Increasing work engagement within businesses in the 4IR era: The predictors' impacts

🆔 *Foluso Philip Adekanmbi* [(a)]* 🆔 *Wilfred Isioma Ukpere* [(b)]

[(a)]*Ph.D., Department of Industrial Psychology and People Management, College of Business & Economics, University of Johannesburg, South Africa*
[(b)]*Department of Industrial Psychology and People Management, College of Business & Economics, University of Johannesburg, South Africa*

ARTICLE INFO

ABSTRACT

This investigation seeks to answer the research question of how employee creativity (EC), employee polychronicity (EP), high-performance human resource practices (HPHRP), and perceived organizational culture (POC) impact work engagement (WE) inside organizations in the 4IR period. Nine (9) businesses in Nigeria's Lagos, Ogun, and Oyo States served as the study's sample. Data for this examination were gathered using a cross-sectional survey methodology, and respondents who agreed to participate in the investigation were randomly assigned questionnaires. Consequently, a simple random sampling method was used to select participants. Analysis using statistical software for social sciences (SPSS version 28) was performed on 261 of the 270 distributed questionnaires that were recovered and determined to be useable. This study demonstrated how POC, EC, EP, and HPHRPs all have a substantial, positive, and independent influence on the improvement and sustainability of WE in Nigerian companies operating in the 4IR era. In light of this, the research's findings have helped sustain workplace engagement during the fourth industrial revolution, notably in Nigeria. The literature on creativity, polychronicity, high-performance human resource strategies, corporate culture, and job engagement has also benefited from its contributions.

Introduction

Organizational change is inevitable and will persist in the workplace. It enhances organizational performance and makes adjustments for the environment and working situations. Because change is essential to ensure work organizations' success and survival in improved technical revolution, privatization policies, and globalization, organizations that resist change will not survive the current industrial revolution (Rebeka & Indradevi, 2015; Gupta, 2016). The growth of internet technologies and Cyber-Physical Systems gives Industry 4.0 its foundation. A production structure that is quicker, more accurate, high-quality, and less expensive was built in response to these advancements, which made sure that efficiency, particularly in production, rose and the industries expanded (Ertugrul & Deniz, 2018).

The internet of things, or industry 4.0, is a new production system where living and non-living items can communicate and interact, innovative production is conceivable, and cyber-physical systems are utilized. With the help of the shift in client demands brought on by digitization and digital technologies, which ensure that businesses address these demands and requirements more quickly and efficiently, the products and services have started to be customized much more (Hacioglu & Sevgilioglu, 2019). In addition, the characteristics of the 4IR will have various effects on employment, affecting not just one industry but all industries.

The 4IR represents a massive opportunity for growth since, by 2030, Africa will have the world's largest workforce, the necessary infrastructure, technological innovation, and the use of skills (Groenen, 2019). Nigeria is transitioning its trading standard from traditional business to online commerce, highlighting the influence of the 4IR (Ajah & Chigozie-Okwum, 2019). However, Nigeria

has made relatively little effort compared to its global rivals. As a result, to implement the fourth industrial revolution, Nigeria must develop alternative sources of revenue other than oil and gas, which are at a point of no return (Ajah & Chigozie-Okwum, 2019).

Human resource development (HRD) and organizational behavior (OB) researchers have become increasingly interested in studying work engagement during the past ten years (Shuck & Wollard, 2010). In recent years, positive psychologists, human resource specialists, and management experts have expressed a growing interest in teaching others how to increase workplace engagement (Akoi et al., 2021). Employee engagement can be physical and mental (Abdullah et al., 2021). Wellins et al. (2011) indicated that work engagement is the level at which employees love and believe in what they do and feel valued for doing it. Therefore, engaged workers feel energized and productively connected to their job activities and think they're up to the challenges of their position. A large body of research illustrates the advantages of highly engaged employees for businesses in today's competitive market (Ahmed et al., 2021). Scholars posited that engaged workers are less likely to quit their jobs and are more likely to attend meetings regularly (Akoi et al., 2021). Hence, understanding the idea of engagement and participation and its potential impacts on businesses is crucial (Ali & Anwar, 2021).

Modern enterprises must incorporate both the Internet and the smart industry. These are practical strategies for businesses to foster employee creativity and maintain a highly competitive position in the market (Asif et al., 2019). An organization's ability to innovate and gain a competitive advantage is greatly influenced by its workforce (Tan et al., 2019). Since encouraging employees' creativity is crucial for retaining a competitive position, managers must train their millennial staff (Younas et al., 2018). For all sorts of businesses in the current decade, the value of creativity at the employee level has become essential (Dong et al., 2017). Organizations heavily rely on the creativity of their staff to adapt to the present changing circumstances, such as the 4IR. Therefore, individual creativity is essential for all organizations' competitive advantages and long-term survival (Zhu et al., 2018). So, discussing methods to encourage creativity is necessary for management academics and business executives. Furthermore, employee polychronicity is the simultaneous participation of employees in several related tasks. Employees can handle multiple schedules simultaneously; as a result, allowing them to research new ways to complete their tasks and come up with fresh ideas (Jang & George, 2012). When one prefers to complete various things at once rather than feeling pressured to meet several goals, this is called polychronicity, which is distinct from having multiple tasks and goals (Kapadia, 2016). Besides, innovative ideas are guided by polychronicity, a crucial component of employee creativity (Yousaf et al., 2021). Therefore, how much effect could polychronicity have on the variation in employee involvement within the 4IR?

Businesses concentrate on efficiency and effectiveness in their operations in the current competitive business environment. This has affected the management literature's emphasis on using human resource practices (HRPs) to connect better organizational and personal performance goals (Ang et al., 2013). HPHRPs are a collection of updated employee-focused HR procedures that convey that the company values both work and its employees (Noopur & Dhar, 2019). It is a technique for increasing value where the organization's people are seen as a crucial resource for maintaining viability (Fu et al., 2017). This method makes employees like and believe in their performance (Noopur & Dhar, 2019). In addition, Hofstede et al. (2010) indicated that every person possesses a set of feelings, behaviors, and thoughts acquired during their life. These individuals join a company that follows its principles, values, and procedures. Therefore, the organization must establish and instill a shared culture in its members or employees to accomplish the shared aim. Organizational culture can also be seen as a set of shared beliefs, values, and conventions that influence how employees feel, think, and behave in the workplace (Olawuyi, 2017). Van et al. (2013) concluded that where individuals feel their workplace cultures are helpful, they innovate and advance the firm. Consequently, it is fascinating for researchers (McKenna, 2012).

How successfully employees in Nigerian businesses engage within the 4IR is a critical subject that has not been adequately addressed. Given that change is the norm in today's world, survival and an insufficient investigation of the potential predictors of work engagement threaten the effectiveness of work organizations. Since there are few studies on these variables in Nigeria's businesses during the 4IR era, it is necessary to ascertain further the consequences of predictors of employee engagement.

In the 4IR era, this research attempts to add information on employee work engagement and create a practical methodology for achieving and sustaining it. Consequently, the following research inquiries:

    i.   Does employee creativity impact work engagement within Nigeria's businesses in the 4IR era?

    ii.   With the 4IR era, how will employees' polychronicity affect their participation in Nigerian businesses?

    iii.   How can HPHRPs affect employee engagement in Nigerian organizations under the Fourth Industrial Revolution?

    iv.   In the 4IR era, how does organizational culture affect employee engagement in Nigeria's commercial organizations?

    v.   Are there any relationships between work engagement and employee creativity, polychronicity, HPHRPs, and POC in Nigeria's businesses in the 4IR era?

    vi.   In the 4IR era, what are the most effective strategies for boosting and maintaining work engagement in Nigeria's businesses?

This article used a cross-sectional survey method to address the questions mentioned above, and questionnaires were distributed randomly to gather the information needed for analysis. The Statistical Packages for Social Sciences (SPSS version 28) was used to analyze the data that had been recovered and was usable.

The format of this essay is as follows: A literature review including empirical studies that illuminate the connection between the study's independent and dependent variables follows the introduction. The background information on research and methods is included in the third section. The authors offer views and implications following analysis and study outcomes. Key takeaways, suggestions, directions for further research, and limits round out this paper's conclusion.

Literature Review

The impacts of POC, HPHRPs, employee polychronicity, and creativity on employee work engagement in businesses are examined in the study's literature evaluation.

Work Engagement

Employee engagement is a successful response to the overall organization and the degree of employees' devotion to their employer, according to Ali et al. (2021). According to Anwar and Abdullah (2021), employee engagement reflects a person's relationship with the company and is linked to the person's desire to be involved in the business world. Work engagement is a favorable, contented psychological state combining vigor, dedication, and absorption components (Schaufeli & Bakker, 2004). In summary, vigor comprises high levels of energy and resilience, whereas dedication to one's work entails a strong sense of purpose, pride, and difficulties related to one's profession. Employees that are entirely focused on their work-related activities and happily absorbed in them so that time flies by are said to be absorbed. They hardly ever manage to disconnect from their jobs.

4IR

Huge cultural, social, and economic changes are occurring worldwide due to the digital revolution, creating a new environment in which we must learn to exist. The fourth industrial revolution is a worldwide discussion topic, as it was in 2016 when the World Economic Forum (WEF) emphasized it (WEF, 2016). This phenomenon is driven by an unmatched level of automation and connection and is based on artificial intelligence, big data, robots, and the Internet of Things (Quan & Park, 2017).

Employee Creativity and Work Engagement

According to Hertenstein et al. (2019), creativity is the expansion of new and advantageous thoughts that increase the competency and worth of diverse processes. Also, Bai et al. (2016) and Revilla and Rodriguez-Prado (2018) posited that creativity results from one's cumulative creative invention or capacity and advanced knowledge based on prior experiences. Being creative is coming up with fresh ideas pertinent to and helpful in carrying out activities at work (Zhu et al., 2018; Kremer et al., 2019). Employees evaluate their work in light of the organization's interests because they feel connected and agree. Employees desire to link their interests with the company as a shared interest and work to build relationships of trust by developing their creative thinking for the company (Tse et al., 2018). The expression of creativity that encourages uniqueness, resourcefulness, and ingenuity is a crucial component of employee engagement. As a result, employee creativity and work engagement are related (Olokundun et al., 2017). Consistent with research, employees' creativity has a favorable and considerable impact on their level of engagement at work (Bagheri et al., 2013). According to Bakker and Leiter (2010), employees that are more creative and open to new ideas are more engaged at work. However, employees who are less creative and receptive to new ideas are less engaged (Bakker & Xanthopoulou, 2013). Consequently, it is hypothesized that:

H₁: Employee creativity significantly impacts work engagement within Nigeria's businesses in the 4IR era.

Employees' Polychronicity and Work Engagement

People who perform numerous related activities at once are said to be polychronic (Mulki & Wilkinson, 2017). It entails carrying out several tasks concurrently or rotating between them (Kaufman-Scarborough, 2017). People with polychronic behavior prefer multitasking because it makes them feel better (Sharma & Gursoy, 2018). Polychronic employees are more likely to remain engaged (Cooper-Thomas et al., 2014). Hecht and Allen (2005) also recommended that polychronic servers stay motivated and happy in their profession. Slåtten and Mehmetoglu (2011) highlighted that polychronic employees exhibit a high level of work engagement in the workplace to bolster this claim. Because they were happy while executing numerous tasks at once, workers with effective task-switching skills gradually stayed engaged with their work (Asghar et al., 2020). Following the study on polychronicity and work engagement mentioned above, this report hypothesized that:

H₂: Employees' polychronicity significantly influences their engagement within Nigeria's businesses in the 4IR era.

High-performance Human Resource Practices and Work Engagement

Human resource practices that increase individual and organizational performance are known as HPHRPs (Zhang & Jia, 2010). HPHRPs for this study include selective hiring, in-depth training, internal mobility, worker security, a clear job description, result-driven evaluation, incentive pay, and engagement. These are a collection of HRPs linked together and geared toward improving workers' knowledge, skills, and abilities (Messersmith & Wales, 2011). HPHRP is a system for creating a happy work environment, encouraging good behavior at work, and increasing employee engagement to raise performance levels (Ahmad & Allen, 2015). It is a process of value enrichment where the firm's workforce is viewed as an essential resource for maintaining competitive advantage (Fu et al., 2015). According to Karatepe (2013), high-performance human resource practices impact employees' engagement at work.

Akhtar et al. (2016) evaluated the effect of HPHRPs on employee engagement and discovered that these practices significantly and favorably influence employees' engagement at work. Furthermore, Zhong et al. (2016) state that high-performance HR practices are directly related to employee engagement at work. The findings of Goyal and Patwardhan (2021) demonstrated the crucial part HPHRPs play in engaging employees by raising their attention, vigor, focus, and dedication. Thus, the current study has made the following predictions:

H₃: HPHRPs significantly affect work engagement within Nigeria's businesses in the 4IR era.

Organizational Culture and Work Engagement

According to Naidoo and Martins (2014), organizational culture is a shared understanding held by members of an organization that sets it apart from other organizations. It offers guidance and reinforces norms of conduct to regulate organizational actors and enable them to carry out their obligations and tasks effectively and efficiently to accomplish shared organizational goals and objectives. The perception of an organization's culture can be favorable, unfavorable, supportive, or unsupportive. Businesses with a positive culture reward their workers and foster an environment that allows them to grow, develop, and reach their full potential (Robbins & Judge 2012). Widodo (2017) states that corporate culture influences employees' duties or tasks. It might be the fundamental or guiding principle to which every employee of the organization must adhere without unjustified resistance. The significant tenets, ideologies, and patterns of conduct that make up organizational culture. These factors determine the organization's primary strategy and the possibility that it will remain in the market or eventually leave it (Olawuyi, 2017). The findings of Naidoo and Martins' (2014) study showed that organizational culture in South African information and communication technology enterprises positively impacts work engagement. Also, researchers stressed that having a positive workplace culture promotes employees' engagement and motivates them to work toward the organization's goals in a particular manner (Santoso & Soehari, 2020). Employees benefit from organizational culture because it encourages them to achieve their goals and be highly engaged, fulfilled, and grow within the company (Puspita et al., 2020). Consequently, the following hypotheses are made:

H₄: Perceived organizational culture significantly influences work engagement within Nigeria's businesses in the 4IR era.

H₅: Employee creativity, polychronicity, HPHRPs, and POC jointly impact work engagement within Nigeria's businesses in the 4IR era.

Research and Methodology

In Nigeria's Lagos, Ogun, and Oyo States, nine (9) firms provided the study's sample. A cross-sectional survey methodology was used to collect data for this investigation, and surveys were disseminated randomly among people who volunteered to participate in the study. Consequently, participants were chosen using a simple random sampling technique. 261 of the 270 disseminated questionnaires were recovered, deemed usable, and subjected to Statistical Packages for Social Sciences analysis (SPSS version 28). In addition, this research examined its hypotheses and gathered information on its participants' creativity, polychronicity, HPHRPs, organizational culture, and engagement at work. Therefore, linear multiple regression was used to assess the study's assumptions. Each person voluntarily agreed to participate in the study and maintained their anonymity. However, this paper piloted a factor and reliability analysis to create a perfect instrument and determine the survey's local consistency.

Segments of this research survey include:

Section A: Demographics

The demographic information includes the individuals' gender, age, years of work experience, marital status, and level of education.

Section B: Employee Creativity

This study used a four-item scale created by Akgunduz et al. (2018) to assess employee creativity. The 5-point Likert response scale used in this measurement has a Cronbach's alpha of 0.87. For the current investigation, the dependability coefficient was.90. "The subordinates create novel but workable ideas" was the sample statement.

Section C: Employees' Polychronicity

The five-item polychronicity measure, adopted from a study by Yousaf et al. (2021), had a Cronbach's alpha of .82. It uses a 5-point Likert scale for responses. For this investigation, the dependability coefficient was .85. "I prefer to undertake two or more tasks at once," was the sample response.

Section D: HPHRPs

A 14-item measure of perceived HPHRPs from Ahmad and Allen's (2015) study was adopted as a result of the study. The objects' initial alpha coefficient was.90. The dependability coefficient for the current study was .92. It had a Likert scale with three possible responses: "1= Disagree" to "3= Agree."

Section E: Perceived Organizational Culture

The 24-item scale established by Cameron and Quinn (2011) to measure POC was used in this study to evaluate how employees regarded the company's culture. Each question item on the survey had a Likert scale, with 1 being highly opposed to it and 5 being firmly in agreement. The 24-item measure's initial Cronbach's alpha was 0.80. However, this study found that this measure's dependability had a Cronbach's alpha coefficient of 0.89.

Section F: Work Engagement

The work engagement tool from the study (Kuok & Taorminab, 2017) was promoted in this paper. Cognitive, emotional, and physical engagements are its three sub-sections. The six (6) items that make up the cognitive assessment have a reliability value of .88. In contrast, the present study found a coefficient of .87. Six (6) elements make up the emotional sub-section with a reliability of .89. This paper, in comparison, achieved dependability of .88. Six (6) items in the physical engagement section have a reliability of .91, while the dependability of this study was .90. The work engagement scale has a total of eighteen (18) elements, with a 5-point Likert response scale.

Findings and Discussions

The obtained data were examined, and the outcomes are shown in the tables below.

Table 1: Linear Multiple Regression results present the joint influences of EC, EP, HPHRPs, and POC on WE

Model	R	R-squared	Adjusted R-squared	F	Sig
1	.975[a]	.925	.924	82494.026	.000

a. Dependent Variable: Work Engagement
b. Predictors: (Constant), Employee Creativity, Employees' Polychronicity, HPHRPs, and Perceived Organizational Culture

Source: Author's findings.

**Table 2:** Measurements of the predictors of WE

Influencers	B	β	t	Sig	95.0% Confidence Interval for B		R	R²	F	P
					Lower Bound	Upper Bound				
(Constant)	-33.139		-1194.879	.000	-33.184	-33.075	.975[a]	.925	82494.026	<0.01
Employee Creativity	.163	.082	230.414	.001	.162	.165				
Employee's Polychronicity	1.944	.673	1382.232	.000	1.941	1.946				
High-Performance Human Resource Practices	.805	.170	530.589	.000	.802	.808				
Perceived Organizational Culture	.146	.188	325.643		.145	.147				

a. Dependent Variable: Work Engagement

Source: Author's findings.

The resulting matrix, shown in Table 2, demonstrates how employee creativity influences work engagement positively and significantly (β = .082; p<.001). As a result, in the 4IR era, employees' creativity increases their work engagement within Nigerian businesses. Employee polychronicity also significantly and positively influences their engagement (β =.673; p<.001). This suggests that employees' polychronicity inside Nigeria's business organizations boosts their level of work engagement in the 4IR era. Furthermore, the findings indicate that HPHRPs positively impact work engagement (β =.170; p<.001). This finding implies that implementing HPHRPs in Nigerian businesses during the 4IR era increases WE. Furthermore, the outcomes demonstrate that work engagement is positively influenced by perceived organizational culture (β =.188; p<.001). This indicates that the more employees believe their organizations promote a favorable culture, the more engaged they are in the 4IR era. These results confirmed the study's first four hypotheses.

Also, according to the findings presented in Table 1 (R=.975, R2 =.925, F = 82494.026, p<.001), employee creativity, polychronicity, HPHRPs, and POC all together had a substantial and positive effect on WE in Nigeria's businesses in the 4IR period. This finding infers that in the 4IR era, employee creativity, polychronicity, HPHRPs, and POC accounted for 97.5% of the observed variations in work engagement within Nigerian businesses. The remaining 2.5% was attributed to elements this study did not measure. These results supported the fifth hypothesis of this paper.
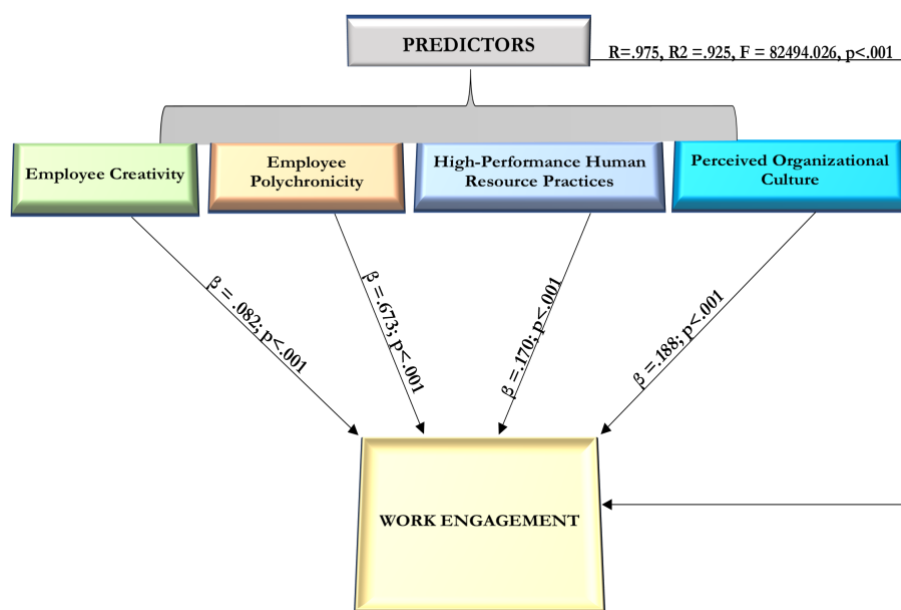
Figure 1: The combined and individual influence of *EC, EP, HPHRPs, and POC on WE* in Nigeria's businesses in the 4IR era; *Source:* Author's findings.

This study found that employee creativity considerably and favorably affects work engagement. Employee creativity and work engagement are associated because, as previously noted, evidence shows a creative expression that fosters originality, resourcefulness, and cleverness is critical to employee engagement (Olokundun et al., 2017). It also corroborates the notion that workers' creativity positively and significantly influences their degree of engagement at work (Bagheri et al., 2013). This investigation's findings prove that employees are less inventive, open to new ideas, and less engaged at work (Bakker & Xanthopoulou, 2013). As a result, this article has demonstrated that, in Nigerian organizations operating in the 4IR period, employee creativity is a predictive factor that considerably impacts work engagement.

This study demonstrated how employee polychronicity considerably and favorably affects job engagement. According to the research, employees' polychronicity in Nigerian businesses boosts their level of participation in the 4IR era. The conclusion (Cooper-Thomas et al., 2014) that polychronic personnel are more likely to stay engaged is supported by this result. The current findings support Sltten and Mehmetoglu's (2011) contention that polychronic employees have a high level of work engagement at their workplace. Additionally, this article upholds Asghar et al.'s (2020) assertion that those with good task-switching skills eventually kept involved with their work since they were joyful when completing multiple activities simultaneously. Therefore, this paper has shown that employee polychronicity is a predictive feature that strongly affects work engagement in Nigerian businesses in the 4IR period.

This study also revealed that HPHRPs positively impacted employee engagement. Implementing HPHRPs encourages work engagement in Nigerian firms in the 4IR era. The results have proven that HPHRP is a system for fostering a positive work environment, promoting appropriate behavior at work, and raising employee engagement to improve employee performance (Ahmad & Allen, 2015). It also supports Karatepe's (2013) assertion that HPHRPs impact workers' engagement. Moreover, this study lends credence to earlier studies that found that HPHRPs had a positive and significant impact on employees' WE (Akhtar et al., 2016). This study also supports Zhong et al.'s (2016) claim that high-performance HR procedures are directly linked to worker engagement. It also endorsed Goyal and Patwardhan's (2021) findings, which showed the critical role HPHRPs play in energizing, motivating, and focusing employees. As a result, this paper suggests that in the 4IR period, high-performance human resource practices will significantly predict work engagement in Nigerian organizations.

Furthermore, this study demonstrated how an organization's culture is regarded positively impacts employee engagement. The findings also indicated that firms' ability to engage employees would increase as they foster positive cultures. This result supports the claim (Naidoo & Martins, 2014) that organizational culture benefits work engagement in South African information and communication technology firms. It supports Santoso and Soehari's (2020) argument that having a healthy workplace culture encourages employees to engage in their job and drives them to work toward the organization's goals in a certain way. Also, it supports the claim (Puspita et al., 2020) that organizational culture benefits workers since it motivates them to meet their objectives and be highly engaged, fulfilled, and grow within the business. Organizational culture helps employees by enabling them to accomplish their objectives, be highly engaged, fulfilled, and advance within the business. Consequently, this paper suggests that in the 4IR period, perceived organizational culture will significantly predict work engagement in Nigerian organizations.

This paper has further proven that employee creativity, polychronicity, HPHRPs, and POC strongly and jointly impact WE within Nigeria's businesses in the 4IR era. Thus, these predictors inspired a 97.5% disparity in work engagement. The other 2.5% was

ascribed to factors not assessed in this investigation. This result validates the hypothesis: Employee creativity, polychronicity, HPHRPs, and POC jointly impact work engagement within Nigeria's businesses in the 4IR era.

Table 3: Study hypotheses

Objectives	Hypotheses	Hypothesis test	Decision
To determine the impact of employee creativity on work engagement within Nigeria's businesses in the 4IR era.	H_1: Employee creativity significantly impacts work engagement within Nigeria's businesses in the 4IR era.	$\beta = .082$; $p<.001$ multiple Linear regression analysis	$p<.001$, Accept H_1
To determine the influence of employees' polychronicity on work engagement within Nigeria's businesses in the 4IR era.	H_2: Employees' polychronicity significantly impacts their engagement within Nigeria's businesses in the 4IR era.	$\beta = .673$; $p<.001$ multiple Linear regression analysis	$p<.001$, Accept H_2
To determine the impact of HPHRPs on work engagement within Nigeria's businesses in the 4IR era.	H_3: HPHRPs significantly affect work engagement within Nigeria's businesses in the 4IR era.	$\beta = .170$; $p<.001$ multiple Linear regression analysis	$p<.001$, Accept H_3
To ascertain how perceived corporate culture affects employee engagement in Nigerian enterprises within the 4IR period.	H_4: In the 4IR era, POC substantially impacts work engagement in Nigerian businesses.	$\beta = .188$; $p<.001$ multiple Linear regression analysis	$p<.001$, Accept H_4
To ascertain how the 4IR era's businesses in Nigeria are affected by employee creativity, polychronicity, HPHRPs, and POC.	H_5: Employee creativity, polychronicity, HPHRPs, and perceived organizational culture jointly impact work engagement within Nigeria's businesses in the 4IR era.	$R= .975$, $R2 =.925$, $F = 82494.026$, $p<.001$ multiple Linear regression analysis	$p<.001$, Accept H_5

Source: Authors

This investigation intended to develop an applied model for increasing and sustaining work engagement in the 4IR era. This is shown in figure 2.
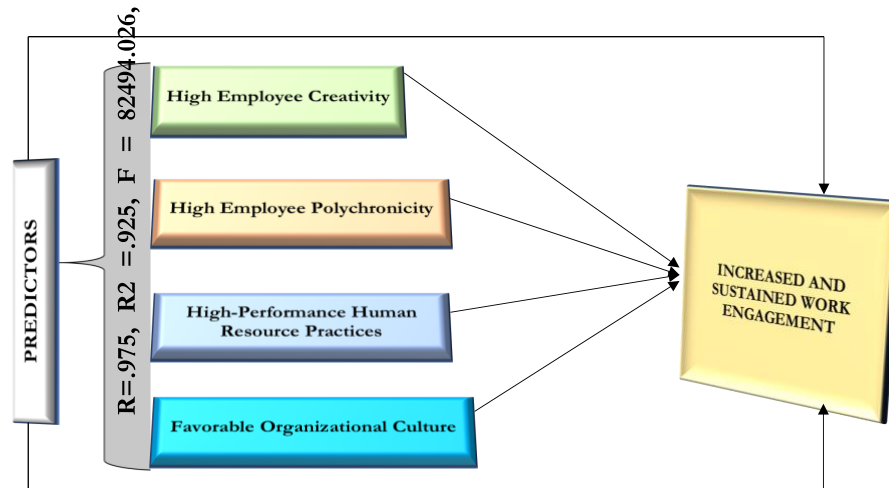
Figure 2: An applied model of efficiently increasing and sustaining work engagement in the 4IR era; *Source:* Paper's findings.

Conclusions

The paper's final matrix shows that HPHRPs, perceived organizational culture, employee creativity, and polychronicity all have a substantial, independent positive impact on WE in Nigerian enterprises during the 4IR era. These findings supported the investigation's first four hypotheses. Moreover, this study's findings suggest that employee creativity, polychronicity, HPHRPs, and POC accounted for 97.5% of the observed variances in work engagement in Nigerian businesses in the 4IR era. As a result, it confirmed the fifth hypothesis of this investigation.

As a result, this study contributes to the literature on 4IR, psychology, human resources management, organizational/employee performance, and development. Additionally, it submits that businesses can improve employee engagement in the 4IR era.

However, the generalizability of the cross-sectional survey used in this study is a drawback (a limit through a sampled population). Due to the simultaneous assessment of the exposure and the outcome, there was no evidence of a temporal connection between exposure and outcome.

This study recommends mixed-method research to explore the subject in future studies. This would provide more comprehensive data regarding the 4IR era determinants of work engagement.

The findings of this study have some ramifications for corporate leadership and management in terms of necessary future systematic and developmental thoughtful intervention to obtain high employee creativity, polychronicity, HPHRPs, favorable organizational culture, and increased work engagement within Nigeria's businesses, particularly in the current 4IR era.

Direction for Future Research

To better understand the factors influencing work engagement in the 4IR era, researchers should use a pragmatic mixed-method survey to investigate the effects of predictors of work engagement in the 4IR period.

Beneficial suggestions include the following:

i. *The goal of management should always be to encourage employees' sense of engagement and belonging, which supports and fosters their creativity and innovativeness in the current 4IR era.*

ii. *The polychronic attitude of employees should be adequately emphasized and encouraged by management as it is essential for enabling them to become more involved in their work. Employees should receive sufficient encouragement and support to encourage and promote their polychronic attitude in the present 4IR era.*

iii. *In addition, management and other office leaders should create human resource policies that convey to staff that their companies pursue a value-enrichment plan and see them as essential resources for a respectable level of life. These procedures are necessary for ensuring engagement and removing the difficulties the fourth industrial revolution has brought forth.*

iv. *In the current 4IR period, the management of organizations should, according to this paper's advice, ensure a sound, consistent strategy that encourages a positive organizational culture and motivates employees to embrace it.*

References

Abdullah, H., Ismail, I., Alnoor, A., & Yaqoub, E. (2021). Effect of perceived support on employee's voice behavior through the work engagement: A moderator role of locus of control. *International Journal of Process Management and Benchmarking, 11*(1), 60-79. https://doi.org/10.1504/IJPMB.2020.10033080.

Ahmad, M., & Allen, M. (2015). High-performance HRM and establishment performance in Pakistan: An empirical analysis. *Employee Relations, 37*(5), 506-524. https://doi.org/10.1108/ER-05-2014-0044.

Ahmad, N., Ullah, Z., Arshad, M. Z., Waqas Kamran, H., Scholz, M., & Han, H. (2021). Relationship between corporate social responsibility at the micro-level and environmental performance: The mediating role of employee pro-environmental behavior and the moderating role of gender. *Sustainable Production and Consumption, 27*, 1138-1148. https://doi.org/10.1016/j.spc.2021.02.034.

Ajah, I. A., & Chigozie-Okwum, C. C. (2019). Exploring the benefits of the 4th industrial revolution: The Nigerian experience. *AFRREV STECH: An International Journal of Science and Technology, 8*(1), 22-32. https://doi.org/10.4314/stech.v8i1.3.

Akgunduz, Y., Alkan, C., & Gök, Ö. A. (2018). Perceived organizational support, employee creativity, and proactive personality: The mediating effect of meaning of work. *Journal of Hospitality and Tourism Management, 34*, 105-114. https://doi.org/10.1016/j.jhtm.2018.01.004.

Akhtar, A., Nawaz, M. K., Mahmood, Z., & Shahid, M. S. (2016). Impact of high-performance work practices on employees' performance in Pakistan: Mediating role of employee engagement. *Pakistan Journal of Commerce and Social Sciences (PJCSS), 10*(3), 708-724. http://hdl.handle.net/10419/188275.

Akoi, S., Ali, B. J., Saleh, P. F., Najmalddin, B., Mustafa, R. S., Abdulmajid, M. R., & Hama, A. R. (2021). Elaborating the characteristics that affect buyers in online shopping: The case of generation Z girls in the Kurdistan region of Iraq. *Akoi, S., Jamal Ali, B., Fadel Saleh, P., Najmalddin, B., Sabah Mustafa, R., Rzgar Abdulmajid, M., & Rebwar Hama, A.(2021).Elaborating the Characteristics that Affect Buyers in Online Shopping: The Case of Generation Z Girls in Kurdistan Region (TRUNCATED),*

Ali, B. J., & Anwar, G. (2021). Work engagement: How does employee work engagement influence employee satisfaction? *Ali, BJ, & Anwar, G.(2021).Work Engagement: How does Employee Work Engagement Influence Employee Satisfaction, 7*(6), 10-21. https://doi.org/10.22161/ijaems.76.2.

Ali, M., Islam, T., Mahmood, K., Ali, F. H., & Raza, B. (2021). Corporate social responsibility and work engagement: Mediating roles of compassion and psychological ownership. *Asia-Pacific Social Science Review, 21*(3), 196-213. https://www.researchgate.net/publication/354401407.

Ang, S. H., Bartram, T., McNeil, N., Leggat, S. G., & Stanton, P. (2013). The effects of high-performance work systems on hospital employees' work attitudes and intention to leave: A multi-level and occupational group analysis. *The International Journal of Human Resource Management, 24*(16), 3086-3114. https://doi.org/10.1080/09585192.2013.775029.

Anwar, G., & Abdullah, N. N. (2021). The impact of human resource management practice on organizational performance. *International Journal of Engineering, Business, and Management (IJEBM), 5*(1), 35-47 https://doi.org/10.22161/ijebm.5.1.4.

Asghar, M., Gull, N., Tayyab, M., Zhijie, S., & Tao, X. (2020). Polychronicity at work: Work engagement as a mediator of the relationships between job outcomes. *Journal of Hospitality and Tourism Management, 45*(3), 470-478. https://doi.org/10.1016/j.jhtm.2020.10.002.

Asif, M., Qing, M., Hwang, J., & Shi, H. (2019). Ethical leadership, affective commitment, work engagement, and creativity: Testing a multiple mediation approach. *Sustainability, 11*(16), 4489. https://doi.org/10.3390/su11164489.

Bagheri, G., Esmaili, M., Abasi, A., & Seraji, R. (2013). Analysis of the effect of individual creativity on the employee's engagement at work: Case study: Agriculture organization of Qom. *International Journal of Accounting Research, 1*(2), 8-17. https://doi.org/10.12816/0001129.

Bai, Y., Lin, L., & Li, P. P. (2016). How to enable employee creativity in a team context: A cross-level mediating process of transformational leadership. *Journal of Business Research, 69*(9), 3240-3250. https://doi.org/10.1016/j.jbusres.2016.02.025.

Bakker, A. B., & Leiter, M. P. (2010). *Work engagement: A handbook of essential theory and research* Psychology press.

Bakker, A. B., & Xanthopoulou, D. (2013). Creativity and charisma among female leaders: The role of resources and work engagement. *The International Journal of Human Resource Management, 24*(14), 2760-2779. https://doi.org/10.1080/09585192.2012.751438.

Cameron, K. S., & Quinn, R. E. (2011). An introduction to changing organizational culture: Based on the competing values framework. *Diagnosing and Changing Organizational Culture,* 1-12.

Cooper-Thomas, H. D., Paterson, N. L., Stadler, M. J., & Saks, A. M. (2014). The relative importance of proactive behaviors and outcomes for predicting newcomer learning, well-being, and work engagement. *Journal of Vocational Behavior, 84*(3), 318-331. https://doi.org/10.1016/j.jvb.2014.02.007.

Dong, Y., Bartol, K. M., Zhang, Z., & Li, C. (2017). Enhancing employee creativity via individual skill development and team knowledge sharing: Influences of dual-focused transformational leadership. *Journal of Organizational Behavior, 38*(3), 439-458. https://doi.org/10.1002/job.2134.

Ertuğrul, İ., & Deniz, G. (2018). The World of 4.0: Marketing 4.0 and Industry 4.0. Bitlis Eren University Journal of Social Sciences, 7(1), 143-170. https://dergipark.org.tr/tr/pub/bitlissos/issue/38061/420974.

Fu, N., Flood, P. C., Bosak, J., Morris, T., & O'Regan, P. (2015). How do high-performance work systems influence organizational innovation in professional service firms? *Employee Relations, 37*(2):209-231. https://doi.org/10.1108/ER-10-2013-0155.

Fu, N., Flood, P. C., Bosak, J., Rousseau, D. M., Morris, T., & O'Regan, P. (2017). High-Performance work systems in professional service firms: Examining the practices-resources-uses-performance linkage. *Human Resource Management, 56*(2), 329-352. https://doi.org/10.1002/hrm.21767.

Gupta, A. (2016). A research paper on the employees' attitude towards organizational change. *IOSR Journal of Dental and Medical Sciences, 15*(2), 44-47. https://www.iosrjournals.org/iosr-jdms/papers/Vol15-issue2/Version-12/K0152124447.pdf.

Goyal, C., & Patwardhan, M. (2021). Strengthening work engagement through high-performance human resource practices. *International Journal of Productivity and Performance Management, 70*(8), 2052-2069. https://doi.org/10.1108/IJPPM-03-2020-0098.

Hacioglu, U., & Sevgilioglu, G. (2019). The evolving role of automated systems and its cyber-security issue for global business operations in Industry 4.0. International Journal of Business Ecosystem & Strategy (2687-2293), 1(1), 01-11. https://doi.org/10.36096/ijbes.v1i1.105.

Hecht, T. D., & Allen, N. J. (2005). Exploring links between polychronicity and well-being from the perspective of person–job fit: Does it matter if you prefer to do only one thing at a time? *Organizational Behavior and Human Decision Processes, 98*(2), 155-178. https://doi.org/10.1016/j.obhdp.2005.07.004.

Hertenstein, E., Waibel, E., Frase, L., Riemann, D., Feige, B., Nitsche, M. A., . . . Nissen, C. (2019). Modulation of creativity by transcranial direct current stimulation. *Brain Stimulation, 12*(5), 1213-1221. https://doi.org/10.1016/j.brs.2019.06.004.

Hofstede, G., Hofstede, G. J., & Minkov, M. (2005). *Cultures and organizations: Software of the mind* Mcgraw-hill New York.

Olokundun, M., Ibidunni, A. S., Ogbari, M. & Peter, F. (2017). Entrepreneurship educator's competence on university students' commitment to learning and business plan writing. *Academy of Strategic Management Journal, 16*(2), 1-10. https://www.academia.edu/38178448/IJMET_09_12_083_pdf.

Jang, J., & George, R. T. (2012). Understanding the influence of polychronicity on job satisfaction and turnover intention: A study of non-supervisory hotel employees. *International Journal of Hospitality Management, 31*(2), 588-595. https://doi:10.1016/j.ijhm.2011.08.004.

Kapadia, C. (2016). Doing more in less time: How multitasking increases creativity. Paper presented at the *Academy of Management Proceedings, 2016*(1) 17543. https://doi.org/10.5465/ambpp.2016.304.

Kaufman-Scarborough, C. (2017). Monochronic and polychronic time. *The International Encyclopedia of Intercultural Communication,* 1-5. https://doi.org/10.1002/9781118783665.ieicc0110.

Kremer, H., Villamor, I., & Aguinis, H. (2019). Innovation leadership: Best-practice recommendations for promoting employee creativity, voice, and knowledge sharing. *Business Horizons, 62*(1), 65-74. https://doi.org/10.1016/j.bushor.2018.08.010.

Kuok, A. C., & Taormina, R. J. (2017). Work engagement: Evolution of the concept and a new inventory. *Psychological Thought, 10*(2), 262-287. https://doi.org/10.5964/psyct.v10i2.236.

Martien Groenen (2019). Animal Genomics," Wageningen University & Research, accessed November 19, 2019.

McKenna, M. (2012). *Conversation & responsibility* Oup Usa.

Messersmith, J. G., & Wales, W. J. (2011). Entrepreneurial orientation and performance in young firms: The role of human resource management. *International Small Business Journal, 31*(2), 115-136. https://doi.org/10.1177/0266242611416141.

Mulki, J. P., & Wilkinson, J. W. (2017). Customer-directed extra-role performance and emotional understanding: Effects on customer conflict, felt stress, job performance, and turnover intentions. *Australasian Marketing Journal, 25*(3), 206-214. https://doi.org/10.1016/j.ausmj.2017.04.002.

Naidoo, P., & Martins, N. (2014). Investigating the relationship between organizational culture and work engagement. *Problems and Perspectives in Management, 12*(4), 433-441. http://hdl.handle.net/10500/14656.

Noopur, N., & Dhar, R. L. (2019). Knowledge-based HRM practices as an antecedent to service innovative behavior: A multilevel study. *Benchmarking: An International Journal, 27*(1), 41-58. https://doi.org/10.1108/K-08-2021-0737.

Olawuyi, O. S. (2017). Organizational culture as a factor affecting employee performance and increased productivity in tourism organizations (Agodi gardens and university of Ibadan's zoological garden). *Afro-Asian Journal of Social Sciences, 8*(2), 1-18. https://www.academia.edu/33865370/organizational_culture_as_factor_affecting_employee_performance_and_increased_productivity_in_tourism_organizations_agodi_gardens_and_university_of_ibadans_zoological_garden.

Puspita, D., Salimi, F., & Winarsihi, S. (2020). The effect of incentives, work discipline, and organizational culture on the performance of the national archives employees of the republic of Indonesia in banda aceh. *Sarwah: Journal of Islamic Civilization and Thought, 18*(01), 33-48. https://ejurnal.iainlhokseumawe.ac.id/index.php/sarwah/article/view/829.

Quan, Y., & Park, S. (2017). Review on the application of industry 4.0 digital twin technology to quality management. *Journal of the Korean Society for Quality Management, 45*(4), 601-610. https://doi.org/10.7469/JKSQM.2017.45.4.601.

Rebeka, E., & Indradevi, R. (2015). A study on the perception of employees during a change in an organization. *Mediterranean Journal of Social Sciences, 6*(1), 72. https://doi.org/10.5901/mjss.2015.v6n1p72.

Revilla, E., & Rodriguez-Prado, B. (2018). Building ambidexterity through creativity mechanisms: Contextual drivers of innovation success. *Research Policy, 47*(9), 1611-1625. https://doi.org/10.1016/j.respol.2018.05.009.

Robbins, S. P., & Judge, T. (2012). Essentials of organizational behavior.

Santoso, T. B., & Soehari, T. D. (2020). The influence of organizational culture, work satisfaction and generation Y characteristics of employee performance (case study at DKI Jakarta regional office BPJS employment). *Dinasti International Journal of Education Management and Social Science, 1*(4), 454-467. https://doi.org/10.31933/dijemss.v1i4.138.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior, 25*(3), 293-315. https://doi.org/10.1002/job.248.

Sharma, B., & Gursoy, D. (2018). HRM practices in hospitality and tourism industry: A review of the literature. Paper presented at the *8th Advances in Hospitality and Tourism Marketing and Management (AHTMM) Conference, 28.*

Shuck, B., & Wollard, K. (2010). Employee engagement and HRD: A seminal review of the foundations. *Human Resource Development Review, 9*(1), 89-110. https://doi.org/10.1177/1534484309353560.

Slåtten, T., & Mehmetoglu, M. (2011). Antecedents and effects of engaged frontline employees: A study from the hospitality industry. *Managing Service Quality: An International Journal, 21*(1), 88-107. https://doi.org/10.1108/09604521111100261.

Tan, C., Lau, X., Kung, Y., & Kailsan, R. A. (2019). Openness to experience enhances creativity: The mediating role of intrinsic motivation and the creative process engagement. *The Journal of Creative Behavior, 53*(1), 109-119. https://doi.org/10.1002/jocb.170.

Tse, H. H., To, M. L., & Chiu, W. C. (2018). When and why does transformational leadership influence employee creativity? The roles of personal control and creative personality. *Human Resource Management, 57*(1), 145-157. https://doi.org/10.1002/hrm.21855.

Van den Heede, K., Florquin, M., Bruyneel, L., Aiken, L., Diya, L., Lesaffre, E., & Sermeus, W. (2013). Effective strategies for nurse retention in acute hospitals: A mixed method study. *International Journal of Nursing Studies, 50*(2), 185-194. https://doi.org/10.1016/j.ijnurstu.2011.12.001.

Wellins, R., Bernthal, P., & Phelps, M. (2011). Employee engagement: The key to realizing competitive advantage (development dimensions international monograph). *Melalui Http://www.Ddiworld.com/DDI/media/monographs/employeeengagement_mg_ddi.Pdf,*

Widodo, D. S. (2017). The effect of compensation, leadership, and organizational culture through work motivation on employee performance. *Jurnal Manajemen Dan Kewirausahaan, 5*(2), 1-7. https://doi.org/10.26905/jmdk.v5i2.1570.

World Economic Forum. (2016). The future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution. *Global Challenge Insight Report.*

Younas, W., Farooq, M., Khalil-Ur-Rehman, F., & Zreen, A. (2018). The impact of training and development on employee performance. *IOSR Journal of Business and Management (IOSR-JBM), 20*(7), 20-23. https://doi.org/10.9790/487X-2007042023.

Yousaf, Z., Majid, A., & Yasir, M. (2021). Is polychronicity a panacea for innovative work behavior among nursing staff? Job embeddedness and the moderating role of decentralization. *European Journal of Innovation Management, 24*(1), 173-189. https://doi.org/10.1108/EJIM-06-2019-0172.

Zhang, Z., & Jia, M. (2010). Using social exchange theory to predict the effects of high-performance human resource practices on corporate entrepreneurship: Evidence from china. *Human Resource Management, 49*(4), 743-765. https://doi.org/10.1002/hrm.20378.

Zhong, L., Wayne, S. J., & Liden, R. C. (2016). Job engagement, perceived organizational support, high-performance human resource practices, and cultural value orientations: A cross-level investigation. *Journal of Organizational Behavior, 37*(6), 823-844. https://doi.org/10.1002/job.2076.

Zhu, Y., Gardner, D. G., & Chen, H. (2018). Relationships between work team climate, individual motivation, and creativity. *Journal of Management, 44*(5), 2094-2115. https://doi.org/10.1177/0149206316638161.