Severity of Ethical Issues in Virtual Teams on Construction Projects

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ABSTRACT

The outbreak of the coronavirus pandemic has brought a new dynamic into team decision-making on construction projects. Face-to-face meetings of construction stakeholders have largely metamorphosised into virtual. Meanwhile, the online decision-making process has been challenged by some ethical issues, especially in developing countries. To have an empirical investigation of the ethical issues concerning virtual teams' decision-making process on construction projects, an online survey was purposely conducted among construction professionals in Lagos State, Nigeria. This is important to pinpoint the severity of ethical issues confronting virtual team decision-making process in a developing nation and to proffer useful solutions to the problems. To achieve this goal, descriptive and inferential analyses were conducted with the data collected from the online survey of fifty-eight construction professionals in the target area of study. First, the reliability of the dataset was checked with Cronbach's alpha value. The normality of the data retrieved was also determined with Shapiro-Wilk test, while the significance difference on the opinions of the respondents on the ethical issues were checked with Kruskal-Wallis H test. Finally, a modified relative severity value (mRSV) was computed to determine the severity of the ethical issues. Based on the results of the analysis, the high ranked ethical issues in virtual teams are technical uncertainties, unpredictable communication, lack of follow-through on ideas, and unequally distributed information, among others. Several recommendations were suggested such as ensuring that stakeholders find a collective solution to the potential technical glitches of participants at different locations. The tendency of seamless participation on online platforms should be appraised before proposing a virtual collaboration. Conclusively, a virtual team decision making process is indispensable in this digital world, thus, mitigating the ethical and other challenges confronting the process is important for its continual deployment in construction organisations and on construction projects.

INTRODUCTION

Before the outbreak of the Coronavirus pandemic, virtual teams were predominantly in developed countries. Meanwhile, the pandemic has forced business owners and organisations in developing nations to embrace virtual platforms for undertaking daily services. Although onsite execution of construction projects cannot be achieved virtually (Leung et al., 2021a), the online platform has provided remote methods of monitoring construction projects (Wang et al., 2021), and other decision-making processes between stakeholders can also be done. Several online training and webinars were also organised to educate practitioners in developing how professional services can be delivered virtually (Chamola et al., 2020). In fact, several professional organisations conducted a series of training for their members on how services can be undertaken in virtual environments (Leung et al., 2021a, 2021b). Interestingly, organisations have been able to continually deliver their expected tasks to their clients and advance their course amidst the pandemic (Calamlam et al., 2022; Draugalis et al., 2020). Through the virtual platforms, decisions on projects are undertaken in good time, while securing the safety of the workers from contracting the virus.

Despite the tremendous benefits that virtual platforms have provided for the continual delivery of services, some challenges still confront fruitful discussion of virtual participants (Furst et al., 2004; Reyna et al., 2018). The problems are more obvious in developing countries where internet connections are epileptic (Gupta and Pathak, 2018). Past studies have investigated the

challenges constituting ethical issues in virtual teams (Morrison-Smith and Ruiz, 2020; Tan et al., 2019; Ebrahim et al., 2009). The determinants of performance of the virtual team in developing countries have been investigated (Tan et al., 2019). Meanwhile, empirical study on the severity of ethical issues is rare. This study, therefore, evaluated the severity of ethical issues obstructing virtual teams on construction projects. Through various statistical analyses conducted, the severity level of each ethical issue sourced from extant literature was determined and accompanied by relevant discussions. Practical recommendations were also provided on the ethical issues to ensure the continued effective usage of virtual platforms for team decision making on construction projects.

LITERATURE REVIEW

Ethics provides a moral codes that foster healthy governance and behaviour of individuals within an organization (Oladinrin and Ho, 2016). While ethical issues are not peculiar to any sector, unethical practices among players of construction industry, such as cover pricing, false declaration, bid cutting, poor documentation, late and short payments, is alarming (Matthew, 2014; Adnan et al., 2012). Unethical behaviour or poor implementation of ethical codes in the construction industry (Oladinrin and Ho, 2016), as evidenced by the high rate of uncompleted and delayed projects with massive time and cost overruns, poor and substandard quality of work (Matthew, 2014). Whilst ethical issues in construction tend to be predicated on professional malpractices in traditional construction managemnent setting, one aspect that is rarely considered are the ethical issues implicit in the virtual project management.

With the advent and advancement in information communication technologies (ICTs), organizations began to use virtual teams to fulfil organizational functions (Kraut et al., 2018). As a result of the diverse benefits of ICTs such as fast-tracked responses, cost saving, etc., organisations are willing to embrace virtual teams in their daily decision making, especially when other members of the team are at different locations. In some instances, the virtual teams may have never worked together before and may not have the opportunity to work together again when the project is over (Jarvenpaa and Ives, 2004; Kiely et al., 2021). A virtual team provide the opportunity to engage experts in a particular field on a project for consultation, raise hours of business by having people working in different time zones, boost productivity, and maintain a competitive edge in the global market. As a result, organizations are increasingly relying on virtual teams to carry out their activities (Jang, 2013). However, there are ethical issues confronting virtual team decision making. On the part of Kayworth and Leidner (2002), some similar problems are similar to both virtual and physical teams.

One of the profound hindrance to a virtual team, especially in developing countries with unstable internet is a technical glitch. The technical uncertainties could arise due to certain factors such as socioeconomic divide, the usage of ICT, and differences in culture (Pazos, 2012). The technical issue could be due to uncontrollable situations beyond the control of the team or a lack of adequate knowledge to combat technical problems. In some instance, the technical glitch could culminate in negative emotions that impact team functionalities and collaboration (Ayoko et al., 2012). To combat emotion-related problems among a virtual team, the facilitator of online activities must be able to communicate effectively, provide feedback, and pass on organizational knowledge to other colleagues (D'Souza and Colarell, 2016). Besides the emotional or psychological effect of technical uncertainties on the participants, other problems such as unpredictable communication, departure of a key member of the team, etc., often arise in virtual meetings. This frustrates the virtual participants, hinders task focus and results in a loss of team spirit (Jarvenpaa and Leider, 1998). Communication in a virtual

environment is majorly based on electronic-mediated asynchronous information which allows the streaming of multiple ideas simultaneously (Lilian, 2014). On the other hand, important ideas may be omitted in the process of exchanging multiple themes of information in a virtual environment. Therefore, devising a method to capture the thought of all virtual participants directly is important (Leung and Wei, 2019). For example, multiple stakeholders on virtual platforms, e.g., Zoom may simultaneously enter their ideas on Google sheets. However, the team leader must disconnect access to edit the Google sheet to avoid missing information or deletion of any vital idea by the participants mistakenly.

Some of the major hurdles for virtual teams are growing trusting relationships, lack of human social interaction, and cultural differences (Levasseur, 2012). The trust issue is more significant in virtual teams than in face-to-face teams (Cascio and Shurygailo, 2003). The confidentiality which online platforms may not guarantee is the main issue for lack of trust to some extent. Considering construction projects in which cost information and other vital documents are kept secret, company representatives may be reluctant to disclose such information openly on online platforms. Meanwhile, Cascio and Shurygailo (2003) opined that setting high expectations for the virtual team members for them to optimum delivery of assigned tasks.

Due to the uniqueness of a virtual environment, virtual team leaders are also confronted with challenges such as project coordination, cultural diversity, cooperation, numerous time zones, etc. (Nydegger and Nydegger, 2010). Besides, the commitment of virtual participants has been generally reported to be low (Wilson et al., 2013; O'Hara-Devereaux and Johansen, 1994; Shameem et al., 2017). Considering construction projects that involve multi-disciplinary stakeholders, possibly from different time zone may affect the efficiency and mental alertness of the participants in the virtual team. In addition, technical uncertainties in which a participant struggles to connect to the online platforms with other team members could reduce the excitement and willingness to collaborate with other stakeholders. However, Garro-Abarca et al (2021) opined that the level of commitment of virtual participants can only be improved when they have the same goals on the objectives of the project and team. Therefore, the virtual team members would ensure that every obstruction to a seamless discussion is sorted out at all costs.

Diversity in a virtual team manifests in several factors such as geographical locations, people of different values and cultures, communication patterns, etc. (Lilian, 2014). Besides, cultural diversity in a virtual environment may also involve having stakeholders with different accents in a team (Presbitero, 2020). In addition, participants with different cultural values may be grouped together in virtual teams. For instance, participants from a culture with high power distance may be grouped with others with a free expression of thoughts in the presence of senior officials. This diversity may bring a dynamic pattern to a virtual environment and could also serve as hindrance to communication and exchange of information on the other hand. Interestingly, Yilmaz (2016), linguistic matching is a key determinant of team performance in a virtual environment. Apart from communication tools such as drawings, bill of quantities, sketches, calculations, etc., the language of the virtual team members are significant in virtual team to ask questions, respond to verbal queries, and seek clarifications. Based on extant literature, the ethical issues in virtual teams are presented in Table 1.

Table 1: Ethical Issues in Virtual Team

Code	Ethical Issues	Sources
E-1	Low individual commitment	O'Hara-Devereaux and Johansen (1994); Wilson et al. (2013); Garro-Abarca et al. (2021).
E-2	Technical uncertainties	Ayoko et al. (2012); Pazos (2012).
E-3	Absenteeism	O'Hara-Devereaux and Johansen (1994); Meluso et al. (2020).
E-4	Unequally distributed information	Lilian (2014).
E-5	Departure of leader or key member	The authors
E-6	Lack of follow-through on ideas	Benetytė and Jatuliavičienė (2013); Wattanatinnachot (2022).
E-7	Lack of task focus	Jarvenpaa and Leider (1998).
E-8	Unpredictable communication	Lilian (2014).
E-9	Lack of social interaction	Cascio and Shurygailo (2003); O'Hara-Devereaux and Johansen (1994).
E-10	Linguistic differences	Levasseur (2012); Lilian (2014); Yilmaz (2016); Presbitero (2020).
E-11	Loss of team spirit	Jarvenpaa and Leider (1998).
E-12	Lack of trust	Cascio and Shurygailo (2003); Germain (2011); Lilian (2014).

Research Methodology

This study adopted survey research design to investigate the severity of ethical issues in virtual team decision-making process in the Nigerian construction industry. Survey research design was deemed appropriate to obtain the opinions of multiple construction professionals in the Nigerian construction industry (Flynn et al., 2018) which is important for drawing inferences in the study. Questionnaire was used to collect data on the severity of ethical issues in virtual team decision-making process from construction professionals in Lagos State, Nigeria. Lagos State was purposely selected because it is the base of major construction establishments in Nigeria (Oke and Ogunsemi, 2013). In other words, Lagos State is the seat of many construction professionals in the Nigerian construction industry. Besides, it is the commercial nerve of Nigeria where many construction projects are constantly executed (Fagbenle et al., 2011). The State also recorded the highest confirmed case of Coronavirus pandemic (NCDC, 2022), which can be used to deduce the probable embracement of virtual platforms for decision-making by construction stakeholders.

The questionnaire contained two sections in which the first part consisted of background information of the respondents. The severity of ethical issues was to be rated in the second part on a five-point rating scale in which 1 represented very low severity, and 5 stood for very high severity. The questionnaire was administered to construction professionals namely engineers, builders, quantity surveyors, amongst others based in Lagos State, Nigeria via the email of the secretaries of various institutions. The secretaries of the professional institutions were appealed to send the questionnaire links to their respective members. Besides, the respondents were also appealed to in the email to forward the questionnaire links to other colleagues that are qualified to respond to the survey. Based on the sample size of construction professionals, i.e., 369 computed prior to the administration of the online survey, fifty-eight responses were returned. With Statistical Package for Social Sciences (SPSS version 25), descriptive and inferential statistics were carried out with the fifty-eight responses received. Although the responses received is small, i.e., 15.7% of the sample size, it can be considered adequate for analysis. For example, the data received is more than thirty which is regarded as the minimum response for conducting statistical analysis, determining central limit, and drawing necessary conclusions (Ott and Longnecker, 2016). Secondly, such a limited response rate is not unusual in an online survey (Cunningham et al., 2018), and lastly, past studies on severity levels had employed

relative smaller sample size to draw useful inferences and conclusions (Luo et al., 2015; Wuni et al., 2022).

Traditionally, the probability of the occurrence of an item and the severity are often multiplied to determine the impact of such item (Ameyaw and Chan, 2015). Meanwhile, modifications to the method are acceptable depending on the objective of the study. For instance, the level of occurrence could be used mainly (Wu et al., 2006), or the level of severity (Wuni and Shen, 2020, Wuni et al., 2022). The modification was done to enable analyses of relative severity of each of the ethical issues from individual responses. This study, therefore, evaluated the severity of ethical issues in virtual teams to determine the possible impact on team decision-making on construction projects. The reliability of the dataset was also checked with Cronbach's alpha value to determine the internal consistency (Hair et al., 2010). The normality of the data was also determined with Shapiro-Wilk test, a p-value less than 0.05 is an indication that the data is not normally distributed (Corder and Foreman, 2014). Therefore , the use Kruskal-Wallis H test, a non-parametric test was used to identify the difference in the opinions of the respondent's groups on the ethical issues accordingly.

DATA ANALYSIS

The majority of the respondents had more than five years of work experience in the construction industry. The background information also showed the educational level of the respondents. Few respondents had a higher diploma certificate (8.6%), bachelor's degree (43.1%), master's degree (46.6%), and one respondent had a doctoral degree. The respondent cut across various construction disciplines such as quantity surveyors (31%), engineers (44.8%), builders (6.9%), project managers (8.6%), and others (8.7%). All the respondents have participated in virtual team decision making on construction projects in time past.

The internal consistency of the data was checked with Cronbach's alpha value, in which a 0.898 value was obtained. The Cronbach's alpha value was higher than the minimum threshold of 0.6, indicating an excellent internal consistency (Hair et al., 2010). The Shapiro Wilk test was also conducted to determine if the data were normally distributed (Corder and Foreman, 2014). Based on the results of the Shapiro-Wilk test in Table 2, the p-values of all the ethical issues are less than 0.05, implying that the dataset is not normally distributed, and a non-parametric statistical test is appropriate to check any significant difference. Therefore, the Kruskal-Wallis H test was computed to determine the difference in the opinions of the respondents on each item. The results of the Kruskal-Wallis H test indicated that statistical difference existed in 'lack of social interaction (E-9)' with a significant value of 0.014. Further analysis such as a post-hoc test may be conducted to determine the main group of the respondents responsible for the significant difference on "lack of social interaction (E-9)" (Pallant, 2020), however, since the statistical difference occurred in one item, conducting the further statistical analysis may not be necessary. This study computed the severity of ethical issues in virtual teams using the score relative severity of each item.

Table 2 also contained the median, mode, and frequency distribution of the level of severity of the ethical issues in the virtual team decision-making process. All the ethical issues have a median value of 4.00, except for 'linguistic differences (E-10) with a median of 3.00. Low individual commitment (E-1) and unequally distributed information (E-4) have mode values of 5.00, while other ethical issues have a mode of 4.00. The high values of the descriptive statistics, i.e., median and mode (Ojo and Ogunsemi, 2019) indicated that the ethical issues have a considerable impact on virtual team decision-making on construction projects.

Table 2: Descriptive and Inferential Analysis of Ethical Issues of Virtual Teams

Code	Ethical Issues	S-W test	K-W	Level of severity					Median	Mode
				1	2	3	4	5		
E-1	Low individual commitment	0.000*	0.526	1	7	16	16	18	4.00	5.00
E-2	Technical uncertainties	0.000*	0.532	0	2	16	20	20	4.00	4.00[a]
E-3	Absenteeism	0.000*	0.440	2	7	12	20	17	4.00	4.00
E-4	Unequally distributed information	0.000*	0.919	1	6	11	18	22	4.00	5.00
E-5	Departure of leader or key member	0.000*	0.883	3	8	9	25	13	4.00	4.00
E-6	Lack of follow-through on ideas	0.000*	0.354	0	7	7	28	16	4.00	4.00
E-7	Lack of task focus	0.000*	0.848	3	5	12	25	13	4.00	4.00
E-8	Unpredictable communication	0.000*	0.691	0	5	9	29	15	4.00	4.00
E-9	Lack of social interaction	0.000*	0.014*	0	10	10	24	14	4.00	4.00
E-10	Linguistic differences	0.000*	0.534	7	8	15	18	10	3.00	4.00
E-11	Loss of team spirit	0.000*	0.897	1	10	11	18	18	4.00	4.00[a]
E-12	Lack of trust	0.000*	0.661	2	11	10	20	15	4.00	4.00

Note: S-W test = Shapiro Wilk test significant at 95% confidence level, K-W = Kruskal-Wallis H test

The relative severity value *(RSV)* was used to analyse responses received from questionnaire survey. RSV is regarded as a method for discovering significant factors among a variety of individual factors (Zhang et al., 2011). Therefore, RSV of each ethical issue was computed with equation 1 and later normalised using equation 2. In equation 1, RSV_a indicates the *RSV* index for ethical issue *a;* D_a denotes the severity grade of ethical issue *a;* Y_a represents the frequency count for ethical issue *a;* and *N* represents the sample size for the study. For equation 2, $nRSV_a$ represents the normalised relative severity value for ethical issue *a;* $Mn.RSV_a$ denotes the lowest RSV index for ethical issue *a;* $Mx.RSV_a$ stands for the highest RSV index for ethical issue *a.*

$$RSV_a = \frac{\sum_{a=1}^{N} D_a Y_a}{N} \quad \text{(i)}$$

$$nRSV_a = \frac{RSV_a - Mn.RSV_a}{Mx.RSV_a - Mn.RSV_a} \quad \text{(ii)}$$

Traditionally, RSV is often computed using the average weighting score, while ignoring the level of dispersion in the respondent's opinions. Whereas, considering the degree of dispersion in the rating is important to obtain a modified RSV *(mRSV*) that addresses the limitations of a traditional method (Wuni et al., 2022). Based on equation 3, the traditional *RSV* and dispersal level, i.e., standard deviation are combined to determine the $mRSV_a$ index for ethical issue *a.*

$$mRSV_a = RSV_a - \frac{RSV_a}{\sigma} \quad \text{(iii)}$$

Table 3: Severity of Ethical Issues in Virtual Team

Code	Ethical Issues	RSV_a	$nRSV_a$	σ_a	$mRSV_a$	Rank
E-2	Technical uncertainties	4.00	1.00	0.88	8.55	1
E-8	Unpredictable communication	3.93	0.91	0.88	8.40	2
E-6	Lack of follow through on ideas	3.91	0.88	0.94	8.07	3
E-4	Unequally distributed information	3.93	0.91	1.07	7.60	4
E-9	Lack of social interaction	3.72	0.61	1.02	7.37	5
E-1	Low individual commitment	3.74	0.64	1.09	7.17	6
E-7	Lack of task focus	3.69	0.57	1.08	7.11	7
E-3	Absenteeism	3.74	0.64	1.12	7.08	8
E-11	Loss of team spirit	3.72	0.61	1.14	6.98	9
E-5	Departure of leader or key member	3.64	0.50	1.13	6.86	10

Code	Ethical Issues	RSV_a	$nRSV_a$	σ_a	$mRSV_a$	Rank
E-12	Lack of trust	3.60	0.44	1.17	6.68	11
E-10	Linguistic differences	3.28	0.00	1.25	5.90	12

RESULTS AND DISCUSSION

Through equations 1, 2, and 3, the RSV_a; $nRSV_a$; and $mRSV_a$ were computed and presented in Table 3. The ranking of each ethical issue was based on the value of $mRSV_a$ to determine the severity of ethical issues in the virtual team decision-making process for construction projects. Based on the results of the analysis, the five high ranked ethical issues in a virtual team are technical uncertainties (E-2), unpredictable communication (E-8), lack of follow-through on ideas (E-6), unequally distributed information (E-4), and lack of social interaction (E-9).

Technical uncertainties ranked the most critical ethical issue in virtual teams with mRSV of 8.55. Recently, due to the outbreak of the Coronavirus pandemic, construction stakeholders globally embraced virtual platforms for interaction and decision making. Meanwhile, the internet bandwidth at different locations of the stakeholders, especially in developing nations may not be strong enough to have a seamless discussion. Because internet connections in most developing countries are not stable and unpredictable (Gilani and Faccia, 2022; Adeoye et al., 2022), various technical problems that affect the audibility, and audio-visual display of the virtual participants may arise. In fact, the virtual participants may not be able to predict the kind of technical problems that would obstruct the exchange of information that can add value to the project. The technical uncertainties, therefore, remain a critical issue in a virtual team in developing nations. Logically, the technical uncertainties in a virtual team contributed to *unpredictable communication* (E-8) pattern that was ranked second in the analysis. Since stakeholders' interaction is indispensable to achieving the desired outcomes of a project, it implies that communication tools such as drawings, estimations, and other documents must be shared through virtual means and accessible to all participants. Sadly, the unstable broadband connectivity in developing countries could cause a glitch to the transfer of documents to be used for decision making in a virtual environment. Meanwhile, the availability of documents for communication in a virtual team is a key determinant of the commitment of the participants (Ferrel and Herb, 2012). Therefore, communication tools and features to enhance communication in virtual team must be adequately secured and functional before the meeting commences.

The analysis also revealed that *lack of follow-through on ideas (E-6)* ranked third based on the mRSV computed. According to Benetytė and Jatuliavičienė (2013), the reliability of a virtual team rest on commitment and basic follow-through on the suggestions and discussion of the team. This result contrasts with the submission of Wattanatinnachot (2022) which indicates a constant occurrence of follow through on any ideas or task given in a virtual team because of the cognitive trust of the online participants. In other words, the cognitive expectations from other virtual team members to follow through could create a sense of responsibility in the team. Besides, when a senior officer is present in a virtual team, all the ideas may be carefully follow-through as long as they are vital to achieving the team goals. Surprisingly, *unequally distributed information (E-4)* has a mRSV of 7.60, ranking in the fourth position among other ethical issues. Considering the set-up of virtual platforms in which files could be shared with the participants to access. A participant that has a problem connecting to online platforms with other team members may not have access to the file shared before the connection was secured. This leads to unequal distribution of information. In fact, in situations where the participant asked for a copy of a file, the verbal information among the team members may not be relayed in exact form. According to Cramton (2001), unevenly distributed information can hinder

collaboration among the team on assigned tasks. Therefore, documents for discussion in a virtual team must be sent before the commencement of the meeting to the participants.

Lack of social interaction (E-9) also have a significant mRSV score based on the analysis. Although online platforms for discussion are majorly called social platforms, the interaction in a virtual environment may not create the kind of connections in some cultural settings. For instance, in developing nations, social interaction in a virtual environment does not fits into all situations (Chiluwa, 2013). It is believed that some discussions are better in face-to-face mode, especially when the message to be communicated is a bad one such as the demise of a family member, or information that a contractor was disqualified in a project bid. However, some authors in developing nations also argued that virtual platform does not reduce the social interaction between people (Olowu and Seri, 2012), especially if they are at a far distance apart.

Low individual commitment (E-1) of virtual participants also received a considerable mRSV score in the analysis. According to the study by Fayomi and Sani (2022), the commitment of the virtual team member is a key determinant to the success of an online meeting. Whereas, reduced affective commitment may be experienced in a virtual team (Johnson et al., 2009) because of limitations to achieving great bond among participants in a virtual platform. The commitment can only be enhanced if the participants have common goals, project acceptance, and willingness to contribute to the project through thick and thin (Leung and Chan, 2007). Meanwhile, the low commitment of virtual participants can be reduced drastically when the top management which the team represents provides important tools that can enhance discussion to complete the assigned task. Besides, the leader of the virtual team can also engage and stimulate other members to gain their commitment. In an environment where the commitment level of team members cannot be guaranteed, it could be deduced that *lack of task focus (E-7)* would also thrive. During the outbreak of Coronavirus when participants have to work from home, construction stakeholders' concentration on tasks may be distracted by some domestic issues.

Absenteeism (E-3) was also denoted as a negative occurrence that can impede virtual team decision-making. This study confirmed that absenteeism constantly occurs in virtual team (Meluso et al., 2020). Firstly, the stakeholders on construction projects located in remote areas may be confronted with the inability to connect virtually with other team members due to poor internet connection. Secondly, it is logical for virtual participants in remote areas not to indicate facial appearance to have better audio reception for communicating with other members. Meanwhile, stakeholders could disguise under the pretence of poor internet connection to avoid participating in the discussion as expected while having an online presence at the meeting. Therefore, Benetytė and Jatuliavičienė (2013) opined that forewarning communication absenteeism to virtual participants is important to discourage having a participant with a virtual presence on the platform without contribution.

Recommendations and Practical Implications

This study investigated the severity of ethical issues confronting virtual decision-making on construction projects through various analyses. Previous studies explored ethical issues in virtual team (O'Hara-Devereaux and Johansen, 1994; Mockaitis et al., 2012), and research efforts that determined the severity of the ethical issues are unknown. This study, contributes theoretically to the literature on ethical issues obstructing decision making on construction projects in developing countries. Based on the findings of this study, several practical recommendations were posited.

This study revealed technical uncertainties as the most severe ethical issues confronting virtual teams on construction projects. There could be a technical issue in a virtual environment, however, the case of developing countries may be unique and need more practical attention. Therefore, it is recommended that construction stakeholders that have chosen to undertake the decision-making process in virtual platforms must be sure that their respective locations could avail of their internet connection without any disruption. The stakeholders may also procure an internet router with adequate capacity to suit the internet connectivity in their respective locations. In the process, several ethical issues such as unpredictable communication can be eliminated.

Lack of follow-through on ideas is also indicated as a significant ethical issue in virtual teams. To reduce this, it is advised that a feedback mechanism on all the implementation of the ideas suggested should be established. To ensure that all the ideas in the discussion are followed through, the minutes of the meeting should capture the key points with an indication of participants assigned to undertake a given task with a timeline. The team leader should also ensure that the responsibility to follow through with all the ideas are considered carefully. Considering the referential values to the elderly in some developing nations, it is recommended that the virtual team be facilitated by the stakeholder that commands the respect of others. This would assist the team to be well-coordinated and achieve the common goals. On the other hand, responsibilities could be delegated to each participant in the virtual team to avoid role ambiguity or work overload. In this process, the problem of unequal distribution of information may be avoided. Besides, the file for discussion may be uploaded to the cloud folders a day before the meeting starts for virtual participants to download and study them carefully.

Finally, to overcome the problem of low individual commitment and lack of social interaction in virtual team. It is recommended that the team leader be competent to keep a virtual team active and engaged them appropriately. The leader should also understand team dynamics and possess the ability to manage a virtual audience. With the effort of the team leader, and the cognitive willingness of the virtual members, the goals of the team can be achieved. In addition, the time used for communicating on virtual platforms should be limited compared to an equivalent face-to-face meeting.

CONCLUSION

Since the outbreak of the novel Coronavirus, most organisations have gradually embraced virtual platforms for continual delivery of services, in which the construction industry is not exempted. Despite the tremendous benefits and improvement in technological devices with which stakeholders undertake daily business, some dysfunctional factors still hamper virtual teamwork. The severity of the ethical issues in virtual team decision-making process on construction projects in a developing nation was investigated through a survey. The results of the analysis revealed that technical uncertainties, unpredictable communication, lack of follow-through on ideas, unequally distributed information, lack of social interaction, low individual commitments, etc., are the critical ethical issues confronting virtual teams on construction projects in developing nations. This study is novel in the sense that it does not only assess the ethical issue but computes the severity of the ethical issue in virtual team.

Based on the results of the analysis of the severity of the ethical issue in virtual team, practical recommendations were proposed. The study suggested ensuring that the virtual participants' locations avail them the opportunity to connect to the internet effortlessly. Explicitness on the

ideas and the obligations expected of each virtual participant were posited to ensure that the problem hovering on lack of follow-through on ideas is abated. Through this, role ambiguity, task overload, idleness, etc., can be avoided in a virtual team. It is also advised that the facilitator of the virtual team should be such that command the respect of other team members, understand team dynamics, and possess the ability to stimulate others to contribute on online platforms.

Although this study achieved the stated objectives through the various analysis conducted, the results in other developing nations may be different from the ones established in this study. Therefore, it would be important to determine the severity of ethical issues in other cultural settings different from where this study was carried out. Secondly, other ethical issues apart from those identified in extant literature may be important to study as well. Therefore, a qualitative study can be carried out to determine other ethical issues that may be peculiar to construction projects in other situations. It is also important to note that the conclusion for this study was drawn with the data from small sample of construction professionals via online platforms. It is advisable that future studies should investigate the severity of ethical issues in virtual team with larger data. To generate more responses, paper-based survey should be administered to construction professionals in the study area and other parts of Nigeria. This can provide a more robust findings that may be different from the ones reported in this study.

REFERENCES

Adeoye, A. A., Oladokun, T. A., & Opalere, E. (2022). Readiness for digital reference services: a survey of libraries in Ibadan Metropolis, Nigeria. *International Information & Library Review*, *53*(4), 306-314.

Adnan, H., Hashim, N., Mohd, N., & Ahmad, N. (2012). Ethical issues in the construction industry: Contractor's perspective. *Procedia-social and behavioral sciences*, *35*, 719-727.

Ameyaw, E. E., & Chan, A. P. (2015). Evaluation and ranking of risk factors in public–private partnership water supply projects in developing countries using fuzzy synthetic evaluation approach. *Expert Systems with Applications*, *42*(12), 5102-5116.

Matthew, A. (2014). A study on ethical construction management. *Scholedge International Journal of Business Policy & Governance*, *1*(1), 1-7.

Oladinrin, O. T., & Ho, C. M. (2016). Critical enablers for codes of ethics implementation in construction organizations. *Journal of Management in Engineering*, *32*(1), 04015023.

Ayoko, O. B., Konrad, A. M., & Boyle, M. V. (2012). Online work: Managing conflict and emotions for performance in virtual teams. *European Management Journal*, *30*(2), 156-174.

Benetytė, D., & Jatuliavičienė, G. (2013). Building and sustaining trust in virtual teams within organizational context. *Regional Formation and Development Studies*, (2), 18-30.

Calamlam, J. M., Ferran, F., & Macabali, L. G. (2022). Perception on research methods course's online environment and self-regulated learning during the COVID-19 pandemic. *E-Learning and Digital Media*, *19*(1), 93-119.

Cascio, W. F., & Shurygailo, S. (2003). E-Leadership and Virtual Teams. *Organizational Dynamics, 31,* 362–367.

Chamola, V., Hassija, V., Gupta, V., and Guizani, M. (2020) A comprehensive review of the COVID-19 pandemic and the role of IoT, drones, AI, blockchain, and 5G in managing its impact. *IEEE Access*, *8*, 90225-90265.

Chiluwa, I. (2013). Community and social interaction in digital religious discourse in Nigeria, Ghana and Cameroon. *Journal of Religion, Media and Digital Culture*, *2*(1), 1-37.

Corder, G.W., & Foreman, D.I. (2014). *Non-parametric Statistics: A Step-by-step Approach*,

Wiley, Hoboken, NJ.
Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, *12*(3), 346-371.
Cunningham, T. R., Guerin, R. J., Keller, B. M., Flynn, M. A., Salgado, C., & Hudson, D. (2018). Differences in safety training among smaller and larger construction firms with non-native workers: Evidence of overlapping vulnerabilities. *Safety science*, *103*, 62-69.
D'Souza, G. C., & Colarelli, S. M. (2010). Team member selection decisions for virtual versus face-to-face teams. *Computers in Human Behaviour*, *26*(4), 630-635.
Draugalis, J. R., Johnson, E. J., & Urice, D. R. (2020). Challenges and lessons amid the COVID-19 pandemic at one college of pharmacy. *American Journal of Pharmaceutical Education*, *84*(6), 655-659.
Ebrahim, A. N., Ahmed, S., & Taha, Z. (2009). Virtual teams: A literature review. *Australian journal of basic and applied sciences*, *3*(3), 2653-2669.
Fagbenle, O. I., Makinde, F. A., & Oluwunmi, A. O. (2011). Factors influencing construction clients'/contractors' choice of subcontractors in Nigeria. *Journal of Sustainable Development*, 4(2), 254-259.
Fayomi, J. O., & Sani, Z. A. (2022). Strategies for transforming the traditional workplace into a virtual workplace in smart cities. *Smart Cities and Regional Development (SCRD) Journal*, *6*(1), 35-54.
Ferrell, J. Z., & Herb, K. C. (2012). Improving communication in virtual teams. *SIOP White Paper Series*, 1-7.
Flynn, B., Pagell, M. & Fugate, B. (2018). Survey research design in supply chain management: the need for evolution in our expectations. *Journal of Supply Chain Management*, 54(1), 1-15.
Furst, S. A., Reeves, M., Rosen, B., & Blackburn, R. S. (2004). Managing the life cycle of virtual teams. *Academy of Management Perspectives*, *18*(2), 6-20.
Garro-Abarca, V., Palos-Sanchez, P., & Aguayo-Camacho, M. (2021). Virtual teams in times of pandemic: factors that influence performance. *Frontiers in Psychology*, *12*, 232. doi.org/10.3389/fpsyg.2021.624637.
Germain, M. L. (2011). Developing trust in virtual teams. *Performance Improvement Quarterly*, *24*(3), 29-54.
Gilani, S. A. M., & Faccia, A. (2022). Broadband connectivity, government policies, and open innovation: The crucial IT infrastructure contribution in Scotland. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(1), 1-29.
Gupta, S., & Pathak, G. S. (2018). Virtual team experiences in an emerging economy: a qualitative study. *Journal of Organizational Change Management, 31*(4), 778-794.
Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis*, 7th ed., Prentice Hall, NJ.
Jang, C. Y. (2013). Facilitating trust in virtual teams: The role of awareness. *Advances in Competitiveness Research*, 21(1), 61-77.
Jarvenpaa, S. L., & Ives, B. (2004). The global network organization of the future. *Journal of Management Information Systems*, *10*(2), 25-57.
Jarvenpaa, S. L., & Leidner, D. E. (1999). Communication and trust in global virtual teams. *Journal of computer-mediated communication*, *3*(4), JCMC346. doi.org/10.1111/j.1083-6101.1998.tb00080.x
Johnson, S. K., Bettenhausen, K., & Gibbons, E. (2009). Realities of working in virtual teams: Affective and attitudinal outcomes of using computer-mediated communication. *Small Group Research*, *40*(6), 623-649.
Kayworth, T. R., & Leidner, D. (2002). Leadership effectiveness in global virtual teams. *Journal of Management Information Systems*, 18, 7–40.

Kiely, G., Butler, T., & Finnegan, P. (2021). Global virtual teams coordination mechanisms: building theory from research in software development. *Behaviour & Information Technology*, 1-21.

Kraut, R. E., Galegher, J., & Egido, C. (2018). Relationships and tasks in scientific research collaboration. Human-Computer Interaction, 3(2), 31-58.

Leung, M. Y. and Chan, H. K. (2007) Antecedents of commitment in construction management. *Construction Management and Economics*, 25(2), 113-127.

Leung, M. Y., & Wei, X. (2019). Interactive communication in value management workshops. *Proceedings of 2019 Society of American Value Engineers Summit International,* Portland, USA, 149-156.

Leung, M. Y., Baharuddin, D., Khoo, E., Yong, F., Zainordin, N. H., Wei, X. Y., Ojo, L. D., & Li, K.W. (2021b). PAQS International Mini-workshop Report: Impact of Covid-19 on the Construction Industry. The Pacific Association of Quantity Surveyors. Available at https://www.paqs.net/node/277.

Leung, M. Y., Ojo, L. D., & Wei, X. Y. (2021a) Exploring the impact of coronavirus (Covid-19) pandemic on the construction industry: Quantity surveyors' perspective. *Proceedings of the Pacific Association of Quantity Surveyors.*

Levasseur, R. E. (2012). People skills: Leading virtual teams—A change management perspective. *Interfaces*, *42*(2), 213-216.

Lilian, S. C. (2014). Virtual teams: Opportunities and challenges for e-leaders. *Procedia-Social and Behavioral Sciences*, *110*, 1251-1261.

Luo, L., Mao, C., Shen, L., & Li, Z. (2015). Risk factors affecting practitioners' attitudes toward the implementation of an industrialized building system a case study from China. *Engineering, Construction and Architectural Management,* 22(6), 622-643.

Meluso, J., Johnson, S., & Bagrow, J. (2020). Making virtual teams work: Redesigning virtual collaboration for the future. *SocArXiv*, 1-14.

Mockaitis, A. I., Rose, E. L., & Zettinig, P. (2012). The power of individual cultural values in global virtual teams. *International Journal of Cross-Cultural Management*, *12*(2), 193-210.

Morrison-Smith, S., & Ruiz, J. (2020). Challenges and barriers in virtual teams: a literature review. *SN Applied Sciences*, *2*(6), 1-33.

NCDC (2022). Covid-19 Nigeria: Confirmed cases by state. Available at https://covid19.ncdc.gov.ng/ (accessed July 8, 2022).

Nydegger, R., & Nydegger, L. (2010). Challenges in managing virtual teams. *Journal of Business & Economics Research (JBER)*, *8*(3), 69-82.

O'Hara-Devereaux, M., & Johansen, R. (1994). *Global Work: Bridging Distance.* San Francisco, CA: Jossey-Bass.

Ojo, L. D., & Ogunsemi, D. R. (2019). Critical drivers (CDs) of value management adoption in the Nigerian construction industry: A Delphi study. *Journal of Engineering, Design and Technology*, 17(1), 250-264.

Oke, A. E., & Ogunsemi, D. R. (2013). Key competencies of value managers in Lagos state, Nigeria. *Proceedings of 5th West Africa Built Environment Research (WABER) Conference*, 773-778.

Olowu, A. O., & Seri, F. O. (2012). A study of social network addiction among youths in Nigeria. *Journal of Social Science and Policy Review*, *4*(1), 63-71.

Ott, R.L., & Longnecker, M. (2016). *An Introduction to Statistical Methods and Data Analysis,* 7th ed., Cengage Learning, Boston, MA.

Pallant, J. (2020). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS, 7th ed.,* Routledge, New York.

Pazos, P. (2012). Conflict management and effectiveness in virtual teams. *Team Performance*

Management: An International Journal, 18(7/8), 401-417.
Presbitero, A. (2020). Foreign language skill, anxiety, cultural intelligence and individual task performance in global virtual teams: A cognitive perspective. *Journal of International Management*, *26*(2), 100729.
Reyna, A., Martín, C., Chen, J., Soler, E., & Díaz, M. (2018). On blockchain and its integration with IoT. Challenges and opportunities. *Future generation computer systems*, *88*, 173-190.
Shameem, M., Kumar, C., & Chandra, B. (2017). Challenges of management in the operation of virtual software development teams: A systematic literature review. *Proceedings of 4th International Conference on Advanced Computing and Communication Systems (ICACCS)*, 1-8.
Tan, C. K., Ramayah, T., Teoh, A. P., & Cheah, J. H. (2019). Factors influencing virtual team performance in Malaysia. *Kybernetes*, 48(9), 2065-2092.
Wang, X., Liang, C. J., Menassa, C. C., & Kamat, V. R. (2021). Interactive and immersive process-level digital twin for collaborative human–robot construction work. *Journal of Computing in Civil Engineering*, *35*(6), 04021023.
Wattanatinnachot, K. (2022). Team members' perspectives on factors affecting virtual team working in information technology consulting firms. *Asia Social Issues*, *15*(3), 1-24.
Wilson, J., Crisp, C. B., & Mortensen, M. (2013). Extending construal-level theory to distributed groups: Understanding the effects of virtuality. *Organization Science*, *24*(2), 629-644.
Wu, T., Blackhurst, J., & Chidambaram, V. (2006). A model for inbound supply risk analysis. *Computers in industry*, *57*(4), 350-365.
Wuni, I. Y., & Shen, G. Q. (2020). Critical success factors for modular integrated construction projects: a review. *Building research & information*, *48*(7), 763-784.
Wuni, I. Y., Shen, G. Q., & Saka, A. B. (2022). Computing the severities of critical onsite assembly risk factors for modular integrated construction projects. *Engineering, Construction and Architectural Management*. Doi: 10.1108/ECAM-07-2021-0630.
Yilmaz, G. (2016). What you do and how you speak matter: Behavioral and linguistic determinants of performance in virtual teams. *Journal of Language and Social Psychology*, *35*(1), 76-97.
Zhang, X., Shen, L., Wu, Y., & Qi, G. (2011). Barriers to implement green strategy in the process of developing real estate projects. *The Open Waste Management Journal*, *4*(1) 33-37.