The Future Use of Cloud-based Virtual Technologies to Enhance Project Management in West Coast governments: A Delphi Study

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Abstract

The future use of advanced cloud infrastructure technologies has continued to receive increased attention from theory and practice. However, there is a persistent lack of consensus among information technology on the future use of cloud-based technologies to enhance project management in government agencies. This study sought to obtain the consensus of the information technology experts on the West Coast on the future use of cloud-based technologies to enhance project management in West Coast governments. The study adopted a qualitative research method grounded on the Delphi design in which data was collected in three cycles/rounds. A sample of 20 information technology experts sourced from LinkedIn were engaged in semi-structured interviews to generate data. Data collected was interviews was transcribed verbatim to generate a Microsoft Word document, which was subjected to coding. Codes bearing similar meanings were combined to form themes, which were analyzed using the thematic analysis technique. The study findings confirmed that there is a consensus among information technology experts that cloud-based virtual technologies will become increasingly relevant in project management environments due to intensified expectations for efficiency and productivity in project management. The study recommended that government agencies should be abreast of technological advancements and adopt cloud-based virtual technologies to continue optimizing the outcomes of project management in the future.

Keywords: *Productivity, Efficiency, Cloud-Based Virtual Technologies, West Coast Governments, Project Management.*

1.1 Introduction

Advanced technologies are rapidly becoming the mainstay of modern project management endeavors in both private and public sectors (Alzakholi et al., 2020; Bello et al., 2021). Project managers apply the technologies to implement project activities and ensure real-time relay of information as projects progress across the lifecycles (Colander, 2014). While there are several project management technologies applicable in the context of governments, particular attention has been drawn to the crucial role of cloud-based virtual technologies to remain relevant in the future as an enhancer of project management. Recent studies have emphasized that cloud-based technologies are enablers of enhanced management of activities across projects' lifecycles (Deshko et al., 2016; Hashemi et al., 2013). Private and public organizations seeking to enhance project management outcomes have found cloud-based technologies an undeniable tool for actualizing their goals (Joshi & Islam, 2018). However, the consensus of information technology experts on the infinite relevance of cloud-based technologies to continue providing a basis for improved project management has not been adequately established.

The tradition of relying on non-digitalized tools has changed due to the emergence of information and communication technologies (ICT), enabling the government to ensure its citizens and businesses can access services conveniently (Hakizimana & Muhe, 2019). Governments are continuously perceiving cloud technologies as a solution to most operational challenges, owing to their improved efficiency and effectiveness in information transmission (Josh et al., 2017). However, project management in the government sector has seen delays in proactive response to the realities of managing projects using cloud-based virtual technologies. The reactive responses to technological changes are mostly expensive or effective as per the expectations, partly due to rushed decisions or lack of adequate stakeholder involvement (Holzmann et al., 2022). Having knowledge about the future of cloud-based technologies based on IT experts' consensus could motivate the need for a proactive response to changes in project management technologies, including the introduction of cloud-based virtual technologies.

Most project management experts are continuously finding ways of achieving a continued reduction of costs of operation across place and time (Liang, 2012). Existing literature has continuously shown that using cloud-based computing technologies is intended to minimize costs at all stages of project progress (Alashhab et al., 2021; Agrawal, 2021; Holzmann et al., 2022). Several benefits associated with applying advanced technologies to enhance project management, such as efficiency, effectiveness, and risk management, include the key areas of focus in the future of project management (Gao, 2021; Utami et al., 2022; Alzakholi et al., 2020; Caprolu et al., 2019). However, the future use of cloud-based virtual technologies to manage projects in the West Coast governments is not clear from the viewpoint of information technology experts.

1.2 Problem statement

Cloud-based virtual technologies' role in enhancing project management remains obscured in project management landscapes. The cause of this problem is limited knowledge of the consensus of the information technology experts on the future use of cloud-based virtual technologies to enhance project management (Schank, 2021; Evans & Farrell, 2021). The lack of consensus has caused government agencies on the West Coast to exhibit limited attention toward adopting

advanced technologies necessary to enhance project management. The problem delays government agencies' adoption of advanced cloud-based computing technologies. Continued utilization of outdated technologies is associated with inefficiencies, leading to increased costs and completion times for government projects (Shafiq & Shakor, 2021). Despite the criticality of cloud and virtual technologies in public service delivery, Irion (2012) claimed that only a handful of scholarly studies have investigated government cloud services in the United States. According to Kraemer and King (2006), most studies conducted in the past several decades focused on the impacts of information technology in corporate organizations, while only a few studies were based on government organizations.

Many possible factors contribute to the problem, including differences in modalities and effectiveness implementation of cloud-based virtual technologies to manage projects, resulting in positive and negative outcomes. The mixed outcomes lead to diversified opinions among information technology experts, causing the lack of consensus on how government agencies can use cloud-based virtual technologies to enhance project management. As a result of the limited advanced technologies, government projects become unnecessarily costly because of the slow implementation process (Colander, 2014). Implementing best practices in virtual and cloud technologies could improve process efficiency, thereby avoiding delays in project completion and enhancing efficiency in minimizing waste and costs (Alzakholi et al., 2020; Caprolu et al., 2019). Information technology experts' consensus on enhancing project management using cloud-based virtual technologies could influence the government project managers' use of the cloud infrastructure.

1.3 Research Aim

The study aimed to establish a consensus of information technology experts on the future use of cloud-based virtual technologies to enhance project management in West Coast governments.

2.1 Literature review

Internet-based services reflect a milestone in the development of cloud technologies being intensively in use currently. Increased access to cloud and virtual technologies is motivating the use of technologies to optimize organizational operations. Scholars have attempted to distinguish between cloud and virtual technologies. While cloud technologies are software tools based on cloud servers used to store and access data and programs online (Alzakholi et al., 2020), virtual technologies include electronic resources, devices, systems, and tools that process, generate, or store data. Virtual technologies enable users to use information technology services by utilizing resources bound to hardware (Deshko et al., 2016). It allows users to use the total capacity of a physical machine by distributing its capabilities among many environments or users.

Efficiency is a crucial aspect that governments take into consideration when planning for and implementing projects. Taghipour et al. (2020) argued that efficiency enables construction firms to minimize waste from project implementation processes, and waste minimization translates to reduced project costs. Cloud and virtual technologies facilitate data integration, which provides a

basis for project coordination and immediate access to information for making decisions during various levels of a project (Bello et al., 2021). Rapid access to information enables project implementors to make the right decisions. Having the right decisions in place accelerates project progress and enhances performance features such as quality and profitability. Quality ensures project efficiency by eliminating the chances of reworks and costs associated with repairs (Nanakkal, 2021). Profitability implies that an entity implementing the project realizes a considerable difference between costs and revenues. However, Bello et al.'s (2021) study was limited to the construction industry; nonetheless, it confirmed that cloud computing technologies contribute immensely to the efficiency of project implementation processes. Waste minimization is an essential aspect of efficiency that project implementers factor in during project implementation.

A considerable proportion of projects the government implements include construction activities for infrastructures such as houses, transport and communication networks, and power lines. The continuous generation of heterogenous data causes the construction industry's data intensiveness during project progress. Past research has examined the use cases, benefits, and challenges of cloud computing in the construction industry (Bello et al., 2021). The systematic analysis that Bello et al. (2021) conducted revealed that cloud computing acts as a delivery enabler for other emerging technologies such as virtual reality (V.R.), Internet of Things (IoT), Big Data Analytics, and Building Information Modelling (BIM). Emerging technologies' instrumental role in ensuring effective project coordination through data integration allows instant access to a holistic data view. Failure to access data in real-time as the project progresses may lead to wrong decisions that could lead to delays and negatively affect project performance and profitability.

The technology acceptance model (TAM) underscores the willingness to adopt new technologies. Davis (1989) developed the model to illustrate the two primary factors influencing an individual's intention to use new technology: perceived ease of use and perceived usefulness (Chuttur, 2009). Kamal et al. (2020) argued that technology acceptance involves people's choices to accept and adopt the technology. According to Hwang et al. (2019), researchers widely use TAM as a theoretical framework in studies to predict current technological adoption and users' future behavior concerning technology use. Perceived usefulness (PU) depicts the level at which a user accepts that their job efficiency will be improved when using the new technology while perceived ease of use (PEOU) relates to how much an intended user believes that utilizing a particular system will be less cumbersome. Users' beliefs regarding the value of working with the planned technology, such as its potential to enhance their performance, amounts to PU. In contrast, Elkaseh et al. (2016) described PEOU as the extent to which technology's intended users believe they will be released of vigorous effort if they use a particular technology or system. According to the theory, the attitude of the adopter in future technologies will depend on their level of adoption.

Existing literature has consistently revealed that cloud and virtual technologies have several benefits, but still agreed that the challenges of adopting the technologies can cause a significant shift in user intention in the future (Artem et al., 2018; Wang & Alexander, 2021; Gill et al., 2022). Studies on technology acceptance through an extended technology acceptance model found that perceived ease of use, usefulness, social influence, and facilitating conditions positively influence behavioral intentions to use technology in healthcare (Kamal et al., 2020). Moreover, Kamal et al.

(2020) noted that while perceived ease of use and usefulness positively influence technology adoption, negative aspects such as technological anxiety may hamper the adoption of new technologies.

This Delphi study purposed to establish the consensus of information technology experts about the future use of cloud-based virtual technologies to enhance project management in West Coast governments. Data collected from a panel of experts provided a basis for establishing the information technology experts' consensus on the study phenomenon.

3.1 Research Design

The study applied the Delphi design to gather and analyze data from a panel of information technology experts on the future use of cloud-based virtual technologies to enhance project management. The Delphi technique is typically conducted in three data collection and analysis rounds. The research design was suitable for the study because it provided an opportunity to explore the future state of cloud-based computing technologies used in government institutions based on the opinions of the subject-matter experts. Moreover, the future technological state of cloud-based computing technologies was not accurately known, given the rapid technological changes and security threats that characterize operations in digital spaces.

3.2 Sampling Procedures

A sample is a proportion of a study's population directly engaged in the research process (Tipton, 2022). The researcher targeted a population of information technology experts working on the West Coast from which a sample of 20 experts were selected. The eligibility criteria for the sample included working on the West Coast, holding a managerial position, having worked with a government agency for at least two years, and currently aged above 40 years. The researcher applied purposive sampling technique because it requires selecting participants based on their knowledge and experience of the research phenomenon. Purposive sampling ensured the researcher selects a suitable sample of information technology experts with extensive knowledge and understanding of the future use of cloud-based computing technologies to enhance the project management.

3.3 Participant Recruitment

The initial process of recruitment involved using LinkedIn to search for IT executives currently working for organizations on the West Coast at executive levels and requesting them to participate in the study. The recruitment process involved setting the LinkedIn Search Criteria to 'People Search' and clicking on 'Advanced Search' followed by a modification of the search parameters to include 'Information technology expert' in the title field and selecting 'Current' in the dropdown menu. The researcher selected the experts from 'All Industries' but narrowed the seniority to 'Executive.' Each LinkedIn user who met the eligibility criteria was added to a list of potential participants.

3.4 Research Tools

The study adopted semi-structured interviews. Semi-structured interviews permitted the collection of in-depth qualitative data while ensuring that the researcher led the interviewees to provide specific information pertinent to the study (Eppich et al., 2019).

3.5 Data Collection and Analysis

Data was collected in three rounds, given that the research was a Delphi study. Round one was purely explorative and sought to investigate the participating IT experts' opinions on the future use of cloud-based virtual technologies to enhance project management. Round two focused on confirming the thematic issue that emerged from the dataset. Round three established a consensus using Kendall's coefficient concordance (W) based on the participants' rating of the statement read to them. The ratings on a 7- point Likert scale (1- extremely disagree, 7- extremely agree) enabled the researcher to compute Kendall's W which provided a basis for concluding the experts' consensus on the study phenomena. The qualitative dataset was coded and subjected to theming before being analyzed using the thematic analysis technique.

After the participants' confirmation of the transcripts, the next step was data analysis. The six-step qualitative data analysis process was followed (Braun & Clarke, 2006). Thematic analysis involves identifying, analyzing, and reporting patterns within a qualitative dataset. The thematic analysis process in this study required the researcher to organize and describe the dataset in detail and interpret various aspects of the research topic. The interview questions were semi-structured and involved reading out a statement and a set of possible options based on a 7-point Likert scale from which the participants selected the option they believed was best suited for the question. The data collected was subjected to SPSS analysis to generate means, standard deviations, and Kendall's coefficient of concordance, which helped to determine the consensus among the IT experts enhancing project management in West Coast governments using cloud-based virtual technologies.

4.1 Key Results and Findings

The participants for cycle 1 were 20, cycle 2 were 17 and cycle 3 were 15. The decline in the number of the participants in each step was caused by the unavailability of the participants. Despite the lack of 100% response rate for cycle 2 and cycle 3, the sudy generated a high-quality dataset. The qualitative dataset revealed that the intensification of expectations for project management efficiency and productivity is a motivator for continued use of cloud-based virtual technologies in the future. Intensification of expectations for project management efficiency and productivity illustrates the augmented need for project managers to uplift their efforts to satisfy the intensified quality requirements of project management endeavors. The dataset was used to generate four themes.

Theme 1: Future Desire for Improved Productivity and Efficiency

The study findings confirmed that cloud services will continue to play a key role in improving the productivity and efficiency necessary to meet the intensified quality expectations from clients.

> I believe a West Coast government with a full implementation and utilization of cloud-based virtual technologies will experience streamlined project management processes that are connected to positive project outcomes ($P1C_1$).

The study further showed that cloud-based virtual technologies would continue enabling organizations to improve the efficiency with which they manage projects. One of the participants ($P2C_1$) reflected the need to embrace the current wave of cloud-based virtual technologies because of the associated efficiency.

> […] but considering the adoption and development of cloud-based virtual technologies in various sectors of the US government, the West Coast depicts it as a critical component to embrace the wave of implementing cloud-based virtual technologies, which are deemed as efficient and effective in the delivery of government services ($P2C_1$).

The participant further expressed that efficiency and results are critical components in improving a system; therefore, when government agencies adopt cloud-based virtual technology, they should be able to meet the goal of efficiency and results following the set guidelines. However, the continued use of obsolete technologies can undermine the efficiency of project management success in the government sector.

> Apparently, we have continued to utilize obsolete technologies and have a slow response to change. This inconsistency is associated with inefficiencies resulting in increased costs and delayed completion of government projects ($P3C_1$).

The study revealed that the lack of optimized cloud-based virtual technologies is caused by the failure of the West Coast government agencies to use the technologies consistent with the required standards. According to $P4C_1$, the ways in which West Coast government agencies use cloud-based virtual technologies are not compatible with the recommended guidelines.

> For instance, the set standard operation procedures are not fully integrated into agencies' use of the adopted cloud-based virtual technologies ($P4C_1$).

$P3C_1$ also noted that the increased need for efficiency and productivity will continue to push government organizations to adopt cloud-based virtual technologies. According to the participant, cloud-based virtual technologies will be sustained as a tool for project management. The reason for sustained instrumentality is that the West Coast government agencies intend to increase efficiency by integrating cloud computing and e-government to enhance the delivery of public services and save on initial costs and space.

> The uninterrupted access to information from one place will result in increased productivity that is necessary for project completion ($P3C_1$).

Theme 2: Access to Data Sources

Moreover, $P6C_1$ believed that cloud-based virtual technologies could be critical tools for increasing West Coast government organizations' efficiency and access to shared resources, including servers, networks, and data storage. As a result, cloud technologies are becoming more critical in increasing sustainability in project development and completion. However, using obsolete technologies has been blamed for the increased inefficiency that characterizes most government project management processes.

> I have observed the West Coast government's continued use of obsolete technologies and has not adequately transitioned to the evolving technology that could guarantee efficiency. This has resulted in inconsistencies associated with inefficiencies, increasing costs, and delayed completion of government projects ($P6C_1$).

Despite the weaknesses associated with the use of outdated technologies, the study confirmed that the West Coast governments can achieve immense performance through task automation facilitated through cloud-based virtual services. Automation features will streamline repetitive tasks, thus freeing up time for more strategic project activities.

The study findings revealed that there is an increase in the quest for task automation, which will eventually lead to increased demand for cloud-based virtual technologies. Based on the response by $P1C_1$, cloud-based virtual technologies are becoming more relevant than ever in the current context of project management in the government sector.

> […] integrating AI and machine learning models in incident response can be a transformative move since it allows for ruthless automation in deep dive investigations and identification of the root cause, impact, and cause of incidents. Automation ensures prioritization of response efforts and on-time threat identification. Through this, the technologies can provide sustainable, efficient solutions in project management with minimized uncertainty regarding security and privacy concerns.

Theme 4: The Need for Task Automation

P3C1 expressed certainty that government agencies on the West Coast are integrating cloud-based virtual technological solutions to automate repetitive tasks and coordinate team members to focus on more critical tasks in ways that avoids wastage during project implementation ($P3C_1$). Automated tasks permit critical project management processes such as resource allocation algorithms, real-time reporting, and the use of project templates to optimize productivity.

> There is an ever-increasing need for efficiency in project management. I think government agencies can increase efficiency if they apply, um, or use resource allocation algorithms, um, these are advanced resource allocation algorithms that optimize task assignments and resource utilization during the entire project ($P17C_1$).

The participant ($P17C_1$) further said that other important activities like real-time reporting and the use of advanced project templates are inherent in cloud services, and they facilitate simplification of project setup and standardization of project management processes.

The participants identified the need for cross-functional integration with other cloud applications as an enhancer of overall productivity and efficiency of project management. $P20C_1$ said that using cloud-based software allows decentralized teams to connect on a unified platform through which they share files, information, and folders needed to achieve the prospects of project management. On the contrary, it was evident from the study that a lack of cross-functional integration may threaten the applicability of cloud-based virtual technologies for project management. According to $P1C_1$, project managers might face a lack of centrally managed information asset control and oversight, which can threaten the coordination of project management services due to difficulties in collaboration between the agencies, which might undermine the efficiency and productivity of project personnel. Moreover, the participant identified cross-functional integration as the best way through which cloud-based computing technologies can be improved to produce sustained results.

> To improve the future potential of cloud-based virtual technologies for project management, I think it could be better to deliver a joint cloud computing environment through the standard configuration of integration and controls required for meeting the project management, security, and privacy needs of every agency. Therefore, the cloud computing system should always guarantee minimized disruptions and unified project management operations even when migrating data. Seamlessly integrating artificial intelligence (AI), Internet of Things (IoT), and machine learning into the technologies could enhance its effectiveness and efficiency ($P1C_1$).

Another participant ($P4C_1$) also agreed that Artificial Intelligence (AI) is critical to cloud-based services. AI has necessitated easy identification of trends and patterns in government agencies' projects due to the presence of data analytics powered by artificial intelligence.

> The AI systems are efficient, considering they evolve and learn over time; as such, I can say that they necessitate ease and effectiveness in data processing ($P4C_1$).

Additionally, $P6C_1$ echoed the responses by $P1C_1$ and $P4C_4$ that the future potential of cloud-based virtual technologies for project management can be improved through the integration of Artificial Intelligence (AI) and the Internet of Things (IoT), which could further optimize project management operations. $P3C_1$ agreed that through the integration of machine learning algorithms, the West Coast government agencies can revolutionize their effectiveness and efficiency in information security through enhanced incident response.

> The future role of cloud-based virtual technologies for project management can be improved by integrating AI-powered project analytics to navigate the challenges of project execution. Such advancement will enable managers to visualize and analyze projects and develop effective timelines for timely completion ($P3C_1$).

Theme 5: Cross-functional Integration

$P7C_1$ supported the need for cross-functional integration by following the argument that artificial intelligence is a critical component in developing cloud-based services. The participant narrated that AI depicts great potential in the management and storage of data, and considering the great ability of AI to perform data analytics and identify patterns efficiently, the capability positions AI

as a promising integrative tool in fostering government agencies to embrace cloud-based virtual technologies.

> It is therefore certain that the demand for AI services which are cloud-based will continue, I think, into unforseeble future ($P7C_1$).

The essentiality of cross-functional integration is that it helps project managers to streamline the project management processes. The study findings emphasized the necessity of technological systems enabling smooth operations due to the adoption of cloud-based virtual technologies.

> Every system of operation and management requires a system that offers streamlined and smooth operations and considering the benefits accrued from smooth operations from cloud-based virtual technologies, I believe that cloud-based virtual technologies will be sustained by West Coast government agencies in the future ($P2C_1$).

The findings indicate that cloud-based virtual technologies can be enhanced with the technology embracing the integration and incorporation of applications built and designed to meet the systems architecture in cloud services, thus serving the purposes of project management effectively. Cloud-based services have provided the option for organizations such as government agencies to integrate their applications into the cloud platforms; considering the cloud platforms also offer room for enhancing features and services in an integrated manner, the agencies can provide effective and smooth services in meeting their project needs.

The study further revealed that coordinating multiple projects in different locations requires real-time cloud information.

> Cloud-based virtual technologies offer integrated features, including real-time on-site information sharing that enhances swift decision-making, thus minimizing waste caused by delays ($P6C_1$).

The participant further believed that cloud computing could continue offering West Coast government agencies a centralized platform for discussions regarding project management activities. Cloud computing system provides features such as integrated messaging, file sharing, and sections for commenting, which could improve the efficiency of collaboration and communication.

Cycle 2

The participants expressed that cloud-based virtual technologies will continue becoming increasingly relevant due to heightened expectations for efficiency and productivity. The seventeen (100%) participants agreed that government operations are becoming complex and citizens' awareness is high. Satisfying the public expectations with the project that the government is implementing requires a high degree of caution to meet requirements ($P19C_2$). Cloud-based virtual technologies can improve the efficiency and productivity of each project ($P5C_2$). The participants unanimously agreed that increased efficiency and productivity can help to improve project management in West Coast government agencies.

Cycle 3

In cycle 3, the participants were provded with a question about the intensification of expectations for efficiency and productivity will motivate increased use of cloud-based virtual technologies to enhance project management in the future in West Coast government agencies. They answered the question using a 7-point Likert scale, and the data analyzed to generate mean, standard deviation, and Kendall's coefficinent of concordance.

Table 1: *Consensus on Cloud-based Virtual Technology Influence*

	Mean	Standard deviation	Kendall's W
Do you agree that the intensification of expectations for efficiency and productivity will motivate increased use of cloud-based virtual technologies to enhance project management in the future in West Coast government agencies?	6.7333	.45774	0.719

The mean of 6.7333~ 7 indicates that most participants extremely agreed that cloud-based virtual technologies can effectively improve project management in West Coast governments. The mean standard deviation of 0.45774 depicts a low variability in the participants' options between 1 and 7, indicating a consensus among the information technology experts who participated in the study. Kendall's W is 0.719. The concordance coefficient is greater than 0.7, which indicates a strong consensus among the information technology experts that cloud-based virtual technologies result in the thematic aspect presented in the study.

The researcher further investigated the participants' consensus regarding the role of the presented cloud-based virtual technology feature on project improvement. The seven-point Likert scale was used to collect data, and the results were presented using Table 2.

Table 2: Consensus on Cloud-based Virtual Technology in Enhancing Project Management in West Coast Governments

To what extent do you agree with the following in relation to enhancing the performance of project management in West Coast governments?	Mean	Standard deviation	Kendall's W
Intensified expectations for efficiency and productivity optimization	6.6667	0.48795	0.701

The mean of 6.6667 ~7 indicates that most of the participants strongly agreed with the statement aspect of intensified expectations for efficiency and productivity optimization as a motivator for the future use of cloud-based virtual technologies for project management in West Coast governments. The standard deviation of 0.48795 indicates that there was a low variability in the responses. Kendall's W of 0.701 confirmed that there was a consensus among the information

technology experts on the aspect of intensified expectations for efficiency and productivity optimization as a motivating factor for the future use of cloud-based virtual technologies to enhance project management on the West Coast.

5.1 Discussion

The key responsibility of government agencies in improving project management is to optimize efficiency and productivity. The study revealed that quality expectations are rapidly increasing during the current era, characterized by clients paying more attention to quality than price. Mitra (2016) identified that in the current business landscape, customers seek goods that satisfy their exact needs perfectly without being sensitive to prices. Thus, increased insistence is placed on enhancing productivity and efficiency as the cornerstones of ensuring client needs are met. Cloud-based virtual technologies enable project contractors to develop projects that meet the intended audience's exact needs.

The study further showed that cloud-based virtual technologies have the potential for enhancing productivity, unprecedented efficiency levels, and streamlined processes through their functionalities associated with enhanced collaboration and real-time accessibility of shared data. On a similar note, Gao (2021) argued that organizations applying cloud-based technologies in e-government increase the efficiency of executing public service tasks. Alzakholi et al. (2020) supported a positive association between cloud-based technologies and project process efficiency. Efficiency plays a crucial role in enhancing the performance of project management because it minimizes waste, translating to reduced costs of project management (Taghipour et al., 2020). Therefore, cloud-based virtual technologies can optimize efficiency and productivity in West Coast governments and enhance the performance of project management.

The modern world is characterized as fast-paced with dynamic modernity, making cloud-based virtual technologies a key consideration in project management endeavors. Scholars believe that virtual environments are receiving widespread attention as part of the future solutions to ineffective and inefficient service delivery in governments (Swart et al., 2022; Van Raaij & Schepers, 2008; Deshko et al., 2016). Given the observation, it is also evident that cloud-based virtual technologies will remain key elements in project management in the government sector. Cloud computing technologies will continue to provide bases for the revolutionary transformation of several industries over the years (Bello et al., 2021). Government agencies will continue to respond to technological advancements for them to remain relevant in managing projects and achieving strategic objectives (Abd et al., 2019).

6.1 Conclusion

The study established a consensus among information technology experts on the future use of information technology to optimize the outcomes of project management in government organizations. The need to provide platforms that allow real-time access to information across the project cycles cannot be understated in a highly dynamic world. In the future, government entities will proactively respond by adopting technologies that enable them to implement projects virtually using cloud resources and infrastructure (Abd et al., 2019). Nanos et al. (2019) noted that cloud

computing is the latest information and communication technology innovation that will continue to offer several benefits and spur public entities' digital transformation in the coming days. The information technology experts participating in the study had a consensus that cloud-based virtual technologies will continue to remain imperative in project management in the future. Mitra (2016) argued that as technologies continue to advance, public organizations are seeing the need to adopt them to streamline processes increasingly. Currently, project clients are paying increased attention to the quality and productivity of projects.

Despite the robustness of the study's findings, it is necessary to recognize its limitations. All the participants who responded in cycle 1 were not available to participate in cycle 2 and cycle 3. Twenty experts responded to cycle 1 interviews, but only 17 and 15 for cycle 2 and 3 interviews, respectively. The response rates imply that the study missed the input of the participants who were not available to participate in the two cycles. Lower-than-expected response rates may reduce the robustness of the findings and the quality of conclusions made from such findings (Hammarberg et al., 2016). Despite the limitation, the study optimized the available participants to collect data that captured answers to cycle 2 and 3 interview questions.

7.1 Recommendations

Cloud-based virtual technologies provide opportunities to optimize quality and overall productivity (Gao, 2021). Therefore, the future potential of cloud-based virtual technologies can be improved if government agencies advocate for and promote the technologies as agents and catalysts of digital transformation rather than the enterprises of tech spending. This initiative will accelerate change since people will view cloud technologies as efficient service delivery applications rather than simply focusing on costs. Thus, the West Coast government agencies should be prepared to embrace cloud-based virtual technologies and use them as the mainstay for completing projects on schedule, budget, and expected quality.

8.1 Areas for further research

Future studies may recruit participants from government agencies to increase the credibility of the findings and compare the similarities and differences between the current study's findings from the experts working on the West Coast and those working in government agencies. Moreover, researchers may consider applying mixed methods to collect data capturing numeric and non-numeric aspects. Adopting mixed methods is advantageous because it helps to generate data that captures quantitative and qualitative elements of the research phenomenon, hence increasing the robustness of the findings.

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