



MEDIATING EFFECT OF EMPLOYEE WELLBEING ON THE RELATIONSHIP BETWEEN TECHNOLOGICAL CHANGE AND EMPLOYEE PERFORMANCE OF MANUFACTURING COMPANIES IN KADUNA STATE-NIGERIA

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Abstract

This study aims to determine employee wellbeing as a mediating effect on the relationship between technological change and employee performance of Manufacturing Companies in Kaduna state, Nigeria. The study is a cross-sectional study and a survey research design was employed. The sample population of this study comprised employees of 25 selected manufacturing companies in Kaduna state. Data were collected through a structured online survey questionnaire. The hypotheses tested found that technological change has effect on employee performance. Technological change significantly related to employee wellbeing. Employee wellbeing is positively and significantly related to employee performance. Employee wellbeing significantly mediates the relationship between technological change and employee performance of Manufacturing Companies in Kaduna state, Nigeria. Study shows technological change benefits employee wellbeing by empowering staff, reducing workload, enhancing job satisfaction, and balancing work and personal life, emphasizing the importance of supportive work environments.

Keywords: *Technological Change, Technical complexity, Systemic Shift, Employee Performance*

1. INTRODUCTION

The creation of new technology is accelerated by globalization, and as a result, new discoveries are made every day (Joensuu-Salo, Sorama, Viljamaa, & Varamäki, 2018; Oladimeji, Ebodaghe, & Shobayo, 2017). Rapid development leaves many manufacturing companies unsure on whether to switch or upgrade their outdated approach (Kaplan, 2014). In order to reduce the consequence on the surroundings arising from the productive activities of a company and the public's understanding of this effect, companies are under pressure to tackle employee performance challenges as a result of the advancement of climate change and technological changes (De Burgos Jimenez & C'espedes, 2001; George, Merrill & Schillebeeckx, 2020). To address these issues, businesses are contemplating technological changes across all industries (George et al., 2020; Ghobakhloo, 2020). Professionals have urged management to acknowledge technological changes as a strategic opportunity to realize digitalization's maximum potential as an enabler of what is known as technology eco-advantage (BCG, 2021). In line with this, Mercedes-Benz (2022) has



committed to a net zero approach as part of its sustainability program and is seeking to achieve zero toxins from its fleet of vehicles and complete value chain by 2039.

If employees do not want to promote the company from inside, the company will likewise not grow. Effective staff members help the company add value and facilitate the best decisions in order to increase its competitive advantage (Yong *et al.*, 2020). The manufacturing industry must understand the significance of utilizing this new technology as technological advances have evolved to give more available services for the company (Gasparin *et al.*, 2020). A corporation can drive people to be passionate at work and create the best job possible for what the company expects in addition to using technology (Hermawan, 2020; Nardo *et al.*, 2019; Sapta *et al.*, 2020; Aujirpongpan & Hareebin, 2020; Lee & Xuan, 2019). Moral ideals should be ingrained in employee connections in order to foster an atmosphere of belonging and trust, prevent resentment toward one another, and lessen conflicts. According to Sapta *et al.* (2020), this culture of operation is crucial to the company prosperity.

One of prominent factors highlighted in the literature that may significantly influence employee performance is technological change (Dauda & Akingbade, 2018). Consequently, a change in the use of technology in manufacturing companies could lead to positive or negative significant influence on employee performance. To this effect, technological change in the literature is majorly conceptualised as a multidimensional variable (Dauda *et al.*, 2018). Consequently, the prominent proxies of technological change in the literature include technical complexity and systemic shift (Adeniji, Adeyeye, Iyiola & Olokundun, Borishade, Falola, & Salau 2018).

Technical complexity refers to the existence of many interdependent variables in a given system, where more variables and higher interdependence mean greater complexity and uncertainty (Ganco, 2010). On the other hand, systemic shift occurs when change reaches all or most parts of a system, thus affecting the general behavior of the entire system (Wanza & Nkuraru, 2016). Businesses are shaped by technological improvements/changes, which increase productivity and competitiveness. However, while they manage these changes, the welfare of the workforce is vital.

Employee wellbeing, on the other hand, may be a viable intervening variable between technological development and employee performance as postulated by human relations theory. According to the theory, a beneficial change in technology can make employees happier (that is - employee wellbeing) and improve their overall performance. Employee wellbeing refers to the status of an employee's mental and physical health as a result of workplace dynamics (Haddon 2018). A thorough evaluation of a person's physical, mental, and emotional health at work, which affects job satisfaction, absenteeism, and dedication to their organisation.

Nigeria's manufacturing sector's contribution to GDP is low, with only 13% in the second quarter of 2020 (Varrella, 2021). Other African countries' industrial sectors contribute more, such as Algeria, Central African Republic, Democratic Republic of Congo, Egypt, Equatorial Guinea, Gabon, Lesotho, and Morocco. This underperformance is alarming, as smaller nations in Africa perform better in the industrial sector. The poor performance of Nigerian manufacturing enterprises is attributed to various factors, including economic slowdowns, lack of coordinated fiscal and monetary policies, poor macroeconomic fundamentals, increasing production costs, and global value chain disruptions. According World Bank (2021) poor road networks, inefficient train



systems, weak port infrastructures, and erratic power supply also hinder performance. Employee performance is a crucial factor in organizational success, and this study aims to identify elements affecting good employee performance).

There is little empirical evidence to support this association, despite the fact that in practice technological changes appears to be more and more understood as a deliberate attempt to improve employee performance. In earlier studies, most of the previous studies focused largely on technology and performance or firm performance. Such as: Abbas, Muzaffar, Mahmood & Ramzan (2014), Sait, Muharan, Chin, Sulaiman, Zakuan & Choon (2018) and Gagnon & Dragon (2019) examined the relationship between technology and employee performance. As a consequence, the extant research is scattered, and its results are inconsistent from each other.

Technological change is a multidimensional variable, with technical complexity, systemic shift, and process innovation being proxies (Lakshmi & Rajarathinam, 2016). However, few studies have examined the impact of technical complexity on organizational performance (Cheah, Bellavitis & Muscio 2020; Kim, Park & Juh, 2019). Systemic shift is often overlooked, some studies used it as dependent variables (Hendradjaja & Leoma, 2021). Independent variables like digital technology-enabled capabilities and organizational culture have been studied (Lixu, Yang, Long & Shuili, 2022; Durowoju, 2017; Dauda & Akingbade, 2018 & Bendig, Schulz, Theis & Raff, 2023), but individual employee performance is not often examined.

The related studies mentioned above all analyse direct relationships between independent and dependent variables of their study, neglecting the possibility of indirect relationships between independent and dependent variables. The available studies stated above have not examined the mediating effect of employee wellbeing in the relationship between technological change and the performance of employees to the best the researcher knowledge, amounting to a gap of knowledge in the literature. With the inclusion of a mediation variable (employee wellbeing), it will contribute to better understanding of the relationship between technological change and employee wellbeing. When an independent variable and a dependent variable do not appear to be directly related, mediation analysis will help to clarify the link between these variables (Baron & Kenny 1986).

The current study makes use of Human Relations Theory, Human relations theory is a school of organisational thought that emphasises workplace informality, staff productivity, and worker satisfaction. Human relations theory does not hold that employees are basically interchangeable parts, in contrast to scientism. There are three basic parts to the organisational human relations theory. The philosophy emphasises the significance of the individual first. A worker is a unique person who reacts to his or her environment, not just a cog in a machine. Considering these unique traits is necessary in order to maximise worker productivity. Second, the informal organisations at work are taken into consideration by the human relations theory. It's possible that a worker's affiliations with other employees are more significant to them than the formal organisational chart and have a greater impact on their level of productivity (Scott, 2016) Based on the propositions of human relations theory, employee wellbeing may be a potential intervening variable between technological change and the performance of employees (Hossni, 2019). The study seeks to investigate employee wellbeing as a mediating effect on the relationship between technological change and employee performance of Manufacturing Companies in Kaduna State.



2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Employee Performance

Bello & Adebajo (2014) define employee performance as how well a person completes the duties that make up a job. To provide employees the best chance to build their career plans and identify their strengths and shortcomings so that businesses may decide on salaries, offer promotions, and evaluate employee behaviour, performance needs to be assessed (Kehoe & Wright, 2013). Work results, according to Wayne and Ferris (1990), depend on the degree of quantity and quality, the method of production, and the intensity of supervision. (1) Job knowledge, which refers to the degree of expertise in job-related tasks that would directly influence the quantity and calibre of work results; (2) Initiative: the degree of initiative displayed in performing work-related duties, particularly while addressing issues that may emerge; (3) Mental aptitude: the capacity and quickness with which one can comprehend instructions, adapt to existing working conditions and working ways; (4) Attitude: the degree of motivation and positive outlook when performing tasks; (5) Job performance: the control over time and attendance, including levels of timeliness and attendance. The culture of the workplace gives the workers a sense of comfort. Job competence and job autonomy will have an impact on work when employees believe they can address a problem at work (Hewagama *et al.*, 2019).

2.2 Technological Change

Scott (2022) defines technological change as the development of new technologies as well as advancements in current ones that enhance the market's offerings while also introducing new ones. This is the process of enhancing a product's or process's efficiency so that the output increases without the need for a corresponding increase in input. This is due to the fact that, when technology advances, a company no longer needs to start by assembling fresh raw materials to create a product, but rather can employ the same product and enhance the original technology to produce a better product. Technology has revolutionized the way companies conduct business by enabling small businesses to level the playing field with larger organizations. This allows owners to create operations using the most effective technology available. Changes in technology affect businesses and business activity in a major way. Many businesses have adapted to new technologies and use these to shape and influence their future. Technologies have made elements of business such as manufacturing, communication, purchasing, sales and advertising easier and more effective for businesses.

2.3 Dimensions of Technological Change

Technological change is measured using different proxies, which includes:

a. Technical Complexity

Dorner (1996) describes technical complexity as the presence of numerous interdependent variables in a particular system; more variables and higher interdependence imply greater complexity and uncertainty. Also, "Definition" (n.d.) defined technical complexity as the technological challenge or risk connected to a specific business possibility or problem that motivates the need for change. Complexity is a measurable trait. Technical complexity is characterized by components with "multiple interactions" and by "a non-decomposable" system (Singh, 1997). Technology complexity can be defined in terms of the level of interdependence and interaction between the subparts of a technological system (Mastrogiorgio & Gilsing, 2016). In particular, this study defines technology complexity as the degree to which the technology is



systemic, has multiple interactions and low modifiability. Technical complexity can be considered as a proxy for appropriability and a form of organizational technological change (Barney, 1991).

b. Systemic Shift

Connolly (2017) states that system shift happens when changes influence all or most system components and have an impact on the overall behaviour of the system. However, since people typically find it simpler to concentrate on the components than on the networks that link those parts, systemic change is frequently difficult to imagine, let alone inspire. All systems organize individual pieces into some sort of interrelated whole. According to Udeh & Igwe (2013), systemic shift also known as systemic change occurs when change reaches all or most parts of a system, thus affecting the general behaviour of the entire system. However, systemic change is often difficult to envision, let alone encourage, because people generally find it easier to focus on the parts than on the systems that connect those pieces. Systematic change is a long-term tactic that modifies the corporate culture as well as the attitudes and values of employees with the on-going objective of cutting costs and improving quality ("Definition" n.d.).

c. Employee Wellbeing

According to Diener, Suh, Lucas, and Smith (1999), Forgeard, Jayawickreme, Kern, and Seligman (2011), Keyes, Shmotkin, and Ryff (2002), Seligman (2011), Stratham and Chase (2010), and Zheng, Zhu, Zhao, and Zhang (2015), there is still much to be understood and debated about employee well-being. According to Warr (2002), employee well-being is often understood to encompass the whole of a person's experience and performance from both a physical and psychological perspective. According to Ryan and Deci (2000), there are two major philosophical approaches to happiness and well-being: hedonism, which is enjoyment focused, and eudemonism, which is power-realization-focused. According to Juniper, Bellamy, and White (2011) and Siegrist, Wahrendorf, Knesebeck, Jurges, and Borsch-Supan (2006), the term "employee well-being" is most frequently used to refer to an employee's overall well-being that they believe is influenced by their job and workplace interventions. According to World Health Organisation (2013) employee well-being encompasses an individual's capacity to understand their capabilities, manage stress, work productively, and contribute to their community.

Durowoju (2017) examined the effect of technological change on the performance of small and medium enterprises in Lagos state. Descriptive survey research with the sample population of 153 respondents made up of managers and owners of small and medium enterprises within Lagos metropolis was used for this study. The major statistical technique used was a linear regression technique. The hypothesis tested found that technological change has effect on organizational performance of small and medium enterprise within Lagos metropolis.

Al-Hawary & Al-Dafiri (2017) assessed the effect of components of information technology adoption on employees' performance. The study population consisted of managers in the Interior Ministry of Kuwait State. Data were collected through the use of questionnaires. The researcher found that there is a significant effect of adoption of information technology elements represented by (hardware, software, data bases, and the human element) on employees' performance of Interior Ministry of Kuwait State. The researcher also finds that the investment in information technology is an important tool in enhancing performance.



Dauda & Akingbade (2018) examined how employee relation could be employed for technological change management. It also seeks to determine effective method of using technological innovation for improved performance in the Nigerian manufacturing industry. Questions based on the hypotheses were formulated and 1256 questionnaires were distributed to 30 selected manufacturing industries in beverages, textile, steel, cement and chemical industry in Nigeria. Findings reveal that employee relations do not have significant relationship with technological change.

Baskaran, Lay, Ming and Mahadi (2020) investigated the relationship between technology adoption drivers and employee job performance in the Malaysian Manufacturing Industry. In addition, the mediating effect of perceived job insecurity was also evaluated on the relationship between technology adoption and employee job performance. Employing a quantitative research method, data was collected from 370 respondents through a structured online survey questionnaire. The findings indicated that job satisfaction and motivation to be statistically significant while the workload was failed to be retained in the research. Additionally, there was no statistical evidence for the mediating effect of job insecurity in the research. Hence to lead to the development of Hypotheses one.

Ho₁ Technological change has no significant effect on employee performance.

Ho₂ Technological change has no significant effect on employee wellbeing.

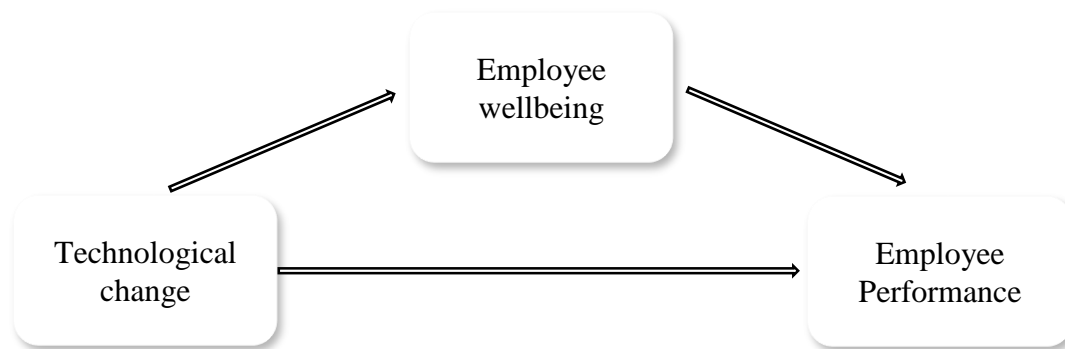
Krekel (2019) examined the relationship between employee wellbeing, productivity and performance. They survey the evidence and studied the question in a meta-analysis of 339 independent research studies, including the wellbeing of 1,882,131 employees and the performance of 82,248 business units, originating from 230 independent organisations across 49 industries in the Gallup client database. The study found a significant, strong positive correlation between employees' satisfaction with their company and employee productivity and customer loyalty, and a strong negative correlation with staff turnover. Ultimately, higher wellbeing at work is positively correlated with more business-unit level profitability.

Abdullah, Huang, Sarfraz, Ivascu, and Riaz (2020) investigated the impact of Internal Service Quality (ISQ) on nurses' job satisfaction, commitment, well-being, and performance in Pakistan's healthcare sector. A cross-sectional quantitative research with 412 nursing employees from 20 private healthcare centers revealed that ISQ directly affects employees' satisfaction, commitment, and well-being. Well-being mediates job satisfaction and performance relationships, but not commitment and job performance. Hence to lead to the development of hypotheses two.

Ho₃ Employee wellbeing has no significant effect on employee performance.

Ho₄ Employee wellbeing does not have a mediating effect on the relationship between Technological change and employee performance.

In accordance with the above literature, the framework shown in Figure 1 is presented to emphasize the connections between the components in the study.

Fig.1 Conceptual framework:

Source: Researchers

3. RESEARCH METHODOLOGY

The study used a cross-sectional survey research design to study 1,452 employees from 25 manufacturing companies in Kaduna State, Nigeria. A sample size of 302 employees was selected. Increased representation by adding 30% to sample size, resulting in 393 participants. Questionnaires were distributed using simple random sampling and proportionate sampling to each selected manufacturing firm, addressing errors and ensuring accurate responses.

The study used a structured closed-ended questionnaire, divided into two sections, to gather data on employee demographics, technical complexity, systemic shift, and employee performance. Respondents were employees from various manufacturing companies. The questionnaire was measured using a 5-point Likert.

Employee performance in this study was measured using employee task performance. In measuring task employee performance, the study used the instrument developed by Koopman. Bernaards, Hildebrandt, Vincent, Henrica and Allard (2014) it has five items. Items for employee wellbeing were adapted from Zheng, Zhu, Zhao and Zhang (2015) have seven items. In addition, Technical complexity in this study was measured using the six item scale developed by Ganco (2010). Also, measuring systemic shift was adopted from the study of Westenholz (2013) it has six items scale.

The study analyzed 393 distributed questionnaires to respondents, with 93% returning 365 copies. Outliers were detected, and 33 copies were deleted. Out of the 332 usable copies, 84% were suitable for analysis, making the study appropriate. Outliers were identified using Mahalanobis distance, resulting in a total of 332 usable copies.

4. DATA ANALYSIS AND RESULTS

The study used SmartPLS 4.0 in other to compute the two basic model of PLS path modelling which includes measurement model and structural model (Anderson & Gerbing, 1988).

4.1 Measurement Model

In the measurement model, items loadings will be examined and only items that loads above 0.50 will be retained (Fornell & Larcker, 1981). The internal consistency was measured using composite reliability (CR) threshold (0.7), Average Variance Extracted (AVE) threshold (0.5) and Fornell & Larcker (1981) threshold (below 0.85) are acceptable.

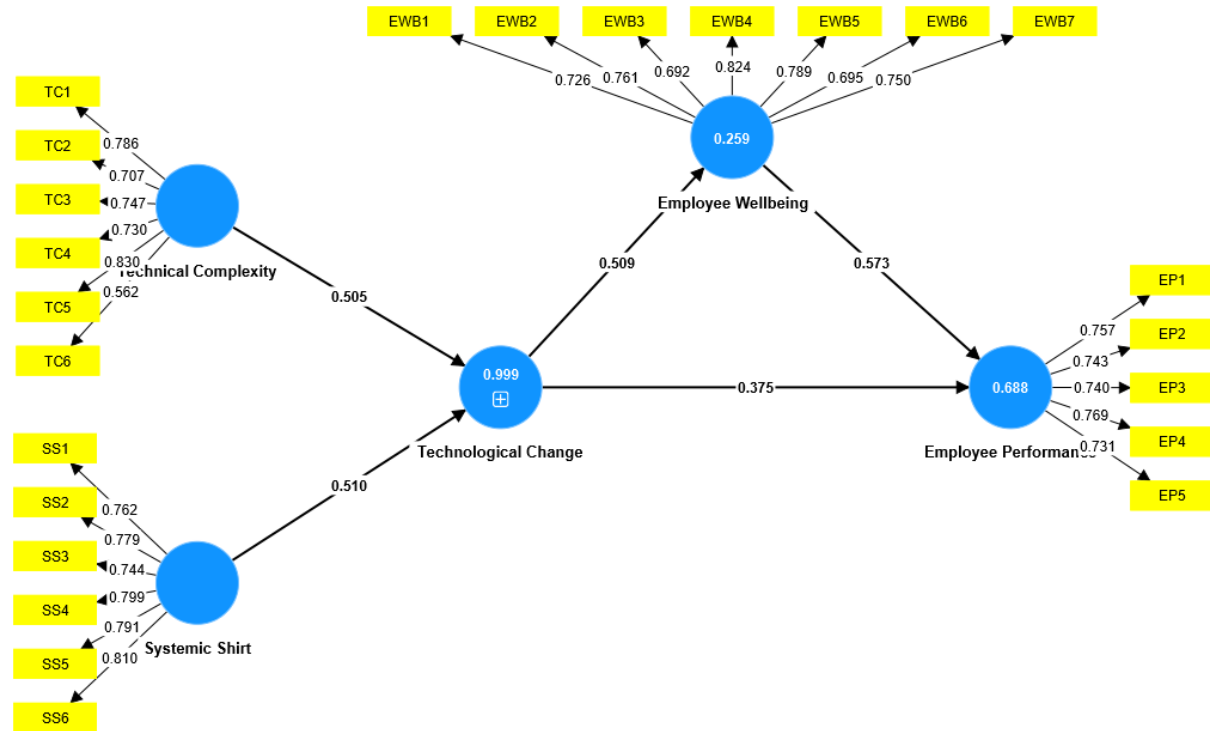


Figure 2: Measurement Model

Table 1: Construct Reliability and Validity

Construct	Items	Loadings	VIF	AVE	CR
Employee Performance	EP1	0.757	1.600	0.560	0.805
	EP2	0.743	1.764		
	EP3	0.740	1.614		
	EP4	0.769	1.897		
	EP5	0.731	1.426		
Technical Complexity	TC1	0.786	1.646	0.535	0.823
	TC2	0.707	2.834		
	TC3	0.747	1.675		
	TC4	0.730	3.092		
	TC5	0.830	2.715		
	TC6	0.562	2.524		
Systemic Shift	SS1	0.762	2.028	0.610	0.872
	SS2	0.779	1.884		
	SS3	0.744	1.877		
	SS4	0.799	1.742		
	SS5	0.791	2.089		



	SS6	0.810	2.030		
Employee Wellbeing	EWB1	0.726	2.066	0.562	0.873
	EWB2	0.761	1.933		
	EWB3	0.692	1.606		
	EWB4	0.824	1.703		
	EWB5	0.789	1.689		
	EWB6	0.695	2.087		
	EWB7	0.750	1.360		

Source: Smart-Pls Output, 2023

According to Hair, Black, Babin & Anderson (2014), loadings should not be below 0.5. On Table 1, it can be seen that all items measuring different latent variable loaded above 0.5. This means all the items were retained. Similarly, On Table 1, all construct have a composite reliability coefficient greater than 0.7 and all construct met the minimum benchmark for AVE which is 0.5 (Tabachnick & Fidell, 2013). This means the data collected are valid and reliable. The data were next tested for discriminant validity. And Table 3 demonstrates that all of the HTMT values were below 0.85 (Hair et al., 2011). According to these three tables, all constructs have a high level of convergent validity.

Table 2: Discriminant Validity using HTMT ratio

	EP	EWB	SS	TC
1 Employee Performance				
2 Employee Wellbeing	0.847			
3 Systemic Shift	0.717	0.488		
4 Technical Complexity	0.813	0.605	1.102	

Source: Smart-Pls Output, 2023

Structural Model

The structural model was assessed to test the hypotheses of the study. The study also examined the quality of the model criteria. To this end, Hair, Black, Babin & Anderson (2014) identified four key criteria for assessing the structural model in PLS-SEM. Researchers looked at the variance inflation factor (VIF) before looking at the structural model to see if there was collinearity between the study construct indicators. VIF values larger than 5 are indicative of collinearity amongst the predictor constructs (Qalati et al., 2022). According to Hair et al. (2019), the optimal VIF values are about 3 or lower. Because all of the predictor construct values in the study were less than 4, as shown in table 1 above, there was no collinearity.

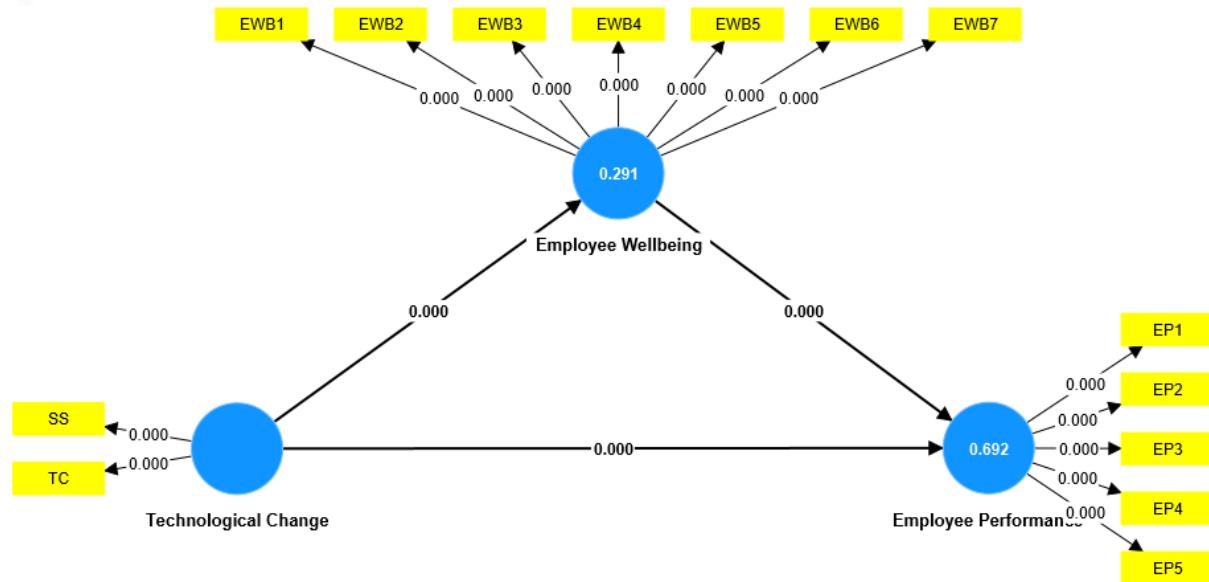


Figure 3: Structural Model

4.2 Test of Hypotheses for Direct Relationships

Before testing for the mediating effect of employee wellbeing in the relationship between technical complexity and systemic shift (higher order), it is important to determine the independent variable and dependent variable.

Table 3: Direct Path Coefficient

Hypotheses	Relationship	Beta Value	Standard Deviation	T Stat	P Value	Decision
HO ₁	TC->EP	0.375	0.037	10.150	0.000	Rejected
HO ₂	TC->EWB	0.509	0.019	13.651	0.000	Rejected
HO ₃	EWB->EP	0.573	0.024	12.362	0.000	Rejected
R Square	0.688					

Source: Smart-Pls Output, 2023

Technological change (TC) has positive relationship with employee performance, according to the HO₁ results ($\beta = 0.375$; $t = 10.150$; $p = 0.000$). Thus, HO₁ that states that Technological change has no significant effect on employee performance of manufacturing companies in Kaduna State is rejected. Similarly, Technological change (TC) has positive and significant effect on employee wellbeing, according to the HO₂ results ($\beta = 0.509$; $t = 13.651$; $p = 0.000$). Hence, HO₂ that states that Technological change (TC) has no significant effect on employee wellbeing of manufacturing companies in Kaduna State is rejected. Finally, Employee Wellbeing is positively and significantly related to Employee Performance, according to the HO₃ results ($\beta = 0.573$; $t = 12.362$; $p = 0.000$). Thus, this study rejects HO₃ that states that Employee Wellbeing has no significant effect on Employee Performance of manufacturing companies in Kaduna State.

R^2 68.8 (0.688) percent, this means 68.8 percent variance in employee performance of manufacturing companies in Kaduna State is accounted for by technological change and employee wellbeing. Table 4 was used to determine the effect size of the direct effect of the independent variables of the study on firm performance. Effect size was assessed through f^2 .

**Effect Size of Exogenous Variables****Table 4: Effect Size**

Construct	f^2	Effect Size
Systemic Shift	0.01	Small
Technical Complexity	0.03	Small
Employee Wellbeing	0.62	Large

Source: Smart-Pls Output, 2023

Table 4 reveals that technical complexity, systemic shift, and employee wellbeing have small, medium, and large effects on employee performance in manufacturing companies. Employee wellbeing is the most significant predictor according to Cohen (1988), f^2 values of 0.02, 0.15, and 0.35.

Predictive Relevance of Exogenous Variables

The study utilised the Stone-Geisser's Q^2 value to assess the predictive relevance of the exogenous variables on employee performance. The result is presented in Table 5.

Table 5: Predictive Relevance of Exogenous Variables

Construct	Q^2_{predict}
Employee Performance	0.468
Employee Wellbeing	0.287

Source: Smart-Pls Output, 2023

Table 5 shows cross-validated redundancy of direct relationships between technical complexity, systemic shift, employee wellbeing, and employee performance. The model has high predictive relevance for employee performance, and the researcher tested the mediating effect of employee wellbeing (Cohen, 1988).

Mediation Analysis**Table 6: Mediation Results**

	<u>Total effect</u>		<u>Direct effect</u>			<u>indirect effect</u>		<u>P values</u>
	β	P V	β	P V		β	t	
TC-EP	0.666	0.000	0.375	0.000	TC-WEB-EP	0.291	12.36	0.000

Source: Smart-Pls, Output, 2023

H_{01} also examines either employee wellbeing mediates the relationship between technological change and employee performance. According to the findings, Technological Change has a significant total effect on Employee Performance ($\beta = 0.666$, $t = 10.15$, $p = 0.000$). The direct effect was still discovered to be positive and significant even when the mediator was added to the model ($\beta = 0.375$, $p = 0.000$). While the indirect effect that was discovered to be significant ($\beta = 0.291$, $t = 12.36$, $p = 0.000$) with the inclusion of the mediator into the study. This demonstrates that the effect of technological change on employee performance passed through employee wellbeing (the mediation is a partial mediation or complementary partial mediation). H_0^4 was hence rejected. Table 6 displays the findings of the mediation result.



4.3 Discussion and Theoretical and Managerial Implications

The researcher's priori expectation of technological change positively impact employee performance in manufacturing companies was confirmed by data analysis. This finding aligns with previous research of Durowoju (2017), Al-Hawary and Al-Dafiri (2017) and Baskaran, Lay, Ming and Mahadi (2020). Emphasizing the importance of considering human factors like motivation, satisfaction, communication, skill development, empowerment, and psychological well-being when examining the effects of technological change on employee performance. Organizations can capitalize on technical improvements and create a productive workplace by recognizing and addressing these human factors.

Technological change positively impacts employee wellbeing in manufacturing companies in Kaduna, improving work-life balance and job happiness. Remote work technologies and flexible schedules help employees balance personal and professional lives, aligning with Human Relations Theory principles. Organizations can enhance employee wellbeing, job happiness, and performance by considering human factors during technology transitions and providing necessary support and resources.

Employee wellbeing is significantly related to employee performance the finding is consistent with the studies of Warr and Nielsen (2018) and Zakaria, Abdulatiff and Ali. (2014), with decreased absenteeism and turnover rates being linked to it. The Human Relations Theory emphasizes employee retention and workplace interruptions, as employees are less likely to miss work and seek new employment opportunities. A positive cycle of increased well-being leads to higher job satisfaction, engagement, and improved performance levels by creating a friendly, inspiring, and empowering work environment that addresses employees' social and psychological needs.

Employee wellbeing significantly mediates the relationship between technological change and employee performance in manufacturing companies. Human Relations Theory highlights the influence of technological change on employee wellbeing, leading to improved performance. Organizations can create a beneficial chain of effects by fostering a supportive work environment, empowering employees, and fostering a supportive work environment.

5. CONCLUSIONS AND RECOMMENDATIONS

This study shows technological change benefits employee well-being by empowering staff, reducing workload, enhancing job satisfaction, and balancing work and personal life. Study links technological change to employee performance, with well-being influencing motivation, engagement, and commitment, leading to better performance. The study highlights the Human Relations Theory's application in understanding technological change, employee wellbeing, and employee performance, emphasizing the importance of supportive work environments.

Organizations should adopt a supportive approach to technological implementation, providing staff with guidance, tools, and assistance to ensure confidence and ease in new technologies. Implementing employee well-being programmes, including mental health support, work-life policies, wellness initiatives, and skill development, improves performance. Effective communication is crucial in technological change, reducing uncertainty, addressing concerns, and providing regular feedback. Organizations should fund skill development programs to support staff in adapting to technology advancements and improving wellbeing. Acknowledging employee



contributions is crucial for motivation, wellbeing, and increased performance and engagement. Organizations prioritizing employee well-being in technological advancements can improve employee performance by implementing supportive initiatives, encouraging empowerment, and creating a happy work environment.

Limitations and Future Research Direction

Study small sample size may impact generalizability; larger, representative sample needed for improved external validity. Cross-sectional design may hinder determining relationship between technological change, employee wellbeing, and employee performance; longitudinal studies might provide stronger evidence. Relying solely on employee feedback for performance and well-being risked social desirability bias; future studies should include objective metrics. This study may have overlooked potential confounding factors affecting technological change, wellbeing, and employee performance, future might include organizational culture, leadership style, and market conditions. Further studies may examine the precise processes through which the relationship between technological change and employee performance is mediated by other factor such as personality, employee empowerment, organisational culture and digital orientation. Targeted therapies can be influenced by an understanding of these systems. The study reveals a positive mediating effect between technological change, employee wellbeing, and performance. Future research can improve validity and apply findings, enabling organizations to make informed decision

References

- Abbas, J., Mahmood, H. K., Muzaffar, A. & Ramzan, M. A. (2014). Impact of technology on performance of employees: A case study on Allied Bank Ltd, Pakistan. *World Applied Sciences Journal*, 29(2), 271-276.
- Abdullah, M. I., Huang, D., Sarfraz, M., Ivascu, L., & Riaz, A. (2020). *Effects of internal service quality on nursesâ job satisfaction, commitment and performance: Mediating role of employee wellbeing*. *Nursing Open*, (), nop2.665–. doi:10.1002/nop2.665
- Adeniji, C., Adeyeye, O., Borishade, T., Falola, H., Iyiola, O., Olokundun, M., & Salau, O. (2018). Data on impact of technological change on employees' cognitive attitude and organizational performance. *Data in Brief*, 18, 1360–1364.
- Al-Hawary, S. I. & Al-Dafiri, M. F. (2017). Effect of the components of information technology adoption on employees performance of interior ministry of Kuwait State. *International Journal of Academic Research in Economics and Management Sciences*, 6(2), 149-169
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411-423.
- Aujirpongpan, S., & Hareebin, Y. (2020). The effect of strategic intuition, business analytic, networking capabilities and dynamic strategy on innovation performance: the empirical study Thai processed food exporters. *Journal of Asian Finance, Economics and Business*, 7(1), 259-268. <https://doi.org/10.13106/jafeb.2020.vol7.no1.259>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Baron, R. M.; Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 51 (6), 1173–1182. doi:10.1037/0022-3514.51.6.1173. PMID 3806354. S2CID 1925599.



- Baskaran, S., Lay, H. S., Ming, B. S. & Mahadi, N. (2020). Technology adoption and employee's job performance: An empirical investigation. *International Journal of Academic Research in Economics and Management and Sciences*, 9(1), 78–105.
- Bello, O. W., & Adebajo, A.A. (2014). Reward system and employees performance in Lagos State: A study of selected public secondary schools. *Kuwait Chapter of Arabian Journal of Business and Management Review*, 3(8), 14-28.
- BCG. (2021). How tech offers a faster path to sustainability. Retrieved (April 20, 2022). <https://www.bcg.com/de-de/publications/2021/how-technology-helps-sustainability-initiatives>.
- Bendig, David & Schulz, Colin & Theis, Lukas & Raff, Stefan. (2023). Digital orientation and environmental performance in times of technological change. *Technological Forecasting and Social Change*. 188. 122272. 10.1016/j.techfore.2022.122272.
- Cheah, S., Bellavitis, C., & Muscio, A. (2020). The impact of technology complexity on the financial performance of R&D Projects: Evidence from Singapore. *The Journal of Technology Transfer*, 1-28., Available at SSRN: <https://ssrn.com/abstract=3540735>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jarsey: Lawrence Erlbaum Associates, Publishers.
- Connolly, M. (2017, February 1). What does systemic change mean to you? [Blog post]. Retrieved from http://serc.carleton.edu/ASCN/posts/change_you.html.
- Dauda, D. Y. & Akingbade, W. A. (2018). Technological change and employee performance in selected manufacturing industry in Lagos State of Nigeria. *Australian Journal of Business and Management Research*, 12-21.
- De Burgos Jimenez, J., C'espedes, J.J., (2001). Environmental performance as an operations objective. *Int. J. Oper. Prod. Manag.* 21 (12), 1553–1572.
- Definition. (n.d.). Retrieved from <https://the-definition.com/term/systematic-change>
- Definition. (n.d.). Retrieved from https://itlaw.fandom.com/wiki/Technical_complexity#:~:text=Technical%20complexity%20is,driving%20a%20need%20for%20change
- Diener, E., Suh, E., Lucas, R., & Smith, H. (1999). Subjective well-being: Three decades of research. *Psychological Bulletin*, 125(2), 276–302.
- Dörner, D. (1996). *The logic of failure: Recognizing and avoiding error in complex situations*. Perseus Books. <https://books.google.com.ng/books?id=SV8FwQEACAAJ>
- Durowoju, S. T. (2017). Impact of technological change on Small and Medium Enterprises Performance in Lagos State. *Economic and Environmental Studies*, 17(4), 743-756.
- Forgeard, M. J. C., Jayawickreme, E., Kern, M., & Seligman, M. E. P. (2011). Doing the right thing: Measuring wellbeing for public policy. *International Journal of Wellbeing*, 1(1), 79–106.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Hossni, M. (2019). *Human relations theory of management*. Retrieved from https://www.researchgate.net/publication/334588642_Human_Relations_Theory_of_Management
- Gagnon, Y. & Dragon, J. (2019). The impact of technology on organizational performance. *The Journal of Public Sector Management*, 28(1), 19-31.
- Ganco, M. (2010). The effect of technological complexity on innovation performance, employee entrepreneurship and mobility: three essays. Retrieved from https://www.researchgate.net/publication/43939590_The_effect_of_technological_compl



- exity_on_innovation_performance_employee_entrepreneurship_and_mobility_three_essays
- Gasparin, M., Green, W., Lilley, S., Quinn, M., Saren, M., & Schinckus, C. (2020). Business as unusual: A business model for social innovation. *Journal of Business Research*, <https://doi.org/10.1016/j.jbusres.2020.01.034>
- George, G., Merrill, R.K., Schillebeeckx, S.J.D., (2020). Digital sustainability and entrepreneurship: how digital innovations are helping tackle climate change and sustainable development. *Entrep. Theory Pract.* 45 (5), 999–1027.
- Ghobakhloo, M., (2020). *Industry 4.0, digitization, and opportunities for sustainability*. J. Clean. Prod. 252, 119869.
- Haddon, J. (2018). The impact of employees' well-being on performance in the workplace. *Strategic HR Review*, 17(2), 72-75.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, 19(2), 139-152.
- Hair, J., Black, W., Babin, B., & Anderson, R. (2014). *Multivariate data analysis* (7th ed.). UK: Pearson New International Edition.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, 31(1), 2-24.
- Hermawan, R. (2020). Optimizing employee engagement to improve human resources performance: A case study of A private university in facing the VUCA era. *Technium Social Sciences Journal*, 12, 196–205.
- Hewagama, G., Boxall, P., Cheung, G., & Hutchison, A. (2019). Service recovery through empowerment? HRM, employee performance and job satisfaction in hotels. *International Journal of Hospitality Management*, 81, 73–82.
- Israel, G. D. (2012). Sampling the evidence of extension program impact 1 (pp. 1–9). ITU. (2018). Achieving universal and affordable internet in the least developed countries. Geneva: *Telecommunication Development Bureau*
- Joensuu-Salo, S., Sorama, K., Viljamaa, A., & Varamäki, E. (2018). Firm performance among internationalized SMEs: The interplay of market orientation, marketing capability and digitalization. *Administrative Sciences*, 8(3), 31. doi:10.3390/admsci8030031
- Juniper, B. A., Bellamy, P., & White, N. (2011). Testing the performance of a new approach to measuring employee well-being. *Leadership & Organization Development Journal*, 25(4), 344–357.
- Kaplan, D. M. (2014). Technology and globalization. In a companion to the philosophy of technology (pp. 325–328). doi:10.1002/9781444310795.ch56
- Kehoe, R. R., & Wright, P. M. (2013). The impact of high performance human resource practices on employees' attitudes and behaviors. *Journal of Management*, 39(2), 366–391.
- Keyes, C. L. M., Shmotkin, D., & Ryff, C. D. (2002). Optimizing well-being: The empirical encounter of two traditions. *Journal of Personality and Social Psychology*, 82(6), 1007–1022.
- Kim, H., Park, S. & Juh, W. (2019). A study on technology development performance and technology commercialization performance according to the technology development capability of SMEs focusing on a comparative analysis of technology business groups. *Journal of Open Innovation: Technology, Market and Complexity*, 5(65), 1-19.
- Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Vincent, H., Henrica, C. & Allard, B.



- (2014). Construct validity of the individual work performance questionnaire, *Journal of Occupational and Environmental Medicine*, 56(3), 331-337.
- Krejcie, M. & Morgan, D. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30, 607-610.
- Krekel, C. (2019). Employee wellbeing, productivity, and firm performance. *SSRN Electronic Journal*. Retrieved from https://www.researchgate.net/publication/332049055_Employee_Wellbeing_Productivity_and_Firm_Performance
- Lakshmi, G. G. & Rajarathinam, M. (2016). Impact of technological change process on Individual performance among the Information Technology (IT) employees in Tamil Nadu. *Asian Journal of Research in Social Sciences and Humanities*, 6(6), 1741-1749.
- Lee, J. W., & Xuan, Y. (2019). Effects of Technology and Innovation Management and Total Factor Productivity on the Economic Growth of China. *Journal of Asian Finance, Economics and Business*, 6(2), 63-73. <https://doi.org/10.13106/jafeb.2019.vol6.no2.63>
- Li, Lixu & Zhu, Wenwen & Wei, Long & Yang, Shuili, 2022. "How can digital collaboration capability boost service innovation? Evidence from the information technology industry," *Technological Forecasting and Social Change, Elsevier*, vol. 182(C).
- Mastrogiorgio, M., & Gilsing, V. (2016). Innovation through exaptation and its determinants: The role of technological complexity, analogy making & patent scope. *Research Policy*, 45(7), 1419–1435
- Mercedes-Benz, (2022). Our strategy | Mercedes-Benz. Retrieved (April 20, 2022). <https://group.mercedes-benz.com/company/strategy/>.
- Nardo, R., Evanita, S., & Syahrizal, S. (2019). The effect of transformational leadership and non physical work environment on innovative behavior with work motivation as a mediation for employees of tour and travel companies in West Sumatera. *2nd Padang International Conference on Education, Economics, Business and Accounting (PICEEBA-2 2018)*.
- Oladimeji, M. S., Ebodaghe, A. T., & Shobayo, P. B. (2017). Effect of globalization on small and medium enterprises (SMEs) performance in Nigeria. *International Journal of Entrepreneurial Knowledge*, 5(2), 56–65. doi:10.1515/ijek-2017-0011
- Qalati, S. A., Ostic, D., Shuibin, G., & Mingyue, F. (2022). A mediated–moderated model for social media adoption and small and medium-sized enterprise performance in emerging countries. *Managerial and Decision Economics*, 43(3), 846-861.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
- Sait, S. S., Muharam, F. M., Chin, T. A., Sulaiman, Z., Zakuan, N., & Choon, T. L. (2018). *Impacts of technology assessments on firm performance*. AIP Conference Proceedings. doi:10.1063/1.5080062.
- Sapta, I. K. S., Landra, N., Supartha, I. W. G., Asih, D., & Setini, M. (2020). Public health welfare in digital-based resources transformation from social capital and information sharing: Creative industries from village. *Systematic Reviews in Pharmacy*, 11(6), 688–696.
- Sapta, Setia & Uii, Muafi & Setini, Made. (2021). The role of technology, organizational culture, and job satisfaction in improving employee performance during the COVID-19 pandemic. *Journal of Asian Finance Economics and Business*. 8. 495–505. 10.13106/jafeb.2021.vol8.no1.495.
- Scott C. (2016). Human relations theory of organisation. Retrieved from https://link.springer.com/referenceworkentry/10.1007/978-3-319-31816-5_2998-1



- Scott (2022). Technological change: Overview, stages & examples. Retrieved from <https://study.com/learn/lesson/technological-change-stages-examples.html>
- Siegrist, J., Wahrendorf, M., Knesebeck, O., Jurges, H., & Borsch-Supan, A. (2006). Quality of work, well-being, and intended early retirement of older employees: Baseline results from the share study. *European Journal of Public Health*, 17(1), 62–68.
- Singh, K. (1997). The impact of technological complexity and interfirm cooperation on business survival. *Academy of Management Journal*, 40(2), 339–367.
- Stratham, J., & Chase, E. (2010). *Childhood wellbeing: A brief overview*. Loughborough: Childhood Wellbeing Research Centre. Retrieved from <http://cite.seerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.9199&rep=rep1&type=pdf>
- Tabachnick, B.G., & Fidell, L.S. (2013). *Using multivariate statistics* (5th ed.). Boston: Pearson.
- Udeh, S. N. & Igwe, N. N. (2013). Effects of mergers and acquisitions on return on capital employed and dividend per share indices of companies in Nigeria. *International Journal of Business Administration*, 4(5), 51-72.
- Varrella, S. (2021). Share of Gross Domestic Production (GDP) generated by the manufacturing sector in Nigeria as of 2020, by activity. Retrieved from <https://www.statista.com/statistics/1207933/share-of-gdp-from-manufacturing-sector-in-nigeria/>
- Wanza, L. & Nkuraru, J. K. (2016). Influence of change management on employee performance: A case of university of Eldoret, Kenya. *International Journal of Business and Social Science*, 7(4), 190-199.
- Warr, P. (2002). The study of well-being, behaviour and attitudes. In P. Warr (Ed.), *Psychology at work* (pp. 1–25). New York, NY: Penguin Press.
- Warr, P. & Nielsen, K. (2018). *Wellbeing and Work Performance*. In E. Diener, S. Oishi, & L. Tay (Eds.), *Handbook of well-being*. Salt Lake City, UT: DEF Publishers.
- Wayne, S. J., & Ferris, G. R. (1990). Influence tactics, affect, and exchange quality in supervisor-subordinate interactions: A laboratory experiment and field study. *Journal of Applied Psychology*, 75(5), 487.
- Westenholz, A. (2013). Main aspects regarding the implication of change management in an organisation. *Research in the Sociology of Organizations*, 27(1), 1-21.
- World Bank (2021). Manufacturing, value added (% of GDP). Retrieved from <https://data.worldbank.org/indicator/NV.IND.MANF.ZS>
- World Health Organization. (2013). *Mental health: A state of wellbeing*. Retrieved from http://www.who.int/features/factfiles/mental_health/en/
- Yong, J. Y., Yusliza, M.-Y., Ramayah, T., Chiappetta Jabbour, C. J., Sehnem, S., & Mani, V. (2020). Pathways towards sustainability in manufacturing organizations: Empirical evidence on the role of green human resource management. *Business Strategy and the Environment*, 29(1), 212–228.
- Zakaria, M., Abdulatiff, N. & Ali, N. (2014). The role of wellbeing on performance in services sector. *Procedia - Social and Behavioral Sciences*, 164, 358–365.
- Zheng, X., Zhu, W., Zhao, H. & Zhang, C. (2015). Employee well-being in organizations: theoretical model, scale development, and cross-cultural validation. *Journal of Organizational Behavior*, 36(5), 621-644.