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Digital Technologies, Justice, Diversity, Equity, Inclusion and Operations in Supply Chain Management: The Moderating Effect of Organizational Culture

Tecnologías Digitales, Justicia, Diversidad, Equidad, Inclusión y Gestión de Operaciones y de la Cadena de Suministro: El Efecto Moderador de la Cultura Organizacional

I. INTRODUCTION

As digital transformation reshapes the landscape of operations and supply chain management (OSCM), questions arise about its broader social impact, particularly on justice, diversity, equity, and inclusion (JDEI). This study examines the effect of the interaction between digital technologies adoption and JDEI on OSCM. Specifically, this guided by two central questions: How do digital technologies influence JDEI in operations and supply chain management (OSCM), and how does organisational culture moderate these effects within Nigerian quoted non-financial firms? In contexts where technology adoption intersects with complex socio-cultural realities, such as Nigeria, the potential for digital tools to either advance or undermine inclusive supply chain practices becomes a critical concern. Answering the question of this study provides not only theoretical understanding of how technology, culture and social sustainability interact, but also practical advice on how to develop efficient and socially fair supply chains in emerging markets.



EXECUTIVE SUMMARY

This study investigates how digital technologies shape justice, diversity, equity, and inclusion (JDEI) in operations and supply chain management (OSCM), with organizational culture as a moderator. Drawing on the newly proposed Digital Justice and Inclusion Theory (DJIT), we develop and test a structural model using survey data from 400 professionals in Nigerian quoted non-financial firms. Partial Least Squares Structural Equation Modeling (PLS-SEM) results reveal that perceived ease of use is the strongest predictor of justice, diversity, and equity outcomes, while behavioral intention and perceived usefulness significantly enhance inclusion. Organizational culture strengthens the effects of digital technologies on justice, equity, and inclusion, but not diversity. The findings advance theory by integrating digital transformation and social sustainability literatures, challenging techno-determinist views, and contextualizing JDEI in an emerging-market setting. This study contributes to theory by integrating digital transformation and social justice paradigms and offers practical insights for building inclusive digital supply chains in emerging economies.

RESUMEN DEL ARTÍCULO

Este estudio analiza cómo las tecnologías digitales configuran la justicia, la diversidad, la equidad y la inclusión (JDEI) en la gestión de operaciones y de la cadena de suministro (OSCM), considerando la cultura organizacional como variable moderadora. Basándose en la recientemente propuesta Teoría de la Justicia y la Inclusión Digital (DJIT), se desarrolla y contrasta un modelo estructural utilizando datos de una encuesta aplicada a 400 profesionales de empresas no financieras cotizadas en Nigeria. Los resultados obtenidos mediante el Modelado de Ecuaciones Estructurales por Mínimos Cuadrados Parciales (PLS-SEM) muestran que la facilidad de uso percibida constituye el predictor más sólido de los resultados relacionados con la justicia, la diversidad y la equidad, mientras que la intención conductual y la utilidad percibida mejoran significativamente la inclusión. Asimismo, la cultura organizacional fortalece los efectos de las tecnologías digitales sobre la justicia, la equidad y la inclusión, aunque no sobre la diversidad. Los hallazgos amplían el desarrollo teórico al integrar las perspectivas de la transformación digital y la sostenibilidad social, cuestionar los enfoques tecno-deterministas y contextualizar la JDEI en el ámbito de las economías emergentes. Además, este estudio contribuye al conocimiento al combinar los paradigmas de la transformación digital y la justicia social, ofreciendo implicaciones prácticas para el desarrollo de cadenas de suministro digitales más inclusivas en las economías emergentes.

Digital technologies, including artificial intelligence (AI), blockchain, Internet of Things (IoT) and big data analytics have changed the face of OSCM worldwide, providing new levels of visibility, responsiveness, and efficiency (Ivanov et al., 2019; Kamble et al., 2020). Although the operational advantages of such technologies have been quite thoroughly described, their social effects, especially the effect on JDEI, are not yet fully comprehended and need deeper investigation. JDEI has long been investigated within the context of HRM and organisational behaviour (Turi et al., 2022), but its application to OSCM is beginning to be understood. The aspects of justice in OSCM include distributive (fair resource allocation), procedural (transparent decision-making), and interactional (respectful communication), whereas diversity involves different demographic and cognitive representation, equity involves structural barriers to opportunity, and inclusion involves active participation of the stakeholders (Colquitt et al., 2001; Turi et al., 2022). In spite of this increasing interest in such social outcomes, the cross of digital transformation with JDEI in supply chains has been little explored, particularly in emerging markets.

Studies have started to investigate the overlap between digital transformation and social outcomes, but there are gaps.

Studies have started to investigate the overlap between digital transformation and social outcomes, but there are gaps. Under what circumstances digital technologies could promote or inhibit social justice (Pang et al., 2024) or connected policy regimes with diversity, equity, and inclusion (DEI) outcomes in operations (Bodrožić & Gold, 2024) have been conjectured in conceptual studies but have scarcely been empirically tested within OSCM contexts. Other authors have discussed diversity, leadership and organisational culture as predictor of performance (Turi et al., 2022; Odazie et al., 2024) without addressing the importance of digital tools as the means of enabling JDEI. Although some studies examined the digital transformation of OSCM (Ning & Yao, 2023; Deep, 2023), the relationship between digital change and JDEI is poorly understood, especially in emerging economies where socio-economic, regulatory, and infrastructural factors establish the patterns of technology adoption. As an example, Pang et al. (2024) described how digital technologies may motivate, enable, or impede social justice but did not provide a supply-chain-specific study. Similarly, Bodrožić and Gold (2024) investigated policy-DEI

links without considering technological factors. In addition, empirical literature is dominated in developed economies with fewer studies done in African settings. The results of research in Pakistan, Jordan, and the United States can be informative, yet their relevance to low-income countries like Nigeria, whose organisational, infrastructural, and cultural contexts are different, is unclear.

Building on these gaps, this study proposes the Digital Justice and Inclusion Theory (DJIT), a novel framework which posits that the influence of digital technologies on JDEI outcomes in OSCM is contingent upon the organizational culture in which they are embedded. According to DJIT, while digital tools can enhance fairness, diversity and inclusion, their effectiveness depend on the cultural values, norms and practices of the adopting organization. An open, participatory and supportive culture can leverage digital systems for inclusive governance and amplify positive outcomes, whereas hierarchical, rigid or exclusionary cultures may deploy the same tools to centralize control and exacerbate inequities (Denison & Mishra, 1995; Heeks, 2020). The moderating effect of organisational culture in the connection between digital technologies and the results of JDEI is poorly studied. Since companies in any industry seek to change their cultures through digital means, it becomes essential to recognize how a company's culture influences the social consequences of technologies in their approach to both ethical regulation and business decisions. By integrating technology adoption constructs (e.g., perceived ease of use, behavioral intention, etc.) with JDEI dimensions, DJIT offers a comprehensive lens to examine socially sustainable supply chains.

The motivation for this study stems from the identified gaps in the literature and recent calls for research on digital transformation's social implications. The work by scholars like Pang et al. (2024) and Bodrožić and Gold (2024) calls for empirical investigations into technology's role in advancing social justice in operations, particularly in underrepresented emerging markets. Nigeria presents a compelling setting for this investigation, given that the nation's complex business environment, characterised by workforce demographic diversity, infrastructural challenges, regulatory inconsistencies and socio-cultural complexities, provides a unique context to explore these dynamics (NBS, 2020). Quoted non-financial firms, contributing over 15% to Nigeria's GDP and 20% to formal employment (NBS, 2020), face barriers to digital adoption

KEYWORDS

Digital technologies, JDEI, OSCM, DJIT, organisational culture, SEM, Nigeria, Emerging economies.

PALABRAS CLAVE

Tecnologías digitales; JDEI; gestión de operaciones y de la cadena de suministro (OSCM); Teoría de la Justicia y la Inclusión Digital (DJIT); cultura organizacional; modelado de ecuaciones estructurales (SEM); Nigeria; economías emergentes.

and institutionalizing inclusive practices, necessitating research on how organizational culture shapes technology's JDEI impacts. Understanding how technology adoption and organizational culture interact to influence JDEI in such an environment has significant implications for both theory and practice.

To address the research question, this study adopts a quantitative, cross-sectional research design to test the hypothesised relationships. The empirical analysis draws on primary data collected through a structured questionnaire administered to 400 OSCM professionals working in 153 quoted non-financial firms listed on the Nigerian Exchange. These firms span key sectors such as manufacturing, consumer goods, healthcare, and industrial products, thereby ensuring sectoral diversity and enhancing the external validity of findings. A stratified random sampling technique was employed to ensure proportional representation across sectors and organizational hierarchies, thus capturing perspectives from top management, middle management, and operational staff. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). PLS-SEM was chosen due to its robustness in handling complex models, small-to-medium sample sizes, and its ability to simultaneously assess measurement and structural models, making it particularly suited for theory development in emerging research domains such as Digital Justice and Inclusion Theory (DJIT).

This study makes three primary contributions. First, it advances theory by introducing DJIT, which integrates digital transformation and social sustainability perspectives to explain culturally contingent technology-JDEI relationships in OSCM. Second, it provides empirical evidence on how technology adoption constructs (e.g., perceived usefulness, ease of use, behavioural intentions, etc.) influence JDEI outcomes in an under-researched emerging economy, extending the geographic scope of OSCM and digital ethics scholarship. Third, it advances research design and contributes methodologically by testing the moderating role of organizational culture, adopting multiple constructs and JDEI dimensions, offering insights into creating equitable and inclusive supply chains. Collectively, these contributions respond to recent scholarly calls for socially aware digital transformation research and offer informed insights to business leaders, policymakers, and researchers aiming to develop inclusive, digitally driven, socially sustainable supply chains in complex socio-economic contexts.

2. LITERATURE REVIEW

2.1. Digital Technologies

The advent of digital technologies has profoundly impacted operations and supply chain management (OSCM), yielding enhanced efficiency, transparency, and decision-making capabilities. The strategic integration of technologies such as Artificial Intelligence (AI), Blockchain, Big Data Analytics, Internet of Things (IoT), and Cloud Computing has empowered organizations to streamline their supply chain processes, minimize lead times, and foster collaborative relationships with suppliers (Kamble et al., 2020). The use of digital technologies by quoted non-financial firms is increasing in Nigeria, although it is facing serious challenges (Arinze, 2024). The lack of proper digital infrastructure, high prices of implementation, the risk of cyber-attacks and tech adoption resistance are among the challenges that limit the active use of digital solutions (Arinze, 2024; Shonubi, 2025). In addition, the integration of these technologies is complicated by regulatory inconsistencies and insufficient digital literacy of members of the workforce.

The infrastructural limitations of Nigeria (e.g., power outages, poor broadband penetration) form so-called 'digital voids' (Heeks, 2017) in which the use of technology can ironically increase inequalities. For instance, traceability ensured by blockchains presupposes the stable connection, which is not always available in the areas of rural sourcing. This requires localized tech-design that is consistent with local realities.

2.2. Justice

The OSCM justice involves the fair and ethical treatment of the stakeholders i.e. employees, suppliers and the customers. This construct has three main dimensions that include distributive justice, procedural justice and interactional justice (Colquitt et al., 2001). Distributive justice is concerned with fair distribution of resources and procedural justice is concerned with fairness and transparency of decisions. Interactional justice is defined as the esteemed and moral treatment of people during business interactions. Digital technologies have greatly improved justice in OSCM as it enables impartial decision-making, fair payment to suppliers, and fair arrangements are made automatic. Predictive analytics with the use

of AI allows organizations to optimize demand forecasting to reduce waste and inventory expenses (Ivanov et al., 2019). Blockchain increases the transparency of a supply chain and prevents fraud and unethical sourcing (Saber et al., 2019). Procedural justice is also promoted through automation and smart contracts that remove the human bias in negotiations and follow through on fair agreements (Kshetri, 2018)

2.3. Diversity

Diversity in OSCM is the incorporation of persons of various backgrounds in the operations and supply chain activities. Various supply chains are more sustainable and innovative, as they introduce the diversity of opinion and ways of solving a problem (Pang et al., 2024). It has been indicated that some organizations that have an inclusive supply chain have a higher performance rate in adaptability, market responsiveness, and customer satisfaction (Carter et al., 2000). Digital technologies have had a massive impact on diversity as they eliminate traditional inclusion barriers. AI-based hiring systems decrease unintentional biases in hiring and promotions, guaranteeing equal representation of disadvantaged communities on the management levels of the supply chain (Raisch & Krakowski, 2021). E-procurement tools will help to include minority-owned businesses more in the process of selecting suppliers, as well as to make the process more transparent and easier (Madzimore et al., 2020). Moreover, online teamwork solutions provide the possibility of remote work, and companies may recruit and keep experienced professionals with a wide variety of backgrounds and geographic locations.

In African supply chains, diversity is not only about the demographic but also cognitive diversity in problem solving (Pang et al., 2024) especially necessary in the Nigerian multi-ethnic business environment. Digital channels (e.g., e-procurement) can amplify minority supplier inclusion but can also exclude those without digital literacy.

2.4. Equity

Equity in OSCM means offering equal opportunity, resources, and benefits to people recognizing individual and structural disadvantage. In contrast to equality that supposes equal treatment, equity considers existing differences and applies specific efforts

aiming at reducing gaps (Reskin, 2003). Equity is essential in supplier selection, development of employees, and customer involvement in supply chain management (Gualandris et al., 2021). Digital technologies have revolutionized equity in recognizing and correcting inequity, monitoring equity, and providing equitable remuneration to small-scale suppliers. The use of AI-based decision systems helps to reveal and resolve any differences in choosing suppliers and promoting employees (Kellogg et al., 2020). Big Data Analytics allows organizations to monitor equity measures and plan specific interventions to address underrepresented populations (George et al., 2014). Digital financial services, such as blockchain powered smart contracts, will provide fair payment to small-scale suppliers by decreasing delays in payment and removing the middlemen (Chang et al., 2019). Training and upskilling services available through cloud-based platforms provide fair access to employees with disadvantaged backgrounds to improve their careers.

2.5. Inclusion

Inclusion ensures that all stakeholders are directly involved in the decision-making and operational activity, which guarantees psychological safety and the engagement of employees, suppliers, and customer confidence. The psychological safety created by an inclusive supply chain makes employees, suppliers, and customers feel valued and listened to (Edmondson & Lei, 2014). Inclusion plays a major role in employee engagement, supplier cooperation and customer confidence (Roberson, 2006). Digital technologies have been crucial in increasing inclusion through virtual teamwork, personalized education, and AI-assisted customer interaction. The use of cloud-based project management platforms, among other forms of virtual collaboration tools, makes it possible to have a diverse team collaborate across geographical locations (Madzimore et al., 2020). Online training can offer individualized training opportunities, which allows employees with different backgrounds to learn pertinent skills (Kellogg et al., 2020). Customer engagement tools that rely on AI guarantee that various customer requirements are served by personalized suggestions and inclusive marketing processes (Raisch & Krakowski, 2021).

2.6. Organisational Culture

Organizational culture plays a pivotal role in determining the extent to which digital technologies influence justice, diversity, equity, and inclusion in OSCM. Culture encompasses the values, beliefs, and practices that shape an organization's approach to digital transformation and JDEI initiatives. Firms with adaptive cultures that prioritize innovation, ethical business practices, and inclusivity are more likely to leverage digital tools effectively (Denison & Mishra, 1995). For Nigerian quoted non-financial firms, fostering a culture that embraces digital transformation and inclusivity is critical. Leaders must champion cultural change by promoting ethical digital adoption, investing in employee training, and aligning technological advancements with JDEI principles (Hariyani et al., 2025). By doing so, organizations can unlock the full potential of digital technologies to promote justice, diversity, equity, and inclusion in OSCM.

2.7. Digital Technologies, JDEI, Organisational Culture and OSCM

With the rapid development of digital technologies, operations and supply chain management (OSCM) processes have also undergone a revolution, enabling organisations to increase their efficiency, transparency, and decision-making capabilities (Kamble et al., 2020; Novatia Consulting, 2024). Artificial Intelligence (AI), Blockchain, Big Data Analytics, Internet of Things (IoT), and Cloud Computing are technologies deliberately used to streamline logistics and optimize supply chain operations, decrease lead times, and promote collaboration between stakeholders (Al-Talib et al., 2025; Kam et al., 2026). This has been running faster in Nigeria, where even non-financial companies, quoted or not, are responding to the call of technology; although infrastructural deficiency, the cost of implementation, cyber-attacks, and workforce digital illiteracy can be seen as defining challenges.

The introduction of digital technologies in OSCM creates implications of relevance to justice, diversity, equity, and inclusion (JDEI). Supply chain justice implies fair treatment among stakeholders, encompassing distributive, procedural, and interactional components (Colquitt et al., 2001). The ideals of justice are achieved on the digital front through the use of digital tools that enable unbiased decision-making processes, both in terms of supplier compensation and automated contract execution via

smart contracts and blockchain (Saber et al., 2019; Kshetri, 2018). For example, predictive analytics powered by AI can enhance the accuracy of demand forecasting, minimize waste, and ensure equal resource distribution (Ivanov et al., 2019).

OSCM diversity can be described as the engagement of people with different demographics and socio-economic backgrounds, which increases resilience in supply chains and the innovativeness of organizations (Pang et al., 2024). Digital platforms are less traditional because they enable AI-assisted recruitment in a bias-free environment, facilitate e-procurement, and promote greater engagement with minority-owned suppliers, as well as remote work using online tools (Raisch & Krakowski, 2021; Madzimore et al., 2020). Equity is concerned with ensuring equitable access to resources and opportunities, taking into consideration situated disadvantages and applying targeted interventions (Reskin, 2003). Equity can be enhanced with the help of digital technologies by ensuring equality in supplier selection and employee promotion, monitoring equity measures using big data, and promoting payment timeliness and fairness through blockchain-based financial services (Kellogg et al., 2020; George et al., 2014; Chang et al., 2019).

Inclusion ensures the active participation of everyone involved in making decisions and being involved in the work process, which promotes psychological safety and engagement (Edmondson & Lei, 2014; Roberson, 2006). Digital tools support inclusion by enabling individuals to work anywhere and at any time, personalizing digital learning, and enhancing customer engagement through the use of AI (Madzimore et al., 2020; Kellogg et al., 2020; Raisch & Krakowski, 2021). Organisational culture is a pivotal factor influencing the impact of digital technology on JDEI outcomes in OSCM. Culture involves a system of shared values, beliefs, and practices that mediate psychological attitudes related to digital adoption and inclusivity (Denison & Mishra, 1995). Companies with a culture of adaptation, innovation, and ethics are better positioned to utilize digital tools to enhance justice, diversity, equity, and inclusion (Platania et al., 2025). Within the Nigerian context, the development of such a culture can be achieved through the leadership team's commitment to ethical digital transformation, workforce training instruments, and the coordination of technological efforts with JDEI ideals (Adebayo et al., 2022; Novatia Consulting, 2024). To conclude, digital technologies and organisational culture

are the perfect synergy that can make OSCM more just, diverse, equitable, and inclusive. Nevertheless, to achieve this potential, it is essential to overcome the infrastructural, regulatory, and cultural obstacles, particularly in developing markets such as Nigeria. In this study, the author utilizes these insights and empirically examines how the implementation of digital technology affects JDEI in the context of the quoted non-financial companies in Nigeria, and how these effects are moderated by organizational culture.

2.8. Theoretical Framework: Digital Justice and Inclusion Theory (DJIT)

This study is grounded in the Digital Justice and Inclusion Theory (DJIT), a novel framework that explains how digital technologies influence justice, diversity, equity, and inclusion (JDEI) outcomes in operations and supply chain management (OSCM), particularly in emerging economies. Existing theories such as the Technology Acceptance Model (TAM), Resource-Based View (RBV), and Institutional Theory provide partial insights into technology adoption and organizational behaviour but fall short in fully capturing the socio-ethical implications of digital transformation within OSCM. TAM (Davis, 1989) predicts technology adoption based on perceived usefulness and ease of use, yet overlooks social justice dimensions. RBV (Barney, 1991) conceptualizes digital tools as strategic resources but assumes neutral benefits, failing to acknowledge their potential to reinforce inequities. Institutional Theory (DiMaggio & Powell, 1983) focuses on conformity to institutional norms but underexplores the operational mechanisms through which technology can shape inclusion. DJIT advances these perspectives by explicitly linking digital affordances to JDEI outcomes and theorizing organizational culture as a key contingency that determines whether technologies foster inclusion or entrench bias (Heeks, 2020; Sandberg & Alvesson, 2020). **Table 1** presents a comparative summary.

In term of contribution, the DJIT framework extends Bodrožić & Gold's (2024) policy-driven DEI model by theorizing techno-cultural interactions as the core mechanism for equitable transformation. Another key contribution of DJIT is that it challenges the techno-optimist assumption that digitalization inherently promotes inclusion, instead proposing that organizational culture critically shapes these outcomes (Sandberg & Alvesson, 2020).

Table 1. **Comparison of Existing Theories and DJIT Contributions**

THEORY	FOCUS	RELEVANCE TO STUDY	LIMITATIONS IN JDEI CONTEXT	HOW DJIT ADVANCES IT
TAM	Predicts tech adoption based on usefulness & ease of use.	Explains adoption determinants.	Ignores social justice outcomes.	Adds JDEI dimensions & cultural moderation.
RBV	Competitive advantage from unique resources.	Frames digital tech as a strategic resource.	Assumes neutral tech benefits.	Highlights tech's dual potential to enable or hinder inclusion.
Institutional Theory	Organizational conformity to institutional norms.	Explains policy or societal pressures for inclusion.	Limited in capturing tech's operational role.	Integrates operational mechanisms for justice, diversity, equity, and inclusion.
DJIT (This Study)	Intersection of tech, JDEI, and culture.	Predicts conditional JDEI impacts in OSCM.		Contextualizes tech-JDEI in emerging markets; theorises culture as a key contingency.

2.8.1. *Gap and Theoretical Motivation*

The ability of digital transformation to increase efficiency, agility and responsiveness throughout supply chains has been a widely accepted discourse among both academics and practitioners (Ivanov et al., 2019; Kamble et al., 2020). Nevertheless, according to this literature, there are ethical, social, and distributional implications of introducing such technologies, and this has been theorized particularly in diverse and structurally unbalanced ecosystems, such as Nigeria. For example, algorithms can reproduce hiring or supply bias, and large data systems can silence a minority voice in the decision-making process. Following Sandberg & Alvesson (2020) and Rouse et al. (2025), DJIT accounts for this gap, as it challenges the logical presumption that digitalisation promotes inclusivity. Instead, it suggests that the roles of digital technologies are twofold: they may either moderate or contribute to inequity, depending on the organisational culture and systems of values that mediate them.

2.8.2. *Theoretical Foundations*

DJIT is supported by three interconnected streams of the literature:

- a. Digital Transformation Literature: Digital tools such as AI, blockchain, and big data are transformative but not value-neutral. They embody the intentions, biases, and constraints of their designers and implementers, and their impacts are

mediated by the organizational and societal contexts in which they are deployed (Leonardi, 2011; Heeks, 2020).

- b. JDEI in OSCM: Justice, diversity, equity, and inclusion in operations and supply chains are not only moral imperatives but also drivers of innovation, risk mitigation, and competitive advantage (Bapuji et al., 2020; Carter et al., 2008). These dimensions affect the decision-making, stakeholders and supply chain resilience.
- c. Organisational Culture Theory: Organizational implementation of digital systems and their interpretation is influenced by common values, norms, and assumptions. Culture has the potential to facilitate inclusive digital transformation or to strengthen exclusionary cultures, based on whether the culture facilitates transparency, fairness and participation (Denison & Mishra, 1995; Hofstede, 2011).

These three streams converge in DJIT, which holds that the socio-ethical effects of digital technologies in OSCM depend on the culture of implementation.

2.8.3. Theoretical Propositions

Based on its foundations, DJIT makes three central propositions as follows:

P1: Properly integrated digital technologies have the potential to improve JDEI in OSCM.

The mechanisms are AI-based bias detection, blockchain-based transparent and tamper-proof transactions and big data analytics to measure inclusion.

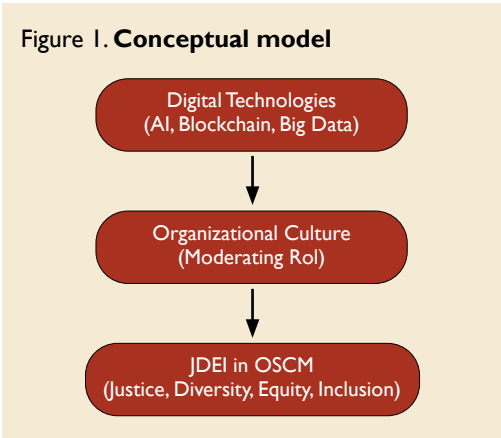
P2: The influence of digital technologies on JDEI outcomes is moderated by organisational culture.

Cultures with an inclination to transparency, fairness and the involvement of stakeholders are likely to enhance the positive effects of digital tools whereas hierarchical or exclusionary cultures can repress them.

P3: The effect of digital technologies to JDEI is neither homogenous, but technology-specific. While blockchain can enhance the transparency and procedural justice, AI can contribute to the diversity of recruitment or pay equity, and big data can contribute to fair resource distribution.

2.9. Conceptual Model of DJIT

The conceptual model (**Figure 1**) illustrates the connections among digital technologies, justice, diversity, equity, and inclusion (JDEI) and organization culture in operation and supply chain management (OSCM). It is based on Digital Justice and Inclusion Theory (DJIT) that argues that the social effects of digital change will vary according to the cultural context within which technologies are implemented. The independent variable is digital technologies such as AI, blockchain, IoT and big data analytics. They have the potential to increase transparency, efficiency and responsiveness (Ivanov et al., 2019; Kamble et al., 2020), but are not value-neutral in that they are designed in ways that influence the outcomes (Leonardi, 2011; Heeks, 2020). They may support or obstruct JDEI based on governance and inclusivity of implementation. The dependent variable is JDEI outcomes which are: justice (distributive, procedural, and interactional fairness), diversity (representation of diverse demographic and cognitive profiles), equity (elimination of structural barriers) and inclusion (active voice and participation) (Colquitt, 2001; Bapuji et al., 2020). They are OSCM ethical requirements and performance motivators (Robinson et al., 2022). The technology-JDEI relationship is moderated by organisational culture. Positive effects are enhanced by cultures that prioritise transparency, fairness and participation, but hierarchical or exclusionary cultures can offset or reverse them (Denison & Mishra, 1995; Hofstede, 2011; Sandberg & Alvesson, 2020). The arrows in **figure 1** indicate: (P1) the direct positive impact of digital technologies on JDEI; (P2) moderating impact of culture; and (P3) the variation in the impacts across technologies. DJIT therefore disavows deterministic perspectives, and highlights the fact that socio-technical outcomes are culturally contingent, especially in emergent economies such as Nigeria.



3. HYPOTHESIS DEVELOPMENT

In this section, the hypotheses of the study are formulated relying on the Digital Justice and Inclusion Theory (DJIT) and the available literature. DJIT suggests that digital technologies can stimulate justice, diversity, equity, and inclusion (JDEI) in operations and supply chain management (OSCM) and inhibitory at the same time. The proposed study contributes to the literature as it theorizes that the impacts of digitalization depend upon the context of a specific culture (Sandberg & Alvesson, 2021; Lange & Pfarrer, 2017).

3.1. Digital Technologies and Justice in OSCM

DJIT theory and organisational justice theory (Colquitt et al., 2001) state that fairness in OSCM can be changed through digital technologies, namely, unfair human bias, a lack of transparency, and standardisation of decision-making can be achieved with the help of digital technologies, including AI, blockchain, and analytics (Tavoletti et al., 2022). Nevertheless, the mere existence of technology is not sufficient to create fair impacts; what gives it much relevance is the design and construction of such systems, which depend on the values and practices of organisations (Leonardi, 2011). The snag in this case is that technology also reproduces some of the biases that exist if they are unattended (Bapuji et al., 2020).

Hypothesis:

H1: The adoption of digital technologies has a positive influence on justice in operations and supply chain management processes in Nigerian quoted non-financial firms.

3.2. Digital Technologies and Diversity in OSCM

DJIT builds on diversity management theory, suggesting that digital technologies can remove barriers to underrepresented groups and support diverse representation in OSCM (Raisch & Krakowski, 2021). AI-based recruitment systems and e-procurement systems are conceptualized to reduce implicit bias and open up opportunities for minority supplier ownership (Madzimore et al., 2020). However, this is not always the case; digital tools could become a source of exclusion unless a deliberate design trap or an inclusive culture is in place (Robinson et al., 2022).

Hypothesis:

H2: The adoption of digital technologies has a positive influence on diversity in operations and supply chain management processes in Nigerian quoted non-financial firms.

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3.3. Digital Technologies and Equity in OSCM

Based on the theory of equity and digital justice in technology (DJIT), digital technologies should advance equity through data- and objective-based access and distribution of resources (Kellogg et al., 2020; George et al., 2014). For example, structural inequalities can be revealed through big data analytics, and blockchain can mitigate unfair compensation. Nonetheless, there is always a potential danger that technology solutions can build up inequality unless the data or algorithms behind them are inclusive (Chang et al., 2019).

Hypothesis:

H3: The adoption of digital technologies has a positive influence on equity in operations and supply chain management processes in Nigerian quoted non-financial firms.

3.4. Digital Technologies and Inclusion in OSCM

DJIT and inclusion theory (Edmondson & Lei, 2014) suggest that digital technologies can support inclusion by facilitating the broader participation of stakeholders and promoting a sense of psychological safety. Marginalized voices can be reinforced, and overall participation can become significantly more engaging by utilizing virtual collaboration tools and digital training (Kellogg et al., 2020). Nevertheless, digital divides and resistance to change could become an obstacle to the positive outcomes of these actions.

Hypothesis:

H4: The adoption of digital technologies has a positive influence on inclusion in operations and supply chain management processes in Nigerian quoted non-financial firms.

3.5. The Moderating Role of Organizational Culture

The central principle of DJIT is that the influence of digital technology adoption on the JDEI outcomes is mediated by organisational culture. Based on contingency theory (Lawrence & Lorsch, 1967) and cultural paradigms (Denison & Mishra, 1995), we propose that cultures that foster the notions of flexibility, education, and integration will be better equipped to utilize digital tools to achieve JDEI. On the contrary, these effects could be mitigated or overturned by rigid or exclusionary cultures. This twist questions the deterministic explanation of technology and the relevancy of context (Heeks, 2020).

Moderation Hypotheses:

H5a: Organisational culture moderates the relationship between digital technologies and justice in OSCM, such that the positive effect is more potent in inclusive cultures.

H5b: Organisational culture moderates the relationship between digital technologies and diversity in OSCM, such that the positive effect is more potent in inclusive cultures.

H5c: Organisational culture moderates the relationship between digital technologies and equity in OSCM, such that the positive effect is more potent in inclusive cultures.

H5d: Organisational culture moderates the relationship between digital technologies and inclusion in OSCM, such that the positive effect is more potent in inclusive cultures.

4. METHODOLOGY

4.1. Study Area

This study examines how digital technologies affect justice, diversity, equity and inclusion (JDEI) of operations and supply chain management (OSCM) in the vibrant business environment in Nigeria. The research was focused on quoted non-financial firms in Nigeria, which contribute to economic growth, employment, innovation and infrastructural development in the various sectors of

the economy. These firms offer a good background to the study of the effects of digital transformation on JDEI outcomes, moderated by organizational culture.

4.2. Research Design and Data Collection

The survey-based quantitative research design was used to obtain the opinion and experience of the professionals on digital technology utilisation, organisational culture and JDEI in OSCM. The primary data collected were obtained through a structured questionnaire used to gather feedback from 400 respondents in 153 Nigerian non-financial quoted firms.

4.2.1. Sampling Procedure

A stratified random sampling method was used to ensure that the important economic sectors (e.g., manufacturing, telecommunications, energy, and consumer goods) were represented. In every stratum, respondents were sampled from managerial and supervisory levels, including executives in finance, marketing, human resources, engineering, operations, and supply chain management. This method guaranteed that different views applicable to the subject matter in the study were portrayed.

4.2.2. Questionnaire Administration

The survey used organisational contacts and professional networks to distribute the questionnaire electronically and in paper form between [specify months/year]. The follow-up reminders were provided to increase the response rate. Participation was uncompelled and preservation was guaranteed.

4.3. Development of questionnaire and Pilot Testing

The study used questionnaire with validated scales from previous studies (e.g., Bodrožić & Gold, 2024; Deep, 2023; Okatta et al., 2024; Al-Ma'aitah, 2024). In the Nigerian context of OSCM, all items in the questionnaire were developed based on validated scales from earlier studies (e.g., Bodrožić & Gold, 2024; Deep, 2023; Okatta et al., 2024). It had four parts:

Part A: Demographic variables (age, gender, education, role, years of experience).

Part B: Digital technology adoption constructs (perceived ease of use, behavioural intention, perceived usefulness, attitude

toward technology).
Part C: dimensions (justice, diversity, equity, inclusion).
Part D: Measures of organisational culture.

4.3.1. Scale Operationalisation

Each of the constructs was assessed using Likert-type questions on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Adaptations were made to ensure clarity and contextual appropriateness. As an illustration, items related to digital technology adoption were conceptualized using the Technology Acceptance Model (TAM), whereas items related to JDEI relied on organizational justice and diversity literature.

4.3.2. Pilot Test

An OSCM pilot survey was conducted involving 35 specialists in the field of OSCM working in firms that were not part of the significant sample, to assess the clarity, reliability, and validity of the questionnaire. A few changes were made to the wording and sequence of items to enhance understanding, following feedback from pilot participants. The coefficients of Cronbach's alpha of each of the scales were higher than 0.80, which implies good internal consistency.

4.4. Sampling Technique and Sample Size Determination

Stratified random sampling was used to ensure proportionate representation of firms across Nigeria's non-financial sectors (e.g., manufacturing, healthcare, agriculture). The Nigeria Exchange Group database provided the sampling frame of the 153 quoted non-financial firms.

The sample size was determined using Cochran's formula for an unknown population size:

$$n = \frac{(Z^2 \times p(1-p))}{E^2}$$

Using the parameters $Z = 1.96$, $E = 0.05$, and $p = 0.5$, the calculation yielded:

$$n = \frac{(1.96)^2 \times 0.5(1-0.5)}{(0.05)^2}$$

$n = 385$ approximately

To increase representativeness and statistical power, 400 respondents were targeted, including managers and supervisors from finance, operations, HR, marketing, supply chain, and engineering departments.

4.5. Data Collection Procedure and Ethics

The questionnaires, which were to be used, were disseminated both electronically through Google Forms and physically by trained research assistants. The participants issued informed consent. Confidentiality and anonymity were observed and were given freely.

4.6. Data Analysis Methods

The analysis of the data was carried out as follows:

- (a) Descriptive analysis (SPSS v25): Used to get frequencies, percentages, means, and standard deviations.
- (b) SmartPLS 4 Structural Equation Modeling (SEM): Convergent and discriminant validity; composite reliability; AVE validations of the measurement model. The estimation of structural model testing the hypothesized relationships and moderating effects (Hair et al., 2019). The significance of the path was estimated in 5,000 resamples via bootstrapping (Kline, 2015).

This method enables the simultaneous modeling of latent constructs and the evaluation of a complex interaction, a critical element of the proposed model that interconnects digital technologies, JDEI, and organizational culture.

4.7. Survey Design Considerations and Bias Mitigation

Based on the type of survey, Flynn et al. (2018) offer a Type 2 survey, where all information on independent and dependent variables was recorded for the same respondents at one time. Although such a design is popular in organisational research, it is prone to common method bias (CMB) and other response biases, which may exaggerate the relationship between the variables. To cover these issues and improve methodological validity, several procedural and statistical solutions were chosen:

4.7.1. Procedural Remedies

The questionnaire was well-designed, with different sections and clear guidelines to minimize respondent fatigue and confusion.

Participants were promised anonymity to reduce social desirability bias. Questions about independent and dependent constructs were mixed and phrased to avoid patterned responses. A pilot test was conducted to identify and rectify ambiguous leading questions.

4.7.2. Statistical Remedies

A single-factor test, as postulated by Harman, was conducted after data collection to determine the existence of standard method variance, with results indicating no significant bias. Discriminant validity was established through a confirmatory factor analysis (CFA) in the structural equation modeling (SEM) framework, which demonstrated discriminant validity among the constructs, as the measures assessed different concepts. Latent method factors or marker variables were added as needed to control for method effects. This mitigation strategy, along with the other mentioned mitigation strategies and the explicit mention of the survey design, not only makes the study more transparent but also improves the validity and reliability of the outcome, particularly in terms of addressing the biases inherent in Type 2 designs.

5. RESULTS

5.1. Demographic Characteristics of Respondents

Table 2 provides an overview of the respondents' demographic characteristics, including age, gender, job roles, years of experience in supply chain management, and organizational affiliations. The age profile of the respondents reveals a concentration in the 36-45 years bracket (49.3%), followed by the 46-55 years category (28.0%). Younger age groups (18-25 years and 26-35 years) are underrepresented, accounting for 4.5% and 8.3%, respectively. In terms of gender, the sample exhibits a near-even split, with males comprising 53.0% and females making up 47.0%. The respondents' job roles are diverse, with Operations, Logistics, and Supply Chain Managers forming the largest group (41.8%). Managers and administrators account for 25.8%, while other roles, such as Engineering/Technical and Human Resources and Administrative Support, constitute smaller proportions. The respondents' experience in supply chain management varies widely, with 47.8% having 5-10 years of experience and 29.3% having 11-15 years of

Table 2. **Demographic characteristics of respondents**

DEMOGRAPHIC VARIABLES		FREQUENCY	PERCENTAGE
Age Range	18-25 years	18	4.5%
	26-35 years	33	8.3%
	36-45 years	197	49.3%
	46-55 years	112	28.0%
	56 and above	40	10.0%
Gender	Female	188	47.0%
	Male	212	53.0%
Position in the organization	Executive	30	7.5%
	Manager/Administrator	103	25.8%
	Finance/Accountant	16	4.0%
	Marketing/Sales & Customer Relations	20	5.0%
	Human Resources & Admin Support	31	7.8%
	Engineer/Technical	33	8.3%
	Operations/Logistics & Supply Chain Manager	167	41.8%
Years of experience in supply chain operations	Less than 5 years	64	16.0%
	5–10 years	191	47.8%
	11–15 years	117	29.3%
	More than 16 years	28	7.0%
Types of Organisation	Non-Profit/NGO	20	5.0%
	Government/Public Sector	17	4.3%
	Education	29	7.2%
	Technology/IT	54	13.5%
	Manufacturing/Industrial	26	6.5%
	Finance/Banking	18	4.5%
	Logistics/Supply Chain	21	5.3%
	Services	215	53.8%

experience. A small proportion (7.0%) has more than 16 years of experience.

5.2. Respondents’ Perception of Digital Technologies

Table 3 reveals that respondents have overwhelmingly positive perceptions of digital technologies in supply chain operations. A significant majority (89.5%) agree that digital tools enhance supply chain efficiency, while over 84% recognize benefits in

decision-making, inventory management, and demand forecasting. Specifically, 85.5% of respondents acknowledge the role of technology in improving demand forecasting accuracy. Although 73.5% find digital tools easy to navigate and integrate, 17.3% remain neutral, suggesting some room for improvement in user experience. Furthermore, while most respondents believe employees can quickly learn new software, fewer (60.3%) agree that minimal training is required. Overall, respondents demonstrate enthusiasm for digital transformation, with 83.3% believing technology aligns with strategic supply chain goals and 82.3% expressing a proactive stance toward adopting and recommending new technologies.

Table 3. Respondents’ perception of digital technologies

ITEMS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	MEAN	STANDARD DEVIATION
Perceived Usefulness							
Digital technologies improve the efficiency of our supply chain operations.	4.3%	0.5%	5.8%	50.0%	39.5%	4.11	0.87
Technology adoption enhances decision-making in operations management.	1.5%	3.8%	9.8%	51.5%	33.5%		
Digital tools streamline inventory management processes.	2.5%	4.0%	15.0%	48.5%	30.0%		
Technology improves demand forecasting accuracy in our supply chain.	1.3%	4.3%	9.0%	53.0%	32.5%		
Perceived Ease of Use							
Our digital tools in operations are easy to navigate and integrate.	2.0%	7.2%	17.3%	55.0%	18.5%	3.78	0.94
Employees can quickly learn to use new supply chain management software.	0.8%	5.5%	20.3%	52.5%	21.0%		
Minimal training is required to adopt digital technologies for operations.	5.0%	16.0%	18.8%	44.3%	16.0%		
User-friendly systems reduce errors in supply chain operations.	2.5%	5.0%	19.0%	45.5%	28.0%		
Attitude Toward Technology							
I am enthusiastic about using digital technologies in operations management.	2.8%	4.0%	10.0%	51.0%	32.3%	4.03	0.88
Technology adoption aligns with our supply chain's strategic goals.	2.5%	3.0%	13.5%	55.3%	25.8%		
Technology improves overall supply chain performance.	1.0%	4.5%	9.5%	53.0%	32.0%		
Using technology is integral to meeting customer expectations.	2.8%	4.8%	14.8%	49.5%	28.2%		

ITEMS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	MEAN	STANDARD DEVIATION
Behavioural Intention to Use Technology							
I plan to adopt new technologies to improve the supply chain.	1.0%	2.3%	14.5%	56.5%	25.8%	4.06	0.84
I actively encourage digital transformation in operations.	2.0%	1.3%	12.8%	52.3%	31.8%		
I recommend utilizing advanced technology in supply chain management.	2.8%	2.3%	10.3%	50.0%	34.8%		
I regularly explore new tools to enhance supply chain processes.	1.5%	5.3%	17.3%	48.0%	28.0%		

5.3. Respondents' Perception of Organizational Justice-JDEI

Table 4 presents respondents' perceptions of organizational justice in supply chain operations, revealing moderate agreement on transparency and fairness in decision-making, with 62.8% believing supply chain partnership decisions are made transparently (Mean = 3.68, SD = 0.96), 60.3% thinking employees are treated fairly in performance evaluations, 63.3% expressing confidence in equitable dispute resolution, and 63.1% perceiving fairness in resource allocation. However, a notable proportion of respondents (25.8-28.5%) remain neutral. The findings also reflect positive perceptions of diversity, with 76.5% agreeing that supply chain teams comprise individuals from diverse backgrounds (Mean = 3.88, SD = 0.89), and 75.8% indicating that diverse perspectives are valued in decision-making. Regarding equity, 67.1% agree that career advancement opportunities are equitable (Mean = 3.70, SD = 0.93), though 27.5% remain neutral. Inclusive collaboration in operations receives moderate support, with 69.3% of respondents believing in inclusive collaboration (Mean = 3.96, SD = 0.83), and 15.5-20.8% remaining neutral. Overall, the findings suggest that while organizational justice is perceived positively, opportunities exist to enhance transparency, equity, and stakeholder participation in supply chain management.

Table 4. Showing respondents' perception of JDEI

ITEMS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	MEAN	STANDARD DEVIATION
Justice							
Decisions regarding supply chain partnerships are made transparently.	3.5%	5.3%	28.5%	48.3%	14.5%	3.68	0.96
Employees in operations roles are treated fairly in performance evaluations.	2.5%	10.5%	26.8%	41.0%	19.3%		
Supply chain disputes are resolved equitably.	2.0%	8.0%	26.8%	44.5%	18.8%		
Resource allocation in operations is conducted fairly across departments.	2.8%	8.5%	25.8%	40.8%	22.3%		
Diversity							
Supply chain teams comprise individuals from diverse backgrounds.	2.3%	6.3%	15.0%	53.0%	23.5%	3.88	0.89
Recruitment for operations roles emphasizes diversity.	2.5%	5.8%	19.3%	50.2%	22.3%		
Diverse perspectives are valued during supply chain decision-making.	2.0%	3.8%	18.5%	54.0%	21.8%		
The organization actively promotes diversity in its supplier selection process.	1.8%	4.3%	20.5%	49.3%	24.3%		
Equity							
Career advancement opportunities in supply chain roles are equitable.	2.0%	3.5%	27.5%	49.3%	17.8%	3.70	0.93
Equal access to resources is provided to all employees in operations.	2.0%	12.3%	23.0%	43.5%	19.3%		
Employees in marginalized groups receive support for career growth.	1.0%	9.5%	22.8%	46.8%	20.0%		
Pay scales for operations roles reflect equity across demographics.	2.0%	11.3%	26.8%	44.0%	16.0%		
Inclusion							
Employees in supply chain roles are encouraged to share their ideas and suggestions.	1.3%	4.0%	17.3%	50.7%	26.8%	3.96	0.83
Collaboration across diverse teams is promoted in operations.	0.8%	3.8%	15.5%	52.8%	27.3%		
Supply chain decision-making incorporates input from all stakeholders.	1.0%	4.5%	20.8%	49.8%	24.0%		
Leaders actively foster an inclusive environment in operations	2.0%	2.8%	20.8%	51.7%	22.8%		

5.4. Respondents' Perception of Organisational Culture

Table 5 presents respondents' perceptions of organizational culture in supply chain operations, revealing strong agreement on collaboration (84.5% agreement, Mean = 4.07, SD = 0.82), empowerment (76.5% agreement, 18.8% neutral), innovation (82.0% agreement), open communication (81.7% agreement), continuous learning and development (83.7% agreement), and motivation through celebrating team successes (86.8% agreement). These findings suggest a culture that fosters collaboration, empowerment, and innovation, supporting employee engagement and supply chain efficiency. However, neutral responses, particularly regarding decision-making empowerment (18.8%), indicate areas for further reinforcement of autonomy and leadership support.

Table 5. Showing the respondents' perception of organizational culture

ITEMS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE	MEAN	STANDARD DEVIATION
Collaboration among teams is highly valued in our supply chain operations.	2.0%	2.3%	11.3%	54.0%	30.5%	4.07	0.82
Employees in operations roles are empowered to make decisions that enhance the performance of the supply chain.	0.5%	4.3%	18.8%	51.5%	25.0%		
Innovation is encouraged in addressing operational and supply chain challenges.	1.0%	2.8%	14.2%	53.5%	28.5%		
Open communication is prioritized to improve supply chain processes.	1.5%	4.3%	12.5%	53.0%	28.7%		
Continuous learning and development are emphasized for employees in supply chain roles.	2.0%	3.5%	10.8%	55.0%	28.7%		
Celebrating team successes in operations fosters motivation and commitment to supply chain excellence.	1.3%	2.0%	10.0%	45.8%	41.0%		

5.5. Construct Reliability and Validity

5.5.1. Reliability and Validity Assessment

The constructs in the instrument exhibit strong internal consistency (see **Table 6**), with Cronbach's α values all surpassing the recommended threshold of 0.70, ranging from 0.679 (PEOU) to 0.842 (BI). Composite reliability further confirms this robustness, with values ranging from 0.806 to 0.894, which is well within the recommended range of 0.70–0.95 for PLS-SEM (Hair et al., 2020;

Lee et al., 2023). The fact that AVE values for all constructs exceed 0.50 (ranging from 0.511 to 0.678) indicates solid convergent validity, aligning with Fornell & Larcker's (1981) thresholds. Discriminant validity is confirmed through the Fornell-Larcker criterion (see **Table 7**): each construct's AVE square root (diagonal values between 0.715 and 0.824) exceeds its highest correlation with any other construct, indicating that constructs are empirically distinct. Additionally, all VIFs (see **Table 8**) lie comfortably below 3.3 (range: 1.273-2.150), ruling out multicollinearity and indicating the model is methodologically sound (Kock, 2015). These results collectively validate the measurement model's reliability and appropriateness for further structural analysis.

Table 6. Reliability and Validity Assessment

CONSTRUCTS	CRONBACH'S ALPHA	COMPOSITE RELIABILITY (RHO_C)	AVERAGE VARIANCE EXTRACTED (AVE)
ATT	0.799	0.868	0.622
BI	0.842	0.894	0.678
DIV	0.757	0.845	0.578
ETT	0.788	0.862	0.611
INCL	0.762	0.849	0.586
JUS	0.805	0.873	0.632
PEOU	0.679	0.806	0.511
PU	0.775	0.855	0.596

NB: ATT = Attitude Toward Technology; BI = Behavioural Intention to Use; DIV = Diversity; EQT = Equity; INCL = Inclusion; JUS = Justice; PEOU = Perceived Ease of Use; PU = Perceived Usefulness

Table 7. Discriminant Validity (Fornell-Lacker Criterion)

	ATT	BI	DIV	ETT	INCL	JUS	PEOU	PU
ATT	0.789							
BI	0.721	0.824						
DIV	0.520	0.559	0.760					
ETT	0.490	0.435	0.578	0.782				
INCL	0.458	0.486	0.594	0.603	0.765			
JUS	0.407	0.437	0.609	0.590	0.526	0.795		
PEOU	0.651	0.596	0.626	0.570	0.468	0.536	0.715	
PU	0.638	0.557	0.468	0.410	0.438	0.404	0.591	0.772

NB: ATT = Attitude Toward Technology; BI = Behavioural Intention to Use; DIV = Diversity; EQT = Equity; INCL = Inclusion; JUS = Justice; PEOU = Perceived Ease of Use; PU = Perceived Usefulness

Table 8. **Multicollinearity (VIFs)**

	VIF
ATT1	1.445
ATT2	1.535
ATT3	1.823
ATT4	1.839
BI1	2.150
BI2	2.057
BI3	1.837
BI4	1.697
DIV1	1.441
DIV2	1.424
DIV3	1.608
DIV4	1.464
EQT1	1.483
EQT2	1.479
EQT3	1.702
EQT4	1.746
INCL1	1.684
INCL2	1.792
INCL3	1.380
INCL4	1.354
JUS1	1.594
JUS2	1.952
JUS3	1.687
JUS4	1.565
PEOU1	1.447
PEOU2	1.273
PEOU3	1.290
PEOU4	1.215
PU1	1.496
PU2	1.763
PU3	1.617
PU4	1.335

5.6. Hypotheses

H1: The adoption of digital technologies has a positive influence on justice in operations and supply chain management processes in Nigerian quoted non-financial firms.

The structural model reveals a significant and positive relationship between Perceived Ease of Use (PEOU) and Justice (JUS), with $\beta = 0.403$ and $p < 0.001$ (see **Table 9** and **Figure 2**), indicating that as users perceive digital tools as easier to use, their perceptions of justice in operations improve substantially. Behavioral Intention (BI) exhibits a marginally significant effect on justice ($\beta = 0.174$, $t = 1.891$, $p \approx 0.059$), suggesting that stronger intentions to adopt digital tools also contribute to justice perceptions, albeit less strongly. Other predictors (ATT, PU) are non-significant for justice, underscoring the dominant role of usability in shaping fairness outcomes.

These findings align with recent research highlighting the role of digital technology in promoting operational fairness and stakeholder trust within supply chains. For instance, Sharma et al. (2023) demonstrated that IoT-enabled traceability enhances ethical treatment by enabling visibility and accountability across supply chain nodes. Moreover, Schleper et al. (2024) highlight justice logic as a critical but underexamined dimension in DEI-focused OSCM, advocating for more inclusive technological governance. The results thus empirically support the notion that digital ease of use underpins justice, contributing to the theoretical discourse on digital justice within Operations and Supply Chain Management.

H2: The adoption of digital technologies has a positive influence on diversity in operations and supply chain management processes in Nigerian quoted non-financial firms.

The data in **Table 9** and **Figure 2** highlights a strong positive effect of PEOU on Diversity (DIV) ($\beta = 0.422$, $p < 0.001$), and a similarly strong impact of BI on diversity ($\beta = 0.261$, $p < 0.001$). These findings suggest that user-friendly digital systems and users' intentions to adopt them significantly foster diversity within operational contexts. Other predictors (ATT, PU) did not significantly influence diversity. With $R^2 = 0.448$, nearly half the variance in diversity is explained, indicating substantial predictive strength. This outcome aligns with emerging literature that demonstrates how digitalization can enhance diversity through the use of inclusive digital tools and expanded supplier and employee ecosystems. For

example, Schleper et al. (2024) expand DEI discourse in OSCM by linking diversity outcomes to digital interventions. Industry reports, such as those by Gartner (2023), affirm that 75% of supply chains now include diverse supplier metrics in their digital dashboards, reinforcing the empirical findings. Collectively, these insights highlight the crucial role of usability and adoption intent in leveraging digital technologies to promote operational diversity.

H3: The adoption of digital technologies has a positive influence on equity in operations and supply chain management processes in Nigerian quoted non-financial firms.

As shown in **Table 9** and **Figure 2**, Equity (EQT) is significantly influenced by both PEOU ($\beta = 0.413$, $p < 0.001$) and ATT ($\beta = 0.162$, $p = 0.024$). It suggests that not only does ease of use facilitate equitable treatment, but favorable attitudes toward technology adoption also play a meaningful role. BI and PU showed non-significant effects on equity. The model explains 35.2% of the variance in equity ($R^2 = 0.352$), indicating moderate explanatory power. These findings align with evidence that user-friendly digital solutions and positive attitudes toward technology adoption can help reduce inequities in operational access and outcomes. Singh and Garg (2023) found that IoT-based supply chain platforms improved the fairness of resource allocation in emerging economies. Furthermore, DEI-centric OSCM research links equity to technological empowerment strategies—both attitudinal and functional—highlighted in Schleper et al. (2024). Thus, the results reinforce the notion that digital equality is facilitated by both technological usability and favorable predispositions.

H4: The adoption of digital technologies has a positive influence on inclusion in operations and supply chain management processes in Nigerian quoted non-financial firms.

The results in **Table 9** and **Figure 2** show that Inclusion (INCL) is significantly influenced by PEOU ($\beta = 0.196$, $p = 0.005$), BI ($\beta = 0.243$, $p = 0.001$), and PU ($\beta = 0.147$, $p = 0.009$). It indicates that belief in usefulness, intention to adopt, and ease of use all contribute to inclusive outcomes. ATT did not yield a significant effect. The inclusion model has an R^2 of 0.302, showing moderate explanatory power. These results are supported by MKM literature, such as Financial Times analysis (2024), which underscores that digital tools for DEI, when perceived as valuable and easy, drive team inclusion and organizational belonging. In addition, Schleper

et al. (2024) emphasize the importance of inclusion as an outcome of digitally mediated DEI strategies within supply chains. The findings empirically affirm that PEOU, BI, and PU are vital levers for inclusion, offering evidence-based contributions to digital inclusion theory in OSCM.

Table 9. Hypothesized Paths

HYPOTHEZED PATHS	COEFFICIENT (β)	STDEV	T STATISTICS	P VALUES
ATT -> DIV	0.017	0.071	0.240	0.810
ATT -> ETT	0.162	0.071	2.263	0.024
ATT -> INCL	0.061	0.074	0.822	0.411
ATT -> JUS	-0.041	0.092	0.444	0.657
BI -> DIV	0.261	0.063	4.156	0.000
BI -> ETT	0.054	0.070	0.762	0.446
BI -> INCL	0.243	0.075	3.239	0.001
BI -> JUS	0.174	0.092	1.891	0.059
PEOU -> DIV	0.422	0.052	8.169	0.000
PEOU -> ETT	0.413	0.065	6.358	0.000
PEOU -> INCL	0.196	0.069	2.831	0.005
PEOU -> JUS	0.403	0.080	5.055	0.000
PU -> DIV	0.062	0.056	1.114	0.265
PU -> ETT	0.033	0.066	0.497	0.619
PU -> INCL	0.147	0.057	2.597	0.009
PU -> JUS	0.095	0.070	1.351	0.177
	R-square		R-square adjusted	
DIV	0.448		0.443	
ETT	0.352		0.345	
INCL	0.302		0.295	
JUS	0.314		0.307	

NB: ATT = Attitude Toward Technology; BI = Behavioural Intention to Use; DIV = Diversity; EQT = Equity; INCL = Inclusion; JUS = Justice; PEOU = Perceived Ease of Use; PU = Perceived Usefulness

5.7. Predictive Relevance

As shown in Table 10, the model explains moderate variance in dependent constructs, R² values of 0.448 (DIV), 0.352 (EQT), 0.302 (INCL), and 0.314 (JUS), consistent with Cohen's criteria for substantive explanatory power. Predictive relevance assessed via PLSpredict shows Q²predict values above 0 (e.g., DIV = 0.431, EQT = 0.330), indicating strong out-of-sample prediction capacity.

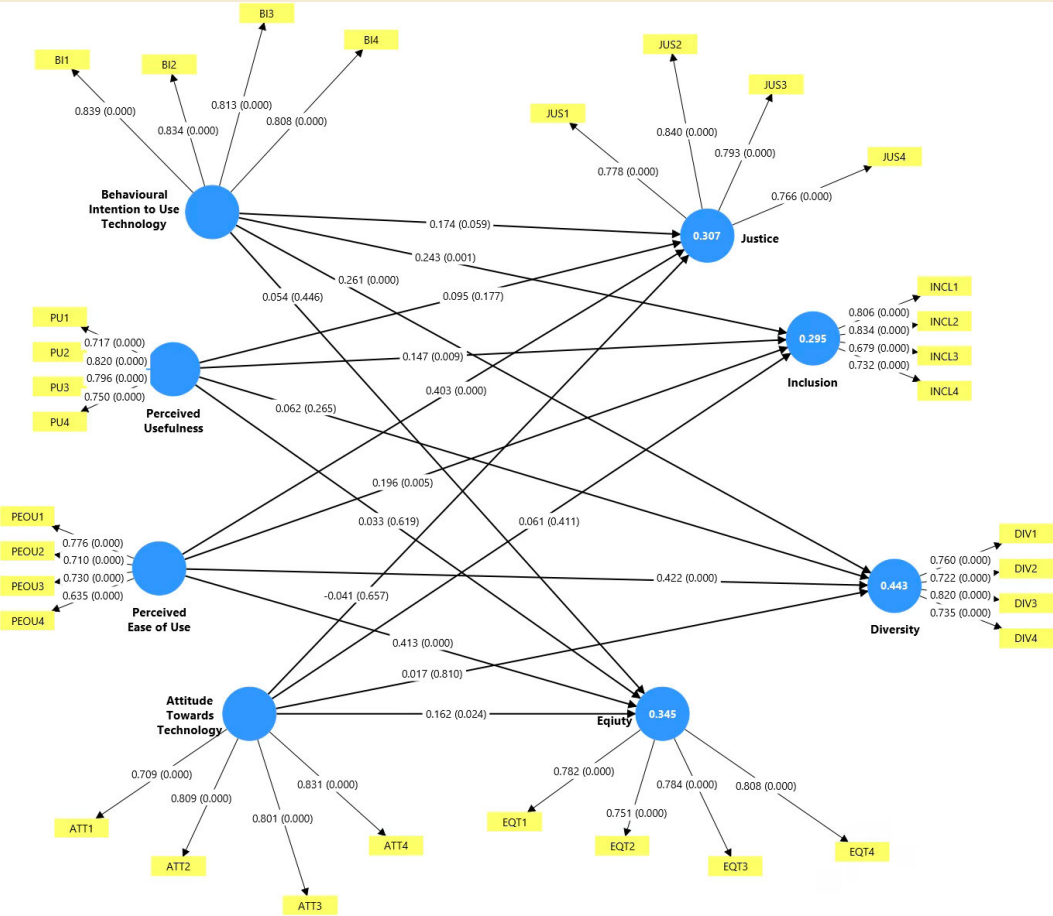
Such results reinforce confidence in the model's explanatory and predictive performance, highlighting that PEOU and BI are key enablers of socially inclusive and equitable digital transformation

Table 10. PLS Predict

	Q ² PREDICT	RMSE	MAE
DIV	0.431	0.760	0.577
ETT	0.330	0.824	0.651
INCL	0.281	0.853	0.661
JUS	0.286	0.851	0.662

NB: DIV = Diversity; EQT = Equity; INCL = Inclusion; and JUS = Justice

Figure 2. Influence analysis showing relationship between digital technologies and JDEI in OSCM



in Nigerian SCM practice. Though R^2 values are between 0.302 and 0.448, the model explains 30.2% to 44.8% of the variance in the endogenous constructs. This means that the model has a meaningful degree of explanatory power, and the variance not explained by the model is due to other factors.

5.8. Moderation Effect of Organisational Culture

Table 11 and **Figure 3** present the moderation analysis examining the role of organizational culture in the relationship between digital technologies and justice, diversity, equity, and inclusion in operations and supply chain management. The results indicate significant direct impacts of digital technologies on justice ($\beta = 0.320$, $t = 4.902$, $p < 0.001$), diversity ($\beta = 0.476$, $t = 9.599$, $p < 0.001$), equity ($\beta = 0.507$, $t = 9.435$, $p < 0.001$), and inclusion ($\beta = 0.212$, $t = 4.102$, $p < 0.001$). Organizational culture independently influences these outcomes, with significant effects on justice ($\beta = 0.400$, $t = 6.717$, $p < 0.001$), diversity ($\beta = 0.279$, $t = 5.379$, $p < 0.001$), equity ($\beta = 0.211$, $t = 3.845$, $p < 0.001$), and inclusion ($\beta = 0.565$, $t = 9.253$, $p < 0.001$). The moderation effects reveal that organizational culture strengthens the relationships between digital technologies and equity ($\beta = 0.154$, $t = 5.170$, $p < 0.001$), inclusion ($\beta = 0.131$, $t = 3.619$, $p < 0.001$), and justice ($\beta = 0.072$, $t = 2.343$, $p = 0.019$). However, organizational culture does not moderate the relationship between digital technologies and diversity ($\beta = 0.010$, $t = 0.399$, $p = 0.690$). The R-squared values indicate moderate to strong explanatory power for diversity ($R^2 = 0.475$), equity ($R^2 = 0.403$), inclusion ($R^2 = 0.479$), and justice ($R^2 = 0.401$). Given these results, the hypothesis is partially accepted. While organizational culture strengthens the relationship between digital technologies and justice, equity, and inclusion, it does not play a moderating role in the relationship between digital technologies and diversity. These findings suggest that digital technologies promote fairness, inclusiveness, and equity, and that organizational culture enhances their effectiveness, except in the case of diversity, where other factors may play a more critical role.

Table 11. **Moderating role of organizational culture in the relationship between digital technologies and JDEI in OSCM**

HYPOTHESIZED PATHS	COEFFICIENT (β)	STDEV	T STATISTICS	P VALUES
DT -> DIV	0.476	0.050	9.599	0.000
DT -> EQT	0.507	0.054	9.435	0.000
DT -> INCL	0.212	0.052	4.102	0.000
DT -> JUS	0.320	0.065	4.902	0.000
OC -> DIV	0.279	0.052	5.379	0.000
OC -> EQT	0.211	0.055	3.845	0.000
OC -> INCL	0.565	0.061	9.253	0.000
OC -> JUS	0.400	0.060	6.717	0.000
OC x DT -> DIV	0.010	0.026	0.399	0.690
OC x DT -> EQT	0.154	0.030	5.170	0.000
OC x DT -> INCL	0.131	0.036	3.619	0.000
OC x DT -> JUS	0.072	0.031	2.343	0.019
PU -> DIV	0.062	0.056	1.114	0.265
PU -> ETT	0.033	0.066	0.497	0.619
PU -> INCL	0.147	0.057	2.597	0.009
PU -> JUS	0.095	0.070	1.351	0.177
	R-square		R-square adjusted	
DIV	0.475		0.472	
EQT	0.403		0.399	
INCL	0.479		0.475	
JUS	0.401		0.397	

NB: ATT = Attitude Toward Technology; BI = Behavioural Intention to Use; DIV = Diversity; EQT = Equity; INCL = Inclusion; JUS = Justice; OC = Organisational Culture; PEOU = Perceived Ease of Use; PU = Perceived Usefulness

Figure 3. **Depicting the role of organizational culture in the relationship between digital technologies JDEI in OSCM**

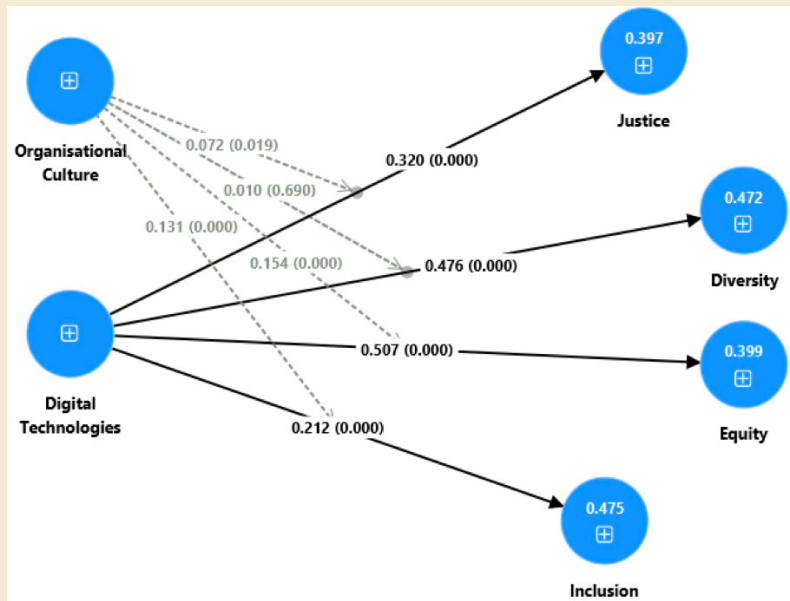


Figure 4. Depicting the simple slope for the moderation effect on equity

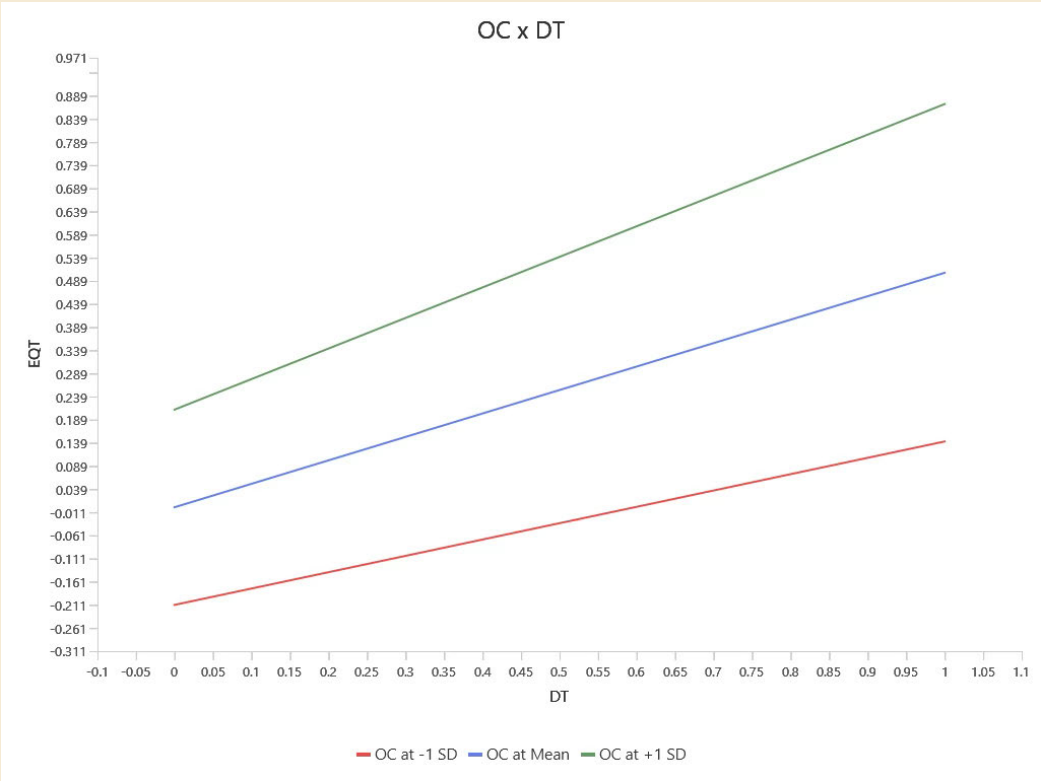


Figure 5. Depicting the simple slope for the moderation effect on inclusion

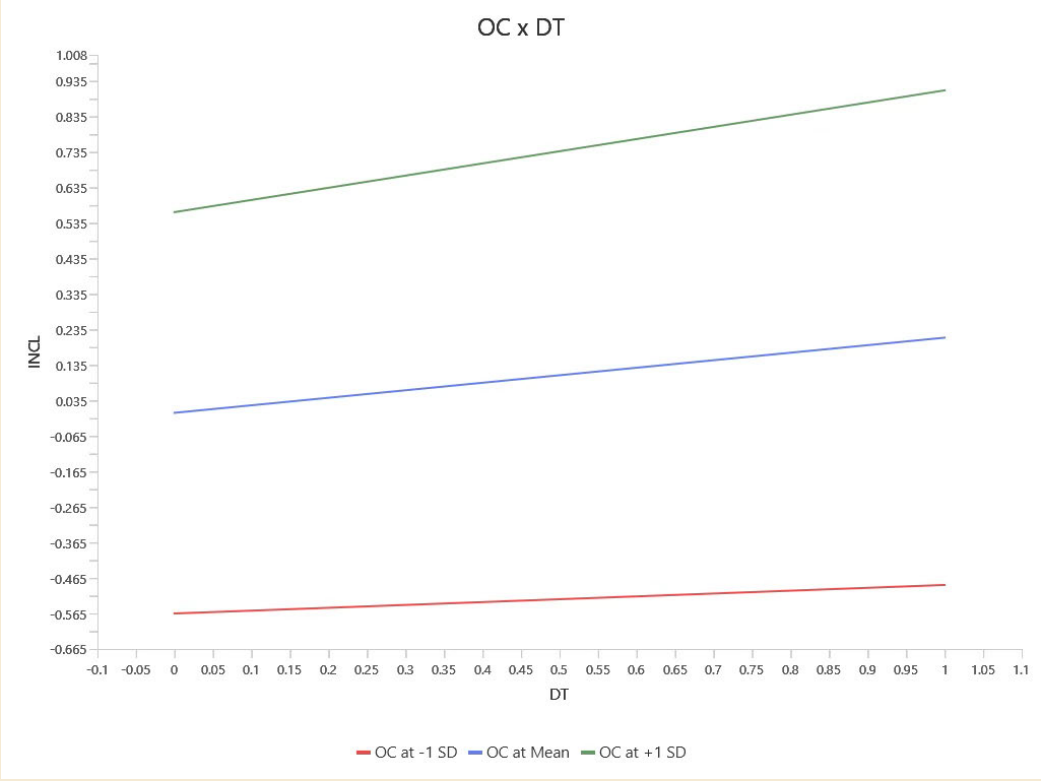


Figure 6. Depicting the simple slope for the moderation effect on justice

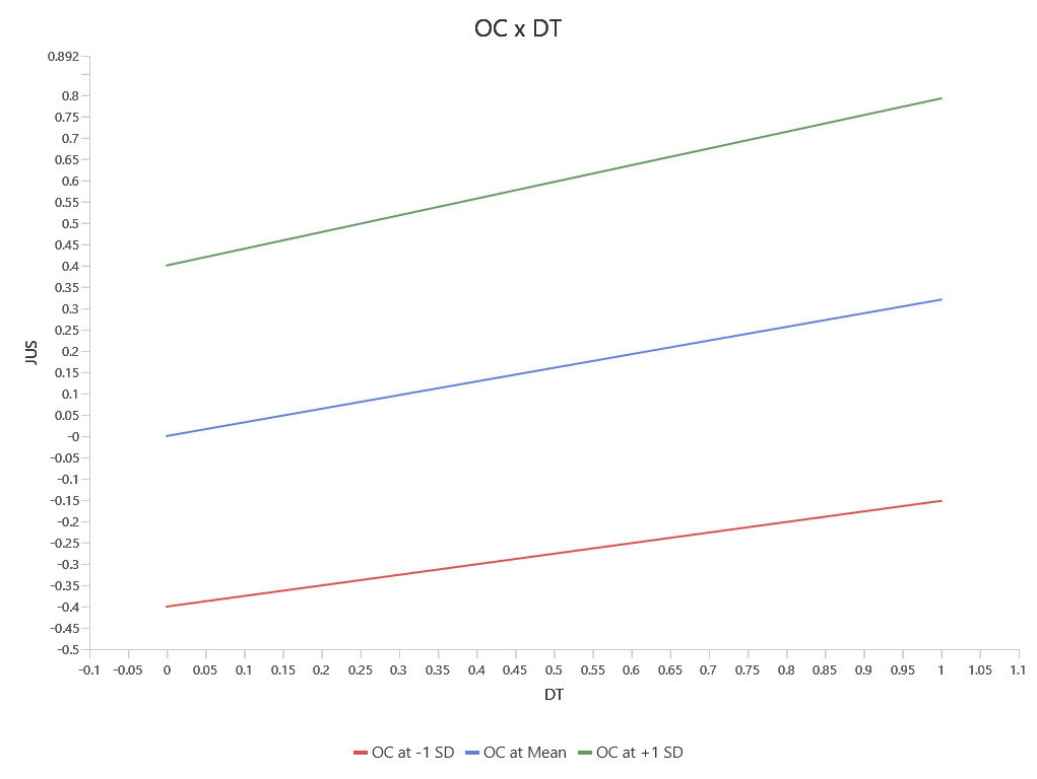
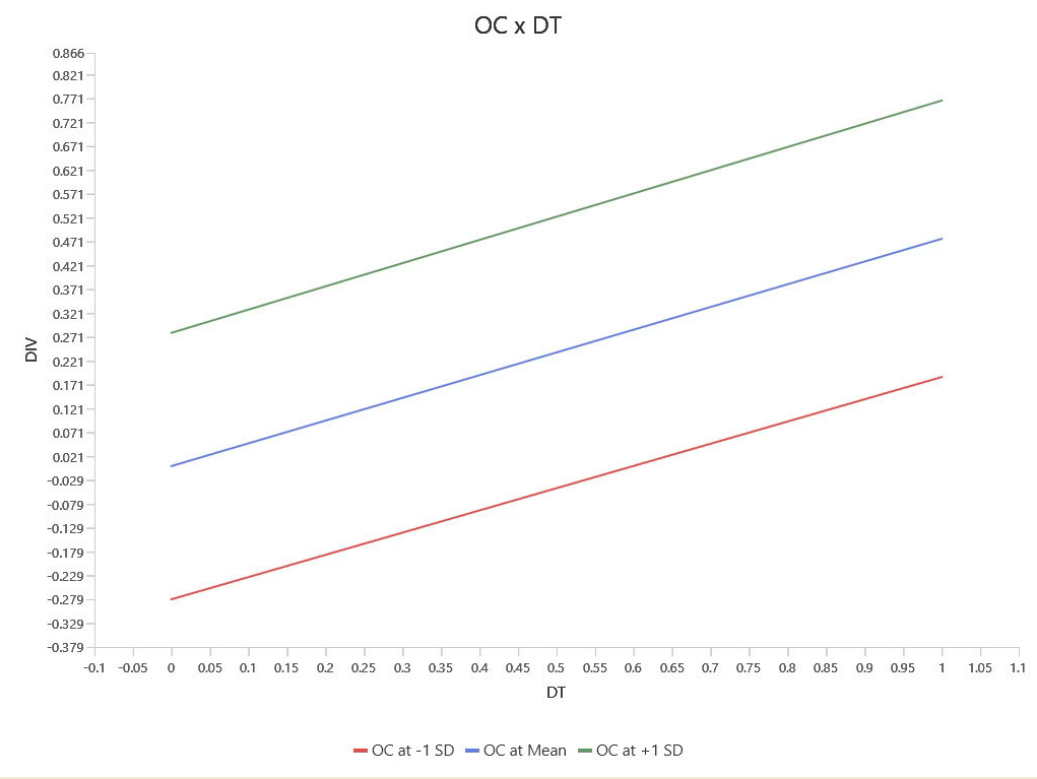


Figure 7. Depicting the simple slope for the moderation effect on diversity



6. DISCUSSION OF FINDINGS

This study extends the existing body of research on digital technologies and their role in fostering justice, diversity, equity, and inclusion (JDEI) in operations and supply chain management (OSCM) within Nigerian quoted non-financial firms. Prior studies have explored various aspects of digital transformation, diversity, and organizational performance across different contexts (Ning & Yao, 2023; Deep, 2023; Okatta et al., 2024; Odazie et al., 2024). Our findings align with and build upon these previous works, while also offering new empirical insights into the Nigerian business environment. The findings support the use of digital technologies and justice in OSCM, demonstrating that Perceived Ease of Use (PEOU) significantly enhances justice in OSCM processes ($\beta = 0.408$, $p < 0.001$). This aligns with Ning and Yao (2023), who found that digital transformation enhances supply chain capabilities and promotes sustainable competitiveness. The ease of using digital tools fosters transparency, ensuring fairer decision-making and process execution. However, Attitude Toward Technology (ATT) and Perceived Usefulness (PU) do not significantly affect justice. This contrasts with Deep (2023), who conceptually linked digitalization to cultural transformation. The study confirms digital technologies and diversity in OSCM, showing that PEOU ($\beta = 0.423$, $p < 0.001$) and Behavioral Intention to Use Technology (BI) ($\beta = 0.263$, $p < 0.001$) significantly promote diversity. These results reinforce Okatta et al. (2024) and Odazie et al. (2024), who established a positive link between diversity and technology adoption. Organizations that integrate accessible and user-friendly digital tools create environments that encourage diverse participation. Findings for digital technologies and equity in OSCM indicate that PEOU ($\beta = 0.412$, $p < 0.001$) and ATT ($\beta = 0.166$, $p = 0.019$) have a positive impact on equity in OSCM. This finding echoes Al-Ma'aitah (2023), who found that organizational culture plays a crucial role in supply chain resilience. A user-friendly digital environment can facilitate fair resource distribution and decision-making. For digital technologies and inclusion in OSCM, BI ($\beta = 0.247$, $p = 0.001$), PEOU ($\beta = 0.188$, $p = 0.008$), and PU ($\beta = 0.147$, $p = 0.011$) significantly impact inclusion, suggesting that both ease of use and the perceived benefits of digital tools contribute to inclusive practices. This aligns with Turi et al. (2022), who found that leadership expertise moderates the impact of diversity

variables. Organizational culture plays a significant moderating role in the relationships between digital technologies and justice ($\beta = 0.072$, $p = 0.019$), equity ($\beta = 0.154$, $p < 0.001$), and inclusion ($\beta = 0.131$, $p < 0.001$), but not diversity ($\beta = 0.010$, $p = 0.690$). This suggests that while a strong organizational culture amplifies the effects of digitalization on justice, fairness, and inclusion. Diversity efforts structural interventions beyond cultural support. In Nigeria's regulated industries (e.g., extractives), mandatory supplier quotas may override cultural influences, echoing institutional theory's emphasis on coercive pressures (DiMaggio & Powell, 1983). These findings extend the conceptual contributions of Bodrožić and Gold (2024) by empirically validating the role of organizational culture in shaping DEI outcomes in OSCM.

The study's findings have significant theoretical and practical implications. Theoretically, the study empirically validates the role of digital transformation in promoting JDEI in OSCM, thereby expanding the frameworks proposed by Pang et al. (2024) and Bodrožić and Gold (2024) on the role of technology in social justice and policy-driven DEI practices. Practically, the findings suggest that organizations should prioritize user-friendly technology to enhance transparency and fairness in their supply chain processes. Leadership should actively promote positive attitudes toward technology to drive equity and inclusion. Organizational culture should be leveraged as a strategic tool to strengthen the impact of digitalization on justice and inclusion.

7. CONTRIBUTIONS TO KNOWLEDGE

This study makes three significant contributions to operations and supply chain management (OSCM) scholarship by developing and empirically validating the Digital Justice and Inclusion Theory (DJIT) within Nigeria's emerging economy context:

7.1. Theoretical Advancements

- i. Our study integrated disparate domains through the application of DJIT. DJIT resolves the theoretical fragmentation between digital transformation and JDEI research by conceptualizing organisational culture as the contingency lens through which technologies affect socio-ethical outcomes. This bridges institutional theory's macro-level pressures (DiMaggio &

Powell, 1983) and technology acceptance models' micro-level mechanisms (Davis, 1989), addressing Pang et al.'s (2024) call for justice-centered digital frameworks.

- ii. The study makes theoretical contribution by articulating the role of organizational culture in influencing the impact of digital technologies on JDEI. This contextual perspective challenges deterministic assumptions about digital transformation and aligns with evidence that technology can both enable and constrain social justice outcomes (Pang et al., 2024; Leonardi, 2011). Our moderation analysis revealed this paradox: inclusive cultures strengthen technology's equity effects, but hierarchical cultures may repurpose the same tools for exclusion.

7.2. Empirical Innovations

We provide the novel quantitative evidence that:

- i. Perceived ease of use (PEOU) is the strongest predictor of justice and equity in African supply chains, surpassing perceived usefulness. This underscores usability as a prerequisite for ethical digitisation in resource-constrained environments.
- ii. Behavioural intention (BI) drives inclusion but not equity, highlighting that willingness to adopt technology alone cannot overcome structural barriers without cultural support.

7.3. Practical Implications

Our findings also translate to actionable pathways for stakeholders:
For OSCM Managers:

- i. Conduct Algorithmic Bias Audits: Implement quarterly reviews of AI/ML tools (e.g., IBM AI Fairness 360) to detect exclusionary patterns in supplier selection or hiring, particularly for marginalized groups. As Martin (2019) cautions, unmonitored algorithms risk 'digital redlining' in diverse markets.
- ii. Diagnose Culture-Tech Alignment: Pre-deployment, assess organizational culture using Denison's (1990) framework. Low 'Involvement' scores (<3.0 on 5-point scale) signal need for co-design workshops with frontline workers to adapt technologies to local needs.

7.4. For Policymakers:

- i. Subsidise Inclusive Technologies: Nigeria's National Digital Economy Strategy should prioritise blockchain grants for

women-owned suppliers to automate equitable payments), addressing the 37% gender gap in supply chain participation (NBS, 2020).

- ii. Mandate JDEI Impact Statements: Tie corporate tax incentives to annual audits of technology's distributional effects, requiring disclosure of diversity metrics in procurement algorithms (per NITDA, 2023 guidelines)."

8. LIMITATIONS OF THE STUDY

This study has several limitations. The sample size and scope are limited to Nigerian quoted non-financial firms, which may restrict the generalizability of the findings. The quantitative approach may not capture the nuances and complexities of the relationships between digital technologies and JDEI outcomes. Additionally, the study relies on self-reported data, uses a cross-sectional design, and employs existing scales and measures, which may have limitations. Contextual factors, such as organizational culture and leadership, may not be fully accounted for, and the findings may not be generalizable to other countries or regions. Furthermore, the study lacks qualitative insights into the experiences and perceptions of employees, managers, or leaders, which may have offered richer understandings of the relationships between digital technologies and JDEI outcomes.

9. CONCLUSION

In conclusion, this study provides new insights into the relationships between digital technology adoption and JDEI outcomes in OSCM within Nigerian quoted non-financial firms. The findings highlight the importance of user-friendly digital technologies, proactive adoption behaviours, and supportive organizational cultures in promoting JDEI outcomes. While digital transformation is a critical enabler, firms must complement it with strong organizational support and leadership commitment to fully realize the benefits of JDEI.

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