oversight of Employees Working Remotely	70	2.56	0.79
12	Training for Employees	66	2.27	0.85

As explored in the literature review, employees who are both older and male tend to the view working remotely more negatively. A review of the data showed that only nine of the 72 managers surveyed were female and only eight managers had been in the industry less than 10 years. A near majority (43%) had been in the industry more than 20 years. These two factors could have a major impact on why managers tend to view working remotely in a more negative viewpoint.

The final research question posed was: How were these experiences similar or different when comparing pre-construction and operations employees, specifically? A statistically significant difference was found among pre-construction and operations employees on interactions with colleagues and managers, building trust with other employees and managers, and health and wellness programs. Pre-construction (M=3.14, SD=.975) reported a significantly more positive outlook towards interactions with colleagues and managers than their operations counterparts (M=2.82, SD=.815), t (94) = -1.71.   With regards to building trust with other employees and managers, pre-construction (M=3.07, SD=.781) also felt more positive working remotely than operations employees (M=2.74, SD=.822), t (93) = -1.84. Finally, pre-construction employees (M=3.44, SD=.712) rated health and wellness programs more positively than pre-construction (M=2.95, SD=.811), t (83) = -2.626. Interestingly, this trend of pre-construction employees feeling more positively towards working remotely was carried throughout all of the remaining experiences, with the exception of the ability to organize their work. Pre-construction employees

felt more negatively towards this with an average answer of 3.21 versus operations employees who averaged 3.28.

As can be seen in Table 5 below, an independent samples t-test compared all experiences between both pre-construction and operations employees. The remaining 15 experiences did not present a statistically significant experience.

Table 5. Comparison of Pre-construction and Operations Employee's Experience Working Remotely: Independent Samples t-test

Experience	t	p-value	Mean Difference
Choosing Work Place	-1.59	.116	-.023
Choosing Work Time	-.469	.640	-.066
Organizing Work	.400	.690	.063
Working Individually	-.610	.543	-.113
Work and Personal Life Balance	-.673	.503	-.115
Commuting Time	-.514	.609	-.056
Unnecessary Interactions	-1.49	.138	-.297
Required Interactions	-.918	.361	-.169
Interactions with Colleague/Manager	-1.71	.090*	-.317
Building Trust with Employees/Manager	-1.84	.069*	-.339
Health and Wellness Programs	-2.63	.010**	-.490
Commitment to Organization	-1.48	.143	-.243
Identifying Start/End Point of Tasks	-.305	.761	-.050
Workplace Unity	-.692	.491	-.140
Communication with other Employees/Trade Partners	-.298	.767	-.058
Access to Work-Related Information	-.426	.671	-.084
Other Household Members	-1.53	.129	-.311
Performance Feedback	-.272	.787	-.046

*Significant at the 0.1 level
** Significant at the 0.05 level

Conclusion

Overall, this study created a foundation for understanding the prevalence of remote work as well as the positive and negative experiences of remote work within the commercial construction industry in Texas and Oklahoma, specifically. Although certain takeaways reinforced previous research, construction overall varies from other industries in that it requires greater face-to-face interaction among general contractors and their trade partners. As such, companies much continue to invest in both technology and training in order to meet the demands of an evolving industry that continues to face productivity challenges. This will ultimately lead to a better overall experience for both the employee and company.

Given that more than half (57%) of employees would like to return to normal working conditions, companies must adapt to offer a short-term solution that will both allow for this while also protecting those who do not feel comfortable returning to the office or job site. By implementing a tiered approach, companies can initially bring back only those employees that must be in the office or on-site for operations to continue to run smoothly. In most instances, these employees can likely be placed on-site, which will allow them to be more spread out, rather

than sitting in a cramped or enclosed space within an office building. Following the first wave, employees can be brought back into the main office location in phases as restrictions continue to lighten, especially given the broad rollout of vaccinations.

This tiered approach is also supported when comparing employees located on-site versus employees located in the main company office. By first focusing on returning employees to their project sites, this can help to alleviate the employees with the most negative experiences working remotely. Following that, employees within the main office located can then return to work in phases based on their desire and willingness to return to normal working conditions.

Furthermore, as this study has shown, there is also a wide divergence between pre-construction and operations regarding their perception of working remotely as well. This presents further opportunity for senior management to establish alternative work procedures for both functional groups. Rather than applying one overarching policy to the entire company, pre-construction could be allowed to continue working remotely indefinitely while operations could begin a tiered return to work as detailed above. This is especially enticing given pre-construction employees felt positively towards building trust with their employees and/or manager as well as interactions with their colleagues and/or manager whereas operations employees rated these negatively. In allowing for two different paths, companies can continue to enhance their image while also reducing staff turnover.

As the title of this paper suggests, this study was conducted to identify perceptions of remote work in the current pandemic environment; however, this is an ever-evolving epidemic and further research will be prudent to understand the long-term impacts and employee needs in a post-herd immunity environment. As companies return to an environment that can allow for an increase in face-to-face communication and reduction in social distancing, management will need to understand the benefits and costs of remote work and select the best approach for their individual projects and their employees overall.

Future Research

Future research will be vital in order to further the understanding and long-term impacts that the Coronavirus has had on the construction industry. As the data of this study has shown, less than half of employees (43%) wished to remain in a remote work environment. Although this could be due to the overall isolation cause by the Coronavirus as well as the expedited and likely unplanned move to working remotely, further investigation is needed to understand employee's desire to return to normal working conditions. Additionally, managers did not feel overly positive towards any of the experiences provided in the survey. Given this study provided pre-determined answers based on previous research, additional exploration may be able to identify alternative experiences that managers feel more positively towards in a remote work environment.

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Appendix I: Survey Questions

1. What is your gender?
2. What is your level of education?
3. How long is your typical commute?
4. Do you currently have children living at home?
5. Do you have a distinct home office area at home to work from?
6. What company do you work for?
7. What market location do you currently work in?
8. What is your company's annual revenue?
9. What is your current job title?
10. Is your role primarily pre-construction or operations?
11. How many years have you been in your current position?
12. How many people report to you directly within your company?
13. How many years of experiences (total) do you have within the construction industry?
14. Do you typically report to a main office location or a job site?
15. In your current role, do you complete any work remotely?
16. Which technologies are you using for the following job roles or day-to-day operations that are currently remote?
17. Did you work remotely prior to the Coronavirus?
18. How often did you work remotely prior to the Coronavirus?
19. Which technologies and/or applications did you use to work remotely previously?
20. When the situation allows for a return to normal working procedures, would you like to maintain working remotely?
21. For what activities would you like to keep it in place for?
22. What have been the biggest obstacles to implementing virtual work procedures since the onset of the Coronavirus?
23. What have your experiences been with virtual work as an employee of your company?
    a. Choosing your workplace
    b. Choosing your work time
    c. Organizing your work
    d. Working individually
    e. Work and personal life balance
    f. Commuting time
    g. Unnecessary interactions
    h. Required interactions
    i. Interaction with colleagues and/or manager
    j. Building trust with other employees and/or manager
    k. Healt and wellness programs
    l. Commitment to your organization
    m. Identifying start and end point of tasks
    n. Workplace unity
    o. Communication with other employees and/or trade partners
    p. Access to work-related information
    q. Other household members
    r. Performance feedback

  s. Other
24. What have your experiences been with implementing virtual work as a manager of other employees?
  a. Employee efficiency
  b. Employee satisfaction
  c. Availability of staff support
  d. Operation costs
  e. Company image
  f. Staff turnover
  g. Company culture
  h. Oversight of employees working remotely
  i. Data security
  j. Company communications
  k. Impact on project costs
  l. Training for employees
  m. Other

Note: Questions #23 and #24 utilized a Likert Scale: Extremely Positive, Somewhat Positive, Somewhat Negative, Extremely Negative, Does Not Apply