International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

A Model of the Nexus Between the Use of Digital Technologies, Organizational Culture, and Performance for Project-Driven Engineering Organizations

Authors:

Mzayifani H. Mzebetshana (MzebetMH@gmail.com)
University of Johannesburg, Johannesburg, South Africa

Innocent Musonda (imusonda@uj.ac.za)
University of Johannesburg, Johannesburg, South Africa

Abstract:

The predominant technology adoption models inadequately consider organizational culture (OC) and organizational performance (OP), resulting in high failure rates of digital transformation initiatives. This study aimed to test and validate the use of digital technologies (DTs), OC, and OP nexus model that can be used in project-driven engineering organizations. A mixed-methods design was used. Quantitative data was collected to finalize the model, and the qualitative data validated it. The findings revealed a nexus between the use of DTs, OC, and OP. OC was a chief predictor of the effective use of DTs and OP. The quantitative results suggested a trivial effect of the use of DTs on OP, while the qualitative results depicted a material impact. The quantitative results suggested a small moderation effect of OC on the relationship between the use of DTs and OP, while qualitative results suggested moderation. The use of DTs mediated the relationship between OC and OP. The control variables, qualification, role, experience, and industry type, had trivial effects on OP. The research presents a unique nexus model, which underlines the importance of the use of DTs, OC, and OP for project-driven engineering organizations in South Africa to realize the benefits of digital transformation initiatives.

Keywords:

Denison Model, Digital Technologies, Organizational Culture, Organizational Performance, Project-Driven Engineering Organizations

Submitted: 2025-08-13. Revised: 2025-08-14. Accepted: 2025-08-18.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Introduction

Project-driven engineering organizations in South Africa are actively engaged in digital transformation initiatives. Emerging DTs, such as the internet of things (IoT), big data (BD), cloud computing (CC), and artificial intelligence (AI), play foundational roles in organizations' digital transformation expeditions (Agrawal et al., 2022; Ahamed et al., 2022; Javaid et al., 2021; Mzebetshana et al., 2025a). The use of these DTs results in the combination of the physical and virtual domains, which are pivotal for on-time and effective decision-making (Datti et al., 2023; Javaid et al., 2021; Mzebetshana et al., 2025b). Ultimately, organizations adopt data-driven approaches, which are key for sustaining organizational competitiveness and success enabled using these DTs (El Hilali et al., 2021; Javaid et al., 2021; Mzebetshana et al., 2025b; Seo et al., 2020). However, very high failure rates of digital transformation initiatives from various organizations worldwide have been reported (Heracleous et al., 2024; Kraus et al., 2022; Oludapo et al., 2024). It is estimated that these failure rates are up to 90% (Nyakanyanga, 2019; Ramesh, 2019; Sanchez-Segura et al., 2024).

While digital transformation is associated with several potential benefits, these failures suggest a lack of complete understanding of digital transformation (Kiyiklik et al., 2022; Kraus et al., 2022; Mielli et al., 2019; Shehadeh et al., 2023; Tsou et al., 2023). Digital transformation schemes fail for different reasons, such as talent deficiency, misalignment between digital and business strategies, failure to design for scalability, and transformation refusal (Mielli et al., 2019). Oludapo et al. (2024) categorized the failure factors into technology, management, innovation, and information systems. These failures result in digital transformation programs being deserted (Ramesh, 2019), project overruns (Heracleous et al., 2024), and financial losses (Ramesh, 2019; Sanchez-Segura et al., 2024; Tabrizi et al., 2019). This raises the question of why technology adoption fails when organizational interest and enthusiasm are apparent.

OC has been pinpointed as the primary contributor to the astronomical failure rates of digital transformation projects (Mielli et al., 2019; Kiyiklik et al., 2022; Shehadeh et al., 2023; Tabrizi et al., 2019; Trushkina et al., 2020; Zumstein et al., 2022). OC directly impacts the adoption and use of DTs, which are associated with digital transformation (Asaah et al., 2020; Seo et al., 2020; Ziemba, 2021; Mzebetshana et al., 2025a). OC shapes how employees perform their tasks, think, and feel (Ciampi et al., 2020; Dahlbom et al., 2020; Schein et al., 2017). Therefore, a strong and positive OC is pivotal for sustainable organizational success (Denison et al., 2014; Nguyen et al., 2019; Schein et al., 2017). This implies that the adoption and use of DTs must be in harmony with OC to increase the success rates of digital transformation projects. Moreover, OC greatly affects OP (Nguyen et al., 2019; Schein et al., 2017), including financial and non-financial aspects (Bag et al., 2021; Al-Tit, 2017).

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

One aspect of non-financial performance is human capital performance (HCP), such as human resources (HR) practices, employee job satisfaction (EJS), employee organizational commitment (EOC), and employee job performance (EJP) (Hassan et al., 2023; Mzebetshana et al., 2025b; Sinding et al., 2014; Sivaraman, 2020). Human capital has been undergirded as an essential strategic asset for all organizations (Sinding et al., 2014). This implies that digital transformation initiatives cannot succeed without the active involvement of human capital (Benahmed et al., 2022; Mzebetshana et al., 2025b; Oludapo et al., 2024). However, few studies suggested a relationship between DTs and some of the HCP (Çini et al., 2023; Hisa et al., 2022; Mzebetshana et al., 2025b; Tapia-Andino et al., 2023). Besides, based on a literature review using databases, such as Scopus databases, no study has established a relationship between the use of DTs and the combined aspects of HCP. Furthermore, studies (Alberti-Alhtaybat et al., 2019; Aguilar-Rodríguez et al., 2021; Asaah et al., 2020; Bag et al., 2021; Bordeleau et al., 2020; Daryanto et al., 2017; Kalu, 2019; Martínez-Caro et al., 2020; Mekhum et al., 2020; Nayak et al., 2019; Ziemba, 2021) have suggested a potential connection between the use of DTs, OC, and HCP; however, based on a scientometric literature review of the nexus, empirical studies have not yet established this relationship (Mzebetshana, 2024).

In addition, few studies have tested their findings on the impact of OC as a factor in the use of DTs against established OC frameworks and theories, such as the competing values framework and the Denison model (Mzebetshana, 2024). Therefore, this study aims to use the Denison model, which has been neglected in previous studies concerning the nexus. While the importance of foundational DTs (IoT, BD, CC, and AI) has been hinted at as part of the nexus, most studies focused on a specific technology, such as analytics (Bag et al., 2021; Bordeleau et al., 2020; Duan et al., 2020; Hallikainen et al., 2020; Nayak et al., 2019), or generally, information and communication technology (Daryanto et al., 2017; Kalu, 2019; Ziemba, 2021). Also, though meager, the importance of the technical factors, including shared IT infrastructure (Seo et al., 2020), network security, and privacy technology, in conjunction with some of the foundational DTs, has been alluded to. These technical factors have been determined to impact the adoption and use of DTs (Khan et al., 2023; Plageras et al., 2017; Seo et al., 2020; Stergiou et al., 2017).

Thus, this study aims to embed the foundational DTs and these technical factors to shed light on their aggregated relationship with the Denison OC and HCP. These identified gaps in the extant literature are unsurprising given that digital transformation was still in its infancy stage (Aguilar-Rodríguez et al., 2021; Bozintan et al., 2023; Kraus et al., 2022); hence, it is not entirely understood (Sanchez-Segura et al., 2024). Therefore, this study's primary objective was to test and validate the use of DTs, Denison OC, and the HCP nexus model that can be used in project-driven engineering organizations, including South Africa. The research question is: What is the relationship between the use of DTs, OC, and OP within the South African project-driven engineering organizations?

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Literature Review

Digital Technologies

The emerging disruptive DTs, such as IoT, BD, CC, and AI, profoundly change an organization's competitive edge as they alter the business model, which is crucial for an organization's survival and sustainable success (Bozintan et al., 2023; Shehadeh et al., 2023). Therefore, organizations adopt the emerging DTs as part of digital transformation initiatives. The use of DTs aids the organization in automating its processes, which is a value-adding task (Benahmed et al., 2022; Datti et al., 2023; Kraus et al., 2022; Verhoef et al., 2021). Moreover, the use of DTs results in improved communication channels and collaboration among employees (Kraus et al., 2022). Ultimately, using DTs improves organizational effectiveness and creates value for stakeholders (Al-Edenat, 2023; Benahmed et al., 2022; Margiono, 2020). IoT enables smart physical objects to communicate independently through communication networks in real time, exchanging data about their surrounding environments and providing this data to users for diverse purposes (Khan et al., 2023).

IoT (and other DTs) generate voluminous data, necessitating BD technology to manage this astronomical data effectively (Supriya et al., 2021). BD technology assists with the processing and analysis of vast data for informed decision-making within organizations (Al-Khatib, 2023). CC enables BD storage and management (Khan et al., 2023). IoT, BD, and CC must be integrated with AI for the ultimate organization's data-driven approach. When AI is combined with IoT, BD and CC result in a competitive advantage and, ultimately, improved OP. However, technical factors, such as security and privacy (Issa et al., 2023; Khan et al., 2023) and IT infrastructure (Zhang et al., 2023), must be considered when designing and implementing various DTs. Emerging DTs result in unique privacy and security risks not covered in traditional IT, which must be addressed (Issa et al., 2023) for effective use.

Organizational Culture

OC is foundational and influential for successfully adopting and effectively using DTs and improved OP. Therefore, organizational leadership must establish appropriate OC (Nguyen et al., 2019). Models, such as the competing values framework and the Denison model, have been advanced to measure OC (Amro et al., 2021; Tulcanaza-Prieto et al., 2021; Vargas-Halabi et al., 2024). Various organizations have extensively utilized these OC models in different contexts and industries worldwide (Chau et al., 2021; Denison et al., 2014). Also, these models are well-validated, making them equally suitable for use. The Denison model is based on four cultural traits: involvement, consistency, adaptability, and mission, which must co-exist (Boyukaslan et al., 2022; Denison et al., 2004; Denison et al., 2014; Gillespie et al., 2008; Vargas-Halabi et al., 2024). This model is grounded on employee attitudes (Tulcanaza-Prieto et al., 2021) and behaviors (Vatan et al., 2024). Further, it can be used at different organizational levels (Vatan

et al., 2024). Therefore, since this study is not focused on the type of culture and the fact that the study focuses on employees, the Denison model is ideal.

The first cultural trait of the model, the involvement trait, accentuates employees' engagement, empowerment, creation of high-performance teams, and employee collaboration (Denison et al., 2014). Moreover, it undergirds human capital development and training (Denison et al., 2014). The consistency trait underscores organizational stability as all employees espouse shared learned beliefs, values, and behavioral norms (Denison et al., 2014). Based on this trait, there is synchronism in how things are conducted within the organization (Denison et al., 2014). Ultimately, the consistency trait leads to a strong OC.

The adaptability trait is concerned with the employees' comprehension of customers' requirements, attainment of new skills, and transformation to align with demands from the external environment (Denison et al., 2014). An organization continuously adapts to the perennial external changing environment (Al-Tit, 2017; Denison et al., 2014; Schein et al., 2017). The mission trait underlines clarity and alignment on the organization's purpose and direction (Denison et al., 2014). All the organization's members are clear about their contribution to the overall purpose and vision (Denison et al., 2014). Therefore, employees take full ownership of their duties as they understand their contributions to the objectives and goals (Denison et al., 2014).

Organizational Performance

OP is foundational as it is an indicator of whether an organization realizes its strategic objectives and goals aligned with its purpose and vision. While OP is vital, it is measured differently due to its complexity and multidimensionality (Oghojafor et al., 2012). Therefore, different approaches have been widely used to measure OP, including goal attainment, systems resources, internal processes, strategic constituencies, and competing values (Kataria et al., 2013; Matthews, 2011). However, recently, there has been a concerted focus on human capital (Lynch, 2012; Sivaraman, 2020). Employees have a direct and significant impact on organizational outcomes (Hassan et al., 2023; Irsyadi, 2023). Thus, while various predominant approaches exist, this study focused on HCP. The success of digital transformation initiatives relies on the active participation of human capital (Benahmed et al., 2022; Oludapo et al., 2024).

Specifically, DTs must align with employees' attitudes and behaviors to increase the success rates of digital transformation initiatives (Çini et al., 2023; Michna et al., 2020; Sivaraman, 2020). This is particularly fitting as different aspects of the organization, including organizational culture, strategies, structures, operations, and processes, are adapted as part of digital transformation. The digital transformation projects must, therefore, integrate the transformation of employees (Oludapo et al., 2024;

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Sivaraman, 2020; Tapia-Andino et al., 2023). Thus, the HCP, such as HR practices (recruitment and selection, development, training, and rewards and recognition), EJS, EOC, and EJP must be aligned with DTs. These HCP aspects are crucial indicators of OP (Uraon et al., 2020). Employees have perceptions, attitudes, and behaviors that impact their performance and, ultimately, OP (Sinding et al., 2014; Uen et al., 2023; Uraon et al., 2020). The HR department strategically ensures that employees optimally perform to deliver sustainable OP (Dwivedi et al., 2023; Uen et al., 2023). Therefore, HR strategies must be aligned with business strategies (Dwivedi et al., 2023), in the case of this study, digital transformation strategies.

Development of Research Hypotheses and a Model

The Relationship Between OC and the Use of DTs

OC has been empirically determined to have a substantial effect on the adoption and use of DTs (Martínez-Caro et al., 2020; Müller et al., 2021; Nayak et al., 2019; Tuukkanen et al., 2022). This is fitting as it has been resolved under the introduction and literature review that OC influences all aspects of organizational life. Nonetheless, within this study's context, which focused on project-driven engineering organizations in South Africa, it is essential to determine the impact of Denison OC. The effect of the Denison model on DTs has been overlooked in the extant literature. Moreover, this study has combined the foundational DTs and the technical factors, which have been inadequately investigated. Thus, the first hypothesis for the study is that:

H1*: there is a direct and positive relationship between OC and the use of DTs.*

The Relationship Between OC and OP

OC has been empirically found to have a major influence on OP (AlMulhim, 2021; Martínez-Caro et al., 2020). The financial/economic and non-financial aspects of OP are equally affected by OC. Therefore, a conducive OC is fundamental for organizations to achieve their strategic objectives and goals. The introduction and literature review explain that OC significantly affects OP, including HCP. Nonetheless, more research within this study's context is required to determine how the Denison OC affects the HCP. The second hypothesis is, therefore, that:

H2*: there is a direct and positive relationship between OC and OP.*

The Relationship Between the Use of DTs and OP

Some studies (Aguilar-Rodríguez et al., 2021; Mishra et al., 2021) have suggested that the use of DTs impacts OP. Other studies (Aguilar-Rodríguez et al., 2021; Lee et al., 2024; Sapta et al., 2021) have focused on some aspects of HCP and concluded that DTs influenced some aspects of HCP. However,

Chopra and Gupta (Chopra et al., 2020) concluded that ICT practices insignificantly influenced learning and growth. Also, Lee et al. (2023) resolved that smart technologies did not positively impact operational performance. Nonetheless, more work is required to determine how the use of DTs influences the combined aspects of HCP. Therefore, the third hypothesis is that:

H3*: there is a direct and positive relationship between the use of DTs and OP.*

The Mediation Role of the Use of DTs in the Relationship Between OC and OP

The mediation role of DTs in the relationship between OC and OP has recently received some scholarly attention from researchers (Daryanto et al., 2017; de Medeiros et al., 2022; El Hilali et al., 2021; Martínez-Caro et al., 2020). Some studies (Andreeva et al., 2012; Chopra et al., 2020) opined that DTs enable and facilitate improved OP. The mediating role of DTs implies that the use of DTs facilitates the real influence of OC on OP. This means that any changes in OC impact OP through the effective use of DTs. While research suggests the mediation role of DTs in the relationship between OC and OP, this study focuses on the Denison OC, combined with the foundational DTs and technical factors and HCP, which have been inadequately researched. Moreover, there is a dearth of research on the nexus within the South African context, precisely, the project-driven engineering organizations. Therefore, the fourth hypothesis is that,

H04*: the use of DTs mediates the relationship between OC and OP.*

The Moderation Role of OC on the Relationship Between the Use of DTs and OP

Hallikainen et al. (2020) investigated the moderating effect of analytical culture in the relationship between BD analytics and OP and resolved that it had a moderating effect. Mishra et al. (2021) studied the moderating effects of flexible direction and control direction culture types in the relationship between BD analytic capability and OP and resolved that it was insignificant. Behl (2022) examined the moderating effect of OC in the relationship between BD analytic capability and OP and concluded that there was a positive moderating effect. The empirical findings are not yet conclusive due to few and contradictory results. Therefore, more research is needed to validate OC's moderating effect. The fifth and last hypothesis is, therefore, that:

H05*: OC moderates the relationship between the use of DTs and OP.*

The Impact of Control Variables on OP

Control variables like experience, qualification, role, and industry type might also affect dependent variables, such as OP, in this study. When control variables significantly affect the dependent variable, they also require management attention. Nonetheless, based on empirical research (Duan et al., 2020; Mishra et al., 2021), the role of the control variables, such as job experience, company size, role, and

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

industry type, was insignificant. All these empirical studies did not entirely focus on HCP. Therefore, there is a need for further study to determine if industry type, qualification, experience, and employee role affect HCP.

Therefore, based on the preceding hypotheses, the relationships between OC, the use of DTs, and OP are multifaceted. These relationships must be fully understood to guarantee the success of digital transformation initiatives, which currently experience high failure rates. Also, the roles of the control variables on HCP must be ascertained, as they might need to be considered as part of management interventions. Significantly, OC plays a foundational role as it is hypothesized that it affects both the use of DTs and HCP. This underlines the need for OC to be adapted as part of digital transformation schemes. The four Denison cultural traits must be present within the organization as they guarantee a conducive environment to increase the success rates of digital transformation initiatives. The co-existence of these traits would warrant organizational internal integration and adaptation to the perennially changing external environment, which is crucial in the digital era.

Moreover, considering the importance of the use of DTs due to their direct impact on HCP and mediation role, it is essential that the correct DTs are implemented, and these DTs must align with the employees' requirements to achieve their tasks. This means that employees must have input during the selection, design, and implementation of DTs so that they can be optimally used. Further, the nexus model suggests complex and reciprocal relationships as the use of DTs mediates the relationship between OC and HCP, while OC moderates the relationship between the use of DTs and HCP. Therefore, organizations must closely manage this complex relationship to warrant the success of digital transformation programs. Figure 1 is, therefore, a model informed by the developed hypotheses.

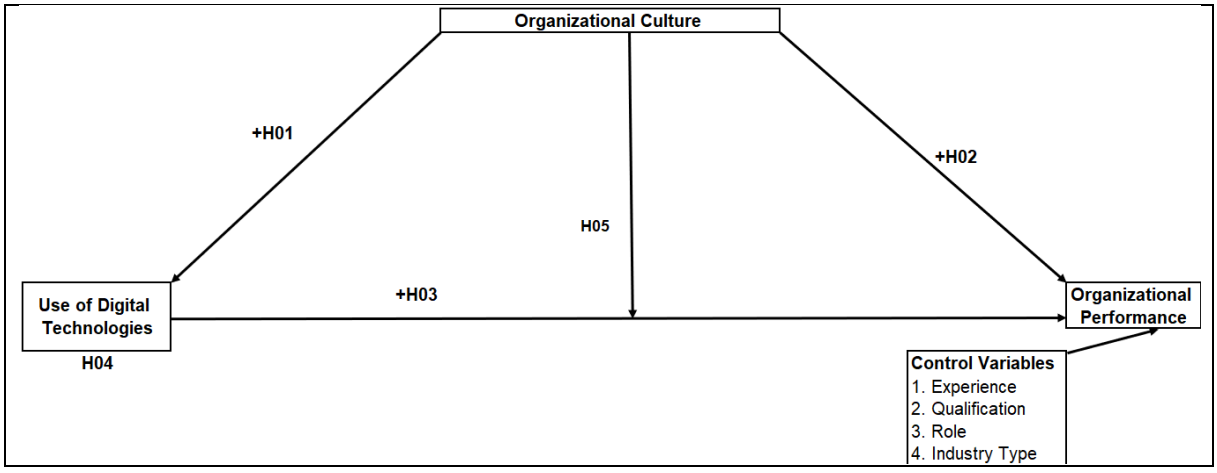

Figure 1: A model of the nexus between the use of DTs, OC, and OP

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Methods and Data

Research Method Design

A mixed methods research design (MMRD) was selected to achieve the study's objective. An MMRD combines quantitative and qualitative research methods (Creswell et al., 2023; van Aardt et al., 2021). On the one hand, from the quantitative research method, surveys based on questionnaires were used to collect data from four project-driven engineering organizations within the public sector in South Africa: an energy company, a water utility, and two logistics companies. On the other hand, from the qualitative research method, interviews with the individual experts and the focus group discussion were used to collect data from the energy utility. The study aimed to integrate the quantitative and qualitative data collected to achieve the study's objectives (Creswell et al., 2023; Creswell et al., 2024; van Aardt et al., 2021). Integration of the two methods was possible as they are data-capturing or analysis techniques; hence, the methods are not firmly attached to their specific epistemology and ontology (van Aardt et al., 2021). Moreover, the quantitative and qualitative methods are in a dialectical relationship (Watkins, 2016), and therefore, they can be merged to sufficiently answer the research problem and question (Creswell et al., 2023; van Aardt et al., 2021; Creswell et al., 2024). Fittingly, mixed methods research (MMR) is not simply the summation of the quantitative and qualitative methods (Younas et al., 2024; van Aardt et al., 2021). Instead, combining quantitative and qualitative methods results in significant insights through the integration and metainferences (Creswell et al., 2023; Creswell et al., 2024; Fàbregues et al., 2024).

The MMR comprises three core designs: convergent, explanatory sequential, and exploratory sequential, as well as embedded designs or complex designs (Creswell et al., 2023; Creswell et al., 2024). This study adopted a convergent mixed methods design. Creswell et al. (2023) opine that "The intent of the convergent design is to compare the results from the qualitative databases with those from the quantitative database by merging the results". The results from both quantitative and qualitative datasets should be similar (Creswell et al., 2023; Creswell et al., 2024; van Aardt et al., 2021). However, Creswell et al. (2023) claim that "When comparing the results, the additional purpose or intent may be to see if the findings converge (match) or diverge, mutually support a construct, or validate one form of data with another". Therefore, this study simultaneously collected quantitative and qualitative data (Creswell et al., 2023; van Aardt et al., 2021). While the quantitative method was the leading method, the qualitative method was employed to validate the developed nexus model. This means a triangulation approach of MMR (Creswell et al., 2023) was utilized to achieve the study's objectives.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Research Methods

The research methods adopted were quantitative and qualitative studies. A quantitative study entailed empirical data collection using a closed-end questionnaire survey and data analysis. The outcome of the quantitative study resulted in the finalization of the nexus model. Quantitative data was collected from four project-driven engineering organizations within the public sector: an energy company, a water utility, and two logistics companies. A probability sampling, random cluster sampling technique (Creswell et al., 2023) was utilized to ensure that the four organizations and the three groups (professionals (such as technical specialists, engineers, technicians, IT professionals), managers, and senior managers) of employees were represented in the sample. A minimum sample size of 77 was determined for the study using power analysis, which is suitable for the partial least squares structural equation modeling (PLS-SEM) data analysis method (Hair et al., 2022). G*Power statistical software package was used to determine the sample size (Hair et al., 2022; Memon et al., 2020). A total of 148 valid responses from selected employees of the four organizations responded to the questionnaire survey, distributed using digital platforms: Microsoft Forms and Google Forms. Quantitative data was collected between mid-June 2023 and 31 August 2023. The quantitative data instruments comprised demographic and multiple-choice questions. Table 1 shows a frequency distribution of industry type, experience, qualification, and role.

Organization			**Experience**			**Qualification**			**Role**		
Energy Company	111	75%	1-4 yrs	7	4.7%	Certificate	6	4.1%	Prof.	77	52%
Water Company	19	12.8%	5-9 yrs	16	10.8%	Diploma	19	12.8%	Man.	60	40.5%
Logistics Company 1	5	3.4%	10-14 yrs	31	20.9%	Degree	13	8.8%	Sen. Man.	11	7.4%
Logistics Company 2	13	8.8%	15-19 yrs	44	29.7%	Master's and above	57	38.5%			
			=/+ 20 yrs	50	33.8%	PostGrad/Hons	53	35.8%			
Total	**148**	**100%**									

Table 1: Frequency distribution of industry type, experience, qualification, and role

In addition, a qualitative study was conducted. This qualitative study comprised empirical data collection using semi-structured interviews with experts and focus group discussions from the energy company.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

While it would have been ideal for employees of the other three organizations (water utility and the two logistics companies) to participate in the individual expert interviews and the focus group discussion, the researcher successfully got employees from the energy company only. This was not considered a significant issue as the energy company was a large organization with different divisions whose cultures were distinct. The interviews were carried out concurrently with quantitative data collection. Semi-structured interviews based on the questionnaires from the quantitative study were used during the interviews. All interviewees were asked the same questions, although not necessarily in the same order. However, follow-up questions were asked based on the responses from the interviewee. A non-probability, purposeful sampling, and snowballing (Faasen et al., 2021) were utilized to select the participants. This guaranteed that all divisions were represented and that the right participants were selected.

The sample size was determined using the theoretical saturation criterion (dos Santos et al., 2021). This means that when there was no new information obtained from interviews, qualitative data collection was stopped. This resulted in five experts participating in the interviews, and one focus group comprising six participants was conducted. Eleven participants were initially invited to participate in the focus group discussion; however, only six participated, which was still sufficient. These participants were from all the divisions of the energy company. Experts were employees with a degree qualification and more than 10 years of experience who were actively involved with digital transformation programs. The focus group was made up of digital technology users who were involved with digital transformation programs. The focus group discussion was used to validate the findings from the experts' interviews. This was particularly critical for the study, as the qualitative study was used to validate the model finalized during the quantitative study. All interviews and a focus group discussion were conducted through Microsoft Teams. The interviews were planned for 30 minutes, and the focus group discussion was planned for 60 minutes. Table 2 depicts the demographic information of participants during interviews and the focus group discussion.

Participant	**Years of Experience**	**Qualification**	**Interview Length**
Experts Interviews			
Expert 1	15-20	Degree	30min
Expert 2	20-25	Degree	35min
Expert 3	20-25	Degree	45min
Expert 4	25-30	Doctorate	30min
Expert 5	20-25	Degree	35min
Focus group			

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Participant 1	10-25	Doctorate	75min
Participant 2		Degree	
Participant 3		Degree	
Participant 4		Masters	
Participant 5		Degree	
Participant 6		Degree	

Table 2: Demographic information of participants during interviews and focus group

Data Analysis

PLS-SEM was utilized to analyze quantitative data. PLS-SEM has been increasingly employed in various fields due to the recently developed statistical software packages (Hair et al., 2022). PLS-SEM was deemed suitable due to non-normal data, a deficient theory about the nexus, the impossibility of ensuring model specification, and complexity due to the incorporation of mediation and moderation variables in the PLS path model (Hair et al., 2022). A SmartPLS 4 software package was used to test the study's hypotheses, and IBM SPSS 29 was employed for data descriptive statistics analysis. The study commenced with descriptive statistics analysis, followed by the testing of hypotheses. Descriptive statistics analysis indicated that the data distribution was skewed, rendering PLS-SEM a suitable data analysis method (Hair et al., 2022).

Additionally, a thematic analysis was adopted for qualitative data. Thematic analysis was suited to detect, explore, and decipher key themes from qualitative data (dos Santos et al., 2021). Qualitative data analysis was performed in steps process (dos Santos et al., 2021): familiarization with the data through transcribing, reading, re-reading, and drafting of initial ideas; generation of initial codes, using ATLAS.ti for data collected from individual experts and manually for data from the focus group discussion; identification and categorization of initial codes into themes; review and generation of thematic maps; definition and naming of themes; and production of a report. The outcome of the analysis was the validation of the nexus model finalized during the quantitative study.

Validity and Reliability

Quantitative study

Validity and reliability are key initial steps to establish the quality of quantitative data. For the PLS-SEM algorithm, the first step is the measurement model assessment, which is concerned with the measurement model's quality (Hair et al., 2022). The standard quality criteria include convergent validity, internal consistency reliability, and discriminant validity (Hair et al., 2022). Convergent validity comprises outer indicator loadings, indicator reliability, and average variance extracted (AVE). The required

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

indicator outer loading values must be 0.7 and above; however, values between 0.5 and 0.7 are acceptable. When indicator outer loading values are 0.4 and below, they are removed (Hair et al., 2022). One indicator (ETTR4) with a value below 0.4 was removed. The convergent validity, measured by AVE, must be 0.5 and above (Hair et al., 2022). While AVE values were above 0.5 for OC and OP, for the use of DTs, four indicators (DCS3, IME1, IME3, IME4), which did not affect content validity, were removed to meet the minimum AVE value. Figure 2 indicates the results of the indicator outer loadings and AVE.

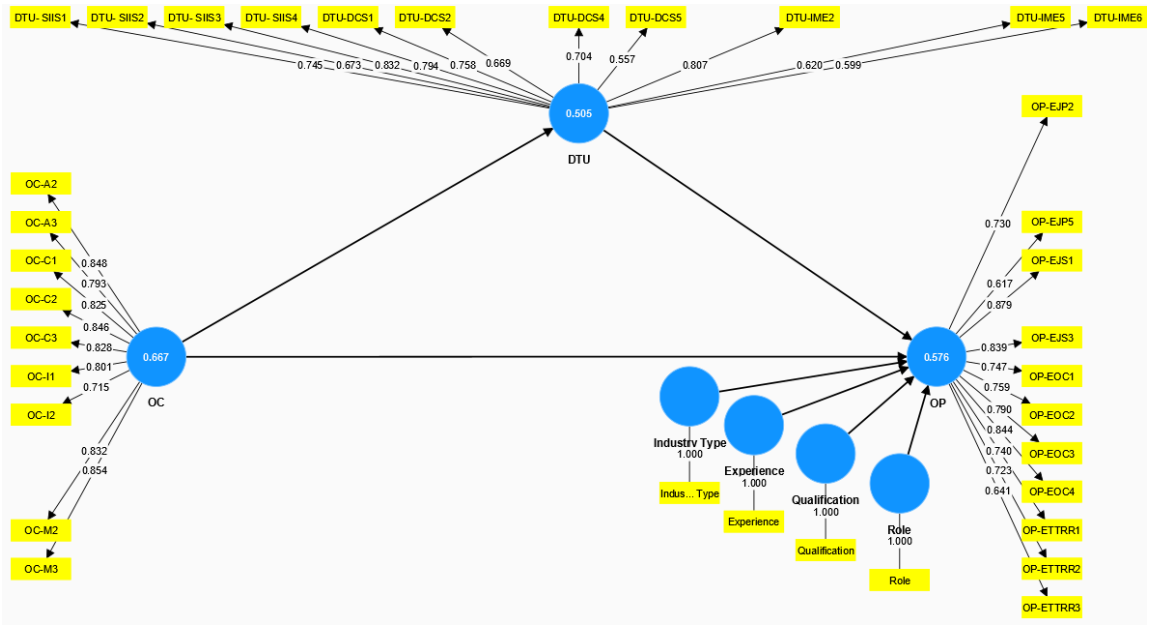

Figure 2: Results of indicator outer loadings and AVE

In addition to convergent validity, the reliability of the study was assessed using internal consistency reliability. Internal consistency reliability was tested using Cronbach's alpha, composite reliability (ρA), and composite reliability (ρc) (Hair et al., 2022). The actual reliability is between Cronbach's alpha and composite reliability (ρc), which is the composite reliability (ρA) (Hair et al., 2022). The threshold value should be above 0.6 for a construct to be deemed reliable (Hair et al., 2022). As depicted in Table 3, internal consistency reliability was met for the three constructs.

Construct	Cronbach's alpha	ρ_A	ρ_c
Digital Technologies' Use (DTU)	0.901	0.919	0.917
Organisational Culture (OC)	0.937	0.938	0.947
Organisation Performance (OP)	0.925	0.931	0.937

Table 3: Results of internal consistency reliability for the study's constructs

Further, the study examined discriminant validity. The heterotrait monotrait (HTMT) ratio was used to estimate discriminant validity (Hair et al., 2022). A threshold of 0.9 was used to assess HTMT (Altinay

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

et al., 2023). The HTMT for OC and OP was 0.899, which was achieved after deleting three indicators (A3, I3, M1) from OC and one indicator (EJS2) from OP. The HTMT for OC and the use of DTs was 0.792. Moreover, the HTMT for the use of DTs and OP was 0.705. As depicted in Table 4, discriminant validity was established. Overall, all the quality criteria were met for the measurement model, which was the prerequisite to test the hypotheses.

	DTU	Experience	Industry Type	OC	OP	Qualification	Role
Digital Technologies' Use (DTU)							
Experience	0.069						
Industry Type	0.150	0.060					
Organizational Culture (OC)	**0.792**	0.081	0.133				
Organizational Performance (OP)	**0.705**	0.064	0.100	**0.899**			
Qualification	0.076	0.116	0.021	0.071	0.116		
Role	0.088	0.174	0.081	0.118	0.149	0.048	

Table 4: Results of the HTMT ratio for the study's constructs and control variables

Qualitative study

Validity and reliability were central in the qualitative phase of the study. On the one hand, validity is concerned with the accuracy of the findings using appropriate procedures by the researcher (Creswell et al., 2023). On the other hand, reliability is concerned with the consistency that the researcher has employed, allowing for similar results when the study is repeated (Creswell et al., 2023). Validity and reliability were assessed in four ways: credibility, transferability, consistency, and confirmability. Data triangulation using interviews with individual experts and a focus group discussion was employed to warrant credibility. Moreover, individuals with extensive experience and relevant qualifications merited credibility. Furthermore, five interviews with experts and one focus group discussion certified the qualitative study's credibility, as the results from the experts' interviews were validated during the focus group discussion.

Also, this study employed detailed descriptions of contexts and participants to guarantee the transferability of the evidence and findings. Further, detailed descriptions of the contexts, settings, and participants were used to guarantee the study's dependability. The careful selection of experts with different expertise also increased dependability. Moreover, triangulation through interviews with experts and a focus group discussion confirmed the dependability of the results. The two data collection methods complemented and corroborated each other. Furthermore, the focus group was crucial for dependability as it ensured that the participants interacted with each other and challenged their views until they converged on a particular view based on the different issues they discussed. Additionally, the study ensured confirmability by discussing the findings with two experts who participated in the interviews.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Results

Quantitative Study

The quantitative study using the PLS-SEM algorithm evaluated the structural model. The structural model assessment commenced with checking the presence of collinearity, as high collinearity might seriously impact the model (Hair et al., 2022). The variance inflation factor (VIF) assesses collinearity in a model. A threshold value of 5 was used (Hair et al., 2022). As depicted in Table 5, the results were below 3, implying no risk of collinearity (Hair et al., 2022).

Constructs	VIF
Digital Technologies' Use (DTU) ➡ Organisational Performance (OP)	2.504
Experience ➡ OP	1.053
Industry Type ➡ OP	1.033
Organisational Culture ➡ DTU	1.000
OC ➡ OP	2.517
Qualification ➡ OP	1.020
Role ➡ OP	1.096

Table 5: Results of the VIF values of the inner model

The favorable VIF results allowed the study to assess the significance and relevance of the structural model relationships (Hair et al., 2022). Path coefficients, total effects, and probability (*p*-values) were used to conduct the assessment (Hair et al., 2022). When the path coefficient (or total effect) value is closer to zero (0), it indicates an insignificant relationship (Hair et al., 2022). In contrast, when closer to 1 (+/-), it depicts a positive or negative significant relationship (Hair et al., 2022). Moreover, when the *p*-value is above 0.05, it suggests an insignificant relationship (Hair et al., 2022). Table 6 shows the results of path coefficients and *p*-values of the PLS path model. Table 7 depicts the results of the total effects and *p*-values of the PLS path model.

Constructs Relationships	**Path Coefficients**	**t Values**	**ρ Values**	**95% Confidence Interval**	**Significance (ρ < 0.05)?**
DTU ➡ OP	0.059	0.813	0.413	[-0.081, 0.204]	No
OC ➡ DTU	0.757	20.753	0.000	[0.686, 0.828]	Yes
OC ➡ OP	0.803	12.465	0.000	[0.671, 0.925]	Yes
Qualification ➡ OP	-0.072	1.692	0.091	[-0.162, 0.005]	No
Role ➡ OP	0.063	1.326	0.185	[-0.027, 0.159]	No

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Experience ➡ OP	0.044	1.065	0.287	[-0.036, 0.125]	No
Industry Type ➡ OP	0.066	1.578	0.115	[-0.013, 0.153]	No

Table 6: Path coefficients and p-values results of the PLS path model

Constructs Relationships	Total Effect	t Values	ρ Values	95% Confidence Interval	Significance (ρ < 0.05)?
DTU ➡ OP	0.059	0.813	0.416	[-0.081, 0.204]	No
OC ➡ DTU	0.757	20.753	0.000	[0.686, 0.828]	Yes
OC ➡ OP	0.848	22.540	0.000	[0.763, 0.902]	Yes
Qualification ➡ OP	-0.072	1.692	0.091	[-0.162, 0.005]	No
Role ➡ OP	0.063	1.326	0.185	[-0.027, 0.156]	No
Experience ➡ OP	0.044	1.065	0.287	[-0.036, 0.125]	No
Industry Type ➡ OP	0.066	1.482	0.115	[-0.013, 0.153]	No

Table 7: Total effects and p-values results of the PLS path model

In addition, the study examined the model's explanatory power to determine whether the results fit the in-sample data (Hair et al., 2022). The coefficient of determination (R-square) and f-square effect size were used. The R-square values of 0.75, 0.50, and 0.25 are substantial, moderate, and small, respectively (Hair et al., 2022). Also, when f-square value is 0.02, 0.15, and 0.35 implies small, medium, and large effect sizes, respectively (Hair et al., 2022). Figure 3 depicts the R-square (adjusted) values (0.571 for the use of DTs and for OP 0.716) and f- square.

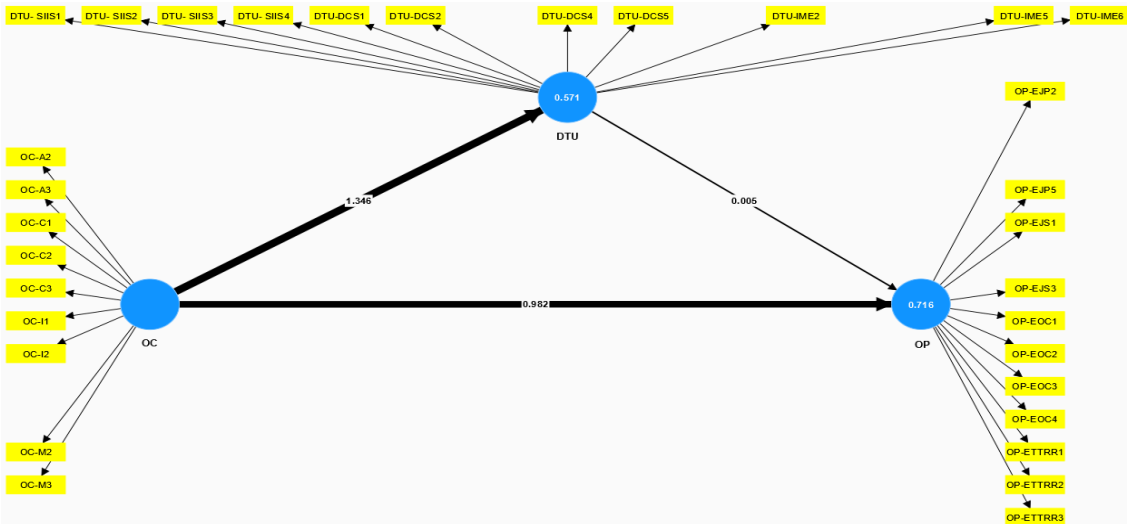

Figure 3: Results of R-square and f-square values of the PLS path model

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Additionally, this study assessed the mediation role of the use of DTs and the moderation role of OC. Mediation is categorized into non-mediation and mediation (Hair et al., 2022). The non-mediation type is divided into direct-only mediation and no effect (Hair et al., 2022). The second category of mediation has three types: complementary, competitive, and indirect-only (full mediation) (Hair et al., 2022). Complementary mediation is when all relationships are significant and positive (Hair et al., 2022). Competitive mediation is when all relationships are significant and are not all positive (Hair et al., 2022). The full mediation is when the direct relationship is significant, but the indirect relationship is insignificant (Hair et al., 2022). Table 8 shows the results of the indirect-only, full mediation role of the use of DTs in the relationship between OC and OP.

Constructs Relationships	**Direct Effect**	**95% Confidence Interval of Direct Effect**	**Significance (ρ<0.05)?**	**Indirect Effect via DTs**	**95% Confidence Interval of Indirect Effect**	**Significance (ρ<0.05)?**
OC⟶OP	0.803	[0.671, 0.925]	0.000 (Yes)	0.044	[-0.062, 0.162]	0.425 (No)

Table 8: Results of the mediation role of the use of digital technologies

Regarding the moderation role of OC, it was determined that it insignificantly moderates the relationship between the use of DTs and OP. The f-square effect size was used to assess the interaction effect of the moderator variable (Hair et al., 2022). The f-square effect sizes of 0.005, 0.01, and 0.025 suggest small, medium, and large effect sizes, respectively (Hair et al., 2022). As shown in Tables 9 and 10, OC insignificantly moderates the relationship between the use of DTs and OP. In Table 9, the simple effect was 0.060, and the interaction term's total effect was 0.064. As shown in Table 10, the bootstrapping results indicated the interaction term's effect of 0.045 and ρ-value of 0.426, indicating that it was insignificant. The result of the f-square value was 0.017, which suggested a medium effect. Overall, OC had an insignificant moderation effect on the relationship between the use of DTs and OP.

Constructs Relationships	**Total effects**
Use of DTs ⟶ OP	0.060
OC ⟶ Use of DTs	0.757
OC ⟶OP	0.890
Use of DTs x OC ⟶ OP	0.064

Table 9: Results of total effects within the PLS path model with moderation

Moderation of the use of DTs	**Interaction Term's Effect**	**ρ value**	**f square Value**	**95% Confidence Interval of the**	**Significance (ρ<0.05)?**

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

				Interaction Term's Effect	
Use of DTs x OC ➡ OP	0.045	0.426	0.017	[-0.063, 0.157]	No

Table 10: Results of the moderation interaction term's effect, *p* values, and *f*-square

Qualitative Study

Data collection process

The qualitative study was conducted through interviews with five experts and a focus group discussion with the users of DTs within the energy company. The interviews were conducted through Microsoft Teams. An appointment had been sent to all participants after they had agreed to be interviewed. Also, during the initial discussion with the prospective participants, background information about the study was provided via email. This background included why the study was required and its benefits for organizations. Moreover, it was emphasized that the study was done for academic purposes only. In all the individual interviews and the focus group discussion, the interviewer opened by greeting and welcoming the participants. Then, the interviewer spent about 5 minutes describing the interview's purpose. The interviewer confirmed during the meetings that ethical approvals had been obtained to collect data.

The participants were informed about the outline of the interviews, specifically that questions on DTs, OC, and OP would be asked about. Semi-structured interviews were adopted for both the interviews with the experts and the focus group discussion. Based on their responses, the participants were asked follow-up questions. During the interviews, notes were taken by the interviewer, and recordings for the focus group discussion were made. The individual interviews were planned for 30 minutes, and the focus group discussion was planned for 60 minutes. While interviews with two participants were completed within 30 minutes, interviews with another participant took about 35 minutes, and interviews with another participant lasted 45 minutes. The focus group discussion lasted 75 minutes.

Participants' demographic information

The participants were carefully selected as in-depth knowledge of DTs, OC, and OP was a prerequisite. The recruitment commenced with the experts that the researcher knew, and then the researcher asked to be referred to other experts within the organization. The first expert interviewed had more than 15 years of experience in IT and a degree. This first expert referred the researcher to three other experts. All three experts had over 20 years of IT experience and minimum degree qualifications. These experts were specialists in IT and had been involved with digital transformation for several years and continued to be actively involved.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Two of these experts were involved with IT architecture, and another expert, including the first, was within IT integration and applications. Importantly, considering their roles, these four experts worked in different businesses within the energy company. Therefore, this made them suitable for the study, as they were knowledgeable about DTs and understood OC and OP. The last expert was from one of the divisions of the energy company, but he worked in other areas of the organization. He had more than 20 years of experience and had a doctorate. He was responsible for digital transformation within the division; over the years, he had implemented several digital systems and tools. Overall, all the experts knew intimately about DTs and their association with OC and OP.

There were six participants in the focus group. Eleven participants were initially invited, but only six could join the focus group discussion. Significantly, all divisions of the energy company were required to be represented in the focus group discussion. The six participants came from different divisions, and hence, it was resolved that the six participants were sufficient to meet the objective of this study. The researcher was referred to these participants by the project manager, who worked closely with them on a digital transformation project. The participants were involved with digital transformation initiatives and were users of the different DTs deployed within the organization. All the participants had a minimum degree qualification, and their experience ranged between 10 and 25 years. One of the participants was an expert within the IT environment with more than 20 years of experience and a doctorate in information systems. Therefore, they were all deemed suitable for the study and were included in the focus group discussion.

Results of the nexus between the three constructs

As depicted in Tables 11 and 12, number 1 indicates that the participant has covered the topic, and number 0 indicates that the participant did not cover the topic. The total was the total number of participants who covered the topic. The percentage was calculated based on the total number and divided by the total number of participants. Overall, the interviews with the experts and the focus group discussion established the nexus between the use of DTs, OC, and OP.

Component	P1	P2	P3	P4	P5	Total	%
Relationship between OC and the use of DTs	1	1	1	1	1	5	100%
Relationship between OC and OP	1	1	1	1	1	5	100%
Relationship between the Use of DTs and OP	1	1	1	1	1	5	100%
The mediation role of the Use of DTs	1	1	1	1	1	5	100%
The moderation role of OC	1	1	1	1	1	5	100%

Table 11: Results of data collection about the Nexus through experts' interviews

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Component	P1	P2	P3	P4	P5	P6	Total	%
Relationship between OC and the use of DTs	1	1	1	1	1	1	6	100%
Relationship between OC and OP	1	1	1	1	1	1	6	100%
Relationship between the Use of DTs and OP	1	1	1	1	1	1	6	100%
The mediation role of the Use of DTs	1	1	1	1	1	1	6	100%
The moderation role of OC	1	1	1	1	1	1	6	100%

Table 12: Results of data collection about the nexus through the focus group

The preceding Tables suggest a nexus between the use of DTs, OC and OP. The use of DTs and OC significantly influences OP. The use of DTs complementarily mediates the relationship between OC and OP. OC moderates the relationship between the use of DTs and OP; however, the moderation size was not determined. However, the control variables qualification, role, and experience did not have a significant impact on the OP.

Discussion

The Relationship Between OC and the Use of DTs

The study's hypothesis that OC directly influenced the use of DTs was supported. The quantitative and qualitative findings underlined OC's chief role in using DTs. These results were aligned with previous studies (Tuukkanen et al., 2022; Zhen et al., 2021), which suggested that OC significantly influenced the adoption and use of DTs. This implied that if OC was not conducive, the adoption and use of DTs would be ineffective (Martínez-Caro et al., 2020). This was because DTs fundamentally impact organizations in aspects such as business models, values, processes, and the relationships among employees within an organization. Ultimately, the different aspects of an organization and the use of DTs would conflict if not adapted to align (Martínez-Caro et al., 2020).

Therefore, organizations must examine their OC and transform it (Lynch, 2012) before implementing DTs to warrant alignment (Martínez-Caro et al., 2020). This is critical for project-driven engineering organizations in South Africa as they are in the early stages of adoption and use of the emerging DTs. These organizations must assess the presence of four cultural traits: involvement, consistency, adaptability, and mission of Denison OC, and any gaps identified must be addressed as part of the digital transformation strategy. The success of the use of DTs heavily relies on the co-existence of the four cultural traits in these project-driven engineering organizations. This would guarantee that the environment within these different organizations was conducive for the effective use of DTs.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

The Relationship Between OC and OP

The quantitative and qualitative results accentuated the substantial influential role of OC on OP. This outcome was in harmony with other empirical studies (Chico et al., 2023; Dawson et al., 2023) that investigated the relationship between OC and OP. This implied that when OC was non-conducive, it would result in poor performance. Considering culture's significant impact on performance, it was necessary to focus on it and create a conducive environment (Dawson et al., 2023). Specifically, the four cultural traits (involvement, consistency, adaptability, and mission) are required for the organization to improve performance. This was imperative for organizations to achieve their strategic objectives and goals. Therefore, similar to the preceding section, South African project-driven engineering organizations require the co-existence of the four cultural traits. These traits are particularly crucial in shaping the employees' attitudes and behaviors, resulting in improved performance for these organizations. Ultimately, the South African project-driven engineering organizations would be able to achieve their strategic goals and objectives.

The Relationship Between the Use of DTs and OP

The quantitative results showed that using DTs had an insignificant impact on OP. However, the qualitative results revealed that the use of DTs had a significant effect on OP. Therefore, the qualitative results implied that the use of DTs needed attention as part of the nexus. The empirical studies reviewed also suggested contradictory results. On the one hand, several empirical studies, such as Bag et al. (2021) and Mishra et al. (2021), have concluded that DTs significantly impacted OP. However, Chopra et al. (2020) concluded that ICT had an insignificant impact on OP. Also, Lee et al. (2023) resolved that smart technologies did not positively impact operational performance. These insignificant results might be due to participants not being familiar with all the DTs included in the questionnaire survey. However, the results also implied that investment in DTs and their utilization alone are insufficient to significantly impact OP (Chopra et al., 2020; Lee et al., 2023). Therefore, other organizational factors must be congruent with the adoption and use of DT for improved OP (Chopra et al., 2020; Martínez-Caro et al., 2020). The South African project-driven engineering organizations must align the adoption and use of DTs with the required performance. Particularly, the employees' attitudes and behaviors must be in synchronism with DTs, contributing to the success of these organizations' digital transformation initiatives.

The Mediation Role of the Use of DTs

The quantitative results suggested that DTs fully mediated the relationship between OC and OP. Also, the qualitative results supported this mediation role; however, the mediation type was complementary, as both OC and DTs significantly influenced OP. Few studies, such as El Hilali et al. (2021) and de

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Medeiros (2022), indicated the mediation role of DTs. These results imply that it was essential to ensure that organizations adopt and utilize DTs that are aligned with their cultures, considering their mediation role. A lack of harmony between OC and the use of DTs would negatively impact OP. This is because using DTs is an enabler and facilitator (Andreeva et al., 2012; Chopra et al., 2020). OC alone was not sufficient to guarantee improved OP. Therefore, South African project-driven engineering organizations must ensure alignment between the four cultural traits of Denison OC and the use of DTs. This implies that these organizations must concurrently consider OC, DTs, and HCP while developing digital transformation initiatives to warrant success.

The Moderation Role of OC

The quantitative results hinted that OC had a small moderation effect on the relationship between the use of DTs and OP. The qualitative results also indicated that OC was a moderator; however, the size of the moderation was not determined. The reviewed empirical studies suggested conflicting results, as some studies (Behl, 2022; Hallikainen et al., 2020) resolved that OC moderated the relationship between DTs and OP. At the same time, Mishra et al. (2021) concluded that OC trivially moderated the relationship. This study is critical as it focuses on the use of various DTs, OC based on the Denison model, and HCP, which is inadequately researched. The results underlined the need to equally pay attention to OC, the use of DTs, and OP to guarantee the success of digital transformation initiatives. This was necessary as changes in OC resulted in changes in the use of DTs, ultimately affecting OP.

It was, therefore, vital to transform OC to certify alignment with investment and application of DTs. In other words, considering that it performs a moderation function on the relationship between the use of DTs and OP, it was crucial that the four cultural traits (involvement, consistency, adaptability, and mission) of the Denison model co-existed. The co-existence of these cultural traits would guarantee that the environment within the South African project-driven engineering organizations was conducive. This conducive environment will increase the success rate of digital transformation initiatives. Precisely, the co-existence of the Denison cultural traits would enable organizational internal integration and adaptation to the perennially changing external environment. Thus, the South African project-driven engineering organizations would benefit from the use of DTs, as the existence of the four cultural traits would increase the positive impact of the use of DTs on OP.

Overall, the South African project-driven engineering organizations must fully comprehend this complex and symbiotic relationship embedded in the nexus model of this study to ensure the realization of digital transformation schemes. This relationship must be effectively managed by these organizations. This implies that these organizations must adopt appropriate DTs and that a conducive environment must be created for organizational success. Further, these organizations must ensure that their employees are at the centre of the digital transformation initiatives to guarantee success.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

The Impact of Control Variables on OP

The quantitative results suggested that the control variables qualification, experience, role, and industry type insignificantly impacted OP. Similarly, qualitative results showed that qualification, role, and experience had an insignificant impact on OP. These results were aligned with other studies (Duan et al., 2020; Mishra et al., 2021), which concluded that the control variables trivially impacted OP. Therefore, since this study focused on the HCP, it sheds further light on the impact of qualification, experience, role, and industry type on performance. While these control variables, especially qualification, role, and experience, were important for organizational success, the results suggested that they were not crucial to adopting and using DTs. Table 13 indicates the results of data integration and metainferences. Figure 4 shows the best-fit nexus model based on the data integration results.

Overarching Themes (Nexus)	**Quantitative results**	**Qualitative results**	**Metainferences**
The impact of OC on the use of DTs	Path coefficient = 0.757 P-value = 0.000	The experts and focus group discussion suggested the direct influence of OC on the use of DTs.	**Confirmation**: The quantitative and qualitative results are consistent.
The impact of OC on OP	Path coefficient = 0.803 P-value = 0.000	The experts and focus group discussion hinted at the direct impact of OC on different aspects of HCP.	**Confirmation**: The quantitative and qualitative results are consistent.
The impact of the use of DTs on OP	Path coefficient = 0.059 P-value = 0.413 Total effect = 0.059 P-value = 0.416	The experts and focus group discussion suggested the direct influence of DTs on the different aspects of HCP.	**Complementary**: The merged results suggest a partial divergence as quantitative results indicate an insignificant impact of the use of DTs, while qualitative results are significant.
The mediation role of the use of DTs	Indirect effect (DTs) = 0.044 P-value = 0.425 Direct effect (OC) = 0.803 P-value was 0.000	Complementary mediation (based on the significant impact of OC and the use of DTs on HCP)	**Complementary**: The merged results suggest a partial divergence as quantitative results suggest the full mediation role of the use of DTs, while qualitative is complementary.

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

The moderation role of OC	Simple effect = 0.060 Total effect = 0.064 Interaction term's effect = 0.045 P-value = 0.426	Moderation (inferences from interviews – OC affects the relationship between the use of DTs and HCP)	**Confirmation/Complementary**: The merged results suggest a partial divergence as quantitative results indicate a small moderation role of OC, while qualitative suggest a moderation role. However, whether this moderation was small, medium, or large, it was possible to establish from a qualitative study.
Impact of control variables on OP	**Qualification**: Path coefficient = -0.072 & P-value = 0.091	Insignificant (inferences from qualitative study)	**Confirmation**: The quantitative and qualitative results are consistent.
	Role: Path coefficient = 0.063 & P-value = 0.185		
	Experience: Path coefficient = 0.044 & P-value = 0.287		
	Industry Type: Path coefficient = 0.066 & P-value = 0.115	Not applicable	**Expand**: Qualitative results suggest the trivial impact of industry type on HCP. Since the qualitative study focused on the energy companies, the effect of industry type was not investigated.

Table 13: Results of data integration and metainferences

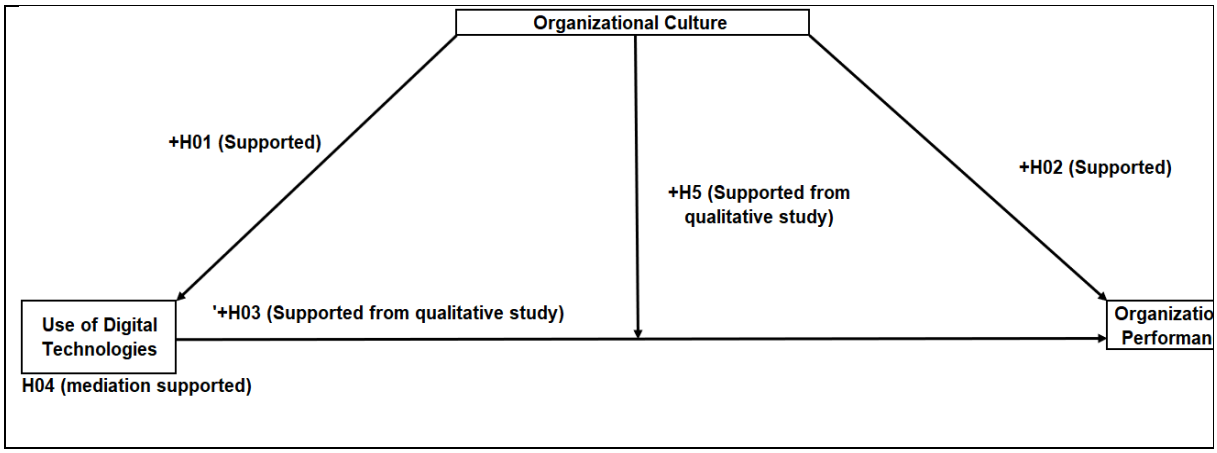

Figure 4: Best-fit nexus model

International Journal of Applied Research in Business and Management (ISSN: 2700-8983)
an Open Access journal by Wohllebe & Ross Publishing, Germany.
Volume: 06 Issue: 02 Year: 2025
https://doi.org/10.51137/wrp.ijarbm.2025.mmat.45882

Conclusion

The primary objective of this study was to understand the nexus between the use of DTs, OC, and HCP and develop a model for use by project-driven engineering organizations in South Africa. A mixed-method research design was adopted, and data-capturing design methods were closed-ended questionnaires, interviews, and focus groups. The analysis of the results revealed a nexus between the use of DTs, OC, and OP. OC had a significant influence on the use of DTs and OP. In contrast, the use of DTs based on the qualitative results suggested its influence on OP. The use of DTs also has a complementary mediation role in the relationship between OC and OP. From the quantitative results, OC insignificantly moderated the relationship between the use of DTs and OP. In the qualitative results, while there was moderation of OC, its effect size was not ascertained. Overall, it was evident that OC, the use of DTs, and OP were crucial and closely related variables. It was pivotal that the four Denison cultural traits were present within the organization before the adoption and use of DTs. Moreover, DTs need to be carefully selected, considering the needs of employees, to ensure their effective use in meeting organizational goals and strategic objectives.

Therefore, project-driven engineering organizations in South Africa must adopt this nexus model. This was particularly relevant as the literature did not indicate that any study based on the nexus had been done within the project-driven organizations in South Africa. Additionally, few studies have focused on HCP to assess the nexus, and a mixed methods design is inadequately used. These findings may help organizations develop appropriate strategies that underline the importance of the human factor in the use of DTs and, ultimately, OP. During the early stages of strategic development, an organization must assess its current culture and, based on its new strategic direction, adapt those aspects of OC that do not align with its new strategic direction, particularly the adopted DTs. Policymakers must ensure that a holistic approach, considering DTs, OC, and HCP, is adopted during strategic development.

This study has some limitations. A significant weakness is the low response to questionnaires from the water utility and two logistics companies. While the minimum sample size was achieved for the study, more responses would have further benefited the study. Also, the qualitative data from interviews and the focus group were limited to the energy company. The study was further limited to public organizations, excluding private organizations. Several indicators were removed to meet the quality criteria. The study's research model also did not assess the impact of the four Denison cultural traits on DTs and HCP. Also, this study did not focus on how the different aspects of HCP are affected by the Denison OC and DTs. Moreover, the study focused on the combined foundational DTs (IoT, BD, CC, and AI) and technical factors (shared IT infrastructure, network security, and privacy), and how the different technologies contribute to the nexus was not assessed. Additionally, it did not develop a practical

framework for organizations to manage the complex and symbiotic relationships embedded in the nexus model.

These limitations point to future research directions. The study must be extended to more project-driven engineering organizations within the public and private sectors in South Africa. This is particularly crucial to ensure the generalizability of the nexus model. This must include getting more responses from several diverse organizations and refining the instruments to ensure that no indicators are deleted to meet the quality standard of the PLS-SEM algorithm. In addition, future research would aid in shedding light on the role of DTs on HCP, as the quantitative results of this study suggested an insignificant role of DTs. In contrast, in the qualitative study, the use of DTs had a significant impact. Moreover, research is required to assess how the different Denison cultural traits affect the use of DTs. Further, how the use of DTs affects the different aspects of HCP needs to be investigated. Also, based on the complex and symbiotic relationships in the finalized nexus model, future research would aid in developing a practical framework to help organizations effectively manage these relationships.

References

Agrawal, S., Sahu, A., & Kumar, G. (2022). A conceptual framework for the implementation of industry 4.0 in legal informatics. *Sustainable Computing: Informatics and Systems*, 33, 1–10.

Aguilar-Rodríguez, I. E., Bernal-Torres, C. A., Aldana-Bernal, J. C., Acosta Aguinaga, A., Artieda Cajilema, C. H., & Chalá, P. (2021). Relationship between social culture, industry 4.0, and organizational performance in the context of emerging economies. *Journal of Industrial Engineering and Management*, 14(4), 750–770.

Ahamed, J., Mir, R. N., & Chishti, M. A. (2022). Industry 4.0 oriented predictive analytics of cardiovascular diseases using machine learning, hyperparameter tuning and ensemble techniques. *Industrial Robot: The International Journal of Robotics Research and Application*, 49(3), 544–554.

AlBar, A. M., & Hoque, M. R. (2019). Factors affecting cloud ERP adoption in Saudi Arabia: An empirical study. *Information Development*, 35(1), 150–164.

Alberti-Alhtaybat, L. V., Al-Htaybat, K., & Hutaibat, K. (2019). A knowledge management and sharing business model for dealing with disruption: The case of Aramex. *Journal of Business Research*, 94, 400–407.

Al-Edenat, M. (2023). Organizational competencies toward digital transformation at the events of disruptive changes: An operational process innovation perspective. *Competitiveness Review: An International Business Journal*, 33(4), 690–710.

Al-Khatib, A. W. (2022). Intellectual capital and innovation performance: The moderating role of big data analytics: Evidence from the banking sector in Jordan. *EuroMed Journal of Business*, 17(3), 391–423.

AlMulhim, A. F. (2021). Smart supply chain and firm performance: The role of digital technologies. *Business Process Management Journal*, 27(5), 1353–1372.

Altinay, L., Alrawadieh, Z., Tulucu, F., & Arici, H. E. (2023). The effect of hospitableness on positive emotions, experience, and well-being of hospital patients. *International Journal of Hospitality Management*, 110, 1–10.

Al-Tit, A. A. (2017). Factors affecting the organizational performance of manufacturing firms. *International Journal of Engineering Business Management*, 9, 1–9.

Amro, P., Alves, A. C., & Sousa, R. M. (2021). Industry and services: Different organizational cultures, same openness to lean implementation? In A. Dolgui, A. Bernard, D. Lemoine, G. von Cieminski, & D. Romero (Eds.), Advances in Production Management Systems. Artificial Intelligence for Sustainable and Resilient Production Systems. APMS 2021. *IFIP Advances in Information and Communication Technology* (Vol. 630, pp. 674–682). Springer, Cham.

Andreeva, T., & Kianto, A. (2012). Does knowledge management really matter? Linking knowledge management practices, competitiveness and economic performance. *Journal of Knowledge Management*, 16(4), 617–636.

Asaah, J. A., Yunfei, S., Wadei, K. A., & Nkrumah, K. F. A. (2020). Cultural orientations and product innovation in the Ghanaian banking sector. *The Service Industry Journal*, 40(7-8), 518–541.

Bag, S., Luthra, S., Mangla, S. K., & de Sousa Jabbour, A. B. L. (2021). Leveraging big data analytics capabilities in making reverse logistics decisions and improving remanufacturing performance. *The International Journal of Logistics Management*, 32(3), 742–765.

Behl, A. (2022). Antecedents to firm performance and competitiveness using the lens of big data analytics: A cross-cultural study. *Management Decision*, 60(2), 368–398.

Benahmed, S., & Hansal, A. (2022). The biggest digital transformation challenges for companies: An analysis framework. *Management and Information Technology in the Digital Era*, 29, 221–231.

Bordeleau, F., Mosconi, E., & de Santa-Eulalia, L. A. (2020). Business intelligence and analytics value creation in industry 4.0: A multiple case study in manufacturing medium enterprises. *Production Planning & Control*, 31(2–3), 173–185.

Boyukaslan, A., & Aşikoğlu, H. (2022). Does organizational culture impact on firm performance: Evidence from Turkey. *Istanbul Business Research*, 51(1), 149–174.

Bozintan, A. G., Crişan, E. L., & Pinco, O. (2023). The impact of digital transformation on strategic management. The Annals of the University of Oradea, 32(1), 647–657.

Chau, T. L., Thach, K. S., Nguyen, Q. T., & Nguyen, P. T. A. (2021). Study on corporate culture of Vietnamese enterprises: An approach of Denison's model. *Can Tho University Journal of Science*, 13(2), 12–19.

Chhillar, D., & Aguilera, R. V. (2022). An eye for artificial intelligence: Insights into the governance of artificial intelligence and vision for future research. *Business & Society*, 61(5), 1197–1241.

Chico, A. L., Lopena, N. P., Esmero, R. B., & Gatchalian, J. K. R. (2023). Organizational culture and employee performance among selected employees in fast food chain. *International Journal of Research and Innovation in Social Science*, 7(5), 1330–1340.

Chopra, M., & Gupta, V. (2020). Linking knowledge management practices to organizational performance using the balanced scorecard approach. *Kybernetes*, 49(1), 88–115.

Ciampi, F., Marzi, G., Demi, S., & Faraoni, M. (2020). The big data-business strategy interconnection: A grand challenge for knowledge management. A review and future perspectives. *Journal of Knowledge Management*, 24(5), 1157–1176.

Çini, M. A., Erdirençelebi, M., & Akman, A. Z. (2023). The effect of organisation employees' perspective on digital transformation on their technostress levels and performance: The public institutions example. *Central European Business Review*, 12(4), 33–57.

Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, CA: SAGE.

Creswell, J. W., & Plano Clark, V. L. (2024). Revisiting mixed methods research designs twenty years later. In C. N. Poth (Ed.), The Sage handbook of mixed methods research design. Thousand Oaks, CA: SAGE Publications.

Dahlbom, P., Siikanen, N., Sajasalo, P., & Jarvenpää, M. (2020). Big data and HR analytics in the digital era. *Baltic Journal of Management*, 15(1), 120–138.

Daryanto, S., Komariah, A., & Kurniady, D. A. (2017). The influence of the authentic leadership, school culture, information and communication technology acceptance on the school management effectiveness in the public accredited vocational high school in West Java. *International Journal of Applied Business and Economic Research*, 15(19), 75–84.

Dawson, M., Guchait, P., Russen, M., Wang, X., & Pasamehmetoglu, A. (2023). Hospitality organizational culture: Impact on employee's job satisfaction, organizational citizenship behaviors,

service recovery performance, and intention to leave. *Journal of Human Resources in Hospitality & Tourism*, 22(3), 460–488.

Datti, L. C., & Kuppusamy, M. (2023). An empirical analysis of the capabilities for digital transformation resilience in selected countries. *International Journal of Professional Business Review*, 8(8), e02627–e02627.

Denison, D. R., Haaland, S., & Goelzer, P. (2004). Corporate culture and organizational effectiveness: Is Asia different from the rest of the world? *Organizational Dynamics*, 33(1), 98–109.

de Medeiros, M. M., & Maçada, A. C. G. (2022). Competitive advantage of data-driven analytical capabilities: The role of big data visualization and organizational agility. *Management Decision*, 60(4), 953–975.

Denison, D. R., Nieminen, L., & Kotrba, L. (2014). Diagnosing organizational cultures: A conceptual and empirical review of culture effectiveness surveys. *European Journal of Work and Organizational Psychology*, 23(1), 145–161.

dos Santos, A., Wagner, C., & Hirschsohn, P. (2021). Qualitative data analysis. In A. dos Santos, J. du Toit, N. Faasen, L. L. Quesada, A. Masenge, I. van Aardt, C. Wagner, A. Bryman, E. Bell, & H. Hirschsohn (Eds.), Research methodology: Business and management contexts (2nd ed.). Oxford University.

Duan, Y., Cao, G., & Edwards, J. S. (2020). Understanding the impact of business analytics on innovation. *European Journal of Operational Research*, 281(3), 673–686.

Dwivedi, P., Chaturvedi, V., & Vashist, J. K. (2023). Innovation for organizational sustainability: The role of HR practices and theories. *International Journal of Organizational Analysis*, 31(3), 759–776.

El Hilali, W., El Manouar, A., & Idrissi, M. A. J. (2021). The mediating role of big data analytics in enhancing firms' commitment to sustainability. *International Journal of Advanced Technology and Engineering Exploration*, 8(80), 932–944.

Faasen, N. (2021). Sampling. In A. dos Santos, J. du Toit, N. Faasen, L. L. Quesada, A. Masenge, I. van Aardt, C. Wagner, A. Bryman, E. Bell, & H. Hirschsohn (Eds.), Research methodology: Business and management contexts (2nd ed.). Oxford University.

Fàbregues, S., & Molina-Azorin, J. F. (2024). Evolving tensions and conversations in mixed methods research design approaches: Section 1 introduction. In C. N. Poth (Ed.), The Sage Handbook of Mixed Methods Research Design. Thousand Oaks, CA: SAGE Publications.

Frisk, J. E., & Bannister, F. (2017). Improving the use of analytics and big data by changing the decision-making culture: A design approach. *Management Decision*, 55(10), 2074–2088.

Gillespie, M. A., Denison, D. R., Haaland, S., Smerek, R., & Neale, W. S. (2008). Linking organizational culture and customer satisfaction: Results from two companies in different industries. *European Journal of Work and Organizational Psychology*, 17(1), 112–132.

Hallikainen, H., Savimäki, E., & Laukkanen, T. (2020). Fostering B2B sales with customer big data analytics. *Industrial Marketing Management*, 86, 90–98.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Thousand Oaks, CA: SAGE.

Hassan, B., Hassan, H., & Hassan, O. (2023). Organisational culture and employee commitment of academic staff: The moderating effect of job satisfaction. *Trends: Economics & Management*, 17(41), 9–20.

Heracleous, L., & Gledhill, D. (2024). Why digital transformation may fail–and what can be done about it. *The Journal of Applied Behavioral Science*, 60(1), 215–219.

Hisa, A., Mohiddin, F., & Susanto, H. (2022). Challenges of digital transformation: Impact on culture and the role of HRM. In *Handbook of Research on Big Data, Green Growth, and Technology Disruption in Asian Companies and Societies* (pp. 256–275).

Irsyadi, A. R. (2023). The effect of quality of work life, job satisfaction, and job commitment on employee performance through work motivation in BPJS employment employees in the DKI Jakarta region in 2023. *Dinasti International Journal of Digital Business Management*, 4(4), 655–664.

Issa, W., Moustafa, N., Turnbull, B., Sohrabi, N., & Tari, Z. (2023). Blockchain-based federated learning for securing internet of things: A comprehensive survey. *ACM Computing Surveys*, 55(9), 1–43.

Jalagat, R. (2016). Job performance, job satisfaction, and motivation: A critical review of their relationship. *International Journal of Advances in Management and Economics*, 5(6), 36–42.

Javaid, M., Haleem, A., Singh, R. P., Rab, S. & Suman, R. (2021). Upgrading the manufacturing sector via applications of industrial internet of things (IIoT). *Sensors International*, 2, 1–16.

Kalu, K. N. (2019). The impact of ICT-diffusion on government effectiveness: What role for cultural practices? *International Journal of Organization Theory & Behavior*, 22(2), 123–154.

Kataria, A., Garg, P., & Rastogi, R. (2013). Employee engagement and organizational effectiveness: The role of organizational citizenship behavior. *International Journal of Business Insights & Transformation*, 6(1), 102–113.

Khan, M. A. A., & Kaidi, H. M. (2023). A comprehensive survey of machine learning techniques in next-generation wireless networks and the internet of things. *Ingénierie des Systèmes d'Information*, 28(4), 959–967.

Kiyiklik, A., Kuşakci, A. O., & Mbowe, B. (2022). A digital transformation maturity model for the airline industry with a self-assessment tool. *Decision Analytics Journal*, 3, 1–13.

Kraus, S., Durst, S., Ferreira, J. J., Veiga, P., Kailer, N., & Weinmann, A. (2022). Digital transformation in business and management research: An overview of the current status quo. *International Journal of Information Management*, 63, 1–18.

Kundi, Y. M., Aboramadan, M., Elhamalawi, E., & Salah Eldin, E. E. (2021). Employee psychological well-being and job performance: Exploring mediating and moderating mechanisms. *International Journal of Organizational Analysis*, 29(3), 736–754.

Lambert, E. G., Qureshi, H., Klahm, C., Smith, B., & Reiner, R. (2017). The effects of perceptions of organizational structure on job involvement, job satisfaction, and organizational commitment among Indian police officers. *International Journal of Offender Therapy and Comparative Criminology*, 61(16), 1892–1911.

Latifian, A. (2022). How does cloud computing help businesses to manage big data issues. *Kybernetes*, 51(6), 1917–1948.

Lee, K. L., Teong, C. X., Alzoubi, H. M., Alshurideh, M. T., Khatib, M. E., & Al-Gharaibeh, S. M. (2024). Digital supply chain transformation: The role of smart technologies on operational performance in manufacturing industry. *International Journal of Engineering Business Management*, 16, 1–19.

Lee, K. L., Wong, S. Y., Alzoubi, H. M., Al Kurdi, B., Alshurideh, M. T., & El Khatib, M. (2023). Adopting smart supply chain and smart technologies to improve operational performance in manufacturing industry. *International Journal of Engineering Business Management*, 15, 1–14.

Lynch, R. (2012). Strategic management (6th ed.). UK: Pearson Higher Education.

Margiono, A. (2020). Digital transformation: Setting the pace. *Journal of Business Strategy*, 42(5), 315–322.

Martínez-Caro, E., Cegarra-Navarro, J. G., & Alfonso-Ruiz, F. J. (2020). Digital technologies and firm performance: The role of digital organisational culture. *Technological Forecasting and Social Change*, 154, 1–10.

Matthews, J. R. (2011). Assessing organizational effectiveness: The role of performance measures. The Library Quarterly: Information, Community, Policy, 81(1), 83–110.

Mekhum, W., & Torasa, C. (2020). Effect of knowledge sharing and digital management to performance on ecotourism in Ranong Province, Thailand. *Research in World Economy*, 11(5), 481–491.

Memon, M. A., Ting, H., Cheah, J. H., Ramayah, T., Chuah, F., & Cham, T. H. (2020). Sample size for survey research: Review and recommendations. *Journal of Applied Structural Equation Modeling*, 4(2), 1–20.

Michna, A., & Kmieciak, R. (2020). Open-mindedness culture, knowledge-sharing, financial performance, and industry 4.0 in SMEs. *Sustainability*, 12, 1–17.

Mielli, F., & Bulanda, N. (2019). Digital transformation: Why projects fail, potential best practices and successful initiatives. In 2019 *IEEE-IAS/PCA Cement Industry Conference*. IEEE.

Mishra, B. P., Biswal, B. B., Behera, A. K., & Das, H. C. (2021). Effect of big data analytics on improvement of corporate social/green performance. *Journal of Modelling in Management*, 16(3), 922–943.

Müller, S. D., Obwegeser, N., Glud, J. V., & Johildarson, G. (2021). Digital innovation and organizational culture. *Scandinavian Journal of Information Systems*, 31(2), 3–34.

Mzebetshana, M. H. (2024). Development of a model of the nexus between the use of digital technologies, organisational culture and performance: A case of energy company, South Africa [Doctoral dissertation, University of Johannesburg]. University of Johannesburg.

Mzebetshana, M. H., & Musonda, I. (2025a). Developing a model of the relationship between organizational culture, digital technologies, and job performance for a South African energy utility. *International Journal of Business & Management Studies*, 6(4), 90–99.

Mzebetshana, M. H., & Musonda, I. 2025b. Towards a model of the nexus between technologies, job satisfaction, organizational commitment, and performance for project-droven organizations in South Africa. *International Journal of Business & Management Studies*, 6(7), 31–54.

Nayak, B., Bhattacharyya, S. S., & Krishnamoorthy, B. (2019). Integrating wearable technology products and big data analytics in business strategy: A study of health insurance firms. *Journal of Systems and Information Technology*, 21(2), 255–275.

Nguyen, V. T., Siengthai, S., Swierczek, F., & Nguyen, A. N. (2019). The effects of organizational culture and commitment on employee innovation: Evidence from Vietnam's IT industry. *Journal of Asia Business Studies*, 13(4), 719–742.

Nyakanyanga, C. (2019). 4 top challenges of digital transformation in South Africa. https://cyber-sentinel.com/4-top-challenges-of-digital-transformation-in-south-africa/ (Accessed December 1, 2023).

Oghojafor, B. E. A., Muo, F. I., & Aduloju, S. A. (2012). Organisational effectiveness: Whom and what do we believe? Advances in Management & Applied Economics, 2(4), 81–108.

Oludapo, S., Carroll, N., & Helfert, M. (2024). Why do so many digital transformations fail? A bibliometric analysis and future research agenda. *Journal of Business Research*, 174, 1–17.

Plageras, A. P., Stergiou, C., Kokkonis, G., Psannis, K. E., Ishibashi, Y., Kim, B. G., & Gupta, B. B (2017). Efficient large-scale medical data (ehealth big data) analytics in Internet of Things. In 2017 *IEEE 19th Conference on Business Informatics* (CBI) (Vol. 2, pp. 21–27).

Ramesh, N. (2019). Digital transformation: How to beat the high failure rate [Doctoral dissertation, Oklahoma State University]. Oklahoma State University Graduate College.

Ramos, M. P., Tasinaffo, P. M., Cunha, A. M., Silva, D. A., Gonçalves, G. S., & Dias, L. A. V. (2022). A canonical model for seasonal climate prediction using big data. *Journal of Big Data*, 9(1), 1–25.

Sanchez-Segura, M. I., Medina-Dominguez, F., Dugarte-Peña, G. L., de Amescua-Seco, A., & González Cruz, R. (2024). Engineering sustainable digital transformation projects immune to technical debt. *Kybernetes*, 53(3), 1092–1116.

Sapta, I., Muafi, M., & Sentini, N. M. (2021). The role of technology, organizational culture, and job satisfaction in improving employee performance during the Covid-19 Pandemic. *The Journal of Asian Finance, Economics and Business*, 8(1), 495–505.

Schein, E. H., & Schein, P. (2017). Organizational culture and leadership (5th ed.). Hoboken, NJ: John Wiley & Sons.

Seo, H., & Myeong, S. (2020). The priority of factors of building government as a platform with analytic hierarchy process analysis. *Sustainability*, 12, 1–28.

Setianto, R. H., & Andreas, W. G. P. (2023). Pengaruh Compensation, Work Environment terhadap Employee Performance dimediasi Job Satisfaction pada industri property. *Journal of Comprehensive Science*, 2(8), 1391–1403.

Shehadeh, M., Almajali, D., Abu-AlSondos, I. A., Alkhwaldi, A. F., & Al-Gasaymeh, A. S. (2023). Digital transformation and its impact on operational efficiency and competitive advantage in Islamic banks. In 2023 *International Conference on Business Analytics for Technology and Security*. IEEE.

Sinding, K., & Waldstrom, S. (2014). Organisational behaviour (5th ed.). London: McGraw Hill Education.

Sivaraman, A. (2020). Soft side of digital transformation: The connected employee. *South Asian Journal of Human Resources Management*, 7(1), 121–128.

Stergiou, C., & Psannis, K. E. (2017). Efficient and secure big data delivery in cloud computing. *Multimedia Tools and Applications*, 76(21), 22803–22822.

Supriya, M., & Chattu, V. K. (2021). A review of artificial intelligence, big data, and blockchain technology applications in medicine and global health. *Big Data and Cognitive Computing*, 5(3), 1–20.

Tabrizi, B., La, E., Girard, K., & Irvin, V. (2019). Digital transformation is not about technology. https://hbr.org/2019/03/digital-transformation-is-not-about-technology/ (Accessed October 9, 2021).

Tapia-Andino, G. F., & Barcellos-Paula, L. (2023). Mediating effect of the adoption of industry 4.0 technologies on the relationship between job involvement and job performance of millennials. *Administrative Sciences*, 13(7), 1–26.

Trushkina, N., Abazov, R., Rynkevych, N., Shevchenko, I., Khaustova, V., & Tkachuk, O. (2020). Digital transformation of organizational culture under conditions of the information economy. *Virtual Economics*, 3(1), 7–38.

Tsou, H. T., & Chen, J. S. (2023). How does digital technology usage benefit firm performance? Digital transformation strategy and organisational innovation as mediators. *Technology Analysis & Strategic Management*, 35(9), 1114–1127.

Tulcanaza-Prieto, A. B., Aguilar-Rodríguez, I. E., & Artieda, C. (2021). Organizational culture and corporate performance in the Ecuadorian environment. *Administrative Sciences*, 11(4), 1–17.

Tuukkanen, V., Wolgsjö, E., & Rusu, L. (2022). Cultural values in digital transformation in a small company. *Procedia Computer Science*, 196, 3–12.

Uen, J. F., Chen, S. Y., Ahlstrom, D., & Yang, M. C. (2023). The power of employee exchange belief: How psychological contract strength mediates the relationship of HR practice consistency and organizational commitment. *Current Psychology*, 42(25), 21746–21758.

Uraon, R. S., & Gupta, M. (2020). Do HRD practices affect perceived market performance through operational performance? Evidence from software industry. *International Journal of Productivity and Performance Management*, 69(1), 85–108.

Vargas-Halabi, T., & Yagüe-Perales, R. M. (2024). Organizational culture and innovation: Exploring the "black box." *European Journal of Management and Business Economics*, 33(2), 174–194.

van Aardt, I., & Quesada, L. L. (2021). Mixed methods research: Breaking the divide between quantitative and qualitative approaches. In A. dos Santos, J. du Toit, N. Faasen, L. L. Quesada, A. Masenge, I. van Aardt, C. Wagner, A. Bryman, E. Bell, & H. Hirschsohn (Eds.), Research methodology: Business and management contexts (2nd ed.). Goodwood, Cape Town: Oxford University.

Vatan, E., Raissi Ardali, G. A., & Shahin, A. (2024). Selecting information systems development models based on organizational culture: An integrated approach of DEMATEL and ANP. *VINE Journal of Information and Knowledge Management Systems*, 54(3), 531–560.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901.

Watkins, J. A. (2016). Theses/dissertation/research reports: A practical guide for researchers to the preparation of written presentations of academic research. Cape Town, South Africa: Lavender Moon Publishing.

Younas, A., & Durante, A. (2024). Decision tree for identifying pertinent integration procedures and joint displays in mixed methods research. *Journal of Advanced Nursing*, 79(7), 2754–2769.

Zhang, C., Wang, X., Cui, A. P., & Han, S. (2020). Linking big data analytical intelligence to customer relationship management performance. *Industrial Marketing Management*, 91, 483–494.

Zhang, X., Xu, Y. Y., & Ma, L. (2023). Information technology investment and digital transformation: The roles of digital transformation strategy and top management. *Business Process Management Journal*, 29(2), 528–549.

Zhen, Z., Yousaf, Z., Radulescu, M., & Yasir, M. (2021). Nexus of digital organisational culture, capabilities, organizational readiness, and innovation: Investigating SMEs operating in the digital economy. *Sustainability*, 13(2), 1–15.

Ziemba, E. (2021). The contribution of ICT adoption by local governments to sustainability—Empirical evidence from Poland. *Information Systems Management*, 38(2), 116–134.

Zumstein, D., Brauer, C., & Zelic, A. (2022). Benefits, challenges and future developments in digital analytics in German-speaking countries: An empirical analysis. *Applied Marketing Analytics*, 7(3), 246–259.