Inclusive Digital Innovation in South Africa: Perspectives from Disadvantaged and Marginalized Communities

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Abstract: Inclusive digital innovation (IDI) entails rolling out policies and digital innovations to ensure equal access to services and new goods by previously excluded and marginalized societies. Digital commerce (d-commerce) has the potential to foster an inclusive community through IDI empowerment in emerging economies; however, the literature on inclusive digital innovation and citizen empowerment is limited on the effect of e-strategy policies and empowerment on d-commerce adoption, use, and recommendation propensity. Underpinned by three theories: the Extended Unified Theory of Acceptance and Use of Technology, the citizen empowerment theory, and the affective decision-making theory of optimism bias and risk, this study proposes a model to establish the determinants of use intention, use behavior, and propensity to recommend d-commerce in disadvantaged and marginalized communities in South Africa. Using survey data from 983 disadvantaged d-commerce users to test the proposed model and hypotheses using IBM Amos for Windows and structural equation modeling (SEM), this paper provides a unique narrative to the empowerment discourse of marginalized people. Results show that privacy, security, trust, and citizen empowerment positively influence use intention and optimism bias, use behavior, and citizen empowerment mediate the propensity to recommend. Factors that promote or hinder citizens' choices to use and recommend d-commerce are pertinent to scholars, government agencies, and regulators seeking better policy implementations to eradicate socio-economic inequalities, sustainable societies, and the empowerment of disadvantaged and marginalized people.

Keywords: B2C d-commerce adoption; ICT access; regulatory framework; disadvantaged and marginalized communities; sustainable societies; citizen empowerment

1. Introduction

The study of Business-2-Citizen (B2C) digital commerce (d-commerce) as an inclusive digital innovation tool by the disadvantaged and marginalized people in emergent nations is entwined with a complex interplay of socio-economic, political, and technological factors [1]. In this study, inclusive digital innovation refers to any technological innovations (i.e., d-commerce) with the potential to foster the socio-economic development of any marginalized and underserved society in developing nations [2]. Similarly, d-commerce refers to the electronic transfer of products, services, information, money, or payments over multiple digital channels between businesses and individuals [3]. There is no better place this research could be studied than with disadvantaged and marginalized people in South Africa. Impoverished and marginalized communities refer to communities that were neglected, underserviced, and predominantly occupied by black, colored, or Indian people during the apartheid era and are currently lagging in social amenities and services compared to mostly white-dominated areas [4].

Over recent years, the potential and power of B2C d-commerce to improve the economic wellbeing of organizations and livelihoods of marginalized people in emerging economies have been equally praised and questioned [5–7]. E-service offering organizations benefit from d-commerce by expanding their market share and offering better one-on-one customer service. Other benefits include the convenient way of conducting business,

efficient money handling and business synergies, which assist in solving cash-in-transit robbery problems [7]. Meanwhile for citizens, d-commerce use can lead to sustainable and empowered communities by giving access to a broader range of information on markets, products, and services for effective and well-informed decision making and choices [8]. Other benefits to customers include conveniences, efficiencies, time and cost-savings, and social equity [9]. Citizen empowerment refers to the process of capacitating poor and marginalized people with the right skills, opening new socio-economic horizons and removing any barriers (i.e., political, legal, technological, and sociocultural) that may work against them, and providing access to affordable ICT assets and tools to enable them to effectively participate in political processes, local decision-making and markets [10]. However, the diffusion, adoption, and transformative power of B2C d-commerce on marginalized citizens in South Africa is challenging, suboptimal, sluggish, problematic, and susceptible to failure due to numerous factors [2]. Despite having sound innovation for inclusive development policies in place, South Africa, like most emergent nations, continues to suffer from poor alignment of these policies with implementation, monitoring, and evaluation [11], thus, threatening and hampering the diffusion and adoption of d-commerce. From the citizens' perspective, transacting using B2C d-commerce tools stands at the highest level of online engagement and requires the right skills [10]. For instance, high levels of a digital divide, ICT skills deficits, abject poverty, lack of the proper mental dispositions, and the exorbitant cost of internet bandwidth pose severe challenges to efforts to reduce inequalities through technological innovations in Africa [12,13]. Furthermore, costly logistics and cybersecurity concerns hamper d-commerce adoption in South Africa [14,15].

Despite the fast-growing d-commerce presence over the past decade across Africa, the continent continues to trail behind the rest of the world [16]. For instance, there were only 11 countries in the top 100 world B2C 2020 E-commerce Index, with South Africa ranked 73 in the world, number 2 in Africa, with 6 in 10 inhabitants using the Internet [16]. With an estimated internet penetration of 57.5% [17], South Africa has enjoyed an annual e-commerce growth rate (CAGR) of 13% and a 37% penetration since the outbreak of the coronavirus pandemic in 2020 [18]. The top five d-commerce performers in South Africa (measured by financial returns) are takealot.com, superbalist.com, Woolworths.co.za, mrp.com, and amazon.com [18]. Therefore, what are the implications for disadvantaged and marginalized people and their life trajectories? Importantly, this study is pertinent to the ongoing discourse on the UN's Sustainable Development Goal (SDG) 10: Reduce inequality within and among countries, and innovative technologies, d-commerce included, have been earmarked as a game-changer toward achieving the SDGs [19]. Thus, this study contributes to theory-building, provides empirical evidence to inform policy implementations on d-commerce, and outlines how to evaluate first-order reflective and second-order formative constructs within the d-commerce context in disadvantaged and marginalized setups.

The rest of this paper is organized as follows: Section 2 presents the literature review, Section 3 presents the theoretical underpinnings, and hypotheses and Section 4 outlines the research model. Section 5, methodology, while Sections 6 and 7 present data analysis and results, and discusses the findings. Finally, the implications, limitations, future research work, and conclusions are presented in Sections 8–10.

2. Literature Review

D-Commerce and Empowerment: Insights from the Literature

The importance of B2C d-commerce interactions and their impact on empowering customers is well documented in the literature [7,8,20,21]. These authors adopted various perspectives to studying d-commerce, though both tend to incline toward factors that affect consumers' intention to adopt d-commerce. Multiple studies [10,22,23] extensively explored and explained the narrative of consumer empowerment as a determinant of e-participation. These scholars revealed that when consumers are psychologically, economically, and informationally empowered, they are more likely to participate in d-commerce.

Therefore, there is a high interest from scholars [24] and practitioners in policy formulation and marketing to establish the potential of d-commerce in alleviating poverty and empowering the marginalized for sustainable livelihoods [24,25]. Most marginalized people lack the right skills and resources required to adopt B2C d-commerce [8,26]. Thus, they are inevitably excluded from the knowledge economy.

The scope and focus of most studies on d-commerce in South Africa and other emergent nations have been limited to diffusion in organizations and logistics efficiency [27–29] antecedents of adoption [30], thus, leaving a research gap in the marginalized individual-user context [31–33]. Alshurideh [33] suggests that more empirical studies are required to propose and test B2C d-commerce models in developing nations; however, most studies pay little attention to e-strategy policy frameworks' pivotal role in informing adoption, repeat purchase, socio-economic sustainability, and recommendation propensity [33,34]. For instance, Jibril, Kwarteng, Pilik, Botha, and Osakwe [35] grounded their d-commerce intentions around the Stimulus Organism Response Theory to determine the external environmental stimuli to adoption. Nevertheless, this study took a narrow narrative to policy stimulus (i.e., government support infrastructure) and internal stimulus (i.e., perceived ease of use); and yet it ignored the crucial role of national e-strategy and policy frameworks in shaping up citizen empowerment leading to d-commerce adoption. In their study, Ingaldi and Ulewicz [36] suggest that d-commerce adoption alone neither reduces inequality nor emancipates the disadvantaged and marginalized people; but constant use and recommendation to others do.

Osman and Tanner [25] proposed an integrated model to explain how marginalized and underserved community members are empowered through e-participation via telecentres. The same authors identify telecentre functions (i.e., services, ICT training, and entrepreneurial support) as solid predictors of use intention and a non-predictor of 'propensity to recommend'. Naranjo-Zolotov et al. [10] explore the factors that motivate and trigger citizens' desire to participate in d-commerce and promote its diffusion through recommendations to others; however, intention to use and recommendation were informed by the Unified Theory of Acceptance and Use of Technology (UTAUT) and empowerment theory predictor variables. Yet, the narrative of policy and regulatory frameworks as informants of 'use intention' and recommendation propensity are missing. Schaupp and Carter [37] suggest that technology users who regard themselves as technology-savvy relative to others (optimism bias) are risk-takers in e-participation, thus, focusing on the effect of optimism bias on 'intention to use' instead of 'use behavior.'

Whereas these studies offer valued insights into the core determinants of citizens' intentions to adopt and purchase via d-commerce [8], scholars, marketers, and policymakers are more concerned with understanding the direct effect of national cybersecurity and e-strategy policies on citizen empowerment, adoption, use and a propensity to recommend d-commerce to others [10]. Therefore, the present study seeks to establish the effect of:

(1) National cybersecurity variables on people's intention to use B2C d-commerce.
(2) National e-strategy on the empowerment of marginalized people.
(3) Citizen empowerment on use intention.
(4) Optimism bias on use behavior.
(5) Citizen empowerment on the propensity to recommend d-commerce.
(6) Use behavior on the propensity to recommend d-commerce.

3. Theoretical Grounding and Hypotheses Development

The multidiscipline nature of d-commerce and the interplay of governmental and non-governmental organizations, regulatory institutions, consumer pressure groups, and civil society makes it difficult and insufficient for this study to be underpinned by a single model. Moreover, B2C d-commerce interactions are complex due to wide disparities in citizens' socio-economic dispositions, technical skills, and competencies [21]. Venkatesh, Thong, and Xu [38] (p. 332) suggest the need "to draw on other theoretical perspectives to identify and examine specific characteristics" affecting citizens' intentions to adopt,

use and recommend B2C d-commerce. Thus, this study draws from the National Cybersecurity Policy and e-Strategy, citizen/psychological empowerment theory, Extended Unified Theory of Acceptance and Use of Technology, and optimism bias, which other scholars [10,21,23,34] have used in previous similar d-commerce studies. Discussed next are theoretical underpinnings leading to hypotheses formulation.

3.1. The National Cybersecurity Policy and E-Strategy

The National Cybersecurity Policy and E-Strategy (NCPF-NeS) articulate government aspirations, procedures, rules, roles, and a well-coordinated and integrated roadmap for rolling out, adopting, and utilizing ICTs E-Systems for a nation [15]. The government uses e-strategy to reach out to and influence the course of actions of its stakeholders (i.e., citizens included). If the strategy is misplaced, it may negatively affect the acceptance and adoption of such services [39]. A sound and responsive e-strategy are required by both governmental and non-governmental organizations to guide their digital transformation agenda and address societal and business needs [39]. The level of acceptance and adoption of digital transformation technologies by citizens is hypothesized to a certain degree as a measure of how effective the strategy was, while the adoption and use of d-commerce by the broader society has a proven record for improving the socio-economic status [40]. Thus, good regulatory frameworks and economic and technological environments are essential for the development of any nation. This could be done by enacting and operationalizing d-commerce and ICT legislation that promotes sustainable growth and creates awareness, diffusion, and adoption by the broader society. The d-commerce landscape in South Africa is informed by several national policies and strategies pertinent to this study: the NCPF-NeS, the citizen/data privacy, electronic payment, and transaction frameworks.

According to [41], inclusive digital transformation targeted at mitigating unequal access to education (i.e., e-learning), healthcare (i.e., telemedicine), and markets (i.e., d-commerce) for disadvantaged societies falls into two categories. Firstly, in the top-down approach, governmental organizations, private companies, and non-governmental organizations enact policies and allocate the required leadership, financial, technical, and training assistance to address local deficiencies [41]. The second approach is the 'community-driven approach' [41], in which the underprivileged community (i.e., grassroots initiatives) drives its developmental agenda. This study adopts the first approach and argues that training assistance to disadvantaged societies instills psychological empowerment through first-hand user experiences, bolstering soft skills and capacity to use ICT for solving daily problems and sustaining livelihoods as hypothesized:

Hypothesis H1. *National e-Strategy (NeS) initiatives significantly influence citizen empowerment (CE).*

The NCPF-NeS [42] provides a framework for a safe, secure, robust, and trustworthy cyber environment that mitigates and counteracts cybercrimes and cyberwarfare, building citizens' awareness, education, trust, and confidence in d-commerce through effective policy implementation. Abdullah et al. [39] hypothesized that there is a gap between convention (i.e., e-strategy) and the practice of d-commerce. As such, the relevant government entities and online service providers must develop a 'customer-centric' e-strategy that addresses stakeholders' needs and promotes widespread acceptance and adoption. According to Gorundutse and Hilman [43], a strategy has a significant influence on business performance. Various studies identify three dimensions for measuring a strategy: customer perspective [39], internal processes [44], and competitive strategy [44]. This study focuses on the relationship between e-strategy and customer perspective, paying attention to how privacy, security, trust, and risk matter affect the acceptance and adoption of d-commerce by disadvantaged citizens as postulated:

Hypothesis H2. *NCPF-NeS initiatives significantly influence citizens' perceptions of privacy (PP) on d-commerce.*

Hypothesis H3. *NCPF-NeS initiatives significantly influence citizens' perceptions of security (PS) on d-commerce.*

Hypothesis H4. *NCPF-NeS initiatives significantly influence citizens' perceptions of trust (PT) on d-commerce.*

Hypothesis H5. *NCPF-NeS initiatives significantly influence citizens' perceptions of risk (PR) on d-commerce.*

National policy initiatives should lay out clear procedures and measures to ensure that individuals and organizations exercise control over access to their information and online transactions and lay out punitive actions against cyber privacy perpetrators [45]. Considering this, hypothesis H6 reads:

Hypothesis H6. *Perceived privacy (PP) positively affects d-commerce use intention (DCUI).*

To build the confidence and trust of online consumers, the NCPF should layout the broader terms and procedures for a "safe, secure, reliable, dependable and trustworthy cyberspace supported by the judiciary system to facilitate the protection of critical information infrastructure and strengthen shared human values" [42] (p. 12). Aboobucker and Bao [46] suggest that customers use perceptions and beliefs of the integrity of the organization and the reliability of the Internet to measure the security strength of d-commerce. The same authors argue that the "average e-service user is not knowledgeable enough to distinguish the various website security features." For instance, if online service providers remain elusive to customers on why they are collecting specific data, for how long they are going to keep it, its integrity, confidentiality, and access by third parties, most customers remain skeptical and reluctant to adopt online services as hypothesized:

Hypothesis H7. *Perceived security (PS) positively affects d-commerce use intention (DCUI).*

Hypothesis H8. *Perceived trust (PT) positively affects d-commerce use intention (DCUI).*

3.2. Affective Decision-Making Theory of Optimism Bias and Risk (ADMTOB)

The ADMTOB uses two cognitive processes, i.e., the 'rational' and the 'emotional' that a person takes under risk and uncertainty conditions [37]. The "rational process decides on an action, while the emotional process forms a perception of risk and in doing so, is optimistically biased" [37] (p. 2). Optimism bias (OB) is the degree of confidence in being less vulnerable than an average user when using a digital system [47]. The probability of one being attacked, hacked, or losing confidential information or money on d-commerce constitutes a personal risk. Thus, the acceptance and use of d-commerce may rely on trust and optimism bias. Despite being aware of technology-related risks, citizens who regard themselves as technology-savvy continue to use online systems [37]. In this study, OB is measured as a second-order formative predictor of d-commerce use behavior and is defined by three first-order reflective items:

(1) Experience to circumvent—defines an individual's belief that their previous experience makes them less vulnerable to risks on d-commerce compared to an average user [48].
(2) Means to control (i.e., data rights)—refers to an individual's belief of having access to the necessary resources and tools to circumvent security breaches [49,50]
(3) Trust my skills—refers to one's confidence in their ICT skills to exercise a course of action to avoid information security breaches compared to his/her peers [48].

The ADMTOB has not been widely used to study d-commerce adoption in disadvantaged and marginalized communities [50]. Thus, it provides new insights as hypothesized:

Hypothesis H9. *Perceived risk (PR) has a positive effect on d-commerce use intention (DCUI).*

Hypothesis H13. *Optimism bias (OB) has a positive effect on d-commerce use behavior (DCUB).*

3.3. Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)

The UTAUT2 is an extension of the original UTAUT model designed to suit the consumer-use acceptance context by eliminating the individual variable of voluntariness and incorporating three new constructs of hedonic motivation, price value, and habit [51]. The UTAUT2 theory suggests that the type of resources, capabilities, and opportunities at one's disposal affect behavioral realization. This perception of behavioral control leads to actual behavior, i.e., use behavior. A recommendation is a post-adoption act determined by an individual's perceptions and experience with a system [52]. Zhou [53] identifies use behavior as a strong predictor of an 'intention to recommend.' In the B2C context, where adoption and use of d-commerce are voluntary, persuasive, and positive recommendations, mediated by the service provider's trust and online systems, have a positive effect on diffusion [34]. The flexibility of the UTAUT2 to integrate with citizen empowerment, optimism bias, and propensity to recommend variables to predict d-commerce use behavior makes this model pertinent to this study. Thus, this study posits that:

Hypothesis H12. *D-commerce use intention (DCUI) has a positive effect on d-commerce use behavior (DCUB).*

Hypothesis H14. *D-commerce use behavior (DCUB) has a positive effect on 'propensity to recommend' (PTR).*

3.4. Citizen Empowerment Theory

Two empowerment theories underpin this study: the psychological empowerment theory [54] and the STEP Empowerment Framework [55]. The STEP framework posits that citizens are not necessarily empowered by having access to ICTs and information. Instead, technology is a potential tool for empowerment, provided the relevant sociocultural, technical, informational, economic, and political conditions exist. This framework has been primarily applied to understand how ICT-enabled citizen engagements can improve the quality of the public service delivery system for impoverished communities [56]. Regardless of the widespread use of empowerment theories in the organizational and community contexts, its application in studying the empowerment of disadvantaged and marginalized people through B2C d-commerce remains subdued. This was demonstrated by the cursory analysis done in this study [57,58]. The STEP Framework and psychological empowerment theory view empowerment as a set of interrelated dimensions [10,59]. In this study, the citizen empowerment construct is informed by the e-Strategy Framework [36] and measured as a second-order formative predictor of d-commerce use intention and 'propensity to recommend'. From these two empowerment theories, citizen empowerment is defined by five first-order dimensions, namely:

(1) Capability/psychological—assess the skills required to competently execute tasks on d-commerce, self-reflect, and solve problems [54].
(2) Sociocultural—refers to citizens' motivation to participate and their capabilities to access and use the information for cultural expression [59].
(3) Technical and information—describes the artifacts of the websites (i.e., tools and information available, how they have been designed, accessibility to marginalized areas, security features, real-time interaction) required to empower citizens through ICT [36].
(4) Meaning—refers to an individual's perception of the value associated with their participation in B2C d-commerce [10].
(5) Economic considerations—refers to the costs associated with acquiring and accessing digital technologies and the benefits derived [25].

Sustainable Development Goal number ten [19] identifies ICTs as catalysts for reducing inequalities within a country by ensuring that the disadvantaged and underserviced

segments of society are empowered by having access to information, knowledge, and derived benefits through use. Several scholars [30,56,60] identify citizen consultation, establishing telecentres to administer digital literacy, making internet bandwidth accessible and affordable to disadvantaged communities, and conscientization as fundamental for persuasive d-commerce adoption. This study hypothesizes that when disadvantaged people are made aware of the benefits of using d-commerce and receive the right skills and an enabling economic environment, they are likely to adopt and recommend it to others. Thus, hypotheses H10 and H11 read:

Hypothesis H10. *Citizen empowerment (CE) has a positive effect on d-commerce use intention (DCUI).*

Hypothesis H11. *Citizen empowerment (CE) positively affects the propensity to recommend d-commerce (PTR).*

4. Research Model

Considering the literature review and theoretical grounding discussed above, this study integrates selected constructs from UTAUT2 with NCPF-NeS, ADMTOB, and citizen empowerment to fill a research gap in d-commerce adoption, use, and empowerment of disadvantaged and marginalized communities for sustainable livelihoods. The Extended Unified Theory of Acceptance and Use of Technology has been adapted and applied for various technology acceptances [61,62]; however, the common use of these four theories in d-commerce adoption and empowerment of disadvantaged communities is unique. Impoverished and marginalized communities are characterized by abject poverty, a digital and utilization divide, and a lack of information and skillsets to actively participate in the digital economy for sustainable development. Thus, this study explores the anchoring role of national policy initiatives targeted at citizen empowerment through ICTs in the digital economy and curbing cybersecurity concerns to promote d-commerce adoption and use. The proposed model (see Figure 1) identifies three dependent variables: d-commerce use intention, d-commerce use behavior, and the propensity to recommend. Despite receiving some attention at the policy formulation level and discussion forums, the role, implementation, and impact of the national cybersecurity policy in addressing threats to d-commerce, influencing the behavior and intentions of disadvantaged and marginalized people to actively engage in d-commerce in South Africa, remain subdued in the literature [63]. Figure 1 shows the research model with the fourteen proposed hypotheses.
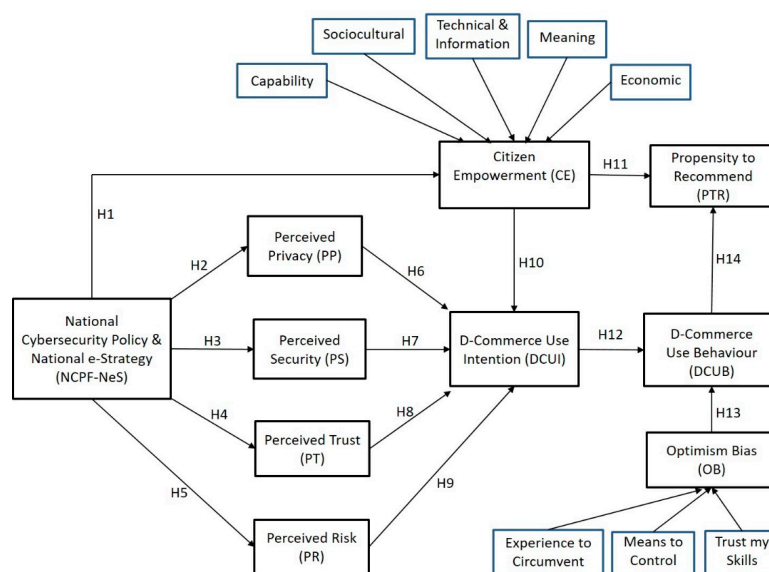

Figure 1. B2C d-commerce conceptual framework.

5. Methodology

Two separate survey instruments were administered to disadvantaged and marginalized B2C consumers in Limpopo Province, South Africa to test the hypotheses and establish the model fit. This study reasons that respondents should have used the Internet and any form of d-commerce to make a meaningful contribution, thus, the premise for administering the first screening-out survey. The second, detailed survey aimed to assess respondents' (16 years old and above) perceptions of the effect of cybersecurity and citizen empowerment on their intentions to use and recommend d-commerce to other disadvantaged community members based on their B2C d-commerce experiences.

5.1. Measurement Instruments

The closed-ended survey questionnaire used for data collection in this study was adapted from previous studies [10,37,43,63–65]. The questionnaire had three significant sections. Section A: collected socio-demographic related information, Section B: gathered citizens' experience in using the Internet and d-commerce; and Section C: factors affecting participants' intention to use, use behavior, and propensity to recommend d-commerce measured using five-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree). A funnel method was used to ask questions from Section B to Section C, i.e., from general to specific questions relating to the DCUI, DCUB, and PTR independent construct variables. Table A1 in Appendix A shows the construct items used in the main survey questionnaire. The original primary survey instrument was designed in English and then translated by professional translators into four significant languages (Afrikaans, Sepedi, Tsonga, and Venda) spoken in the Limpopo Province of South Africa to ensure full participation and easy comprehension by respondents. Since closed-ended questions were used and the sequence of the questions was not altered across the different versions, no back translation was required.

5.2. Sampling and Data Collection

The study was conducted in the Limpopo Province's five districts (Capricorn, Mopani, Sekhukhune, Vhembe, and Waterberg) in South Africa, targeting lived experiences and perceptions of B2C d-commerce users in urban, peri-urban, rural areas, farming areas and the countryside. Before completing the questionnaire, the researcher explained the purpose of the survey, highlighting that participation was voluntary with no financial rewards. All collected information was treated with confidentiality and anonymity and used solely for academic purposes and nothing else. A respondent-driven sampling (RDS) strategy was used to gather 983 usable surveys. Abu-Shanab and Shehabat [66] suggest that the sample size for any structural equation modeling should be 10–20 surveys per construct variable of the research model. Considering the first- and second-order predictors, seventeen variables were identified for this study. This translates to a minimum of 360 surveys (i.e., 20 × 18). The 983 surveys used for this study are considered adequate, surpassing the minimum threshold (i.e., 983 > 360). Data collection was administered between October 2020 and May 2021. The socio-demographic information of the respondents is shown in Table 1.

Table 1. Profile of respondents (n = 983).

Variable	Frequency	Percentage (%)
Gender		
Female	434	44.2
Male	549	55.8
Age		
16–25 years	77	7.8
26–35 years	295	30.1
36–45 years	339	34.5
46–55 years	190	19.3
Above 56 years	82	8.3

Table 1. *Cont.*

Variable	Frequency	Percentage (%)
Education Qualifications		
Metric Certificate	92	9.4
Diploma	261	26.5
Degree	297	30.2
Masters	146	14.9
Doctorate	101	10.3
Others	86	8.7
Profession		
Employed	432	43.9
Self-Employed	145	14.8
Unemployed	190	19.3
Student	174	17.7
Other	42	4.3
Net Monthly Income (ZAR.)		
Below ZAR 5000	296	30.1
Between ZAR 6000 and ZAR 14999	254	25.8
Between ZAR 15000 and ZAR 24999	201	20.4
Between ZAR 25000 and ZAR 34999	133	13.5
Above ZAR 35000	100	10.2

6. Data Analysis and Results

Using structural equation modeling (SEM), the proposed research model and research hypotheses were analyzed using IBM Amos version 26 for Windows. IBM Amos is a covariance-based SEM (CB-SEM) technique used for theory testing and confirming hypotheses using empirical data [67]. Confirmatory studies using CB-SEM require large sample sizes and normally distributed data, and this study complies [67]. Confirmatory factor analysis established the key predictors of d-commerce adoption, use, and propensity to recommend. The proposed model is complex with 18 endogenous variables; the sample size was large (n = 983) and fulfills Abu-Shanab and Shehabat's [66] suggestion for a sample size to be 10–20 surveys per construct variable in the research model.

6.1. Data Cleaning and Normality Test

The IBM Statistical Package for Social Sciences (SPSS) version 28.0 for Windows tests data normality after screening out all surveys with missing or incorrectly completed entries. For SEM, Hair et al. [67] suggest that data should first be tested for homogeneity to establish its normality. To achieve this, and as suggested by Ho and Yu [68] for large sample sizes (n > 300), the Kolmogorov–Smirnov test for normality was conducted to test skewness (sk) and kurtosis (k) of the data sets for all the variables. Analysis of the data shows that two items of perceived privacy (sk = −1.509; k = 5.620 and sk = 1.915; k = 3.908), two for perceived trust (sk = −2.521; k = 3.102 and sk = 1.489; k = 6.763;) and one item for use intention (sk = −1.611; k = 4.137), were not normally distributed due to high-kurtosis and skewness values. Boxplots were generated to identify the outliers (i.e., 69 and 792 for PP; 52 and 701 for PT; and 86 for use intention). Therefore, the winsorization approach was employed by modifying the weights of the outliers by replacing them with the second largest and second smallest values in the observations. Table 2 shows the Kolmogorov–Smirnov tests Lilliefors significance correction for normality performed after winsorization with all values for the constructs not significantly different from being normally distributed (i.e., $p < 0.05$) [69].

Exploratory factor analysis (EFA) with the varimax rotation method was conducted to assess whether the construct items were correlated with each construct and suitable for factor loadings (see Table A1 in Appendix A). A sampling adequacy Kaiser–Meyer–Olkin (KMO) value of 0.908 was obtained, which is superb [70]. The Bartlett Test of Sphericity was used to measure the strength of the relationships and multivariate normality. An approximate

Chi-Square (χ^2) value of 496.708, and a degree of freedom (Df) of 285, were significant (Sig. = 0.000). All items, except (PP3, PP5, PT2, PT5, and DCUI3) were multivariate normal, with KMO values above the recommended 0.6 [70]. This confirms the loaded construct items (see Table A1 in Appendix A).

Table 2. Kolmogorov–Smirnov normality results.

Measured Items	Statistic	df	Sig. (*p*-Value)
PP	0.438	609	0.010
PS	0.409	600	0.000
PT	0.400	599	0.000
PR	0.399	599	0.001
CE	0.385	292	0.000
OB	0.447	627	0.000
PTR	0.399	597	0.000
DCUI	0.457	621	0.000
DCUB	0.461	588	0.000
NCPF-NeS	0.447	627	0.000

Notes: PP, perceived privacy; PS, perceived security; PT, perceived trust; PR, perceived risks; CE, citizen empowerment; OB, optimism bias; PTR, propensity to recommend; DCUI, d-commerce use intention; DCUB, d-commerce use behavior; NCPF-NeS, national cybersecurity policy and e-Strategy.

Because both the independent and dependent variables were measured using the same survey instrument, there was a possibility of discrepancies arising in the responses, thus, a common methods bias (CMB). A Harman's single factor test [71] was used to assess for CMB, and the first significant component's eigenvalue was within the recommended range of less than 50% (i.e., 14.29%) [72]. This finding demonstrates that CMB was not a problem since the remaining unextracted variance explained many factors.

6.2. Measurement Model

The proposed B2C d-commerce model consists of first-order and second-order formative constructs. Internal consistency reliability, convergent validity, and discriminant validity [67] evaluated the measurement model for the first-order reflective constructs. Cronbach's α and composite reliability (CR) (Table 3) were used to assess the internal consistency reliability for each construct. Values for both the CR (i.e., 0.86 to 0.98) and Cronbach's α (i.e., 0.80 to 0.97) for all latent variables were above the minimum recommended value (0.70), thus, suggesting a good internal consistency [73]. Convergent validity was evaluated by examining the average variance extracted (AVE) for each construct of the proposed model. All measurement items had AVE values higher than 0.5 (Table 3), thus, demonstrating a good convergent validity [67]. Two approaches were used to examine discriminant validity. First, the square root of AVE should always be greater than the AVE [74]. From Table 3, all square roots of AVE were greater than their respective AVE values with the symbol "†" Second, any measurement item loads more highly on the construct they are measuring than the rest of the constructs [75]. Overall, the measurement model was superb. Because both the independent and dependent variables were measured using the same survey instrument, there was a possibility of discrepancies arising in responses. Thus, a common methods bias (CMB).

Multicollinearity and statistical significance of the weights were used to evaluate the measurement model for the two second-order formative constructs (citizen empowerment and optimism bias). Specifically, multicollinearity is assessed by two factors estimated using IBM SPSS regression analysis, the variance inflation factor (VIF) and tolerance factor [76]. The VIF values for the citizen empowerment construct varied from 1.006 to 1.502 (Table 4), while that for the optimism bias extended from 1.131 to 1.724 (Table 5). Therefore, all VIF weights were within the recommended 1 to 5 ranges [67] with statistically significant weights ($p < 0.01$). This demonstrates the absence of collinearity.

Table 3. Cronbach's α; CR, composite reliability; AVE, correlations and the square root of AVE.

Construct	CA-α	CR	AVE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. NCPF-NeS	0.92	0.95	0.87	0.93 †															
2. Perceived privacy	0.94	0.96	0.89	0.59	0.94 †														
3. Perceived security	0.93	0.95	0.88	0.46	0.63	0.95 †													
4. Perceived trust	0.91	0.93	0.78	0.43	0.52	0.28	0.88 †												
5. Perceived risk	0.90	0.94	0.84	0.39	0.55	0.39	0.54	0.92 †											
6. DCUI	0.96	0.98	0.93	0.47	0.46	0.35	0.35	0.63	0.96 †										
7. DCUB	0.94	0.96	0.89	0.50	0.42	0.50	0.60	0.42	0.49	0.94 †									
8. PTR	0.95	0.96	0.90	0.42	0.51	0.43	0.52	0.51	0.40	0.31	0.95 †								
9. Capabilities	0.88	0.92	0.75	0.44	0.40	0.47	0.44	0.46	0.36	0.29	0.57	0.87 †							
10. Sociocultural	0.89	0.92	0.76	0.38	0.36	0.53	0.37	0.40	0.20	0.41	0.58	0.29	0.87 †						
11. T and I	0.81	0.87	0.66	0.37	0.62	0.25	0.43	0.27	0.28	0.40	0.46	0.33	0.60	0.81 †					
12. Meaning	0.86	0.91	0.77	0.49	0.52	0.46	0.31	0.39	0.47	0.55	0.40	0.48	0.55	0.53	0.89 †				
13. Economic	0.97	0.98	0.95	0.41	0.45	0.48	0.56	0.39	0.55	0.34	0.22	0.17	0.46	0.41	0.48	0.97 †			
14. ETC	0.80	0.86	0.64	0.52	0.48	0.21	0.50	0.42	0.52	0.58	0.39	0.20	0.33	0.52	0.48	0.54	0.80 †		
15. Means to control	0.82	0.88	0.65	0.39	0.39	0.45	0.28	0.45	0.42	0.29	0.39	0.54	0.38	0.26	0.43	0.37	0.65	0.81 †	
16. Trust my skills	0.83	0.89	0.67	0.46	0.37	0.39	0.49	0.52	0.33	0.37	0.45	0.48	0.22	0.44	0.51	0.40	0.53	0.58	0.82 †

Notes: CA-α, Cronbach's α; CR, composite reliability; AVE, average variance extracted; †, square roots of AVE in bold; NCPF-NeS, national cybersecurity policy, and e-Strategy; ETC, experience to circumvent; T and I, technology and information; PTR, propensity to recommend; DCUB, d-commerce use behavior; DCUI, d-commerce use intention.

Table 4. Citizen empowerment construct measurement model assessment.

Second-Order Formative Construct	First-Order Reflective Construct	Tolerance	VIF	Weight
Citizen Empowerment	Capability	0.034	1.006	0.311 **
	Sociocultural	0.011	1.483	0.434 ***
	Technological and Information	0.023	1.054	0.358 ***
	Meaning	0.019	1.071	0.387 ***
	Economic	0.002	1.502	0.485 ***

Notes: ** $p < 0.01$; *** $p < 0.001$.

Table 5. Optimism bias constructs measurement model assessment.

Second-Order Formative Construct	First-Order Reflective Construct	Tolerance	VIF	Weight
Optimism bias	Experience to circumvent	0.012	1.724	0.523 ***
	Means to control	0.127	1.131	0.391 ***
	Trust my skills	0.098	1.306	0.416 ***

Notes: *** $p < 0.001$.

The tolerance factor for the citizen empowerment construct ranged from 0.002 to 0.034 (Table 4) and that for optimism bias, from 0.012 to 0.127 (Table 5). The tolerance factors for all the two reflective-formative constructs were within the 0 to 1 rule of thumb range. The closer they are to zero, the more robust the association between the measurement items of each second-order variable [77].

6.3. Structural Model

Two approaches, Hair et al. [67], were used to test and validate the overall fit of the structural model: firstly, by evaluating several fit indices for the retention model against the revised structural model. Secondly, by conducting a structural path analysis of the hypothesized model to establish path coefficients (beta value, β), standard error estimates per iteration, t-tests, and significance (*p*-values). Table 6 shows the retention and revised structural models' index values. The retention model has some index values below the recommended ranges. For example, the chi-square over degrees of freedom (χ^2/df) ratio (3.03) for the retention model was above the recommended value (i.e., 3), GFI, NFI, and RFI values were below 0.90; and the TLI and IFI were below 0.95. Thus, showing a lack of model fit in the retention model [78]. As presented in Table 6, all indices of the revised structural model were more significant than the recommended values. Therefore, the findings demonstrate a good model fit [79,80].

Table 6. Structural model fit indices for the retention vs. revised structural model.

Fit Index	Recommended Value	Retention Model (CFA)	Revised Structural Model
χ^2	n/a	561.214	496.708
Df	df $\geq$ 0	367	285
χ^2/df	1 < df < 3	3.03	1.55
Probability Level (*p*)	*p*-value < 0.05	0.008	0.000
GFI	$\geq$0.90	0.873	0.988
AGFI	$\geq$0.80	0.801	0.875
NFI	$\geq$0.90	0.798	0.970
RFI	$\geq$0.90	0.879	0.946
TLI	$\geq$0.95	0.936	0.969
IFI	$\geq$0.95	0.942	0.987
CFI	$\geq$0.90	0.901	0.955
RMSEA	<0.08 (good fit); <0.05 (excellent fit)	0.065	0.024

Notes: χ^2, Chi-Square; Df, degree of freedom; χ^2/df, chi-square over degrees of freedom; GFI, goodness-of-fit index; AGFI, adjusted-goodness-of-fit index; NFI, normed-fit index; RFI, relative-fit index; TLI, Tucker–Lewis index; IFI, index of fit; CFI, comparative fit index; RMSEA, root-mean-square-error of approximation.

The second part of the structural model involved establishing the path coefficients and hypotheses testing (see Table 7). Hypotheses of this study were tested using Hair et al.'s [67] rule of thumb, which states that the parameter coefficient (standardized loading weight) of the hypothesized relationship is statistically significant ($p < 0.05$) when its t-test value is above 1.96. From Table 7, it can be established that the national cybersecurity policy and e-Strategy had a significant influence ($p < 0.05$) on citizen empowerment, perceived security, and perceived trust. The standardized loading weights and t-test values were 0.87 and 12.43 for citizen empowerment, 0.80 and 6.67 for perceived security, and 0.39 and 4.88 for perceived trust. Based on these results, hypotheses H1, H3, and H4 were accepted. Similarly, the t-test values for the relationships (NCPF-NeS → PP; 1.40) and (NCPF-NeS → PR; 1.56) were below the 1.96 rule of thumb [67] and not significant ($p > 0.05$). Accordingly, hypotheses H2 and H5 were rejected on the same grounds, and their hypothesized paths were deleted (see Figure 2) to improve the model fit [75]. In line with the findings of this study, the National e-Strategy did not affect citizens' perception of privacy and risks when using d-commerce.

Table 7. Summary of path coefficients and hypotheses testing.

Hypothesis	Hypothesized Path	Weight Loading (SLW)	S. E	CR/t-test	*p*-Value	Adj. R²	Hypothesis Supported?
H1	NCPF-NeS → CE	0.87	0.07	12.43	***		yes
H2	NCPF-NeS → PP	0.21	0.15	1.40	0.17		no
H3	NCPF-NeS → PS	0.80	0.12	6.67	***		yes
H4	NCPF-NeS → PT	0.39	0.08	4.88	0.01 **		yes
H5	NCPF-NeS → PR	0.28	0.18	1.56	0.07		no
H6	PP → DCUI	0.41	0.08	5.23	***	}	yes
H7	PS → DCUI	0.55	0.09	6.11	***	}	yes
H8	PT → DCUI	0.81	0.07	11.57	***	}0.71	yes
H9	PR → DCUI	−0.34	0.09	−3.78	0.03 *	}	yes
H10	CE → DCUI	0.70	0.06	11.67	***	}	yes
H11	CE → PTR	0.88	0.08	11.00	***	}0.85	yes
H12	DCUI → DCUB	0.89	0.07	12.71	***	}0.78	yes
H13	OB → DCUB	0.65	0.07	9.29	***	}0.78	yes
H14	DCUB → PTR	0.59	0.06	8.83	***	}0.85	Yes

Notes: SE, standard error; CR, critical ratio/t−tests; *p*-value, significance level; NCPF-NeS, national cybersecurity policy, and e-Strategy; DCUI, d-commerce use intention; DCUB, d-commerce use behavior; CE, citizen empowerment; PP, perceived privacy; PS, perceived security; PT, perceived trust; PR, perceived risk; PTR, propensity to recommend; OB, optimism bias; Adj. R², adjusted squared multiple correlations. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.
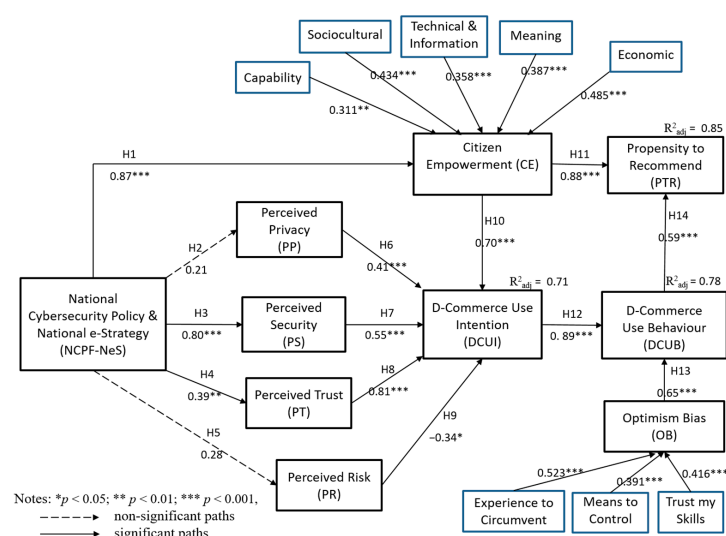

Figure 2. Structural model results.

Evidence (see Table 7) shows that all five hypothesized predictor variables had a significant influence on the DCUI dependent variable. The respective SLW and t-test values were 0.41 and 5.23 (p = 0.000) for (PP → DCUI), 0.55 and 6.11 (p = 0.000) for (PS → DCUI), 0.81 and 11.57 (p = 0.000) for (PT → DCUI), −0.34 and −3.78 (p = 0.030) for (PR → DCUI) and 0.70 and 11.67 (p = 0.000) for (CE → DCUI). Therefore, hypotheses H6, H7, H8, H9 and H10 were accepted.

Furthermore, the results show that citizen empowerment significantly influenced the propensity to recommend d-commerce to others. This is evidenced by an SLW of 0.88 and a t-test value of 11.00 (p = 0.000); thus, H11 was accepted. As evidenced in Table 7 and Figure 2, intention to use d-commerce was the strongest predictor of d-commerce use behavior (SLW = 0.89, t-test = 12.71 and p = 0.000), while optimism bias exerted a positive and significant effect on d-commerce use behavior (SLW = 0.65, t-test = 9.29 and p = 0.000). Similarly, d-commerce use behavior was a strong and significant predictor of a propensity to recommend among disadvantaged and marginalized people as confirmed by SLW value of 0.59 and t-test = 8.83 (p = 0.000). As such, hypotheses H12, H13 and H14 were accepted.

Figure 2 illustrates the adjusted squared multiple correlations ($R2_{adj}$) statistical measures (ranging from 0 to 1), SLW, and significance. As shown in Figure 2, the proposed model explained 71% of the variances in the DCUI, while 78% were explained for the DCUB and 85% for the PTR independent variables. This finding demonstrates the predictive power supremacy of the proposed model, with all values closer to 1 [67] in the context of disadvantaged and marginalized communities in South Africa.

7. Discussion

The study proposes and tests a model to understand the effect of national cybersecurity policy and e-strategy frameworks on citizens' behavioral intentions to adopt, use and recommend d-commerce among disadvantaged and marginalized community members in South Africa. The conceptual model is informed by the NCPF-NeS framework, UTAUT2, ADMTOB, and citizen empowerment theories. The results show that males dominate d-commerce adoption (55.8%). Forty-three percent (43.9%) of the respondents were employed, the majority (30%) earned less than ZAR 5000.00 net per month, and the 26 to the 46-year age group were eager to recommend d-commerce to others. Thus, disposable income and technical skills played a crucial part in the d-commerce adoption. The perceived security and perceived trust constructs were not only directly influenced by NCPF-NeS but also contributed positively and significantly toward d-commerce use intention. This finding concurs with earlier studies [46,81]. This implies that when disadvantaged and marginalized people view d-commerce as not offering enough security to transactions and personal information, they are bound to have little trust in the national framework meant to address these issues and the technologies themselves.

The findings also suggest that the NCPF-NeS plays no significant role in building citizens' confidence in the privacy or risky perceptions regarding d-commerce technologies. The data for this study could not support hypotheses 1 and 2, thus, calling for further investigation. This finding is unexpected and deviates from findings of prior studies [82,83], which established the two constructs as significant. A possible explanation of this finding could be that most transactions performed (i.e., telephonic ordering of goods and food items followed by the ATM card tap-payment option with the courier person) eliminated most risks associated with cyber hacking and theft. Similarly, privacy concerns to the possible loss of confidential banking details and personal information were less significant if the customer was not performing any transaction. This is in line with the findings of previous studies [84,85]. Perceived privacy and perceived risk were significant predictors of d-commerce use intention, which reaffirms the results of previous studies [75,86]. This finding implies that when the government enforces privacy issues stipulated in the national cybersecurity policy and through the judiciary system, citizens are motivated to adopt d-commerce technologies. Similarly, negative risk perceptions lead to low adoption, as established in previous studies [87,88]. This might explain why the adoption and use of

d-commerce technologies among disadvantaged and marginalized people are treated with skepticism in South Africa.

E-Strategy was found to be a significant predictor of citizen empowerment. This finding mirrors the results from previous studies on citizen empowerment [25,26]. These studies identify that setting up the right digital technology policies plays a catalytic role in empowering citizens with the right skills and resources required to adopt ICTs. The five first-order reflective items of capability, sociocultural, technical and information, meaning, and economic were significant predictors of citizen empowerment. Thus, citizen empowerment positively influenced the intention to use d-commerce. This finding reaffirms previous studies on empowerment through e-participation [10,58,61]. One possible plausible explanation for this finding could be that when disadvantaged and marginalized people receive the right ICT skills, they are psychologically empowered and determined, and when the government makes the Internet accessible and affordable, they are likely to adopt and recommend d-commerce to others.

Moreover, this study establishes that one's intention to use d-commerce leads to actual use behavior. Thus, only adopters find d-commerce useful and tend to recommend it to others, while non-adopters may not. This finding agrees with previous studies which found use intention as a strong predictor of use behavior in the technology acceptance context [53] and d-commerce adoption [89].

Similarly, optimism bias is a second-order construct with a significant impact on d-commerce use behavior. This study found the three first-order reflective items, namely, 'experience to circumvent,' 'means to control,' and 'trust my skills' as salient predictors of optimism bias. Despite having sticking privacy and risk concerns on d-commerce, the enlightened and educated individuals in disadvantaged and marginalized communities who regarded themselves as technologically savvy comparable to the average person remained resolute with d-commerce use. This finding mirrors the findings of previous studies on d-commerce adoption [42,50], which found optimism bias as a significant predictor of use behavior in disadvantaged setups.

Use behavior positively and significantly influences one's propensity to recommend d-commerce to others. This finding is consistent with the results of previous studies [10] on e-participation and d-commerce [10,81]. One plausible explanation for this finding could be that as users become experienced and enjoy the benefits of using d-commerce, they are most likely to recommend and assist others in using the same technology.

8. Implications of the Findings

The findings of this study have implications for theory building, ICT for development, and the managerial best practices discussed next.

8.1. Theoretical Implications

Crucially, this study contributes to theory building by proposing a comprehensive research model drawing from the national cybersecurity framework, e-strategy, behavioral intention, citizen empowerment, optimism bias, and propensity to recommend d-commerce to others in disadvantaged and marginalized communities. This mixing of concepts and empirical testing is unique and pertinent to emerging economies engulfed in deep socio-economic disparities that are attempting to achieve the Sustainable Development Goal 10 of poverty and inequality eradication. Thus, the NCPF-NeS plays a fundamental role in laying out privacy, security, trust, and risk mitigation mechanisms for d-commerce to enculturate a positive security perception in citizens and to encourage adoption and socio-economic sustainability. Governments can empower citizens through integrated activities guided by the NCPF-NeS by creating inner motivation and capabilities to realize the meaning and economic gains from d-commerce participation. Capabilities entail that once a disadvantaged person receives the right skill sets to use d-commerce, their intentions towards technology adoption can be positively influenced. Sociocultural, this may entail that citizens are more motivated to participate in d-commerce when they perceive themselves as

part of the 'mass d-commerce use wave'. The technical information aspect suggests that telecentre intermediaries at community levels may be required to assist disadvantaged and marginalized citizens with hands-on technical matters to persuade d-commerce adoption. Meaning entails that when individuals foresee value from using d-commerce, they are more motivated to use it and potentially recommend it to others. Finally, economics could imply that national policy frameworks should regulate the cost of acquiring digital devices and the cost of internet bandwidth required to access d-commerce to encourage adoption. Similarly, marginalized citizens are often in a dire financial predicament and any tangible gains in cost servings go a long way towards socio-economic sustainability. Integrating optimism bias into UTAUT2 as a second-order formative construct to inform use behavior in d-commerce provides new insights into the adoption discourse. This study explored and empirically proved that despite the privacy and risk concerns on d-commerce, when marginalized people are technologically empowered with the right skill sets and tools to circumvent cyber-attacks, they are likely to continue using such technologies and recommend others. Thus, this study contributes to a deeper understanding and evaluation of the first- and second-order multidimensional constructs in d-commerce [61].

Importantly, the findings of this study confirm the superior explanatory power of the proposed model in predicting d-commerce use intention, d-commerce use behavior, and the propensity to recommend. The DCUI achieved an adjusted squared multiple correlation of R2adj = 0.71, R2adj = 0.78 for DCUB and R2adj = 0.85 for PTR.

8.2. Implications for ICT for Development

Information and communication technology for development (ICT4D) is an academic discipline concerned with how technological tools could be used as developmental interventions to uplift poor, disadvantaged, and marginalized communities [90–92]. ICTs, with d-commerce technologies included, are being used as vehicles to promote many emerging economies' overall economic performances and growth [91]. In South Africa, specifically, the extensive penetration of the Internet and digital technologies such as smartphones and social networking is a reasonable opportunity for business organizations to conduct business competitively with existing customers and new market segments such as disadvantaged and marginalized communities using relatively cheaper methods of transactional costs [93]. Thus, B2C d-commerce is a crucial tool for national, regional, and global integration and inclusion and for curbing global challenges like coronavirus (COVID-19) through the effective distribution and selling of commodities online without exposing oneself by going into shopping malls.

Extending the work of previous scholars on B2C d-commerce adoption in emerging economies [6,20], our findings suggest that government interventions through a national e-Strategy are crucial for the survival and growth of B2C d-commerce. Together with B2C d-commerce firms, the government could advance the national developmental agenda on ICT by empowering disadvantaged and marginalized people with the right skills and tools, thus, reducing inequalities through the diffusion and adoption of B2C d-commerce across communities.

8.3. Practical Implications for Managers

On the practical frontier, the findings of this study provide a better understanding of how citizen empowerment, if not adequately addressed, could negatively impact developing nations and fail to reduce poverty and inequalities among their citizens. This suggests that marginalized people in disadvantaged and marginalized communities require multifaceted assistance from the government and d-commerce organizations to break the d-commerce technology utilization divide. Furnished with such information, decision and policymakers on the national e-Strategy policy should identify essential ICT skills lacking in communities through government-to-citizen consultations, regulating internet bandwidth costs, establishing a roadmap with clear timeframes for meeting targets, and establishing telecentres, science, and technology parks at strategic community levels to

administer training programs. Similarly, policymakers should collaborate with d-commerce managers to develop effective and efficient strategies for accelerating and promoting inclusive digital innovations. They should focus on promotional strategies like demonstrations to marginalized people on how to effectively use B2C d-commerce tools. Emphasis could be drawn to the economic value and servings one could achieve from using d-commerce and such initiatives could go a long way in creating a sense of allegiance to d-commerce and enculturating the positive empowerment perceptions required for someone to adopt and recommend such technologies to others.

Moreover, this ensures the socio-economic sustainability of marginalized people. Thus, all these efforts go a long way towards embracing the best inclusive digital innovation practices. Similarly, digital inclusive and responsive policies may be further enhanced.

Regarding optimism bias, d-commerce service providers and government agencies handling ICT matters should strive to empower citizens with the right technical skills. Such skills build one's confidence and expertise to circumvent online risks and attacks. Developing and empirically testing models addressing consumer perceptions and behavior on d-commerce in emerging markets is imperative to marketing and innovation directors seeking to expand their market shares. The findings of this study provide a crucial tool for championing a precise and persuasive d-commerce business expansion drive, coupled with community outreach, inequality reduction, and citizen empowerment.

9. Limitations and Future Research

The first limitation is the context in which this study was conducted (i.e., disadvantaged and marginalized communities in South Africa). Beyond this scope, the findings of this study are in question. Thus, caution should be taken when generalizing these findings as socio-economic and political circumstances vary drastically across nations. On the methodology frontier, the proposed research model focuses only on four customer perspective e-Strategy-related constructs (i.e., cybersecurity) as informing citizens' behavioral intention to adopt d-commerce. Yet, in practice, the NCPF-NeS constructs go beyond these five. Going forward, this is an area worth exploring, together with the non-significant constructs of perceived privacy and perceived risk in different circumstances across the region. To test the proposed model, empirical data was collected from participants with d-commerce experience. This selection criterion might have introduced some limitations by leaving out non-d-commerce users who might have brought fascinating insights into the discourse of d-commerce adoption, use, and recommendation intent. Future studies could involve users, non-users, technically savvy, and less experienced respondents. The relationships between e-strategy and perceived privacy (H2), and e-strategy and perceived risk (H5), which were not supported by data in this study, deserve further investigation. Beyond the scope of the proposed and tested model, constructs like social movement and activism [94] and emotional brand attachment [95] could enrich the discourse of d-commerce adoption in disadvantaged and marginalized communities.

10. Conclusions

It has never been easy to empower previously disadvantaged people in marginalized communities and convince them to adopt, continue using, and subsequently recommend d-commerce to others. Knowing which factors promote or hinder these processes is pertinent to organizations and governments attempting to eradicate poverty and inequalities. Drawing on the NCPF-NeS, UTAUT2, ADMTOB, and citizen empowerment theories, this study proposed a conceptual model to explain the effect of national policies on citizen empowerment, and how empowerment influences an individual's behavioral intention to adopt, use and recommend B2C d-commerce to others. The mediating effect of optimism bias on the propensity to recommend after continuance usage was explored. To empirically test the proposed model, a survey of 983 respondents from disadvantaged and marginalized communities in South Africa was administered. NCPF-NeS significantly predicts citizen empowerment, perceived security, and perceived trust. Perceived privacy, security, trust,

and risk greatly influenced d-commerce use intention. Citizen empowerment emerged as a salient predictor of d-commerce use intention and the propensity to recommend while d-commerce use intention and optimism bias positively predict use behavior. This study highlights that empowerment and poverty alleviation of disadvantaged and marginalized communities through d-commerce is complex and requires a multi-stakeholder approach to succeed. Findings from this study can help both public and private sector policymakers and practitioners involved in innovations for inclusive development like d-commerce and technology diffusion aimed at redressing inequalities, poverty alleviation, and the digital and utilization divide in disadvantaged and marginalized communities. The proposed B2C d-commerce research model offers a theoretical lens and a vantage point for scholars and policymakers to elevate the discourse of citizen empowerment through national policies, d-commerce adoption, use, and recommendations to other disadvantaged and marginalized people.

Appendix A

Table A1. Construct measurement item and factor loadings.

Construct	Item	Measurement	Loadings	Reference
National cybersecurity policy and e-strategy (NCPF-NeS)	NCPF-NeS1	I believe that national ICT policies are there to support the growth of d-commerce.	0.93	Makame et al. [21], Noruwana et al. [23]
	NCPF-NeS2	I believe the government is doing enough to encourage d-commerce adoption.	0.85	
	NCPF-NeS3	The government has established intermediaries to facilitate d-commerce use in our community.	0.92	
	NCPF-NeS4	I believe the government has put the right resources (capability, sociocultural, technical, and ICTs) for citizens to realize the gains from d-commerce use.	0.88	
	NCPF-NeS5	I believe that government incentives, subsidies, and regulations ease d-commerce adoption.	0.93	
Perceived privacy (PP)	PP1	I feel that my privacy is protected on d-commerce websites.	0.89	Dang and Pham [6]; Oliveira et al. [81]
	PP2	I am concerned that whatever information I provide on d-commerce may be used for other purposes without my consent.	0.90	
	PP4	I believe there are effective mechanisms to address online privacy violations of personal information and transactions.	0.78	

Table A1. *Cont.*

Construct	Item		Measurement	Loadings	Reference
Perceived security (PS)	PS1		I have confidence in the security of my transactions on d-commerce.	0.88	Aboobucker and Bao [46], Riquelme and Román [85]
	PS2		Entering confidential information on d-commerce is unsafe.	0.91	
	PS3		I believe d-commerce service providers implement robust security measures to protect online customers.	0.95	
Perceived trust (PT)	PT1		I have faith in the transactions on d-commerce.	0.85	Makame et al. [21], Wei et al. [75]
	PT3		I have no trust in d-commerce due to many uncertainties.	0.90	
	PT4		I trust the legal structure is there to assist me with problems encountered on d-commerce.	0.94	
Perceived risk (PR)	PR1		I believe shopping for a product online is riskier than offline shopping.	0.88	Wang [64], Fortes and Rita [96]
	PR2		I believe it is risky to provide my bank-card information to d-commerce businesses.	0.96	
	PR3		I believe there is a high risk of my transaction being hacked on d-commerce.	0.91	
Intention to use (DCUI)	DCUI1		If I have access to d-commerce, I predict I will use it.	0.96	Wei et al. [75], Makame et al. [21]
	DCUI2		If I am empowered with the right ICT skills, I would like to use d-commerce.	0.92	
	DCUI4		Given that I have access to d-commerce, I intend to use it.	0.89	
Use behavior (DCUB)	DCUB1		I will continue using d-commerce in the future.	0.87	Naranjo-Zolotov et al. [10]
	DCUB2		I will continue using d-commerce daily.	0.94	
	DCUB3		I vow to frequently transact on d-commerce.	0.93	
Optimism bias (OB)	Experience to circumvent	OBE1	I have the right experience circumventing security threats compared to the average user.	0.78	Cho et al. [48]
		OBE2	I will continue using d-commerce despite all risks associated with the Internet.	0.92	
	Means to Control	OBM1	I have the means to control information security threats on d-commerce	0.88	
		OBM2	I feel I can safely continue using d-commerce from my secure digital device.	0.79	
	Trust my Skills	OBT1	I am technically savvy and will always use d-commerce for my purchases.	0.90	
		OBT2	I trust my technical skills in overcoming any security breach while on d-commerce.	0.91	

Table A1. *Cont.*

Construct	Item	Measurement	Loadings	Reference
Citizen empowerment (CE)	Capability–CEC1	I have become skilled in using d-commerce.	0.96	
	CEC2	I can make a transaction on d-commerce without challenges.	0.87	
	CEC3	Government structures are available to conscientiously assist citizens in adopting d-commerce.	0.94	
	Sociocultural–CES1	I am motivated to participate in d-commerce for cultural expression.	0.88	
	CES2	I believe I am part of our community's 'social d-commerce wave' group.	0.91	
	Technology–CET1	I find d-commerce websites straightforward to maneuver and use.	0.79	Naranjo-Zolotov et al. [10], Kim and Gupta [26], World Bank [55]
	Information			
	CET2	There are telecentre intermediaries in our community to ease access to d-commerce.	0.81	
	Meaning CEM1	D-commerce I use is valuable to me.	0.90	
	CEM2	I believe there is a time-serving from d-commerce engagement.	0.85	
	CEM3	I believe there are cost savings from using d-commerce.	0.87	
	Economic CEE1	I have the suitable digital devices needed to access d-commerce.	0.86	
	CEE2	I can afford the cost of internet data bundles to access d-commerce.	0.92	
	CEE3	I get financial benefits/servings from using d-commerce	0.79	
Propensity to recommend	PTR1	I will recommend d-commerce to someone if I have a positive experience.	0.90	Oliveira et al. [91], Hoehle and Venkatesh [97]
	PTR2	I would recommend d-commerce to someone if I receive the proper training.	0.89	
	PTR3	I am likely to recommend d-commerce to anyone who requires my assistance.	0.93	

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