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Virtual work system and operational efficiency in organizations

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Abstract - The swift paradigm shifts to embracing a virtual work system necessitated by the COVID-19 pandemic have drastically fast-tracked and revolutionized organizational operations. As modern organizations progress in piloting this contemporary route meticulously, there constantly lies the critical need for managers to understand and fathom the significance of the virtual work system on the firms' operational efficiency. These, however, have presented unprecedented opportunities but have also invariably introduced unique, complex challenges that need to be checkmated. Using the exploratory research design approach and drawing from the Technology Acceptance Model (TAM), this paper reveals the need for practicing a virtual work system and supports that organizational efficiency can be achieved through flexibility, reduction of running cost, minimal work spaces, etc., while leveraging on modern innovations to enhance employees' work-life balance.

Keywords: virtual work system, operational efficiency, covid-19 pandemic, workplace, organization

1. Introduction

Virtual work system was brought to limelight and illuminated the business world during the COVID-19 outbreak. The outbreak of the disease was declared a Public Health Emergency of International Concern (PHEIC) by the World Health Organization in January 2020 (WHO, 2020a) and was later pronounced a pandemic in March 2020 (WHO, 2020b) as highlighted by Ugwuzor and Eke (2022). Organization all over the globe had to adjust and align their business operations to accommodate the policies enacted for the prevention and further spread of the disease (NCDC, 2020). There were house quarantines and global lock-downs, travel limitations and restrictions, and downsizing of employees in most economic sectors which resulted in many individuals losing their jobs (Alobidyeen et al., 2022; Hevia & Neumeyer, 2020). By so doing, telecommuting and remote work became an emerging new normal in many organization. The phrase 'the world is a global village' had no better time to shine. Digitization and telecommuting became a significant driver of globalization and innovation as technological improvements promote easier, faster, and more affordable communication among people, organizations, and governments without certain limitations of time and physical presence (Owusu et al., 2023). This period saw an ever-increasing utilization of contemporary technology, innovative ideas and showcased a healthy welcoming embrace towards globalization. Virtual work system explicitly refers to the

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use of technology to enhance organizational operations and to communicate and improve collaboration among team members across different geographical locations. Many organizations began to operate virtual work system which is a workplace environment that can be domiciled anywhere, at any given location. It can be cited at other preferred places outside the conventional office buildings and work environments. By being remote, employees have the privilege to also work from home. Going by existing studies, according to Francis et al. (2022), and Okechukwu et al., (2022), virtual work systems empower organizations to embrace and implement flexible work arrangements, improve productivity, and boost employee well-being.

Given this background, organizations in the quest to continue their business operations were provided with the option to carry out their activities in alternate places with the aid of technology via the use of electronic tools and digital platforms (Wozniak-Jechorek et al., 2024; and Smite et al., 2025). Examples of such virtual devices that are built for virtual work system are both online and offline software applications (APPS), social media platforms, computers, smart phones, projectors, printers, several other types of electronic devices, and most importantly, an internet enabled environment for connectivity to ease collaboration and communication. However, the technological know-how of these virtual working tools and how to utilize them in the heat of the moment also accounted for the loss of jobs for many employees. The ability to navigate these digital tools and platforms has a direct impact on an organization's operational efficiency. Being able to operate these essential tools enhances the performance of employees, promotes organizational productivity and efficiency.

Operational efficiency is on the other hand is seen to be an organizations level of expertise and proficiency in performing official tasks which can be essentially measured by task completion time, error rates, workflow delays, performance and productivity, etc. It refers to the ability to optimize resources and processes, goods and services within the shortest means possible with reduced cost, time, material, and effort (Adesina et al, 2024 & Nur et al., 2025). According to Atlassystems (2025), operational efficiency goes beyond just cost reduction. It has to do with performing better, working smarter and not harder.

Scholars like Smith and Johnson (2020), and Damghani (2023), defined virtual work system as a system that enables organizations to tap into the global talent pool, improve employee work-life balance and reduce operational costs. It is a system of work arrangement that allows employees to carry out official tasks and remotely collaborate with colleagues using digital tools and technologies. Virtual work system according to McTaggart and Loonam (2024) is a coordinated structure where tasks, technologies, and communication processes are geographically dispersed to individuals and groups to function remotely as if they were all co-located. It goes beyond a collectively shared physical workplace as it leverages on digital tools and ICT to achieve organizational goals.

It has been established that virtual work system connotes a workplace where the use of technology in performing official tasks is prevalent e.g. remote/hybrid policies, digital collaboration tools, Apps, social media platforms. Its key characteristics are; remote work, digital communication, flexibility, and global recruitment. By remote work, it allows employees to work anywhere and as such reduces commuting time and increases flexibility. Working from the comfort of home saves transportation cost and time required to get to the office. It helps organizations in reducing overhead costs, such as office space and utilities. By digital communication, virtual tools aid to expedite collaboration and communication among members of a team. Communication is important in all situations and organizations can never go wrong if effective communication through these digital gadgets is properly utilized.

These tools can enhance knowledge sharing among team members within the organization. Virtual work system is synonymous with flexibility allowing employees to balance work and their private life. This eventually leads to an improved work-life balance. Segbenya and Okorley (2022) opined that when employees feel somewhat relieved from the stress that comes with work and have some time to refresh themselves, they bounce back being more energetic and voraciously passionate to be productive in the organization. Recent literatures

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(Stahl et al., 2025, Bano et al., 2024, He et al., 2025, Chambers, 2024; and Aydin et al., 2024, etc.) have posited that global recruitment is a key characteristic of contemporary virtual work system because it permits organization to hire the best talent from anywhere in the world, rather than being restricted by geographic location. By doing this, access to global talent and utilization of global best practices becomes palpable.

Harvard Business School (2020) defined operational efficiency as the streamlining of processes, elimination of waste, and the optimization of resource allocation to maximize productivity and performance. This is in agreement with Terrell and Gillis (2024) where operational efficiency is referred to an organization ability to reduce time wastage, effort and materials while still producing products and services at a high-quality level. Gomstyn and Jonker (2024) defined operational efficiency as the optimization of business processes and resources for the purpose of reducing operation costs while improving productivity. From the above definitions, we observe that they all share one thing in common which is reducing or eliminating waste and improving productivity. Hence operational efficiency can be simply seen as how proactive an organization is in terms of performance and productivity.

Every organization strives for efficiency and productivity in other to remain competitive in the ever-evolving global market. This is one of the major objectives of any organization therefore, mangers seek to hire global talent that align with this mission. Operational efficiency also connotes the possible continuity of business operations in the face of a disaster or pandemic as earlier stated in relation to the COVID-19 outbreak. For Abdul et al, (2024), cost savings, increased productivity, rapid response to change, are some of the positive impressions felt in implementing virtual work system to attain operational efficiencies in organizations. It can also be measured by the length of time required to complete a task, the extent of error rates during and after operations, workflow delays, data accuracy, and general work performance. This allows organizations to make cost efficiencies, improve product quality, and provide better service to customers.

The implementation of a virtual work system is a primary part of an organizations tactic and one that supports the organization's vision and mission thereby creating novel advantages, both in terms of products and operations. Virtual work system and operational efficiency are closely knitted together as the use of the first impacts on the latter. As posited by Riyanto (2023), contemporary technologies do have a unique combination effect that quickens innovation and progression in a variety of ways such as; customer experience, managerial styles, business models, employee performance and productivity.

This paper therefore explains the relationship between virtual work system and operational efficiency, challenges faced in adopting a virtual work system, solutions, and how adopting a virtual work system has helped organizations to be efficient and compete globally.

2. Method

This paper is anchored on the Technology Acceptance Model (TAM). This model was introduced by Fred Davis in 1986 and was further developed by Fred Davis, Richard Bogozzi, and Paul Warshaw as highlighted in Davis et al (1992). Technology Acceptance Model focuses on explaining the theoretical foundation for the successful adoption and implementation of technology in any organization.

Going by the theory, it identified two constructs that are heavily relied upon for technology utilization in any system. They are Perceived Usefulness (PU), and Perceived Ease of Use (PEOU). First of all, before accepting the technology, the organization has to determine the need for embracing the technology by understanding what they stand to gain if they do so. The second construct explains how comfortable and easy it would be applying the technology in practical terms.

The theory therefore, proposed that the tendency to use any technology is determined by the benefits organization derive from it coupled with the ease of using the technology. The theory

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is pertinent to the study because the practice of virtual work system in any organization will be determined by managers who perceive its usefulness and supposed simplicity.

2.1 Method of Fetching Data

Data used in this study were derived from peer-reviewed journal articles, conference papers, and trustworthy publications retrieved via several academic databases such as ScienceDirect, Researchgate, Scopus, Google Scholar and JSTOR etc.. The researcher focused on literature's published between 2020 and 2025 to ensure and guarantee current and valid thoughts. Certain keywords such as virtual work system, operational efficiency, COVID-19 Pandemic, workplace, organization was entered in and used during the search process. Basically, mostly articles that focused on virtual work, remote system, organizational operational efficiency, effects arising from the COVID-19 Pandemic were carefully selected.

3. Results and Discussion

3.1 Results

How virtual work system has helped organizations improve their operational efficiencies is key as organizations seek to complete favorably in the global market. Hence the link shared between the two becomes necessary. The U.S Government Accountability Office (2025) has showed that federal agencies implementing remote and hybrid systems observed reduction in real estate expenditures and improved recruitment timelines. This showcases a dual efficiency outcome by lowering fixed costs and faster talent acquisition. Froese et al. (2025) have posited that virtual work enhances flexibility by allowing organizations access to specialized expertise without relocation barriers. This flexibility translates into better products, customer service, and faster response times.

Error reduction and training via virtual technologies have further improved operational efficiency in organizations. According to Qawqzeh et al., (2025), the integration of virtual reality (VR) technology training programs in the workplace has greatly enhanced employee's skill acquisition, safety awareness, and self-efficacy compared to traditional methods. This has helped to reduce workplace errors and accidents, lowers rework costs which strengthens operational efficiency. Elliot (2024) clearly pointed out that virtual and hybrid work arrangements have enhanced employee satisfaction by reducing the stress of commuting and enabling better work-life balance. The employee remains a significant factor in effective organization operations. Virtual work system not only serves as a tool that responds to global disruptions but is also a strategic tool for improving operational efficiency. It cuts across boundaries (Bloom et al, 2024), streamlines processes through digital communication (Handke et al., 2024), enhances productivity (Bloom et al., 2024), and many more.

3.2 Discussion

The shift to virtual work system has pioneered some challenges that are inevitable in any organization or sphere of life. Just like change, challenges also transform from one phase of problem to another and the emergence of virtual work system is not an exemption. It also has some peculiar challenges arising from its implementation, and continuity. These peculiar challenges are seen to be major concerns that are attached to virtual work system. Literature's have identified some general organizational cross-cutting challenges affecting virtual workplace environment and its operational efficiency.

According to scholars like Villamor et, al (2023), Ma (2024), and Perlow & Eun (2024), one of the major general challenges of a virtual work system is that of communication and collaboration where there are lots of communication breakdowns. This becomes a worrisome challenge due to the difficulty in conveying tone, and intent via digital systems. Due to this, it may result to misunderstanding and as such lead to several errors. Larson et, al (2023) also posited that the absence of face-to-face interaction fuels a lack of physical interaction which gives birth to loneliness and social isolation because employees will feel disconnected from their

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colleagues. When this happens, the organization is faced with difficulties in coordinating and collaborating across different time zones and locations.

Technical Challenges such as connectivity issues, cyber-security risks, and technical support also disrupts the smooth operation of a virtual work system. Connectivity issues can take the form of fluctuating internet connectivity, and software glitches while cyber-security risks deal with an increased risk of cyber-attacks and data breeches. Furthermore, there is difficulty in providing technical support to workers working remotely. Hence, remote workers may struggle with technical issues and thereby feel frustrated. For Tan (2024), security and data protection challenges pose serious threats towards practising a virtual work system. Issues of compliance with laws and regulations related to virtual work threatens both organization and individual privacy. Hence there is a problem of data protection, ensuring security and confidentiality of data. These challenges can be mitigated by ensuring regular check-ins, clear expectations, and provide regular feedback channels to ensure fairness and understanding. By fostering trust and collaboration, managers can introduce team-building activities, share common goals, and recognize individual contributions. Organization are to invest in robust and reliable technological infrastructure to secure their data and help to train virtual team members to enable them to be culturally competent and to manage cultural differences.

In apropos to the challenges and observations as discussed, the practical implications brought forward strongly postulate that organizations should regularly sensitize employees about the importance of operating a virtual work system and how it can help them advance their skills and perform their jobs better. Communicating the actual usefulness of the adopted technology and its ease of use remains significant. Certification in ICT literacy should be a major prerequisite for employee recruitment into the government civil service and even in the business world. This will tackle issues of job delays and encourage work-flow and sustainability. This should be a general knowledge while professionals in the ICT department can be domiciled accordingly. Before an employee should consider working from home, he or she should make sure certain conditions are met at home ensuring that the home-front is conducive. Working from home does not necessarily mean it must be at the employee's residence. Employees can also look for alternate places that support concentration to enable them perform optimally. Managers should regularly initiate refresher courses, virtual competency training programs, and employee empowerment should be regularly provided by organizations for optimal employee engagement, organizational productivity, and operational efficiency.

3.2.1 The meeting point of virtual work system and operational efficiency and some sector specific challenges

The meeting point between virtual work system and operational efficiency can be seen at the point where technology-enabled work procedures improve how organizations use their time, resources, and human effort (Marasigan et al., 2022, Willis et al., 2021). Following this, according to Dzandu et al (2023), their connection involves being strategic and operational.

Virtual work system and operational efficiency meet at the intersection of technology, process improvement, and employee productivity. This is a point where technology via digital infrastructure transforms work processes, ensuring it is much faster, cheaper, more accurate and more flexible (Maity & Lee, 2025).

In other to be efficient, managers are to meticulously observe their unique sector specific challenges while operating a virtual work system and think out of the box to find lasting solutions. Therefore, improving operational efficiency through virtual work systems based on some selected unique organizational challenges remains pertinent.

Firstly, In the educational sector, there are some unique challenges that can hinder operational efficiency via the application of a virtual work system. Digital exhaustion between teachers and students, limited student engagement and attention in online classes and disproportionate access to devices and internet etc. can become bothersome. In other to prevent fatigue caused by constant digital usage that may make the eyes blurry from long hours of focusing on the screens, McTaggart and Loonam (2024) suggested a combination of asynchronous

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content with live discussions. These are recommended to combat fatigue and improve engagement. Gamification and educative interactive tools should also be co-opted in the learning process. This will enhance participation. According to Frontiers in Psychology, (2025), teachers should be educated on modern instructional design for virtual teaching. Contemporary ways should be constantly desired to enhance participation and concentration. There should be an equitable access (through device loan programs and accessible offline content) for all teachers and students.

Secondly, the banking sector is one that embraces contemporary technology in attending to customers and communicating among staff. Some problems as identified here by Al-Dosari & Hassan (2024), Frontiers (2025), Global screening services (2024), Intelpoint (2025), Preprints (2025) and AllAfrica (2025) etc. include; data theft and an increased risk in cyber-security breaches, staff fatigue from incessant digital workload and difficulty in building trust and collaboration in remote compliance teams. These can be curtailed by using AI tools to automate and fast-track routine financial operation, thereby reducing workload (KPMG, 2025). In other to maintain in-person connections and reduce technology stress (techno-stress), there should be the application of rotation-based hybrid policies (NumberAnalytics/IBM, 2023). There should be a surveillance culture for trust as regular cyber hygiene training programs (e.g clocking in and clocking out) are to be carried out regularly. According to Outstaffer (2024) a trusted security framework should be adopted with identity management.

Thirdly, potential difficulties in monitoring operations safely from a distance, mental fatigue as a result of shift-based digital control rooms and disconnections arising from fieldwork-deskwork remote collaborations etc. are some identified unique sector-specific challenges in the oil and gas sector. However, these can be tackled by scheduling remote and on-site rotation duties to avoid isolation and fatigue. Olatunji (2025) encouraged the use of Internet of Things (IoT) and digital twins for real-time remote monitoring and simulations. Field staff should be equipped with strong and durable smart devices for an all-in-one smooth data sharing. It is advisable that investments be made on virtual reality (VR) training to simulate hazardous scenarios remotely.

Fourthly, the agriculture sector and its challenges in operating a virtual work system is that there is limited digital literacy and internet connectivity in rural areas which has triggered challenges in remotely coordinating supply chain. There is also a poor access to virtual advisory and learning systems. Based on the challenges, mobile-based platforms (like WhatsApp and SMS Apps) should be deployed to rural areas for advisory services where internet is weak or absent. Tibamwenda and Kamusigisha (2024) stressed on the need to develop virtual cooperatives to connect farmers, suppliers, and buyers. Remote sensors and GPS technology should be utilized for real-time farm data that can be shared virtually. There should also be digital skills training tailored to benefit low-tech environments. However, in agriculture, virtual work system goes beyond digital literacy and internet connectivity. According to Chakradhar (2025), processes that enhance operational efficiency like task automation, predictive analytics, crop health monitoring, etc should also be considered as these are major complementary pillars of virtual agriculture that boosts productivity, and reduce waste.

Fifthly, in the medicine/health sector, African facilities in most rural areas lack stable power and internet which is a big challenge in the sector. According to BMC Health Services Research (2024), there are other key challenges like; digital infrastructure gaps in telemedicine and virtual clinics**,** workforce digital illiteracy and resistance or low patient engagement. The barriers in digital infrastructure can be met by enhancing broadband access, stabilizing power, and ICT capacity via investment in infrastructure. Healthcare workers lag behind in digital illiteracy and should be trained in virtual tools and platforms (e.g., teleconsultation systems). Doctors should be trained in web-side manner (CHI Conference, 2023). There should be a blend of in-person and virtual care for easy transition and to maintain trust. Patients especially in rural areas should be well sensitized so they can cooperate with healthcare workers to serve them better.

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Lastly, the automobile sector requires modern engineering technologies and updated software's in AutoCAD, ArchiCAD, etc. to comfortably fit into contemporary trends but it is not also exempted from virtual work system challenges like; delays in product development caused by remote engineering, design, testing, and prototyping collaboration gaps, and poor remote coordination leading to supply chain disruptions (Morgan, 2023). Managers can tackle these challenges by establishing clear virtual supply chain dashboards and remote performance trackers for proper coordination. Tanpure et al., (2023) is of the opinion that automobile organizations should employ the use of cloud-based product life-cycle management (PLM) platforms for real-time updates. There should be an integration of cross-functional virtual design studios with tools like Miro and AutoCAD among others.

4. Conclusion

Virtual work system as shown is beneficial to organization and enables them to enhance operational efficiency through reduction in cost, time, materials and optimization of resource allocation. It streamlines work processes, brings about flexible work arrangements, and improves digital communication.

Therefore, by understanding their contemporary challenges, their practical implications, and the relationship between them, organizations can demonstrate global best practices in their quest for operational efficiency and optimal performance.

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