

IMPACT OF VIRTUAL PROJECT MANAGEMENT ON SUSTAINABLE CONSTRUCTION PROJECT DELIVERY DURING THE COVID19 PANDEMIC

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ABSTRACT

The of virtual project Management on Project delivery during COVID 19, was researched on to evaluate and verify the possibilities of escaping from situations of project abandonment and delays in project delivery during emergency situations that may require global, regional or local lock down/restriction of movement. This research considered a theoretical development with a concept of phase- to- phase relationship that gives way to proper segmentation of different project phases to allow complete concentration on each of the phases of the project in allocating time, resources and quality of construction project. In an attempt contribute to knowledge, the concept of road construction project life circle was expanded, from its usual stages of project conception phase, project planning phase, contractor selection phase, project mobilization stage, project execution and project completion/commissioning phase to environmental Impact assessment phase, risk assessment phase, project evaluation and audit phase as well as project report writing and presentation phase between contractor and client, for proper documentation and reference purposes. This research did not fail in testing the hypothetical statements to find out if the implementation of virtual project management had any negative effect on work practises, 2% of expert respondents said they strongly agree, 4% said they agree, 13% said they disagree and 81% said they strongly disagree. The results from respondents on the possibilities of positive impact of virtual project management on work practices during COVID 19 pandemic in the construction industry shows that, 79 % strongly agreed to the statement of hypothesis 14% said that they strongly agreed, 5% said they disagreed while 2% said that they strongly dis agree. The implementation of virtual project management, reduces delay in time of project delivery was also tested, 72% of respondents said that they strongly agreed, 16% said they agreed, 4% said they disagree while 8% said they strongly disagreed. Respondents were also asked if implementation of virtual project management does not reduce delay in time of project delivery, 5% stated that, they strongly agreed, 7% said that they agreed, 14% said that they disagree, while 74% said that they strongly disagreed. Impact of implementation virtual project management on reducing construction project running cost was also tested, 85% said, they strongly agree, 12% agreed, 2%, disagreed 1%, strongly disagreed. The impact of implementation of virtual project management non reduction of construction project running cost shows that 85%, strongly disagreed, 12% disagreed, 1% agreed, and 2% strongly agreed. Hypothesis on Implementation of virtual project management on increase in work team productivity in construction project was also tested, 72% strongly agreed, 22% agreed, 3% disagreed, another 3% strongly disagreed. In testing if implementation of virtual project management does not increase work team productivity in the construction industry, 2% strongly agreed, 4% agreed, 23% disagreed while 71%, strongly disagreed. When impact on implementation of virtual project management on reducing risk associated with health and safety on construction project work team members was tested, 85% said that

they strongly agreed that it reduces risk, 7% agreed, 3% disagreed, while 5% strongly disagreed but 2% strongly agreed that the implementation of virtual project management does not reduce the risk on health and safety of construction work team members, 6% agreed, 8% disagreed while 84% strongly disagreed. This research findings supports the implementation virtual project management as a concept that would accelerate effective project delivery during emergency lockdown situations and recommends priority attention on development of new concepts for improvement of virtual project management for effective work project team membership and efficient delivery of construction projects, given an expected time, running cost, quality, productivity as well as health and safety standard.

Keywords: Construction, Covid19 pandemic, Virtual project, teams, sustainable, Managers.

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1: INTRODUCTION

The emergence of Coronavirus disease in 2019 popularly known as (Covid-19) outbreak was traced to Wuhan, China, since then, the dynamics of its spreading method is not yet medically and scientifically understood Huang et al. [1] ; Zeng et al. [2]. The geometric progression of its spread impact on mortality and morbidity of human beings in a very short space in time caused the stake holders in the global health sector to declare the Virus a pandemic through the World Health Organization (WHO) [3] on March 11, reported cases of decrease in the outbreak in China was a result of the very serious measures taken, in relation to improvement in hygiene and some other medically related treatment practices as well as the introduction of social distancing. Gautam and Hens [4]. The Virus has a very prominent feature of rapid spread and extended incubation period Linton et al. [5]. The Developing status of Nigerian economy with its associated project developmental structure was negatively impacted in all the regions of the country especially in the country's capital (Abuja) and all other state capital as well as other business and financial hubs with Lagos at the epicentre . The challenging situation created a large vacuum in revenue sufficiency which in turn, affected the state's economic capacity to fund projects in the area of meet their immediate project delivery timeline. The review of the growth of the construction industry was carried out and was discovered to manifest a downward progress report of about 0.7% with a high tendency of possible further depreciation if short-term measures are not seriously taken to avert any possible severe disruption more than envisage by the COVID-19 GlobalData,[6]; Thomas, [7]. The negative impact of this pandemic on project delivery affected virtually all the regions within the global community causing severe economic, scientific and technological stagnation throughout the nascent period of occurrence and extended to a post pandemic time. This stagnation resulted from the decisions of governments of the different countries of the world to create a lock down policy and its implementation was the major cause of stagnation especially in area of project development and possible delivery. The reduction in the rate of mortality and morbidity proved that the control measures taken over the pandemic had become very effective and at such there was need to for the application of new policy dimension to ease the lock down so as to resuscitate the near collapsed, collapsing collapsed economies which Ramboll, [8] views as bringing the dwindling economies back on track. Remarkably, projects that survived during the intensified period of the COVID 19 pandemic are those projects that its managers explored the opportunity of virtual project development and delivery method necessitated by the emergency situation caused by COVID-19 that

hindered the execution of almost all global projects, thereby establishing different scenarios of abandoned projects. This virtual controls in the project management and project delivery, emphasised the significance of virtual project development, management, and delivery as effective management effective management concept that uses a conglomeration virtual teams to encourage all global industrial community to continue all project development, management and delivery in all possible emergency situations that may have a movement restrictive nature because of its high life threatening percentage form.

The time dimensional form of project delivery makes the use of virtual projects a very important and sensitive concept since every project is expected to have a start date and a conclusion date considering the facts that projects are temporary endeavours undertaken to create a unique product, service, or result within an expected period of time. The Unique nature of different projects brings about different uncertainty situations that requires project managers to ensures meeting the project standard requirements through application of knowledge, skills, tools, and techniques in execution of project activities which virtual project management is specifically a new dimension of knowledge, skill and technique supportive in the process of timely project delivery. Thus, Project management is accomplished through the appropriate application and integration of project management processes putting into consideration these above mentioned criteria to help complete project life cycle which is a collection of different phases which sometimes have high overlapping tendency. The supply chains in project development process have already suffered significant risks that need effective management system for efficient monitoring and mitigation to accommodate sustainability in the industrial project development processes that would always result to standard globally acceptable timely project delivery in short term, medium term and long term scenarios. Therefore collaborations using virtual project management strategies becomes very vital to building a comprehensive knowledge of certain strategic project factors that would help a formulation of the most acceptable mitigation strategy for effective project delivery. Failure in taking a pragmatic approach in steady monitoring of projects and working in collaboration to overcome major challenges may have adverse effects on the process of project delivery. Therefore, all project managers within their individual levels of engagement, need access information and required resources delivered to them on time to achieve whatever aim of project engagement. (Mukhop and Mukhop,[9] specified that this is possible through virtual means and recommends that leaders are also expected to develop virtual meetings for all project team members with clearly defining the goals as well as short and medium term objectives within emergency periods. Despite the fact that project managers are the key actors that should be responsible for project delivery, it would also be of great importance to continually monitor all possible work progress and needs intermittently so as to evaluate employee motivation and engagement levels in other to know a possible motivational input that would bring about high productivity out using the same virtual concept.

This research was triggered by the negative impact of COVID 19 on project delivery which leg to abandonment of most projects within the heat of the pandemic as a result of restrictions on movement of people and subsequent lockdown. Thus the idea of virtual project came into play to put such abandoned projects into development process once again so as to make sure that projects are delivered effectively within the expected time lag. Project Managers considered the economic sector and implications of abandoning such projects, health sector and such implications, environmental sector and such implications as well as construction and manufacturing sectors and implications of abandonment of projects under such sector. The level of performance within such sectors are considered to be verified within the heat period of the pandemic to ascertain the possibility of bringing in the alternative virtual project management instead of the usual physical practice of project site visitation and supervision for effective project management and efficient project delivery. The application of virtual project

management should have put into consideration, mode and choice of communication since project team members are meant to work remotely, leadership issues as far as virtual project management is concerned, IT management issues which is a key area that should be most supportive to all virtual project management processes and the possibility of coordinating efficient team work so as to produce high performance of positive result oriented nature for societal and client maximum satisfaction.

This study will advance theoretical and practical knowledge on evaluation of virtual management practices being targeted at achieving work progress even during the pandemic and other periods of such emergency situation that may warrant movement restrictions. The study will also provide managerial techniques that would be useful for project managers to enhance researches on the improvement of use of virtual platforms for successful virtual teams in the face of emergency situations such as the COVID 19. Second, the role of clients would also be evaluated to verify how supportive they are to project consultants during the pandemic. The study was limited to only project managers in the construction industry putting into consideration the developing nature of Nigeria and the numerous construction activities taking place simultaneously at different regions in the country. This research would be informative to stakeholders in the construction industry during policy and decision-making processes in the country and as well present effective methodologies for addressing challenges for the stability and sustainability of this sector.

The specific objective of this study is to verify the effect of the COVID-19 pandemic on allocated time for construction project delivery, allocated funds, for construction project delivery and Impact on health and safety of the stakeholders in the construction industry and how virtual project management had impacted on such projects.

1.1: Phase to Phase relationship in Project life cycle

The concept of phase- to- phase relationship can be used in this research for proper segmentation of the different project phases so as to allow complete concentration on each of the phases of the project in allocating time, resources and control for construction projects. The different phases are developed to identify what could be accommodated and expected for each phase. The start of each phase allows possible revalidation of risk associated with execution of the project while the concluding of each phase allows review of results from project delivery so as to ascertain if a project has been completed in an acceptable form according to the terms of contract. Figure 1 below displays the different phases referred to as phase-to- phase relationship.

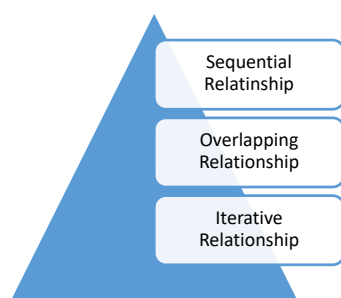


Figure 1: Three stages of Phase-to Phase relationship in project life circle

Multi-phase projects, experience more than one phase-to-phase relationship during the Project life cycle (PMBOK Guide 2008). The sequential Relationship involves completion of a project phase that has already started before initiating the next phase while the Overlapping relationship involves beginning of the next project phase before the completion of the previously started phase and Iterative relationship

is beneficial to largely undefined projects where the planning for the next phase occurs during the current phase. Project development delays may cause a particular project to be carried out using more than one phase. Thus if sequential relationship is used and delay occurs where the project manager is battling to meet the time schedule for the project completion, overlapping relationship may come into play.

1.2: Expanded concept of road construction project life circle

Figure 2 below displays a concept for road construction project life circle, which has been expanded from its usual stages of project conception phase, project planning phase, contractor selection phase, project mobilization stage, project execution and project completion/commissioning phase to environmental Impact assessment phase, risk assessment phase, project evaluation and audit phase as well as project report writing and presentation phase between contractor and client for proper documentation and reference purposes.

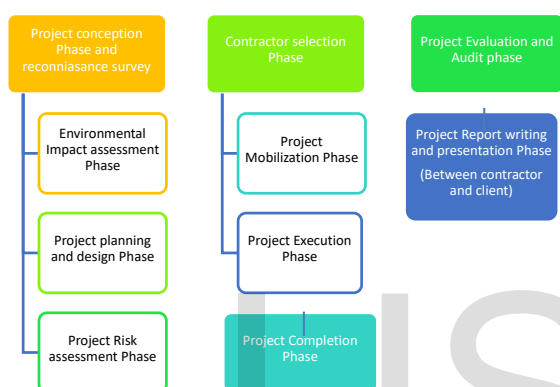


Figure 2: Developing a Concept for Road Construction Project Life Circle

Evaluation of the role of virtual project management in project delivery, is done through various methodologies for achievement of efficient projects management, especially in management of projects during emergency situations. Virtual project management has proven to have adaptability to such situations that may involve global restriction of movement and at such found to be suitable for managing projects involving virtual teams. The traditional project management concepts has no efficient mechanisms to constantly monitor and control projects without site visitation and physical meeting with the project team. Thus the impact of COVID 19 on project delivery introduced the dispersion of project team members as part of uncertainties that can be handled by virtual project management. Fernandez and Fernandez [10]. These Virtual teams are project team that are spatially distributed members at different coordinate but are able to execute their duties electronically through information technology approaches, Hertel et al., [11]. According to Lurey and Rais [12] virtual teams are a groups of people who work in a different location, time, and other boundaries. Fransiskus, [13] also stated that that virtual teams, are groups of geographically, organized set of people working at certain times though dispersed but work together with aid of technology to reach common goals.

Virtual project team should therefore consist of team of experts in the project management sector who have differences in time and space dimension but can electronically coordinate the team's activities within an agreed time frame through an information dissemination process for achievement an effective and efficient project delivery irrespective of distance and uncertainties that may have been created by movement restrictions and other such emergency situations like Corona Virus pandemic. The Iterative approach was necessary for managing projects during COVID 19 period and the approach is

characteristic for agile methodologies. The need for team members' interaction can also be notably increased. Agile project teams practice frequent, most often daily face-to-face meetings, and at such require co-location of team members in order to manage changes and produce increments. (Fernandez and Fernandez [14]. Using agile methods in different environments requires physical meetings for result oriented project delivery. Suresh and Shrinii, [15]. According to Wysocki and McGary, [16] viewing already existing methodologies, adaptive approach such as Adaptive Project Framework is the closest to be suitable for usage in virtual environments. Adaptive Project Framework is based on iterative planning in which mid-level Work Breakdown Structure and functions prioritization is done initially, and more detailed planning and time scheduling is done prior to each cycle. Time spent on planning is optimized, since only the things that are certain are included in the plan. However, this approach may not be the best one for virtual teams. In the virtual team project initiation stage, it is necessary to clarify expectations as much as possible. All these can have positive effect in clearing vagueness that in later stages can cause significant problems resulting with delays lasting much longer than it would have been needed to conduct initial discussions on particular issues. Daily meetings conducted in Adaptive Project Framework are not practical to carry out by virtual teams. Furthermore, Adaptive Project Framework promotes intensive interactions with the customer, which are not entirely suitable for virtual project environments. Another limitation of Adaptive project framework is its resemblance with agile approach that promotes limited usage of software tools that are otherwise the cornerstone of projects in virtual team environments. Wysocki and McGary,[17]. The traditional management processes should be complemented with a more adaptive view this may bring about a hybrid approach to project management with both traditional and agile practices that may be the most valid approach. Fernandez and Fernandez, [18]. It is good to note that the proposed framework of virtual team project management methodology works in combination with the most synchronizing elements of the methods already in existence in combination of tools and support from technology. The proposed framework suitable for virtual Project management has the following characteristics (a) Introduction a detailed collaborative planning for reduction of uncertainty as well as promoting socio-emotional processes, (b) Introduction of iterative project phases in other to reduce risks associated with virtual systems in project management,(c)Introduction monitoring and control with the aid of tools as support systems with quality standard inputs and output in other to unify deliverables and intermediates, (d) Introduction of a more suitable customer approach suitable for virtual project management systems, and (e)Introduction of intensified use of information management technology for communication among project team members, in replacement of face-to-face discussions among project team members.

The developing economies embark on Projects as means of infrastructural development and by such means, create high level employment opportunities for numerous sections of population with its associated economic boost. Ghandour,[19]. COVID-19 pandemic negatively impacted on this sphere of economic and infrastructural development as well as employment growth rate. Some governments carried out significant developmental efforts so as strengthen their health, education, and other strategic sectors of their economy. Most of them boosted the equipment used in the health sector for medical experts who were also given motivations to boost their efforts toward positive input in the system for treatment of patients infected with COVID 19 Virus. In Education sector, funds were provided to enable the applicability student's enrolment into online classes, for continuity of learning and research during the pandemic. In the case of Nigeria government did not do much to remedy delivery of construction projects within the heat of the pandemic and at such, this research becomes very necessary to strategize for delivering construction projects during possible future occurrence.

COVID-19 pandemic heavily affected the systemic processes of delivering construction projects execution. This has made high percentage number of project managers to indulge in working remotely

and simultaneously making sure that very crucial systems of the project are at work. According to Baldwin and Mauro, [20] .90% of the project managers were working from home during the closure of March 2020 leaving about 10% of the staff at the project site in most of the construction industries with considerable care in implementing the COVID 19 protocols. This percentage was allowed to visit project sites of urgent importance which shows that most of the project activities were abandoned during the pandemic. Project Managers that were involved in the construction of residential and commercial buildings also resorted to working from home, while construction team members were allowed one or two days in a week to visit project locations. The drift from workplace environment supervision to home supervision has some negative effects, especially in relation to failure in adequate management of resources at the site.

Ruiz-Torres et al [21] stated that reduction of workforce has a negative impact on both duration of completion of work and the quality of output. They further stated that that the more reduction of workforce, the more extended period for completion of the project. Thus the reduction of workforce places much pressure on the retained workforce and makes them overwork so as to meet the required deadlines. This was actually the case during COVID 19 lockdown with COVID protocol compliance strategy to keep social distancing which in turn caused several project managers to withdraw numerous construction staff from the site with its associated low quality productivity and delay in time of project delivery as well as the possibility of incurring more cost for the construction projects that will definitely affect the budget for the project. This actually made this research more significant in other to allow us explore the advantages of application of virtual project management in organizational workplace which include: (a) Lower Operational Cost that are related to infrastructure like company's office building which will no longer be in use and at such money will not be budgeted for payment for rent of such building or total acquisition. Though the companies will have to spend more money on cost equipment and its maintenance, such as electricity, computer and its software as well as internet facilities but such companies will also have reduced cost of payment of workers since workforce is reduced by working virtually. Virtual Projects teams are meant to meet in the curse of managing projects only when it is obviously important to discuss or carry out compulsory 24-hour work. It is part of the advantage of working virtually, that company can work 24-hour using shift method applicable in different city and country which accelerates productivity. (b) Work Flexibility: Hiring a flexible employee in virtual teams implies that company can scale up or downscale easily instead of the company running at a fixed office. (c) Safety: when companies work virtually, reduces the spread of coronavirus with their employee safety as number one priority.

Disadvantages of Virtual Teams during Covid-19 Outbreak: (a) Employee Isolation in virtual teams during project management can be counter-productive since it brings about lack of physical interactions with its associated cases of depression stress, boredom and decreased performance. In virtual environment communications are slated for mostly for task-oriented activities. (b) Conflict situations arising from different cultural backgrounds of employee as well as difference location specifics resulting to different behaviour too. (c) Higher Cost of Technology that requires organization have to keep up-to-date with newest technology to keep them business.

2: MATERIALS AND METHODS

This research used both quantitative and qualitative research approaches which will include questionnaire distribution to respondents and secondary data from related literature. These information would help his research to establish the effects of the COVID-19 pandemic on the completion time of projects in the construction industry. This would also carry out a comparative analysis between results from selected construction companies. Hassan [22] stated that application of such research process

using a particular research design was result oriented when it was applied in the energy sector on effect of COVID19 outbreak on the environment and renewable energy. Mercy [23] on COVID-19 Pandemic: the Effects and Prospects in the Construction Industry also stated that, the design permits direct collection of information, since it permits the researcher to dig into responses from the respondents, especially when the responses become difficult for possible analysis.

The population of the study is made up of the construction industry in Imo state. The industry is viewed to be at least, second to the largest sector in the country and at such is also seen as a significant means of employment for numerous employable population in the country and even beyond as it accommodates foreign nationals too. Though, the project managers working in this construction sector is our target respondents. This is to make sure that the group that will be the target respondents would be selected from the representative features of the general population, Archya [24]. Purposeful sampling was also employed so as to concentrate on results from expert respondents. 150 project managers were interviewed through questionnaire distribution in the construction industry but 120 respondents returned their questionnaire and responding either agree, strongly agree, disagree and strongly disagree. We ensured high level of accuracy during this research process. The use of excel spread sheet was employed to perform data analysis and such data displayed graphically for easy interpretation of result.

The impacts of COVID 19 during the time of the project, the funding of the project, project execution processes/work practices, productivity, health and safety we sampled the opinions of project managers in Imo state so as to test this research hypotheses. This research is limiting its scope to the construction industries due to the fact that construction industry enjoys less customer patronage on the event of any emergency disaster like a pandemic. Some hypotheses were development to reflect, Construction Project work practices making up **Hypothesis 1:** The implementation of Virtual project management negatively affects work practices during Corona Virus pandemic. Delay in Construction Project Delivery, making up **Hypothesis 2:** The implementation of project virtual project management reduces delay in time of project delivery. Reduction in Construction Project Running cost, making up **Hypothesis 3:** The implementation of Virtual project management causes reduction in construction project running cost. Increased Construction Production Project work team productivity, making up **Hypothesis 4:** The Implementation of Virtual Project delivery increases project working team productivity in the construction industry. Reduction in Project work team health and safety risk exposure making up **Hypothesis 5:** The implementation of virtual project management reduces the risk on health and safety of construction project work team members.

3: RESULTS AND DISCUSSIONS

This Research was conducted to verify the level of impact of implementation of virtual project Management project delivery during COVID 19 Pandemic and at such, hypothetical statements were issued out for test and was tested using results from respondents through the distributed questionnaire to professional in project management, in the construction industry with very good experiences in management and work practices in construction projects.

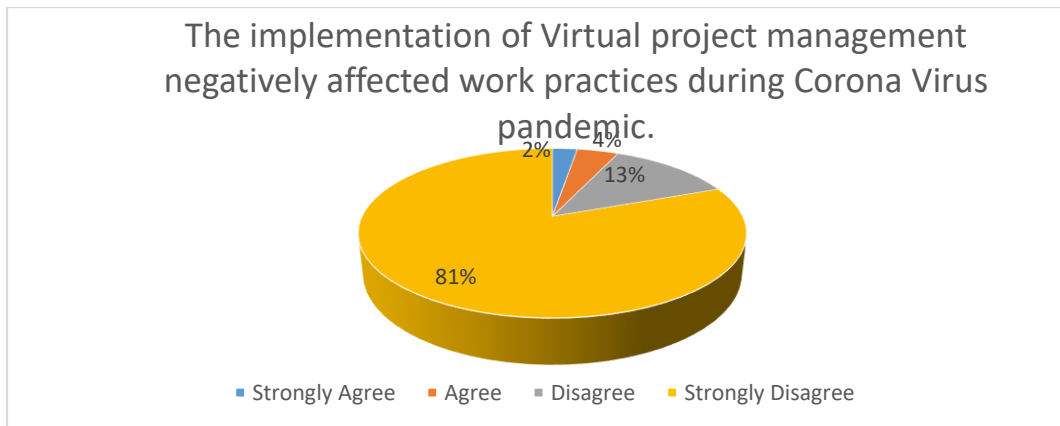


Figure 3: Negative Impact of virtual project management on work practices during COVID 19

The first hypothesis was tested to find out if the implementation of virtual project management had any negative effect on work practises, 2% of expert respondents said they strongly agree, 4% said they agree, 13% said they disagree and 81% said they strongly disagree. This results are specified as displayed on the pie chat in figure 3.

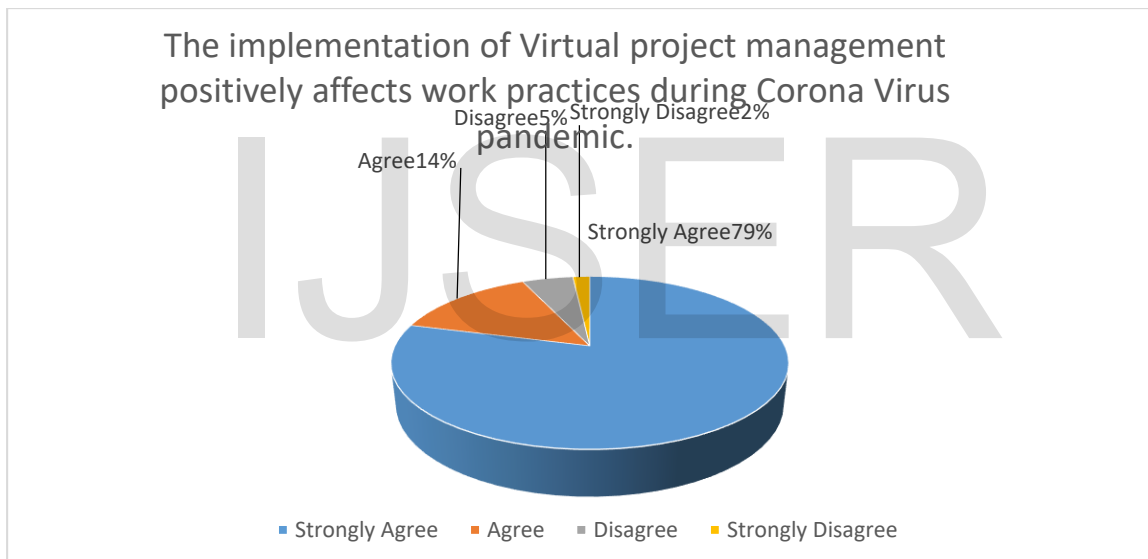


Figure 4: Positive impact of virtual project management on work practices during COVID 19

Figure 4, also displayed the results from respondents on the possibilities of positive impact of virtual project management on work practices during COVID 19 pandemic in the construction industry. Results displayed on the pie chat stated that 79 % strongly agreed to the statement of hypothesis 14% said that they strongly agreed,5% said they disagreed while 2% said that they strongly dis agree.

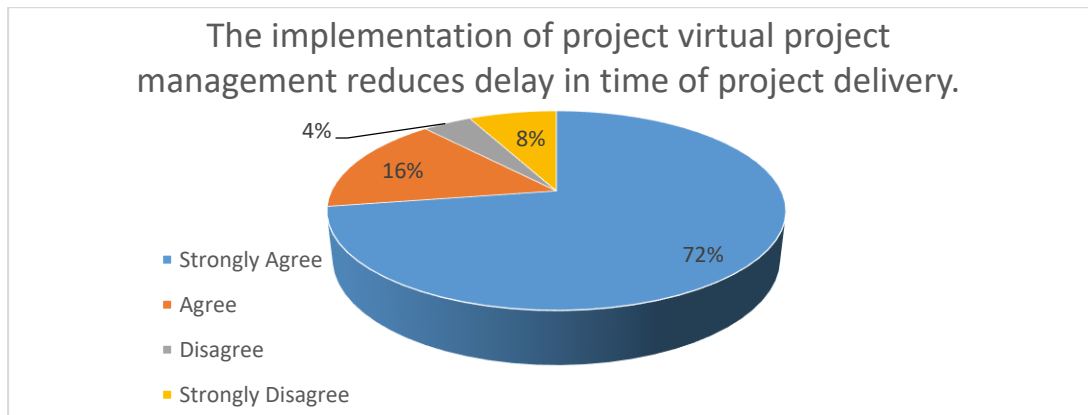


Figure 5: Impact of virtual project management on reducing delay in time of project delivery during COVID 19

Figure 5 displayed results that tested the possibilities of implementation of virtual project management, to reduce delay in time of project Delivery, 72% of respondents said that they strongly agreed, 16% said they agreed, 4% said they disagree while 8% said they strongly disagreed.

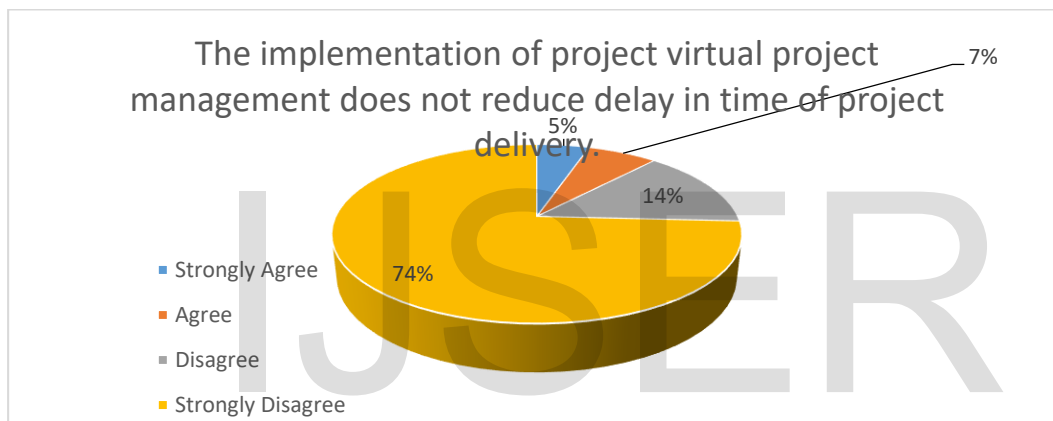


Figure 6: Impact of virtual project management on non-reduction of delay of project delivery during COVID 19

Figure 6 displayed the results that verified that implementation of virtual project management does not reduce delay in time of project delivery. 5% of the respondents stated that they strongly agreed, 7% said that they agreed, 14% said that they disagree, while 74% said that they strongly disagreed.

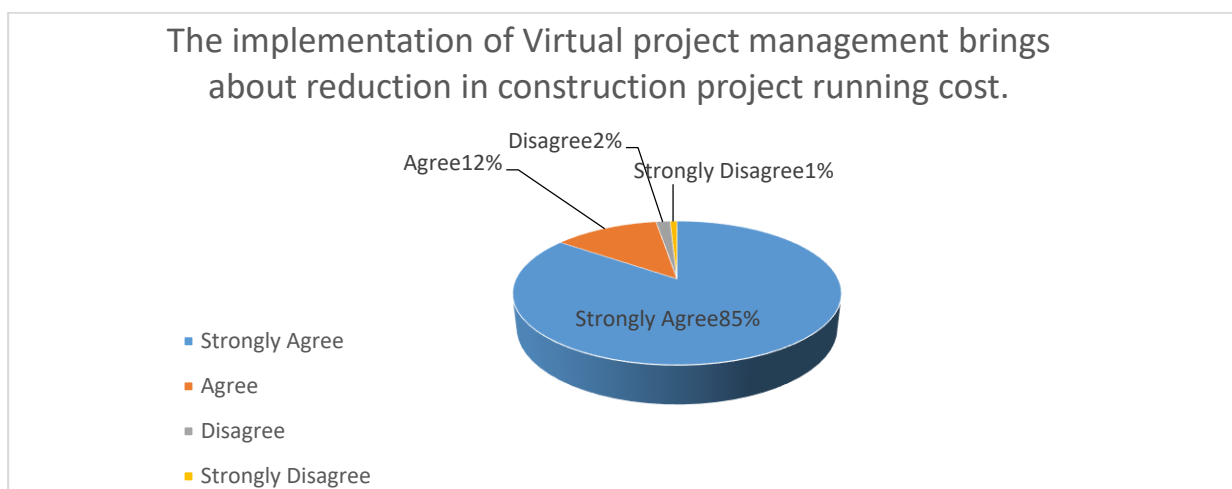


Figure 7: Impact of virtual project management on reducing running cost during COVID 19

Figure 7 displayed the results from respondents on impact of implementation virtual project management on reduction in construction project running cost, 85% said that they strongly agree, that implementation of virtual project management on construction project, brings about reduction in project running cost, 12% said that they agree, 2% said that they disagreed while 1% said that he strongly disagreed.

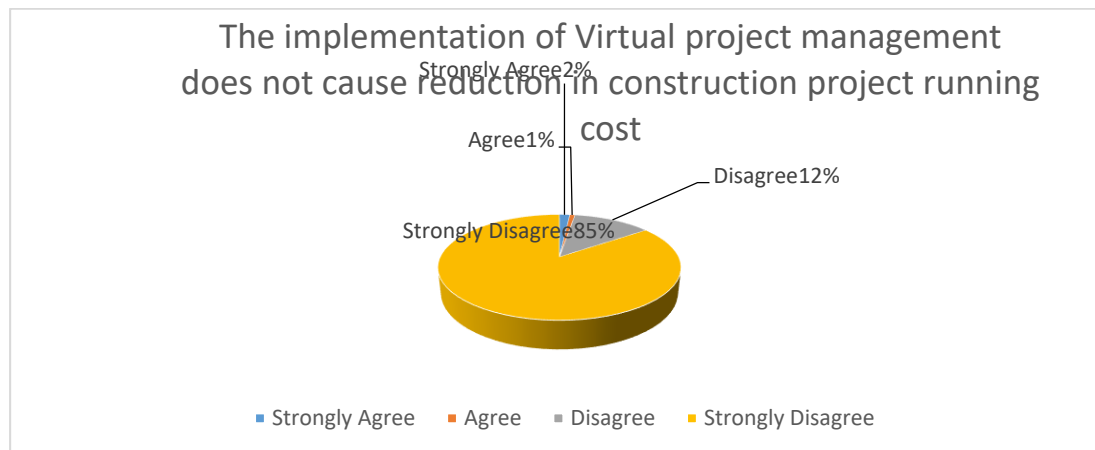


Figure 8: Impact of virtual project management on reducing running cost during COVID 19

Figure 8 displayed results from hypothesis tested from data secured from respondents in questionnaire on the impact of implementation of virtual project management on reduction of construction project running cost. Thus, implementation of virtual project management does not reduce construction project running cost, 85% said that they strongly disagree, 12% said that they disagree, 1% said he agreed, and 2% said that they strongly agreed.

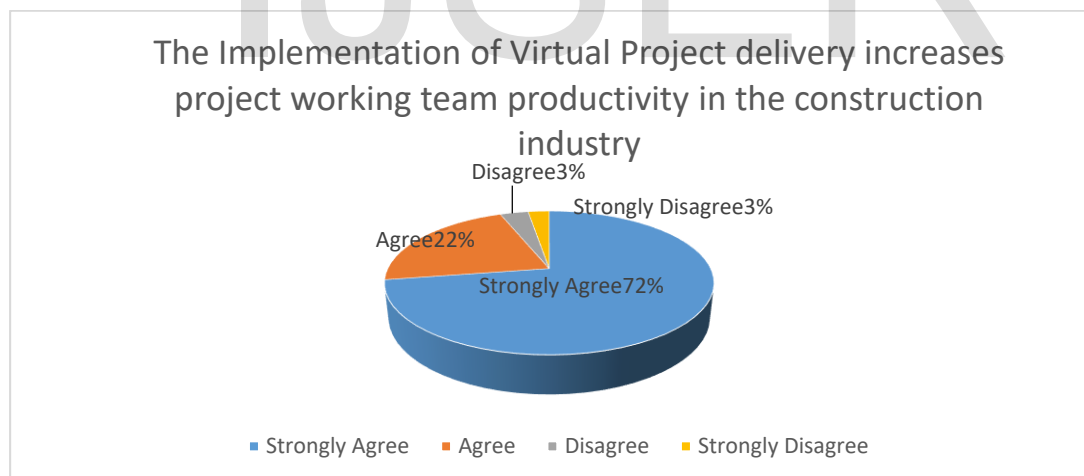


Figure 9: Impact of virtual project management on increase in work team productivity during COVID 19

Figure 9 displayed results from the questionnaire on the implementation of virtual project management on increase in work team productivity in construction project, 72% said that they strongly agreed that it increases work team productivity, 22% said that they agreed, 3% said that they disagreed while another 3% said that they strongly disagreed. This high percentage responses from project managers in construction industry supports the hypothetical statement made in this research on productivity input and output.

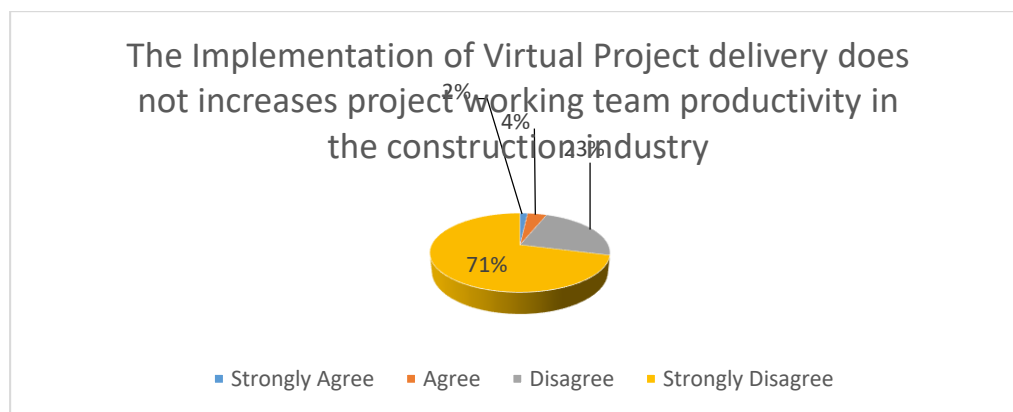


Figure 10: Impact of virtual project management on decrease in work team productivity during COVID 19

Figure 10 shows that only 2% of the interviewed project managers strongly agreed that the implementation of virtual project management does not increase work team productivity in the construction industry, 4% agreed, 23% disagreed while 71% said they strongly disagreed.

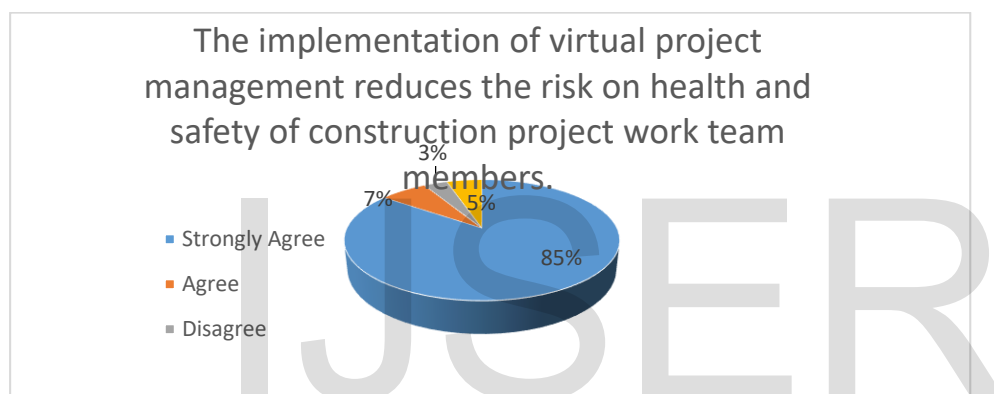


Figure 11: Impact of virtual project management on decrease on health and safety risk during COVID 19

Figure 11 shows the results from respondents which stated that implementation of virtual project management reduces that risk associated with health and safety on construction project work team members, 85% said that they strongly agreed that it reduces risk, 7% said that they agreed, 3% said they disagreed, while 5% said that they strongly disagreed.

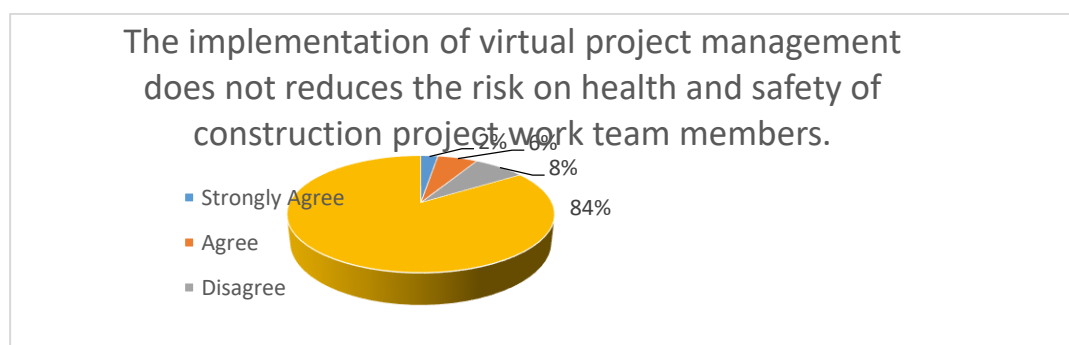


Figure 12: Impact of virtual project management on increase on health and safety risk during COVID 19

Figure 12 shows that 2% strongly agreed that the implementation of virtual project management does not reduce the risk on health and safety of construction work team members, 6% said they agreed, 8% said they disagreed while 84% said that they strongly disagreed.

4: CONCLUSION

The incidence of COVID 19 pandemic affected project delivery in the construction industries with numerous constrains in areas of time of project delivery, running cost of the projects, project work practices for project team members, productivity input and output as well as health and safety of project work team members. This actually necessitated this research to verify the nature of impact on the above mentioned criteria for successful project delivery in construction projects using virtual projects. This research outcome verified that the implementation of Virtual project management did not negatively affect work practices during Corona Virus pandemic rather it positively affected work practices going by the high percentage responses that strongly agreed to the positive impact. Time of Construction Project delivery was also analysed from results from questionnaire coming from expert respondents. It was verified that the implementation of project virtual project management reduces delay in time of project delivery going by the high percentage response of strongly agree and agree. This research also tried to verify if the implementation of Virtual project management causes reduction in construction project running cost and it was ascertained from the high percentage of respondents who said that they strongly agreed. Meanwhile, the impact of Implementation of Virtual Project management on increases project working team productivity in the construction industry was found to be of high percentage in respondents who said they strongly agreed on the positive effect on productivity increase in the construction industry while the fifth hypothesis was tested to verify that implementation of virtual project management reduces the risk on health and safety of construction project work team members. The expert responses were also collected and analysed to verify that very high percentage of the respondents said, they strongly agreed that implementation of virtual project management in the construction industry reduces the effect of construction projects of health and safety exposure to risk. Based on this results, this research is making a supportive argument that development of new concepts for improvement on virtual project management should be given priority attention so as to help in effective work project team membership and efficient delivery of construction projects and every other project given an expected time, running cost, quality, productivity as well as health and safety standard.

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