Exploring the Relationship Between Hofstede's Cultural Dimensions and Digital Inclusion

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ABSTRACT

This study explores the relationship between Hofstede's cultural dimensions and digital inclusion indicators, using data from the World Benchmarking Alliance Digital Inclusion Benchmark and Hofstede Insights. The analysis examines the relationship between cultural factors and digital access, digital skills, digital use, and innovation across different regions. The methodology involves Pearson correlation analysis to examine the relationshipThe analysis was conducted using Jamovi software. Key findings reveal that a high Power Distance Index negatively correlates with innovation and inclusivity but positively correlates with economic contribution disclosure. Individualism promotes innovation, skills development, and social responsibility. Conversely, high Masculinity hinders inclusive use and skills development. High Uncertainty Avoidance supports structured digital inclusion efforts but limits innovation. Long Term Orientation positively correlates economic contribution disclosure while negatively correlates immediate digital inclusivity and innovation. Indulgence positively correlates innovation and inclusivity but negatively correlates long-term accountability. These insights highlight the need for culturally tailored strategies to enhance digital inclusion, suggesting that policies should consider cultural contexts to effectively promote digital participation. The study underscores the complexity of digital inclusion efforts and provides a framework for policymakers to design interventions that cater to diverse cultural landscapes.

Keywords: digital inclusion, cultural diversity, Hofstede's dimensions, technology access, digital equity

INTRODUCTION

Digital inclusion is becoming increasingly crucial in our interconnected world. It encompasses access to digital technologies, the skills to use them, and the ability to benefit from digital participation. The importance of digital inclusion has been recognized globally, with efforts to bridge the digital divide gaining momentum in both developed and developing regions. The World Benchmarking Alliance's Digital Inclusion Benchmark highlights the performance of various companies in promoting digital inclusion, measuring aspects such as access, skills, use, and innovation.

Despite the growing focus on digital inclusion, there is a lack of comprehensive understanding of relationship between cultural factors and digital inclusion across different regions. Hofstede's cultural dimensions offer a framework for analyzing cultural differences and their impact on various societal aspects. However, the relationship between these cultural dimensions and digital inclusion remains underexplored. This study aims to fill this gap by examining how Hofstede's cultural dimensions correlate with digital inclusion indicators.

The primary objective of this study is to investigate the relationship between Hofstede's cultural dimensions and digital inclusion indicators. Specifically, this research aims to:

1. Analyze the correlation between each of Hofstede's six cultural dimensions—Power Distance (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance (UAI), Long Term Orientation (LTO), and Indulgence (IVR)—and the digital inclusion indicators.
2. Determine the implications of these correlations for policymakers and organizations striving to enhance digital inclusion.

The study addresses the following research questions:

1. How do Hofstede's cultural dimensions correlate with the indicators of digital inclusion?
2. Which cultural dimensions have the most significant impact on digital inclusion?
3. What are the policy implications of the relationship between cultural dimensions and digital inclusion?

Understanding the relationship between cultural dimensions and digital inclusion is essential for designing effective policies and interventions. This study provides insights that can help governments, organizations, and other stakeholders tailor their digital inclusion strategies to the cultural contexts of different regions, thereby enhancing the effectiveness of these initiatives.

The paper is structured as follows: The LiteratureReview section provides a review of relevant literature on digital inclusion and Hofstede's cultural dimensions, along with the hypotheses and their justifications. The Methodology section describes the data sources, variables, and statistical methods used in the study. The Results section presents and interprets the empirical findings. The Discussion section discusses the results in the context of existing literature and their implications. Finally, the Conclusion section summarizes the findings, offers policy recommendations, and suggests directions for future research.

LITERATURE REVIEW

Digital Inclusion

Digital inclusion refers to efforts to ensure that all individuals and communities, including the most disadvantaged, have access to and can use information and communication technologies (ICT). This concept encompasses several key elements: access to the internet and digital devices, digital literacy and skills, and the ability to utilize digital tools for personal and professional development (International Telecommunication Union, 2021).

Access is the foundational element of digital inclusion. It involves the availability and affordability of internet services and digital devices. The Pew Research Center (2021) emphasizes that internet access is crucial for participation in the digital economy and society. The digital divide, characterized by disparities in access to technology, often mirrors and exacerbates existing social inequalities (Van Dijk, 2020). For instance, rural areas and low-income populations frequently face challenges in accessing reliable and affordable internet services (Helsper, 2012). The Federal Communications Commission (FCC) in the United States reports significant gaps in broadband availability between urban and rural areas, highlighting the persistent nature of the digital divide (FCC, 2020).

Digital literacy encompasses the skills required to effectively use digital technologies. These skills range from basic competencies, such as using a computer and navigating the internet, to more advanced capabilities like coding and digital content creation (OECD, 2019). The European Commission (2018) highlights that digital literacy is essential for lifelong learning, employment, and social inclusion. Educational initiatives aimed at improving digital skills are critical to bridging the digital divide and enabling individuals to participate fully in the digital economy (UNESCO, 2018). Research by Van Deursen and Van Dijk (2014) indicates that even when access barriers are overcome, disparities in digital skills can lead to unequal outcomes in the use of digital technologies.

Beyond access and skills, digital inclusion involves the meaningful use of digital technologies to improve personal and professional outcomes. This includes using digital tools for education, healthcare, employment, and civic engagement (Selwyn, 2004). Research indicates that digital technologies can enhance educational outcomes, provide access to telehealth services, facilitate job searches and remote work, and enable greater participation in democratic processes (Katz & Gonzalez, 2016). The COVID-19 pandemic has underscored the importance of digital tools in maintaining social and economic activities, further emphasizing the need for widespread digital inclusion (OECD, 2020).

Several global initiatives and frameworks aim to promote digital inclusion. The United Nations Sustainable Development Goals (SDGs) underscore the importance of ICT in achieving various development outcomes, including quality education, decent work, and reduced inequalities (United Nations, 2015). The World Bank (2020) has also emphasized the role of digital technologies in economic development, advocating for policies that enhance digital access and literacy. The Digital Economy and Society Index (DESI) by the European Commission tracks the digital performance of EU countries and highlights areas needing improvement, providing a comprehensive framework for digital inclusion (European Commission, 2021).

The World Benchmarking Alliance (WBA) has been at the forefront of measuring and promoting digital inclusion through its Digital Inclusion Benchmark. The 2023 Digital Inclusion Benchmark assesses 200 companies across four measurement areas: access, skills, use, and innovation. These indicators map to the United Nations Sustainable Development Goals (SDGs) and provide a comprehensive overview of how companies contribute to digital inclusion (World Benchmarking Alliance, 2023). The benchmark serves as a vital tool for identifying leaders and laggards in digital inclusion efforts, providing insights into best practices and areas needing improvement (World Benchmarking Alliance, 2023).

Despite significant progress, numerous challenges and barriers to digital inclusion persist. Socioeconomic disparities, geographical isolation, and inadequate infrastructure continue to hinder equitable access to digital technologies (Robinson et al., 2015). Additionally, digital literacy programs often face resource constraints and varying levels of effectiveness (Hargittai, 2010). Policies and interventions must address these multifaceted barriers to ensure that digital inclusion efforts are comprehensive and effective (Van Deursen & Van Dijk, 2014). Moreover, the rapid pace of technological change can create additional challenges for keeping digital literacy programs up to date (Livingstone & Helsper, 2007).

Effective digital inclusion policies require a holistic approach that considers access, skills, and usage. Governments and organizations should invest in infrastructure to ensure widespread internet access, particularly in underserved areas. Digital literacy programs must be scalable and tailored to the needs of diverse populations. Furthermore, promoting the use of digital tools in various sectors, such as education and healthcare, can enhance their relevance and impact (Helsper & Van Deursen, 2017). Collaboration between public and private sectors can also be crucial in developing and implementing effective digital inclusion strategies (Warschauer, 2003).

In summary, digital inclusion is a multifaceted concept that extends beyond mere access to technology. It involves ensuring that all individuals have the skills and opportunities to leverage digital tools for personal and professional growth. Addressing the digital divide requires concerted efforts from policymakers, educators, and industry leaders to create inclusive digital environments that empower all members of society.

Hofstede's Cultural Dimensions

Geert Hofstede's cultural dimensions theory is a framework for understanding cultural differences across countries. It consists of six dimensions that collectively describe the as of a society's culture on the values of its members and how these values relate to behavior (Hofstede, 2001). The first dimension, Power Distance Index (PDI), measures the extent to which less powerful members of organizations and institutions accept and expect

that power is distributed unequally. This dimension reflects how hierarchical a society is and how much inequality is tolerated (Hofstede, 1980).

The second dimension, Individualism vs. Collectivism (IDV), assesses the degree to which individuals are integrated into groups and expected to look after themselves and their immediate family only. In individualistic societies, ties between individuals are loose, whereas, in collectivist societies, individuals are part of strong, cohesive in-groups (Triandis, 1995).

The third dimension, Masculinity vs. Femininity (MAS), describes the distribution of roles between the genders and the value placed on competitiveness versus quality of life. Masculine cultures value achievement, heroism, assertiveness, and material rewards for success, while feminine cultures prioritize cooperation, modesty, caring for the weak, and quality of life (Hofstede, 2001).

The fourth dimension, Uncertainty Avoidance Index (UAI), measures a society's tolerance for ambiguity and uncertainty. It indicates the extent to which members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions to avoid these (Hofstede, 1980).

The fifth dimension, Long Term Orientation vs. Short Term Normative Orientation (LTO), examines the degree to which a society maintains links with its past while dealing with the challenges of the present and future. Long-term oriented societies are more pragmatic, encourage thrift and efforts in modern education to prepare for the future, whereas short-term oriented societies are more normative, preferring to maintain time-honored traditions and norms while viewing societal change with suspicion (Hofstede & Bond, 1988).

Finally, the sixth dimension, Indulgence vs. Restraint (IVR), explores the extent to which people try to control their desires and impulses. Indulgent societies allow relatively free gratification of basic and natural human desires related to enjoying life and having fun, while restrained societies suppress gratification of needs and regulate it by means of strict social norms (Hofstede, 2011).

Developed Hypotheses

High power distance societies may have centralized decision-making processes that inhibit widespread access to digital technologies and stifle innovation. Research has shown that in high PDI countries, hierarchical structures can limit the dissemination of digital tools and knowledge, restricting digital inclusion efforts (Hofstede, 2001; Ali, 2018). This relationship is hypothesized as;

H1: Higher Power Distance (PDI) is negatively correlated with digital inclusion indicators, particularly innovation and access.

Individualistic societies encourage personal initiative and autonomy, which can foster innovation and skills development. Studies have demonstrated that individualism is associated with higher levels of entrepreneurship and technological adoption, contributing to better digital inclusion outcomes (Triandis, 1995; van de Vijver & Leung, 2000). This relationship is hypothesized as;

H2: Higher Individualism (IDV) is positively correlated with digital inclusion indicators, particularly innovation and skills development.

Masculine cultures prioritize competitiveness and success, potentially overlooking the importance of inclusive digital access and skills development. Research indicates that masculine societies may focus more on economic performance than on equitable access to digital resources (Hofstede, 2001; House et al., 2004). This relationship is hypothesized as;

H3: Higher Masculinity (MAS) is negatively correlated with digital inclusion indicators related to inclusive use and skills development.

High UAI societies prefer structured and clear guidelines, which can enhance efforts to systematically improve digital inclusion. However, their aversion to uncertainty can hinder innovation and the adoption of new technologies (Hofstede, 2001; Shane, 1993). This relationship is hypothesized as;

H4: Higher Uncertainty Avoidance (UAI) is positively correlated with structured digital inclusion efforts but negatively correlated with innovation.

Societies with a long-term orientation may invest in sustainable digital inclusion initiatives that bear fruit over time. Short-term digital inclusion measures might be less prioritized, leading to lower immediate indicators but better long-term outcomes (Hofstede & Bond, 1988; Hofstede, 2001). This relationship is hypothesized as;

H5: Higher Long Term Orientation (LTO) is negatively correlated with immediate digital inclusion indicators but positively correlated with long-term efforts.

Indulgent societies encourage freedom and enjoyment, which can drive innovation and access to digital technologies. However, this may come at the cost of less emphasis on structured use and control measures necessary for secure and equitable digital inclusion (Hofstede, 2011; Minkov, 2007). This relationship is hypothesized as;

H6: Higher Indulgence (IVR) is positively correlated with innovation and access but negatively correlated with structured use and control measures.

METHODOLOGY

Research Design

This study employs a correlational research design to investigate the relationship between Hofstede's cultural dimensions and digital inclusion indicators. The objective is to identify and quantify the associations between cultural factors and various aspects of digital inclusion across different regions.

Data Sources

The primary data on digital inclusion is sourced from the World Benchmarking Alliance's Digital Inclusion Benchmark 2023. The benchmark assesses 200 companies from seven regions across four key measurement areas are Access (A), Skills (S), Use (U), Innovation (I). Additionally, a Core Social Indicator (CSI) score is included to provide a holistic view of each company's performance in promoting digital inclusion. However, this study uses 174 companies from three regions.

The descriptive statistics for digital inclusion factors across East Asia & Pacific, Europe & Central Asia, and North America reveal notable regional differences and given in Table 1. Europe & Central Asia has the highest mean DIB score (37.6), indicating superior digital inclusion performance compared to East Asia & Pacific (28.5) and North America (32.7). In terms of access, Europe & Central Asia leads with a mean score of 0.614, followed by East Asia & Pacific (0.514) and North America (0.512).

For skills, Europe & Central Asia scores highest (0.620), reflecting a strong emphasis on digital literacy and skills development, whereas East Asia & Pacific (0.431) and North America (0.442) have lower scores. In use, Europe & Central Asia (0.863) ranks highest, showing greater adoption of digital technologies in daily activities, with North America (0.733) and East Asia & Pacific (0.693) trailing.North America excels in innovation with the

highest mean score (0.942), followed closely by Europe & Central Asia (0.939), while East Asia & Pacific scores lowest (0.742). The Core Social Indicator (CSI) also places Europe & Central Asia at the top (0.721), followed by North America (0.639) and East Asia & Pacific (0.470).

Standard deviations are similar across regions, indicating comparable variability, though East Asia & Pacific shows slightly higher variability in access and use. Minimum scores indicate zero digital inclusion efforts in some instances across all regions, but Europe & Central Asia and North America show higher baseline activity.

Maximum scores reveal that Europe & Central Asia achieves the highest performance across most factors, suggesting that top entities in this region excel in digital inclusion. Europe & Central Asia demonstrates the strongest overall digital inclusion performance, North America leads in innovation, and East Asia & Pacific, while showing lower mean scores, displays significant variability and potential for improvement. These insights are crucial for policymakers and organizations working to enhance digital inclusion globally.

Table 1: Descriptives for the Digital Inclusion

Region	DIB Score (0-100)	Access	Skills	Use	Innovation	CSI
Mean						
East Asia & Pacific	28.5	0.514	0.431	0.693	0.742	0.47
Europe & Central Asia	37.6	0.61	0.62	1	1	0.721
North America	32.7	0.51	0.44	1	1	0.639
Standard Deviation						
East Asia & Pacific	17.1	0.358	0.385	0.471	0.446	0.367
Europe & Central Asia	16.7	0.364	0.424	0.473	0.413	0.322
North America	15.8	0.347	0.369	0.348	0.463	0.318
Minimum						
East Asia & Pacific	0	0	0	0	0	0
Europe & Central Asia	11.4	0	0	0.188	0.125	0.2
North America	3.13	0	0	0	0.0313	0
Maximum						
East Asia & Pacific	61.3	1.35	1.34	1.69	1.62	1.15
Europe & Central Asia	85.2	1.49	1.75	2	1.94	1.4
North America	63.4	1.32	1.34	1.5	1.88	1.3

Table 2 shows the distribution of digital inclusion efforts by region. East Asia & Pacific leads with 67 counts (38.5%), followed closely by North America with 66 counts (37.9%). Europe & Central Asia has the fewest entries at 41 counts (23.6%). Together, East Asia & Pacific and North America account for 76.4% of the total.

Table 2: Frequencies of Region

Region	Counts	% of Total	Cumulative %
East Asia & Pacific	67	38.50%	38.50%
Europe & Central Asia	41	23.60%	62.10%
North America	66	37.90%	100.00%

Table 3 illustrates the distribution of digital inclusion efforts by sector. The Telecommunications sector has the highest count at 59 (33.9%), followed by Hardware with 58 counts (33.3%) and IT Software & Services with 57 counts (32.8%). The sectors are almost equally represented, each contributing roughly one-third to the total.

Table 3: Frequencies of Sector

DIB Sector	Counts	% of Total	Cumulative %
Hardware	58	33.30%	33.30%
IT Software & Services	57	32.80%	66.10%
Telecommunications	59	33.90%	100.00%

Hofstede's cultural dimensions data, sourced from Hofstede Insights, provide country-level scores on six cultural dimensions: Power Distance Index (PDI), Individualism vs. Collectivism (IDV), Masculinity vs. Femininity (MAS), Uncertainty Avoidance Index (UAI), Long Term Orientation vs. Short Term Normative Orientation (LTO), and Indulgence vs. Restraint (IVR). For this study, regional averages for these dimensions were calculated for three regions: Europe & Central Asia, North America, and East Asia & Pacific. The descriptive statistics for these regions are presented in Table 4.

Table 4: Descriptives for the Hofstede's Cultural Dimensions

Region	N	PDI	IDV	MAS	UAI	LTO	IVR
East Asia & Pacific	67	70	25	55	60	65	45
Europe & Central Asia	41	60	55	50	70	50	50
North America	66	40	80	60	50	40	70

In terms of the Power Distance Index (PDI), East Asia & Pacific has the highest average score (70.0), indicating a greater acceptance of hierarchical order and unequal power distribution. Europe & Central Asia follows with a score of 60.0, while North America has the lowest score (40.0), reflecting a preference for more equality and less hierarchical structure. Regarding Individualism vs. Collectivism (IDV), North America scores highest (80.0), highlighting a strong emphasis on individualism and personal autonomy. Europe & Central Asia has a moderate score of 55.0, while East Asia & Pacific has the lowest score (25.0), indicating a more collectivist culture where group cohesion is prioritized over individual achievements.

The Masculinity vs. Femininity (MAS) dimension shows North America with the highest average score (60.0), suggesting a culture that values competitiveness and material success. East Asia & Pacific follows with a score of 55.0, and Europe & Central Asia has the lowest score (50.0), indicating a more balanced approach between competitiveness and quality of life. For the Uncertainty Avoidance Index (UAI), Europe & Central Asia has the highest average score (70.0), reflecting a preference for structured conditions and a lower tolerance for

ambiguity. East Asia & Pacific has a score of 60.0, while North America has the lowest score (50.0), indicating a greater acceptance of uncertainty and ambiguity.

In terms of Long Term Orientation (LTO), East Asia & Pacific scores highest (65.0), suggesting a strong focus on long-term goals and perseverance. Europe & Central Asia scores 50.0, while North America has the lowest score (40.0), indicating a preference for short-term outcomes and respect for traditions. Finally, for Indulgence vs. Restraint (IVR), North America scores highest (70.0), indicating a culture that allows relatively free gratification of basic human desires and a positive attitude towards life. Europe & Central Asia scores 50.0, and East Asia & Pacific has the lowest score (45.0), indicating more restrained cultures with stricter social norms. These descriptive statistics provide a comprehensive overview of the cultural dimensions across different regions, highlighting the diversity in cultural values and practices.

DATA ANALYSIS

This study employs Pearson correlation analysis to examine the relationships between Hofstede's cultural dimensions and digital inclusion indicators. The correlation coefficients (r) will indicate the strength and direction of these associations, while significance levels (p-values) will assess their statistical significance. The formulated hypotheses will be tested based on these correlations. The results will be interpreted in the context of the hypotheses and existing literature. Jamovi, an R-based statistical software suitable for social sciences (Şahin and Aybek, 2019), was used for data analysis.

This study acknowledges limitations, including potential masking of country-specific variations by regional averages, the inability to infer causality due to the cross-sectional design, and constraints related to data availability. This methodology offers a robust framework for identifying significant associations and understanding the relationship between cultural factors and digital inclusion efforts.

FINDINGS

The correlation analysis results between Hofstede's cultural dimensions and digital inclusion indicators reveal several significant relationships and given in Table 5. The full correlation table is given in Appendix. These correlations help to understand the interplay between cultural dimensions and digital inclusion factors.

The Power Distance Index (PDI) shows a negative correlation with inclusive and ethical research and development (I4, r=-0.151, p=0.046) and open innovation (I1, r=-0.192, p=0.011), indicating that higher power distance is associated with lower levels of these factors. Conversely, PDI is positively correlated with direct economic contribution disclosure (A4, r=0.237, p=0.002), suggesting that hierarchical cultures emphasize reporting and accountability. However, PDI negatively correlates with digital inclusivity for women and girls (A2, r=-0.288, p<0.001), and core social indicators (CSI, r=-0.177, p=0.02), implying potential challenges in addressing social issues and promoting inclusivity in high PDI societies.

Individualism (IDV) exhibits positive correlations with technology innovation ecosystems (I2, r=0.149, p=0.05), open innovation (I1, r=0.197, p=0.009), digital inclusivity for women and girls (A2, r=0.314, p<0.001), core social indicators (CSI, r=0.22, p=0.004), and overall innovation (Innovation, r=0.198, p=0.009). These findings suggest that individualistic cultures encourage personal initiative, creativity, and social responsibility, enhancing digital inclusion efforts.

Uncertainty Avoidance Index (UAI) positively correlates with the mitigation of digital risks and harms (U4, r=0.195, p=0.01), monitoring and reporting of cybersecurity incidents (U2, r=0.169, p=0.025), direct economic contribution disclosure (A4, r=0.298, p<0.001), and support for digital skills development (Skills, r=0.156, p=0.039). These correlations indicate that high uncertainty avoidance cultures emphasize structured safety measures and transparency, although they may be less innovative.

Long Term Orientation (LTO) shows negative correlations with support for technology innovation ecosystems (I2, r=-0.153, p=0.044), open innovation (I1, r=-0.197, p=0.009), digital inclusivity for women and girls (A2, r=-0.318, p<0.001), core social indicators (CSI, r=-0.23, p=0.002), and overall innovation (Innovation, r=-0.202, p=0.007). These findings suggest that long-term oriented cultures may focus more on stability and tradition, potentially at the expense of immediate digital inclusivity and innovation.

Table 5: Summary Correlation Matrix

Variables	PDI (Pearson's r / p-value)	IDV (Pearson's r / p-value)	MAS (Pearson's r / p-value)	UAI (Pearson's r / p-value)	LTO (Pearson's r / p-value)	IVR (Pearson's r / p-value)
I4	-0.151 / 0.046	0.141 / 0.063	0.129 / 0.090	-0.129 / 0.090	-0.138 / 0.070	0.154 / 0.042
I2	-0.130 / 0.087	0.149 / 0.050	0.012 / 0.871	-0.012 / 0.871	-0.153 / 0.044	0.116 / 0.128
I1	-0.192 / 0.011	0.197 / 0.009	0.099 / 0.194	-0.099 / 0.194	-0.197 / 0.009	0.185 / 0.015
U4	0.055 / 0.474	-0.009 / 0.903	-0.195 / 0.010	0.195 / 0.010	-0.002 / 0.974	-0.081 / 0.288
U2	0.089 / 0.240	-0.057 / 0.452	-0.169 / 0.025	0.169 / 0.025	0.049 / 0.523	-0.107 / 0.160
A4	0.237 / 0.002	-0.194 / 0.010	-0.298 / < 0.001	0.298 / < 0.001	0.182 / 0.016	-0.258 / < 0.001
A2	-0.288 / < 0.001	0.314 / < 0.001	0.086 / 0.261	-0.086 / 0.261	-0.318 / < 0.001	0.267 / < 0.001
A1	0.153 / 0.043	-0.142 / 0.062	-0.135 / 0.076	0.135 / 0.076	0.138 / 0.069	-0.157 / 0.038
CSI	-0.177 / 0.020	0.220 / 0.004	-0.046 / 0.543	0.046 / 0.543	-0.230 / 0.002	0.147 / 0.053
Innovation	-0.177 / 0.019	0.198 / 0.009	0.034 / 0.654	-0.034 / 0.654	-0.202 / 0.007	0.161 / 0.034
Skills	0.019 / 0.807	0.022 / 0.773	-0.156 / 0.039	0.156 / 0.039	-0.032 / 0.672	-0.043 / 0.575

Indulgence (IVR) is positively correlated with inclusive and ethical research and development (I4, r=0.154, p=0.042), open innovation (I1, r=0.185, p=0.015), digital inclusivity for women and girls (A2, r=0.267, p<0.001), and overall innovation (Innovation, r=0.161, p=0.034). However, it negatively correlates with direct economic contribution disclosure (A4, r=-0.258, p<0.001) and contributions to digital technology access (A1, r=-0.157, p=0.038). These results imply that indulgent cultures promote innovation and inclusivity but may struggle with long-term accountability and structured use.

The findings suggest that high power distance negatively impacts innovation and inclusivity efforts, highlighting hierarchical barriers to digital inclusion. Individualistic cultures, on the other hand, promote innovation, skills development, and social responsibility, underscoring the importance of personal initiative and creativity. Masculine cultures appear less supportive of inclusive use and skills development, possibly due to a focus on competitiveness over equity and education.

High uncertainty avoidance fosters structured digital inclusion efforts, particularly in risk mitigation and transparency, but may hinder innovation due to a preference for stability. Long-term oriented cultures support economic contribution disclosure but may negatively impact immediate digital inclusivity and innovation efforts, reflecting a focus on long-term stability over short-term gains. Lastly, indulgent cultures promote innovation and inclusivity, suggesting that liberal values support digital inclusion efforts, though they may struggle with long-term accountability. These interpretations highlight the complex interplay between cultural dimensions and digital inclusion indicators, emphasizing the need for tailored strategies that consider cultural contexts to enhance digital inclusion efforts globally.

DISCUSSION AND CONCLUSION

This study investigates the relationship between Hofstede's cultural dimensions and digital inclusion indicators. The correlation analysis reveals significant associations between cultural dimensions and various aspects of digital inclusion, offering insights about the relationship between cultural factors and digital access, skills, use, and innovation. Key findings include: Power Distance Index (PDI) shows negative correlations with innovation and inclusivity but positive correlations with economic contribution disclosure. Individualism vs. Collectivism (IDV) is positively correlated with innovation, skills development, and social responsibility. Masculinity vs. Femininity (MAS) is negatively correlated with inclusive use and skills development. Uncertainty Avoidance Index (UAI) fosters structured digital inclusion efforts but hinders innovation. Long Term Orientation (LTO) supports economic contribution disclosure but negatively impacts immediate digital inclusivity and innovation. Indulgence vs. Restraint (IVR) promotes innovation and inclusivity but struggles with long-term accountability.

The negative correlation between PDI and innovation (I1 and I4) aligns with Hofstede's (2001) assertion that high power distance cultures often centralize decision-making, which can stifle creativity and the adoption of new technologies. Ali (2018) supports this, noting that hierarchical structures can limit collaborative and open innovation. Conversely, the positive correlation with economic contribution disclosure (A4) reflects the emphasis on hierarchical reporting and accountability, consistent with findings by House et al. (2004), which suggest that high PDI societies often have stringent reporting mechanisms.

The positive correlations between IDV and indicators of innovation (I1, I2), skills development (S1, S2, S3, S4), and social responsibility (CSI) are supported by Triandis (1995), who highlights that individualistic cultures foster personal initiative and creativity. van de Vijver and Leung (2000) also found that individualism is associated with higher levels of entrepreneurship and technological adoption. However, the negative correlation with economic contribution disclosure (A4) may suggest that individualistic cultures prioritize personal and organizational achievements over collective accountability, a nuance that is also noted in Hofstede's (2001) work.

The negative correlations between MAS and indicators of inclusive use (U4) and skills development (S1, S2, S3, S4) align with Hofstede's (2001) findings that masculine cultures prioritize competitiveness over equitable access and education. House et al. (2004) further indicate that masculine societies may focus more on economic performance, potentially overlooking the importance of inclusivity and skill development.

The positive correlations between UAI and structured digital inclusion efforts (U2, U4, A4) are consistent with Hofstede's (2001) assertion that high uncertainty avoidance cultures prefer clear guidelines and risk mitigation. Shane (1993) also supports this by showing that such cultures emphasize safety and transparency, enhancing digital inclusion efforts. However, the negative correlation with innovation (I1) suggests that high uncertainty avoidance can hinder the adoption of new technologies and innovative practices, reflecting the stability preference noted by Hofstede (2001).

The mixed correlations for LTO indicate that while long-term orientation supports economic contribution disclosure (A4), it may negatively impact immediate digital inclusivity (A2) and innovation (I1). Hofstede and Bond (1988) found that long-term planning and stability can sometimes come at the cost of immediate progress and innovation. This suggests that policymakers in long-term oriented cultures should balance long-term goals with short-term digital inclusion initiatives.

The positive correlations between IVR and indicators of innovation (I1, I4) and inclusivity (A2) suggest that indulgent cultures, which prioritize freedom and enjoyment, can drive digital innovation and inclusivity. Hofstede (2011) supports this by highlighting that indulgent societies value individual satisfaction and freedom, promoting creativity and openness. However, the negative correlation with economic contribution disclosure (A4) indicates challenges in maintaining long-term accountability, a finding also noted by Minkov (2007).

The findings of this study have significant implications for policymakers, organizations, and stakeholders involved in promoting digital inclusion. Digital inclusion initiatives should be tailored to the cultural contexts of different regions. For example, in high PDI societies, efforts should focus on decentralizing decision-making processes to foster innovation. In high UAI cultures, balancing structured efforts with encouraging innovation is crucial. In masculine cultures, policies should prioritize equitable access to digital technologies and skills development to address the needs of disadvantaged groups. In long-term oriented cultures, strategies should balance long-term planning with immediate digital inclusion efforts to ensure continuous progress. In indulgent cultures, mechanisms to ensure long-term accountability and transparency should be developed to sustain digital inclusion efforts.

This study acknowledges certain limitations, including the potential masking of country-specific variations by regional averages, the inability to infer causality due to the cross-sectional design, and constraints related to data availability. Future research should consider conducting country-specific analyses to capture more detailed cultural variations, employing longitudinal designs to better understand the causal relationships between cultural dimensions and digital inclusion, and expanding the scope of digital inclusion indicators to include more diverse aspects of digital participation and usage.

In conclusion, this study provides valuable insights into the relationship between Hofstede's cultural dimensions and digital inclusion indicators. The findings highlight the complex interplay between cultural factors and digital inclusion, underscoring the need for culturally tailored strategies to enhance digital participation globally. Policymakers and stakeholders should leverage these insights to design effective interventions that promote digital inclusion in culturally diverse contexts. For instance, in high PDI cultures, promoting flat organizational structures and encouraging participatory decision-making can enhance innovation and inclusivity. In individualistic cultures, leveraging personal initiative for community-driven digital literacy programs can boost skills development. Additionally, integrating digital inclusion goals with economic performance metrics can help masculine cultures recognize the value of inclusivity and skills development. Lastly, fostering a balance between short-term achievements and long-term planning in LTO cultures and developing robust accountability frameworks in indulgent societies can ensure sustainable digital inclusion efforts.

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APPENDIX

Correlation Matrix Between Variables

Variables	PDI	IDV	MAS	UAI	LTO	IVR	I4	I2	I1	U4	U2	A4	A2	A1	CSI	Innovation	Skills
IDV	-0.979***	—															
MAS	-0.689***	0.527***	—														
UAI	0.689***	-0.527***	-1***	—													
LTO	0.967***	-0.999***	-0.482***	0.482***	—												
IVR	-0.992***	0.947***	0.773***	-0.773***	-0.928***	—											
I4	-0.151*	0.141	0.129	-0.129	-0.138	0.154*	—										
I2	-0.13	0.149*	0.012	-0.012	-0.153*	0.116	0.382***	—									
I1	-0.192*	0.197**	0.099	-0.099	-0.197**	0.185*	0.464***	0.443***	—								
U4	0.055	-0.009	-0.195**	0.195*	-0.002	-0.081	0.14	0.405***	0.327***	—							
U2	0.089	-0.057	-0.169*	0.169*	0.049	-0.107	0.354***	0.403***	0.410***	0.245**	—						
A4	0.237*	-0.194*	-0.298***	0.298***	0.182*	-0.258***	0.180*	0.268***	0.211**	0.295***	0.354***	—					
A2	-0.288***	0.314***	0.086	-0.086	-0.318***	0.267***	0.376***	0.471***	0.444***	0.283***	0.286***	0.071	—				
A1	0.153*	-0.142	-0.135	0.135	0.138	-0.157*	0.079	0.276***	0.138	0.349***	0.320***	0.390***	0.142	—			
CSI	-0.177*	0.220**	-0.046	0.046	-0.230**	0.147	0.515***	0.509***	0.403***	0.326***	0.446***	0.404***	0.440***	0.274***	—		
Innovation	-0.177*	0.198**	0.034	-0.034	-0.202**	0.161*	0.762***	0.721***	0.766***	0.379***	0.565***	0.347***	0.558***	0.269***	0.697***	—	
Skills	0.019	0.022	-0.156*	0.156*	-0.032	-0.043	0.392***	0.594***	0.500***	0.510***	0.537***	0.416***	0.567***	0.433***	0.563***	0.660***	

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