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**Telecommuting and Employee
Performance:
The Moderating Role of Work Environment**

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SBS WORKING PAPER SERIES

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**Telecommuting and Employee Performance:
The Moderating Role of Work Environment**

by

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Abstract

The study examines the relationship between telecommuting and employees' performance in the Nigerian oil and gas sector using data from three local and three foreign companies in the sector with presence in Lagos, Delta, Rivers, Akwa Ibom and Bayelsa States of Nigeria. The main objective of the study is to explore the relationship between the frequency of telecommuting and flexibility of schedule dimensions of telecommuting and the performance of employees in the Nigerian oil and gas sector and to further explore the moderating role of work environment on the relationship between telecommuting and employee performance. Socio-technical system (STS) theory was used to explain the phenomenon. Data for analyses were obtained through primary means using the instrument of questionnaires. The analytical tools of mean and standard deviation were resorted to using SPSS version 23 while hypothesis was tested with the help of multiple regression analysis. Majorly, the study established that effect of telecommuting flexible schedule on employee performance indicated a significant positive relationship ($b = 0.160$, $t = 3.346$, $p < 0.01$) and impact of telecommuting frequency on the performance of employees showed a positive significant relationship ($b = 0.159$, $t = 3.311$, $p < 0.01$). In view of these, it was recommended that organizations within and outside the oil and gas sector should invest in telecommuting for enhanced performance.

Keywords: Productivity, Telecommuting, Flexibility of Schedule, Frequency of Telecommuting, Employee Performance, Remote work, Work Environment, Work From Home, Telework.

1. Introduction

The uncertainties surrounding business activities all over the world are propelling organizations to take proactive measures for sustainability. Similarly, organizations are making effort to ensure employees gain job satisfaction because of the correlation it has with performance (Onyemachi et al., 2018). Creating a flexible work arrangement is one of the ways for achieving this. Such flexibility has been encouraged with advancements in information and communication technology (ICT). Hence, the fear of lateness to work, procurement of large office space, hours spent commuting to the office and others have been eliminated. The advancement in ICT offered employees the privilege to choose where and when to execute assigned tasks without necessarily being present at a designated place called office (Ali & Drew, 2015).

According to Allen et al. (2015), flexible pattern of work is a product of ICT brought about by a number of factors such as the need to revolutionize organizations, overcome civil or social unrest, diseases outbreaks and security challenges amongst others. A number of benefits are associated with telecommuting pattern of work both to management and employees which have propelled a paradigm shift from the ways organizations previously operated on a daily basis (Mahmud & Paul, 2016). Such benefits are not limited to work-life balance, traffic decongestion, improved time management, fewer distractions from work, reduction in office space costs, increased level of output, and enhanced level of talent pool but increased compliance to environmental regulatory orders.

Research by Davenport and Pearlson (1998) sought to learn more about how employees functioned in a virtual workplace. They conducted in-depth interviews with over a hundred Fortune 500 companies to learn about the diverse work settings and situations in which telecommuting occurs. In order to obtain a better grasp of the telecommuting process, they suggested focus on five areas:

(1) how to manage people (2) information management (3) team management (4) process management and (5) facilities management. Working remotely, whether from a home office, an off-site location, or while on the road, presents unique challenges in terms of how workers interact to their companies and what they want from their managers and leaders in order to be happy and productive (Gibson et al., 2002). Telecommuting-related journal papers published in the early 2000s have addressed a wide range of themes, from labour difficulties to technical hurdles to organizational dilemmas and environmental concerns (Siha & Monroe, 2006). Isolation from the work culture is a concern that many telecommuters perceive, according to Crandall and Gao (2005). They are cut off from both their employment and, to a degree, their social environments. Some managers and practitioners worry that online relationships will supplant face-to-face interactions, causing regular hierarchical and interpersonal relationships to be disrupted (Gibson et al., 2002). Based on these identified issues, the study, objectives of this study therefore are to analyse the impacts of telecommuting dimensions on employee productivity and examine the moderating role of the work environment in the relationship between telecommuting and employee productivity.

1.1 Statement of problem

The relevance of telecommuting on productivity in corporate establishments cannot be overstretched. A wider spread in the usage of telecommuting can have a number of both positive and negative effects on the productivity and welfare of employees (Kaplan, 2014). The benefits of adopting telecommuting in Nigeria are vast, especially during periods of crises such as outbreaks of diseases, insurgency, Indigenous People of Biafra (IPOB) sit-at-home orders, activities of Niger Delta militants, lockdown, etc. (Uford et al., 2022). Despite these benefits as detailed in the study's background, employees oftentimes abuse the autonomy and independence associated with

telecommuting. Such abuse is not far from laxity over the completion of expected tasks at the appropriate time, lack of self-control and self-discipline as well as bad influence of the work environment on employees which are all inimical to productivity.

Literature on the link between telecommuting and productivity in the Nigerian oil and gas industry is quite few making this study one of the pioneer works to explore such topic. Gbajumo-Sheriff and Udobi-Owoloja (2019) explored telecommuting and work-life balance among the employees of oil and gas companies in Nigeria only to discover that infrastructural deficits and traffic in Nigeria clog telecommuting. This shows that the concept of telecommuting is still at the developmental stage in Nigeria where the case study industry is not excluded. According to Gbajumo-Sheriff and Udobi-Owoloja (2019), full-scale adoption of telecommuting in Nigeria results to indiscipline and abuse of privilege which are inimical to performances in all sectors of the economy. To Gbajumo-Sheriff and Udobi-Owoloja (2019), telecommuting is a foreign initiative with limited ease of adoption to the context of Nigeria; hence its effects might not be apparent coupled with associated costs and the absence of mechanisms that monitor performances of employees. As asserted by Uchenna et al (2018) gradual introduction of telecommuting to different sectors of the Nigerian economy can prove to be a difference.

While telecommuting appears to have a slightly antagonistic relationship with productivity, the minimal study on telecommuting and productivity has inconsistent results (Gajendran & Harrison, 2015). Previous studies such as Uchenna et al. (2018) using data from Nigeria revealed positive but weak impact of telecommuting on workers' jobs satisfaction and performance. Sanchez et al. (2018) employed data from Spain to analyse telework and productivity and discovered positive relationship between telework and productivity. Arora et al. (2019) explored data from USA to reveal positive relationship between telecommuting and employees' performances. In the same

vein, Susilo (2020) utilised data from Indonesia to reveal a positive relationship between telecommuting work arrangements and the performances of employees. In contrast, Morikawa (2020) showed a negative relationship between telecommuting and productivity using data from Japan.

Most of these studies were explored in the context of developed nations leaving behind under-developed countries like Nigeria except for Uchenna et al. (2018) who vaguely explored telework and the performances of employees in Nigeria without necessarily pinning the study to a particular sector. This laxity justifies the need to carry out a study of this nature using the Nigerian Oil and Gas industry as a study focus. Similarly, these studies failed to resolve the discrepancy of the relationship between telecommuting and productivity. Some established positive relationship while some established negative relationship. In view of this, the study introduced work environment as a moderator to examine its relationship on the impact of telecommuting on productivity in the Nigerian oil and gas industry with the hope that this moderator would help resolve the inconsistencies that exist in previous studies as far as telecommuting and employee performance is concerned.

Because of the rising complexity of jobs and the resultant division of labour, teamwork has become even more widespread in modern culture. Some activities can only be completed as a team; yet, in other circumstances, the activities may be completed independently by the workers, but they prefer to collaborate for unique reasons and benefits. The majority of telecommuters believe that their work includes contact with co-workers, but that they are allowed to operate independently of their bosses. In such circumstances, telecommuting makes work easier since a person may always communicate with his or her co-workers via chat, voice call, video conferencing, and other means, and they don't have to hassle their supervisor for guidance on a regular basis (Adeel et al., 2014).

In view of the above, telecommuting technologies such as chats, voice call, video conferencing, etc. can aid performance among employees which invariably enhance productivity in organisations. Setiyani et al. (2019) noted that technology bridge physical presence barriers associated with telecommuting. To him, performance is not affected since employees can always communicate with their boss and one another irrespective of location differences.

According to Sarode and Shirsath (2012) work environment greatly influences the productivity of employees in organisations. To him, a workplace climate with characteristics of quality and safe workspace, good management policy and good facilities that aid effective communication are positive to the productivity of employees. A telecommuting work environment rooted in a serene environmental setup aids concentration without loss of time for productivity. However, Prasetyo et al. (2021) remarked that a telecommuting work environment characterised by a series of distractions from members of households and power failures amount to loss of productive time. This invariably most times results in poor performance, hence productivity. Telecommuting work arrangement in Nigeria is generally still at its developmental stage; therefore, the tendency to face distractions is very high and inevitable. According to Prasetyo et al. (2021), a significant feature of the work environment is electricity supply. Availability of power supply is very crucial for the adoption and implementation of telecommuting. Poor power supply disrupts workflow, hence low productivity.

1.2 Research Objectives

The main objective of the study is to explore the relationship between telecommuting and the performance of employees in the Nigerian oil and gas sector using the case of some selected

companies in the industry and to study the moderating role of work environment on the relationship. The specific objectives are stated below, to;

- Determine the relationship between the frequency of telecommuting dimension of telecommuting and employee productivity in the Nigerian oil and gas sector.
- Determine the relationship between the flexibility of schedule dimension of telecommuting and employee productivity in the Nigerian oil and gas sector.
- Investigate the moderating role played by work environment in the relationship between telecommuting dimensions and employee performance.

2. Literature Review

2.1 Telecommuting and Employee Performance

Telecommuting is a situation where employees and employers enter into an agreement in which the employee works outside of the usual work area, such as from home (Onyemaechi et al., 2018). It also includes working from distant locations not limited to homes, libraries, and cafes but places other than traditional workplaces using ICT tools during regular work hours or as may be deemed fit (Kurland and Egan, 1999).

Telecommuting can either enhance performance or hamper it through either a direct channel or an indirect one (Brittany & Rhiannon, 2012). Under the direct channel, performance is affected through changes in efficiency, motivation and knowledge creation of employees. While in the indirect channel, performance is affected through the ability of telecommuting to reduce costs by freeing up resources for other productive activities in an organization. The effectiveness of either channel is dependent on the level of ICT infrastructure appropriateness. According to Gajendran

and Harrison (2017), performance levels can be enhanced through an increase in employee satisfaction which can result to better employee efficiency. Such a level of satisfaction is derivable from a better work-life balance, less absenteeism, less commuting time and fewer distractions. In contrast, Rajbanshi (2022) contends that telecommuting can decrease employee satisfaction through solitude, hidden overtime, distractive home work environment and fusion of private life with work life.

Studies from Godart, Gorg and Hanley (2017), Beckmann (2016) and Beckmann, Cornelissen and Krakel (2020) revealed strong product innovation intensities, high level of productivity and enhanced intensive employee effort with telecommuting respectively. The study by Monteiro, Straume and Valente (2019) revealed that the effect of telecommuting on performance greatly varies across firms but positively impacts firms who undertake research and development. The positive relationship between telecommuting and performance can be linked to a third factor such as better management strategies of firms (Bloom & Reenen, 2016). Employees can gain an increased level of satisfaction through reduced traffic congestion, reduced carbon emission and reduction of housing prices, especially in densely populated urban areas.

According to Bloom and Reneen (2016), telecommuting patterns of work can as well enhance performance through facilitation of cost minimization. It can have a direct reduction on the cost of capital through a reduction in the cost of office space and equipment procurement by organizations. Telecommuting pattern of work attracts a large pool of the workforce which increases the supply of skills matching jobs with hire. Companies can make their choice from the array of talents and skills at a lesser bid resulting to lower labour costs. For instance, a highly skilled employee who for one reason or the other is tied to a given location can be employed through flexible work arrangements of telecommuting (Carlson et al., 2018). Shifting entirely to telecommuting flexible

work patterns enhances the reduction in service costs associated with trade often faced by companies and broadens the ability of companies to draw talents across the globe (Baldwin & Forslid, 2019). In the same vein, the costs for hiring workers can reduce drastically if higher employees satisfaction minimize the rate of voluntary quits and turnover. Companies offering telecommuting work pattern also attract skilled employees at lower wages relative to those not since chances to employ talents across the globe is feasible. In contrast to the argument favouring telecommuting, Bohns (2017) contends that telecommuting can have negative effect of performance. To him, telecommuting limits the privilege for in-person interactions thereby impairing communication flow, knowledge sharing and managerial oversight.

2.2 Flexible Work Arrangement and Employee Performance

Flexible work arrangements are benefits provided by employers to employees permitting them some level of control to choose when and where to work (Aniekwe, 2019). This flexible pattern of work alters the time and place where work is carried out regularly in such a way that employers and employees are satisfied with the working conditions. The practice of flexibility in organizations has gained an increasing level of importance and has become a watchword recently (Essien & Edwinah, 2017). The control employees have over where and when to work may vary as in some cases they are only allowed to perform part of their duties within certain hours while the rest at other times and locations. In a different schedule, some who telecommute are required to be at their workplaces in specified work hours. This type of work arrangement requires that out of the hours employees are expected to work, a specified period is set aside for them to be present at the office.

Employees sometimes can be given the privilege of complete flexibility to schedule the time and location to carry out assigned tasks. As revealed in Feldman and Gainey (1997), telecommuters privileged with higher levels of flexibility exercise more control and autonomy which makes them better off balancing work and family life. Telecommuters with limited level of flexibility have less perception of differences in social cohesiveness and interactions relative to those with greater flexibility (Barkery et al., 2017).

Flexible work arrangement is both useful to employers and employees. To employers, it enhances productivity of employees through an increased level of morale, reduces absenteeism and increases job satisfaction. These are possible because employees' level of commitment to the organization increases, reduces employees' turnover and increases employees' engagement with the organization (Mwebi & Kadaga, 2015). To the employees, Afaq and Raja (2016) remarked that flexible pattern of work reduces work-family conflicts often experienced by employees through more control over their work schedule. According to Atkinson and Hall (2011), flexible work pattern enhances employees' happiness which in turn impacts discretionary behavior and performance outcome of employees.

2.3 Work Environment and Employee Performance

Safety of a work environment is one of the important factors that affect the performance of employees. A good work environment has positive correlation with employees' attitude, drive and overall performance. A reassuring work environment and safe work zone improves performance levels of employees. A safe work zone gives confidence to employees to easily express themselves freely and share ideas with supervisors and colleagues (Hamid et al., 2020).

Employees tend to perform better with a satisfying job and a supportive work environment (Virick et al., 2010). A large pool of evidence exists demonstrating the relationship between telecommuting and employees' performance, albeit telecommuting work pattern detach employees from their work environments. Such detachment is incongruent to performance due to gradual level of demotivation it initiates on employees (Wojcak et al., 2016).

According to Weideman and Hofmeyr (2020), some health benefits are associated with telecommuting pattern of work. To him, a home work atmosphere increases attention, limits distractions and ensures privacy. Afaq and Raja (2016) mentioned that during the Covid-19 lockdown, employees' psychological health gained massive improvement because they were offered more flexible hours of work. However, Niebuhr et al. (2022) noted that a home work environment may increase employee's work hours which often results to shorter recuperation periods. Such experience can reduce quality sleep, physical and mental health.

2.4 Theoretical Framework

2.4.1 Socio-technical system theory

The theory is traced to the World War II era when three scholars at Tavistock Institute in London: Eric Trist, Ken Bamforth and Fred Emery documented their experiences at an English Coal Mining Company (Gorejena et al., 2016). The theory is primarily interested in the exploration of social dimension of people and the society vis-à-vis technical dimensions of organizational structures and processes. The technical dimension in the context of this theory is 'procedure and related knowledge' while socio-technical encapsulates the interrelatedness of social and technical dimensions of either an organization or the entire society (Duchek, 2013).

The theory in broad term is about joint optimization with focus on excellent success in both

technical performances and qualities in the work lives of people. The theory suggests a number of options through which joint optimization is achievable, such that organizations are designed in different ways so that both technical and socio elements lead to enhanced productivity and wellbeing (Shin & Jung, 2012). Socio-technical theory is anchored on two core principles:

The first principle is that interaction between both social and technical factors create conditions for either progressive or retrogressive performances in a business organization. In a part, the interaction is made of linear 'cause and effect' relationships i.e., a normally designed relationships, and the other part are relationships that are non-linear, complex and unpredictable i.e., unexpected relationships that are either good or bad. According to Duchek (2013), whether the relationship is designed or not, the two types of interaction are possible and smooth if both socio and technical elements are laid to work. The second principle is the corollary of the first and it states that the optimization of a single aspect of either technical or socio element alone can only increase the likelihood of undersigned and unpredictable relationships that are inimical to the performances of organizations (Gorejena et al., 2016).

In view of the two principles reckoned above, it is convincing to point out that sociotechnical theory is a theory of joint optimization. The joint designation of both social system and technical system to smoothly work together for enhanced productivity summarizes the essence of the two principles (Duchek, 2013). The core ideology behind the Socio Technical System theory is the combination of human elements with technical systems together for the enablement of new work possibilities and creation of options for technological change (Trist, 1981). The inclusion of human elements in the aspect of negotiation has the tendency to result to higher initial workload, however, it is a pertinent requirement for the system to record success due to the mutual causality of the theory (Gorejena et al., 2016). The Socio Technical System theory has wide linkage with

autonomy, completeness and job satisfaction as both socio system and technical system can jointly function together to achieve expected level of outcome.

A further extensive illustration of the Socio Technical System theory was done by Walker et al. (2018), where paradoxical observation was made with a view to exploring more options of the theory. In his illustration, Socio Technical System theory is not limited to the form of production system communicative of the era of contemporary technological system but the quest to unravel the technical reasons behind the fall in productivity and increase in the rate of absenteeism despite improvement in technologies, amenities and workers earning. The condition above according to Vanderzwan (1975) is a paradox which specifies the underlying irrationality of organizations. To this effect Vanderzwan hypothesized that the cause of the inconsistencies is traced to the diffusion of new form of production technologies which created bureaucratic form of organization i.e., a classic command and control form of organization. Therefore, technology initiated a form of retrograde in the design of organisations. For corrective measure, there is need for joint optimization of the human or socio elements and technical elements to achieve desired level of productivity while at the same time enhance workers' satisfaction (Adler & Reid, 2016).

Socio Technical System theory considers teams or groups as primary unit of analysis rather than individuals. The theory pays special attention to groups' internal supervision and leadership. The emphasis here is that individual's optimal performance does not literally represent group's effectiveness (Duchek, 2013). Hence it is pertinent to understand that cohesion in a group is very vital for the achievement of goals in an organization. This human element factor and technical element combine dynamically to play integral and parallel roles to guarantee group effectiveness- an important proposition of the Socio Technical System theory.

Relating the socio-technical system theory to the context of the topic under consideration, it is foreseeable that the theory is concerned with the interaction of social and technological elements. That is, the relationship existing among people, how people use technologies and the nature of work environment make up the core interest of the theory. The relationship among these three factors for the enhancement of job satisfaction and positive shift in the curve of productivity are what Socio-technical system (STS) theory try to encapsulate (Vanderzwan, 2017). As earlier deciphered from Keshavarz, et al. (2015), the theory was conjectured to provide explanation to the paradox of inverse relationship between improved technology and productivity. Part of the ideology of the socio-technical system theory is minimal critical specification and application to the design of virtual and remote work. Telecommuting work arrangement offers discretion to telecommuters to make decision of how and when to execute their tasks (Carbajal, 2018). In the same vein, telecommuters use their equipment and resources at will to execute their contractual obligation in line with the specifications of employers.

In general, the theory identified the following variables: technology, relationship among people in organisations (a proxy for telecommuting frequency relationship since this is only possible with human relationship and interactions) and work environment. Therefore, Technical System theory has wide linkage with autonomy, completeness and job satisfaction as both socio system and technical system can jointly function together to achieve expected level of productivity in organisations.

2.4.2 Conceptual Framework

The relationships and/or interrelationships as portrayed in the conceptual model for this study is presented in Figure 1. The conceptual model is designed to address the research problem and the,

research objectives of this study. The conceptual model illustrates the direct effect of frequency of telecommuting and flexibility of schedule dimensions of telecommuting on employee performance. It also illustrates the indirect effect of work environment as moderator on the relationship between frequency of telecommuting and flexibility of schedule dimensions of telecommuting on employee performance. Lastly, age, gender, level of education, marital status and household type, were identified as control variables.

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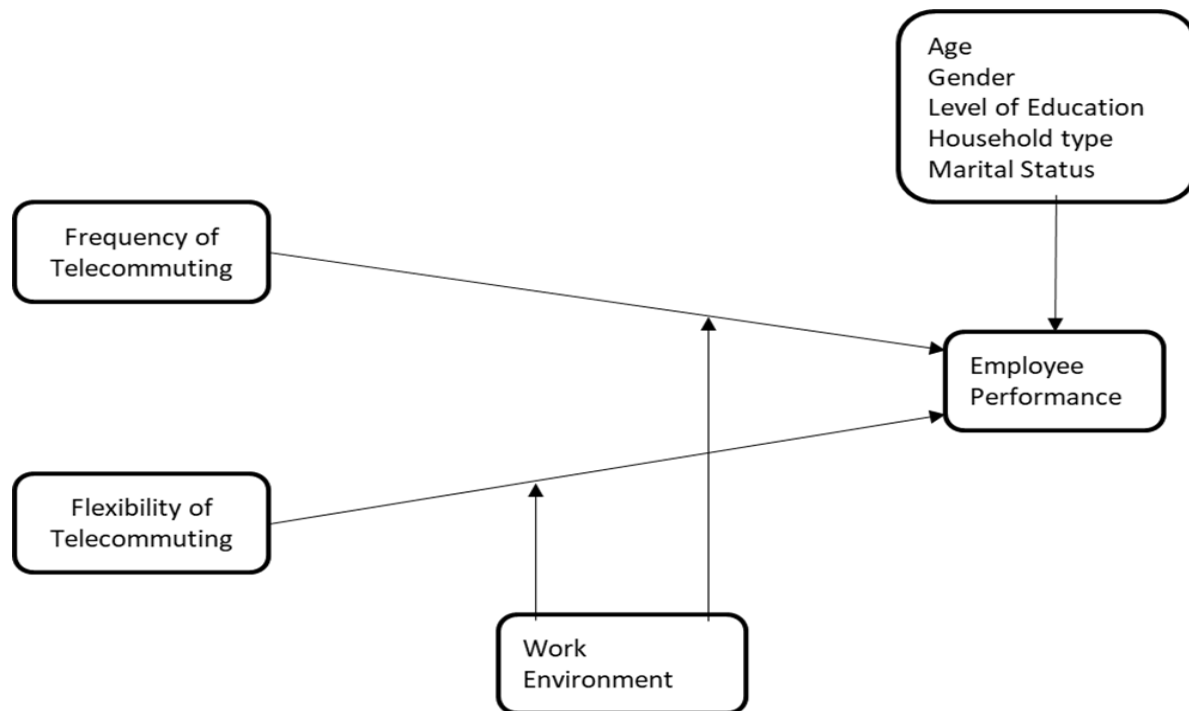


Figure 1: Conceptual Framework (Source: Author's design, 2022)

2.4.3 Hypothesis development and presentation

Telecommuting frequency and employee productivity

As one of the dimensions of telecommuting, not all telecommuters operate on fulltime basis, but some operate on few hours a day. In a study conducted by Olszewski and Mokhtarian (1994) on California State employees showed that the rate at which employees telecommute has relationship with their performance through their ability to effectively manage level of autonomy and independence. Telecommuting frequency deals with the mode of operation of employees to either have greater autonomy and independence or be restricted through the number of times they visit the traditional workplace. According to Feldman and Gainey (1997), full time telecommuters due have more autonomy and less interaction and interdependence relative to those who telecommute for few hours. As debugged in Sturgill (1998), spending more time at the office increases the communication satisfaction telecommuters would have, hence improved level of knowledge sharing which is very crucial for innovation and creativity. Business organisations that anchor their business model on innovation and creativity tend to have track record of enhanced productivity.

Alfanza (2021) examines the extent to which a person's total number of hours per day and days per week working from home is connected with employee productivity, as well as if there is a substantial difference in employee productivity between working at the office and working from home. The findings of this study do not give sufficient evidence to support the belief held by many organizations that a transition to telecommuting will reduce employee productivity. On the contrary, it backs up recent studies that show that, even when telecommuting, productivity was comparable to or higher than before the pandemic. This demonstrates that most employees can be trusted to complete their work from home. In view of this, it is opined that the level of telecommuting frequency has relationship with the level of productivity, albeit the direction of the

relationship is not certain and a subject of empirical investigation. This led to the formation of the first null and alternate hypotheses of this study:

H1₀: Telecommuting frequency has no significant and positive effect on employee productivity.

H1_a: Telecommuting frequency has a significant and positive effect on employee productivity.

2.4.5 Telecommuting flexibility of schedules and employee productivity

According to Feldman and Gainey (1997), telecommuters that have greater flexibility schedule experience more control and autonomy and have higher tendencies of balancing work and family life. Also, telecommuter with more flexible schedule may perceive differences in social cohesiveness and interactions than those with limited schedules. Hence, it is envisaged that employees with greater independence and autonomy tend to be happier, motivated and have better job satisfaction than employees with less flexible schedules and this propels them to record positive trend of productivity. As asserted by Brittany and Rhiannon (2012), businesses benefit increased productivity of employees, enhance job satisfaction and increased level of employees' morale through provision of options for alternative work schedule. In large extent, such arrangement reduces stress faced by employees while also reducing commuting time. Hence, traffic congestion, carbon emission, fuel use, etc. are reduced. It also saves money and time.

In contrast, greater autonomy and independence of employees as a result of flexible work pattern can have gross negative effect on productivity (Olszewski & Mokhtarian, 1994). Based on this, it can be mentioned that telecommuting flexibility of schedules have relationship with employee productivity, however the direction of relationship is not empirically ascertained. One of the reasons for this study, hence the following null and alternate hypotheses are formed:

H2₀: Telecommuting flexibility has no significant positive effect on employee productivity.

H2_a: Telecommuting flexibility has a significant positive effect on employee productivity.

2.4.6 The moderating effect of work environment on the relationship between telecommuting frequency and employee productivity

Study from Feldman and Gainey (1997) revealed that full time telecommuters due have more autonomy and less interaction and interdependence relative to those who telecommute for few hours. The implication of telecommuter's autonomy with more frequency is two sided; they have more freedom to manage their time thereby balancing work and family life. The resultant effect is that they would be motivated and have higher job satisfaction, hence improved productivity. In contrast, more autonomy can also result to less interaction and interdependence among employees which stifles information flow and knowledge sharing. The outcome of this can be inimical to innovation and creativity which is not healthy for enhanced productivity (Olszewski and Mokhtarian, 1994).

According to Morikawa (2020) in an attempt to understand the effect of telecommuting on employee productivity, found that workers were more productive in the office than at home. As revealed in the study, the major reason for less productivity at home was attributed to lack of familiarity with remote access software and work environment. Other environment factors that could pose challenges to full time telecommuter include poor power supply, problem of internet connectivity, distractions from family and friends. In line with Alfanza (2021), poor work environment is not healthy for telecommuting flexible pattern of work. Based on this, the following null and alternate hypotheses are identified:

H3₀: The interaction of work environment and telecommuting frequency has no significant positive moderating role on the relationship between telecommuting and employee productivity.

H3_a: The interaction of work environment and telecommuting frequency has a significant positive moderating role on the relationship between telecommuting and employee productivity.

2.4.7 The moderating effect of work environment on the relationship between telecommuting flexibility of schedule and employee productivity

According to Feldman and Gainey (1997), telecommuters that have greater flexibility schedule experience more control and autonomy and have higher tendencies of balancing work and family life. Flexible work arrangement can be a source of enhanced job satisfaction, morale, happiness and work-life balance to employees; it can also be to the detriment of the organization once employees are carried away by the level of control they enjoy and distraction from the work environment.

Hence, if organizations do not put measures to checkmate employees within the various work environments, they may find themselves can cause loss of concentration and focus on the common course of the organization. In the same vein, lack of familiarity with remote access software, internet connectivity and inadequate electricity supply constitute some issues in a telecommuting work environment (Morikawa, 2020). If management does not have comprehensive policies that regulate employees in flexible work environment, the essence of telecommuting may be jeopardized. Based on this, the researcher is poised to test the following hypotheses:

H4₀: The interaction of work environment and telecommuting flexibility of schedule has no significant positive moderating role on the relationship between telecommuting and employee productivity.

H4_a: The interaction of work environment and telecommuting flexibility of schedule has a significant positive moderating role on the relationship between telecommuting and employee productivity.

3. Methodology

The case study for this paper was the Nigerian oil and gas sector. The reason for exploring this research of the impact of telecommuting on productivity in the context of the Nigerian oil and gas sector was because substantial part of revenue generated in Nigeria is from the sector and this sector of the economy is relatively better funded and able to afford the infrastructural deployments to support effective telecommuting. In the same vein, many multinational companies are present in the sector with required financial strength to adopt telecommuting flexible pattern of work. The companies selected for this study were assured of anonymity. The researcher adopted a descriptive survey design because of its ability to describe the characteristics of a study population (3000); as such accurate sample was guaranteed to draw conclusions from. The study population was made of employees of the selected companies based in four oil producing Nigerian states: Lagos State, River State, Akwa Ibom State, Delta State and Bayelsa States. These companies are in full operation in these states, hence the choice for the states. The researcher adopted purposive sampling technique to sample 5 administrative staff of each company from each state selected for this study. Therefore, the total number of respondents was 120 employees of the selected companies.

Data for this study’s analysis was obtained through the instrument of questionnaire and analyzed with the help of Statistical Package for Social Sciences (SPSS), version 23. Statistical tools of percentage, mean and standard deviation were employed to analyze responses while the hypotheses tested with hierarchical multiple regression analysis. The Likert rating scale having interval scale between 1 and 5 developed for social and management sciences was employed to rate the opinions of respondents. The range of the opinions were presented on scale of ‘strongly disagree’ scoring 1, ‘agree’ scoring 2, ‘neither disagree nor agree’ scoring 3, ‘agree’ scoring 4 and ‘strongly agree’ scoring 5.

4. Findings/Results

Table of Statistical Analysis Results

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-1.018	.223		-4.567	.000		
Age	.047	.047	.063	1.002	.317	.516	1.937
Gender	.045	.068	.031	.665	.506	.903	1.108
HouseholdType	.012	.022	.031	.563	.574	.668	1.497
HighestEdu	.183	.051	.188	3.570	.000	.723	1.383
MaritalStat	-.040	.047	-.044	-.845	.399	.741	1.350
FleTell	.198	.059	.160	3.346	.001	.886	1.128
FreTell	.143	.043	.159	3.311	.001	.871	1.148
WorkEnv	.154	.037	.204	4.152	.000	.838	1.194

WorkEv_FleTel	-.076	.051	-.068	-1.491	.137	.973	1.028
WorkEv_FreTel	-.098	.043	-.108	-2.299	.022	.916	1.092

Table 1: Statistical Analysis Results (Source: Author’s data, 2022)

4.1 The Effect of Control Factors on Employees Performance

A look at the table 1 given above, it could be seen that 9.6% variance of the performance of employees was accounted for by the control variables of age, gender, household type, educational qualifications and marital status of respondents. The result shows that educational qualifications of respondents has a positive and significant effect on employee performance ($b = 0.188$, $t = 3.346$, $p < 0.001$). In the same vein, a positive relationship exists between respondent age performance ($b = 0.063$, $t = 1.002$, $p > 0.1$), gender performance ($b = 0.031$, $t = 0.665$, $p > 0.1$) and household type performance ($b = 0.031$, $t = 0.563$, $p > 0.1$), however, the result is not significant. Alternatively, marital status of respondents exerts a negative performance ($b = -0.044$, $t = -0.845$, $p > 0.1$) insignificant impact on employee performance.

4.2 The Effects of Telecommuting Dimensions on Employee Performance

In this study, the dimensions of telecommuting were employed as explanatory variables where such variables include telecommuting flexible schedule and telecommuting frequency. As revealed in the table, the inclusion of the explanatory variables to the control led to the increase in the variance of performance of employees. This is evident in the variance value of 15.6% against its value at 9.6% in the control variable. The implication of the result is a change in the variance by 10.7% over the explained variance in model one. Nevertheless, the direct effects of the various dimensions of telecommuting on the performance of employees were tested.

The effect of telecommuting flexible schedule on employee performance indicated a significant positive relationship ($b = 0.160$, $t = 3.346$, $p < 0.01$). This implies that in the Nigerian oil and gas industry, the more the telecommuting flexible schedule, the more improvement in the performance of employees. This result could be attributed to the fact that telecommuters often utilize positively the privilege of flexible schedule.

The impact of telecommuting frequency on the performance of employees showed a positive significant relationship ($b = 0.159$, $t = 3.311$, $p < 0.01$). This implies that in the Nigerian oil and gas industry, the more telecommuting frequency, the more improvement in the performance of employees, though not significant.

4.3 The Impact of Work Environment on Employee Performance

The impact of the moderating variable of work environment on employee performance is positive and significant ($b = 0.204$, $t = 4.152$, $p < 0.001$). This implies that in the Nigerian oil and gas industry, employees who are telecommuting are comfortable and not distracted in their telecommuting environment, mostly from their homes, to carry out their daily task. In view of this, a positive work environment helps the improvement of employees' performance in a telecommuting environment. However, the interaction result has shown otherwise, this is evident in the interaction of work environment and flexibility of telecommuting on employee performance as the result shows a negative impact ($b = -0.068$, $t = -1.491$, $p > 0.1$). The result is however not significant. Similarly, the interaction result of work environment and frequency of telecommuting on employee performance shows a negative significant impact ($b = -.108$, $t = -2.299$, $p < 0.05$) on employee performance.

5. Discussion of the Results

The focus of this study has been on establishing the relationship between telecommuting and the performance of employees. The study's findings both in the descriptive and hypothesis sections revealed a significant positive relationship between telecommuting and employees' performance on the average. The introduction of telecommuting in the Nigerian oil and gas sector brought improvement in the overall performance of employees. This implies that organizations gain from the practice of telecommuting pattern of work. This finding is slightly different from that of Morikawa (2020) who established less performance relative to office performance before the outbreak of the COVID-19 in Japan. In line with this finding, Susilo (2020), Oak and Schoeffler (2020) using the economies of Indonesia and Spain respectively established positive relationship between telecommuting and employees' performance.

The study's finding also revealed that on the average telecommuting did not sour the relationship between employees and managers through the aid of telecommuting tools. This finding is dissimilar with the assertions of Sturgil (1988) and Scheiman and Young (2013) when they established that telecommuting place limitations on interpersonal relationships amongst employees and managers. The study's result also revealed that flexible work arrangement has positive and significant effect on employees' performance especially the flexible hours of work it offers to employees. The result is similar to the assertion of Atkinson and Hall (2011) that flexible work pattern enhances employees' happiness which in turn impacts discretionary behavior and performance outcome of employees. Lastly, the study established that positive work environment enhances employees' performance given telecommuting work pattern. Specifically, the study revealed that power failure is the most difficult challenge employees are facing with

telecommuting. The study by Hamid et al. (2020) established that work environment has effect with employees attitude, drive and overall performance.

5.1 Contributions to Theory, Literature and Practice

Firstly, contribution is made to existing literature on the relationship between telecommuting and employee productivity with special consideration to the moderating roles of work environment using socio-technical system theory, adaptive structuration theory and Michigan theory/ matching model.

The impact of the relationship between telecommuting dimensions was moderated by work environment and the interaction effects got after interacting the moderating variable with each of the dimensions of telecommuting (telecommuting frequency and flexibility of schedules) are addition to the existing body of knowledge on the subject matter since no study has done this in the past. In the same vein, Morikawa (2020), Susilo (2020), Sasaki et al. (2020) and Oak and Schoeffler (2020) all established positive relationship between telework/telecommuting on employee performance/productivity but none of them investigated the impacts and relationships of telecommuting dimensions on employee productivity in the Nigerian oil and gas industry. However, this was done as contributions to extant literature in this study where both negative and positive impacts/relationships were established.

Similarly, it was established that work environment plays positive significant moderating roles on the relationship between telecommuting and employee productivity. This is a contribution to practice since no study was found to have established the moderating roles of these variables on the relationship between telecommuting dimension and employee productivity. By implication, a

conducive work environment put telecommuting employees in good shape for optimal performance.

6. Conclusions

The study has been able to establish positive relationship between telecommuting and employees' performance in the Nigerian oil and gas sector. Other major findings showed that positive work environment help telecommuting to thrive. The oil sector is massively associated with strong financial strength that can successfully introduce telecommuting flexible work pattern. Hence, organizations within and outside the oil and gas sector should invest in telecommuting for enhanced performance.

Areas for further study

The scope of this study should be extended to other sectors within the Nigerian economy to find out the nature and impact of telecommuting on the performance levels of employees. A limitation identified in this study is the use of convenience sampling of non-probabilistic sampling method for the collection of qualitative data. Also, this study accounted for only two dimension of telecommuting and did not account for other factors or dimensions of telecommuting that could influence employee productivity. The study also failed to employ other moderating variables that could influence the relationship between telecommuting and employee productivity into the study model work environment. Lastly, the study only covered the Nigerian oil and gas industry and as such, the outcome does not represent a complete view of the Nigerian economic sectors.

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