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DIGITAL LITERACY AMONG COOPERATIVE TRUSTEES IN SOUTHWEST NIGERIA: A DIGCOMP 3.0 ASSESSMENT AND SMART-COOPERATIVE READINESS ANALYSIS

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ABSTRACT

Nigeria's move towards digital economy and the quest for cooperative digitalisation in the country have made the digital literacy of cooperative trustees critical. In Nigeria, over four million cooperatives depend on elected trustees whose digital competencies are critical to their participation in the evolving digital economy. A review of extant cooperative literature, revealed a dearth of empirical information on the subject matter. Against this backdrop, this study utilised the DigComp 3.0 framework to assess the digital literacy of trustees in Southwest Nigeria. Specifically, the study assessed the level of digital literacy of the trustees across the five DigComp 3.0 competence domains. It employed a descriptive cross-sectional survey research design and multistage random sampling technique. Data were collected from 400 respondents through a structured questionnaire adapted from the DigComp 3.0 items. Of the 400 questionnaires distributed, 337 valid responses (84.3%) were analysed. The data was analysed using descriptive statistics, one-sample t-tests, Pearson correlation, and ordinary least squares (OLS) regression. Findings revealed that the overall digital literacy index (DLI: Mean=2.6454, SD=0.9868) was significantly below the midpoint [$t(336)=-6.593$, $p<.001$, 95% CI (−0.460, −0.251), Cohen's $d=-0.36$] indicating low digital literacy level. Nevertheless, the trustees exhibited the highest digital literacy competencies (above the 3.0 threshold) in Information and Data Literacy (IDL) domain (IDL; M=3.1088) but the least competencies in the Digital Content Creation domain (DCC; M=2.2404; $d=-0.73$). DLI correlated positively with smart-cooperative readiness ($r=0.47$, $p<.01$). OLS regression results confirmed DLI is significantly associated with readiness ($\beta=.47$, $R^2=.22$, $F(1,335)=94.7$, $p<.001$). The study concludes that trustees in southwest Nigeria, on a balance, are not digitally literate enough for smart cooperative adoption and recommends DigComp-aligned governance training to improve their digital literacy level.

Keywords: Digital Literacy Index; DigComp 3.0; Cooperative Trustees; Smart Cooperative; Southwest Nigeria; UTAUT

1. INTRODUCTION

The global enterprise digitalisation imperatives have altered the governance requirements of organisations operating in the rapidly evolving global economy. Across both advanced and emerging economies, institutions that once relied exclusively on paper-based records, physical meetings, and face-to-face transactions now operate within digital ecosystems that demand functional competence in data management, online communication, digital content creation, cybersecurity awareness, and technology-mediated problem-solving.

In Nigeria, the political will to digitize cooperatives is strong as evident in the recent ministerial advocacy on cooperative banks of Nigeria share capital mobilization and sensitization. The Ministry advocates for urgent cooperative digitalisation (Aliyu, 2026). Besides, Central Bank of Nigeria's (CBN) cashless policy, inaugurated in 2012 and subsequently embedded within the National Digital Economy Policy and Strategy (NDEPS) 2020–2030) identified cooperatives as delivery vehicles for digital financial services (Federal Ministry of Communication and Digital Economy (2020). In the same vein, the Institute of Cooperative Professionals of Nigeria (ICOPRON) which is the apex cooperative professional body in Nigeria, emphasized the need to digitize cooperative and adopt Artificial Intelligence (AI) in cooperative governance.in its recent 2026 mandatory continuous professional training (MCPT) Smart cooperative model embodies those capabilities.

Smart cooperatives, which are cooperative societies that adopt digital platforms for member data management, electronic payment processing, virtual meeting facilitation, and data-driven governance, represent the aspirational end-state of the policy agenda. However, the feasibility of smart-cooperative transition depends critically on the digital competence of the board and trustees who govern these societies. For instance, a president who cannot create a digital report, a treasurer who cannot manage an e-payment platform, or a general secretary who cannot diagnose a basic digital problem may find it very difficult to lead a digital governance transition regardless of the infrastructure available to them.

Research Objectives

The general objective of this study is to assess digital literacy among cooperative trustees in Southwest Nigeria. The specific objectives are to:

1. assess the level of digital literacy of cooperative trustees in Southwest Nigeria across the five DigComp 3.0 competence domains.
2. test whether the overall Digital Literacy Index (DLI) of cooperative trustees differs significantly from the scale midpoint of 3.00.
3. examine the relationship between digital literacy and readiness for smart-cooperative adoption.

Research Hypotheses

Ho1: There is no significant difference in mean DLI scores across the five competence domains.

Ho2: The overall DLI does not differ significantly from the scale midpoint of 3.00.

Ho3: There is no significant relationship between DLI and smart-cooperative readiness.

2. LITERATURE REVIEW

2.1 The DigComp 3.0 Framework

DigComp was introduced in 2013 as a reference framework for developing and understanding digital competence among citizens of the European Union (European Commission Joint Research Centre, 2022). Subsequent iterations and refinement of the digital competence framework (i.e. DigComp 2.0 in 2016; 2.1 in 2017 and 2.2 in 2022) have occurred based on the evolution of the digital environments, proficiency levels and applications in diverse contexts (Vuorikari et al., 2022). The most recent release, DigComp 3.0, maintains the five core competence areas while extending their scope to encompass artificial intelligence (AI), data literacy, and digital environmental awareness (Cosgrove & Cachia, 2025). This study adopts the DigComp 3.0 framework being the most comprehensive and recent in the DigComp series. The framework incorporates AI which is revolutionising the global economy and demanding of AI skillsets. Ignoring this vital AI inclusion can undermine the study relevance at this time.

The five competence areas comprise (i) Information and Data Literacy (IDL), (ii) Communication and Collaboration (CC), (iii) Digital Content Creation (DCC), (iv) Safety (S) and (v) Problem Solving (PS). The IDL represents the capacity to browse, search, filter, evaluate, manage digital information and data, and understand how algorithms and data

practices shape the information environment. The CC represents the ability to share information through digital technologies, engage in digital citizenship, manage digital identity, and participate ethically in networked environments. The DCC represents the capacity to create and edit digital content across formats (text, image, audio, video), integrate and remix existing content, and understand the legal and ethical dimensions of digital authorship. Safety (S) connotes the ability to protect devices, content, personal data, health, and the natural environment when operating in digital contexts. PS, on the other hand, is the ability to identify and resolve technical problems, to evaluate digital tools creatively, and to identify and address personal competence gaps (Vuorikari et al., 2022).

2.2 Theoretical Framework

The study is based on the Unified Theory of Acceptance and Use of Technology (UTAUT) which is a refined Technology Acceptance Model (TAM) model. Davis (1989) proposed TAM as a parsimonious account of why individuals adopt information systems. This proposition foregrounded the perceived usefulness (the degree to which a system is believed to enhance job performance) and perceived ease of use (the degree to which the system is believed to be free from effort) psychological measures in TAM. TAM has been applied extensively in contexts ranging from enterprise information systems to mobile banking in developing economies (Atarodi et al., 2019; Druică et al., 2026; Shaikh & Karjaluoto, 2015; Souiden et al., 2020). However, systematic comparative reviews identify an explanatory ceiling in TAM when applied to organisational settings, where the social and institutional context (professional hierarchies, peer norms, resource availability) shapes adoption in ways that TAM's individual-level constructs do not fully capture (Díaz-Arancibia et al., 2025).

Venkatesh et al. (2003) addressed the TAM limitation by proposing the Unified Theory of Acceptance and Use of Technology (UTAUT). The theory synthesising eight antecedent frameworks into four core constructs comprising (i) Performance Expectancy (PE), (ii) Effort Expectancy (EE), (iii) Social Influence (SI), and (iv) Facilitating Conditions (FC). PE represents the degree to which using the technology will provide gains in job performance while EE connotes the degree of ease associated with using the technology. The SI refers to the degree to which significant others believe the individual should use the system; and FC captures the degree to which technical and organisational infrastructure supports use (Venkatesh et al., 2003).

This study adopts the UTAUT model. UTAUT is suited to developing-country institutional contexts because it formalises social influence and facilitating conditions, which are salient in settings characterised by professional hierarchies and fragmented digital infrastructure (Sakib et al., 2025; Yakubu & Dasuki, 2019) which is true for Nigeria in general and Southwestern Nigeria in particular. The theoretical bridge between DigComp-based digital literacy and UTAUT-defined readiness is conceptually demonstrated thus: for instance, a trustee with higher DCC and Problem-Solving competencies will perceive digital cooperative platforms as more useful (higher PE) and less effortful (lower EE) leading to increase in their smart cooperative adoption intention (smart-cooperative readiness).

2.3 Cooperative Digitalisation in Nigeria.

Nigeria's NDEPS 2020–2030 establishes a roadmap for digital economic transformation. This roadmap encompasses broadband expansion, digital skills development, digital finance, and e-government (Federal Ministry of Communications and Digital Economy, Nigeria, 2020). The policy identifies financial cooperatives as platforms for extending cashless payment infrastructure to the last mile. Recent ministerial advocacy on establishing cooperative banks emphasized digitalisation of cooperatives as critical to achieving true integration of the bank into the ecosystems of the cooperatives it is established to serve (Aliyu, 2026). Yet, competency benchmarks for cooperative governance actors are not set or provided. This policy gap creates a structural vulnerability. The infrastructure investment envisaged may not achieve optimization if the cooperative leaders responsible for digital governance are themselves digitally illiterate.

2.4 Conceptual Framework

The conceptual framework for this study positions DigComp 3.0 domain competencies (IDL, CC, DCC, Safety, PS) as the antecedent inputs that aggregate into an overall Digital Literacy Index (DLI) which in turn is associated Smart-Cooperative Readiness (R). Smart-cooperative readiness connotes the intention to adopt smart cooperatives. Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) serve as enabling moderators of the DLI→Readiness pathway, consistent with UTAUT. This framework integrates DigComp (supply-side, competence profiling) with UTAUT (demand-side, adoption readiness) to create a diagnostic- model that simultaneously identifies

competence gaps and forecasts institutional readiness. In the present study, the framework is tested at the correlational and regression level.

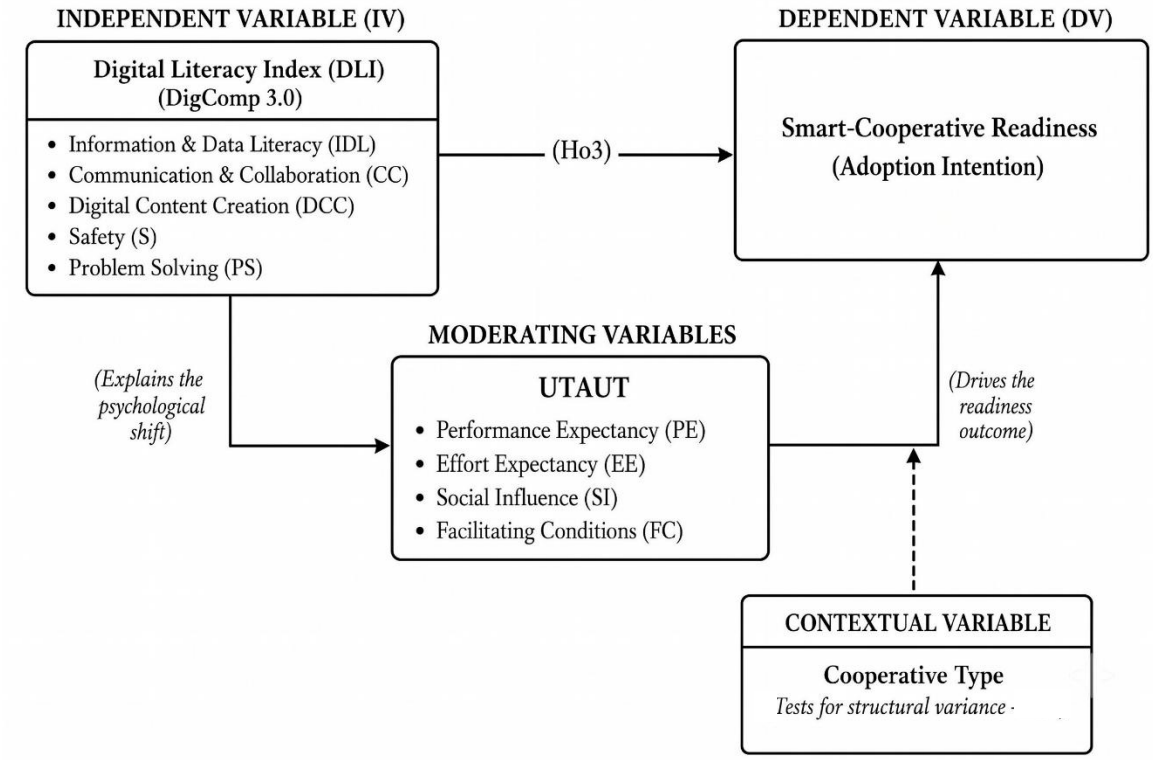

Figure 1: Conceptual framework

Note: The proposed moderating and contextual variables are not empirically tested in this study but included for future studies.

3. METHODOLOGY

3.1 Research Design

This study adopted a cross-sectional descriptive survey design within a quantitative methodological framework. The descriptive research design captures the current digital literacy competencies among the trustees. Cross-sectional research designs enable researchers to capture data at a single point in time. In this case, it helped in capturing the digital literacy level of the trustees in 2025. Quantitative framework enables systematic aggregation of self-reported competency ratings into comparable indices suitable to inferential testing (Cohen, 1992). The ontological assumption of the study is positivist. The assumption holds that digital literacy is a measurable, stable attribute whose variation across individuals can be captured through validated self-report instruments administered under standardised conditions.

3.2 Population and Sampling

The target population comprised all trustees (presidents, general secretaries, and treasurers) of registered and active cooperative societies in Southwest, Nigeria totalling 99,777. A multistage sampling technique was used to select the study respondents. Stage 1 involved purposive inclusion of all six Southwest states to ensure full regional coverage. Stage 2 applied systematic random selection to identify individual societies within each state. Stage 3 involved a census of the three trustee positions within each selected society, ensuring coverage of all three governance roles.

3.3 Sample Size

The sample size was determined using Taro Yamane's (1967) formula; $n = \frac{N}{1+N(e)^2}$ where N is the population size and e = 0.05 (5% margin of error at 95% confidence). This resulted in 387 respondents, approximated to 400 to account for non-response. Four hundred (400) questionnaires were distributed across the six states; however, only the 337 completed questionnaires were returned (84.3% response rate) and deemed usable for analysis. The response rate is above the minimum adequacy threshold of 70% recommended for survey research (Baruch & Holtom, 2008).

3.4 Instrumentation and Variable Measurement

The structured questionnaire comprised three sections. Section A collected demographic and cooperative-level data including age, gender, educational level, occupation, monthly income, governance position, location (state), cooperative type, and meeting modes (online, hybrid, or physical). Section B contained 25 DigComp 3.0 items organised across five subscales (IDL, CC, DCC, S, and PS), each comprising five items rated on a five-point Likert scale (1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree). Domain scores were computed as the mean of the five constituent items while the overall Digital Literacy Index (DLI) was computed as the grand mean across all 25 items.

Section C contained five Smart Cooperative Readiness items operationalising adoption intention and perceived readiness adapted from the behavioural intention and facilitating conditions subscales of UTAUT (Venkatesh et al., 2003). Specifically, the smart-cooperative readiness was measured using a five-item self-report scale adapted from Venkatesh et al.'s (2003) UTAUT framework, rated on a five-point Likert scale (1 = Strongly Disagree to 5 =

Strongly Agree). The items captured trustees' willingness to adopt digital cooperative platforms, perceived performance utility, self-assessed preparedness, advocacy intention, and conditional readiness subject to available infrastructure and support. The composite Readiness index (R) was computed as the mean of the five items.

3.5 Validity and Reliability

Face and content validity were established through structured expert panel review by three specialists in information science, cooperative management, and agricultural extensionists. A 30-respondent pilot study (as conducted to assess internal consistency. Cronbach's alpha values were: IDL = 0.84, CC = 0.81, DCC =0 .78, Safety = 0.83, PS = 0.82, consistent with the acceptable-to-good range ($\alpha \geq .70$) recommended by Nunnally (1978). The composite Readiness index (R) showed good internal consistency (Cronbach's $\alpha = .84$).

3.6 Method of data analysis

Data was analysed using descriptive and inferential analysis. Descriptive statistics including means, standard deviations, frequencies, percentages were computed for demographic variables and domain/index scores. One-sample t-tests were conducted to compare each domain mean and the overall DLI against the scale midpoint of 3.00 Cohen's d effect sizes were computed as $d = (M - 3.00) / SD$ for each test at 95% confidence intervals. Pearson product-moment correlations (PPMC) was used to examine bivariate associations between DLI, domain scores, and the Readiness index while OLS simple linear regression was used to model Readiness as a function of DLI. The OLS model is specific below.

$$Y = b_0 + b_1(DLI) + e$$

Where Y is the smart cooperative readiness index, b_1 is the coefficient of DLI , b_0 is the constant term, and e equals the error term.

4. RESULTS

4.1 Demographic and Cooperative characteristics

Table 1 presents the demographics of the respondents. As evident in the table, the majority of the respondents were male (69.1%), at least 40 years old (57.3%), had secondary level education (62.4%), with 28.7% holding tertiary qualifications and 8.9% reporting only primary education. The three trustee positions were well represented. Specifically, 36.5% were

presidents, 32.9% general secretaries, and 30.6% treasurers. Income levels were considerably low with the majority (67.1%) earning below ₦150,000 monthly. In terms of occupation, the respondents' occupations cut across trading (26.1%), farming (20.2%), teaching (19.0%), artisanship (16.6%) and civil service (14.5%).

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Demographic Variable	Categories	Frequency	Percentage (%)	Cumulative (%)
Age	20-29	16	4.7	4.7
	30-39	128	38.0	42.7
	40-49	97	28.8	71.5
	50-59	40	11.9	83.4
	≥60	56	16.6	100.0
Gender	Male	233	69.1	69.1
	Female	104	30.9	100.0
Occupation	Trading	88	26.1	26.1
	Teaching	64	19.0	45.1
	Artisanship	56	16.6	61.7
	Civil Service	49	14.5	76.2
	Farming	68	20.2	96.4
	Politics	12	3.6	100.0
Education Level	No Formal Education	72	21.4	21.4
	Primary Education	64	19.0	40.4
	Secondary Education	104	30.9	71.3
	Tertiary Education	97	28.7	100.0
Monthly Income (₦)	50,000 - 99,999	138	40.9	40.9
	100,000 - 149,999	88	26.1	67.0
	150,000 - 199,999	41	12.3	79.3

	200,000 - 249,999	16	4.7	84.0
	>=250,000	54	16.0	100.0
Position held in the cooperative	President	123	36.5	36.5
	General secretary	111	32.9	69.4
	Treasurer	103	30.6	100.0

Source: Field Survey, 2025

4.2 Digital Literacy Domains and Index Analysis

Table 2 presents one-sample t-test results for each DigComp 3.0 domain and the overall DLI, benchmarked against the scale midpoint of 3.00. The results revealed that Information and Data Literacy (IDL) was the only domain that recorded a mean above the midpoint (M = 3.1088, SD = 0.8421) and a statistically significant positive deviation [t(336) = +2.374, p = .018, d = +0.13]. The trustees recorded lower than average benchmark for all other DLI domains. The trustees' competency is least in the Digital Content Creation domain (DCC; M = 2.2404, d = −0.73).

The overall DLI was estimated at 2.6454 which is below the benchmark suggesting that the trustees are deficient digital literacy-wise. The t-test of significant relationships revealed that all the DLI domains are significantly lower than the minimum theoretical threshold except for the IDL. The overall DLI is also significantly lower [t(336) = −6.593, p < .001, 95% CI (−0.460, −0.251), d = −0.36] than the threshold. The null hypothesis Ho3 is therefore rejected.

Table 2: **One-Sample t-Test Results for DigComp 3.0 Domains Against the Theoretical Midpoint (N = 337)**

Digital Competence Domain	Mean	SD	t	df	p-value	Cohen's d	95% Confidence Interval	Interpretation
Information & Data Literacy (IDL)	3.109	0.842	2.374	336	.018	0.13	[0.019, 0.199]	Above average
Communication & Collaboration (CC)	2.821	0.910	−3.508	336	.001	−0.19	[−0.279, −0.079]	Below average
Digital Content Creation (DCC)	2.240	1.031	−13.311	336	< .001	−0.73	[−0.870, −0.651]	Below average
Safety	2.589	0.965	−7.821	336	< .001	−0.43	[−0.522, −0.311]	Below average
Problem Solving (PS)	2.521	0.989	−8.849	336	< .001	−0.48	[−0.578, −0.382]	Below average
Overall Digital Literacy Index (DLI)	2.645	0.987	−6.593	336	< .001	−0.36	[−0.460, −0.251]	

Note: Benchmark = 3.00 (neutral midpoint of 5-point Likert scale). Cohen's d = (M − 3.00) / SD. Two-tailed significance.

4.3 Relationship between Digital Literacy and Smart-Cooperative Readiness

The results of the relationship between digital literacy and readiness for smart cooperative is presented in Table 3. Evidence on the table reveals that the DLI and all its domain scores correlated positively and significantly with Readiness at the $p < .01$ level. The DLI recorded the strongest bivariate association with Readiness ($r = 0.47$), followed by CC ($r = 0.45$), PS ($r = 0.43$), IDL ($r = 0.41$), and Safety ($r = 0.38$). DCC recorded the weakest correlation with Readiness ($r = 0.29$). Nevertheless, the DCC relationship with readiness was still significant at 1% level.

Table 3: Pearson Correlation Matrix for DigComp 3.0 Domains and Smart-Cooperative Readiness (N = 337)

Variable	1	2	3	4	5	6	7
1. Information & Data Literacy (IDL)	1.00	0.61**	0.54**	0.57**	0.59**	0.82**	0.41**
2. Communication & Collaboration (CC)		1.00	0.58**	0.52**	0.55**	0.79**	0.45**
3. Digital Content Creation (DCC)			1.00	0.61**	0.63**	0.75**	0.29**
4. Safety				1.00	0.66**	0.78**	0.38**
5. Problem Solving (PS)					1.00	0.81**	0.43**
6. Digital Literacy Index (DLI)						1.00	0.47**
7. Smart-Cooperative Readiness							1.00

Source: Field Survey 2025; Note: ** p < .01 (two-tailed).

The foregoing table establishes correlation but not causation. Towards addressing this gap, the OLS regression was run and the results presented in Table 4.The model was statistically significant [$F(1, 335) = 94.7$, $p < .001$, $R^2 = .22$] indicating that DLI accounts for 22% of the variance in smart-cooperative readiness. The standardised regression coefficient ($\beta = .47$, $t = 9.73$, $p < .001$) confirms the significant positive association of DLI with readiness for smart cooperatives.

Table 4: OLS Regression analysis of effect of DLI on smart-cooperative readiness

Variable	B	SE	B	t	p
(Constant)	1.642	0.148	—	11.09	<.001
DLI	0.312	0.032	0.47	9.73	<.001
R^2	0.22				
F-value	94.7**				

Source: Field Survey, 2025, Note: ** p < .01

5. DISCUSSION

This study assessed digital literacy among cooperative trustees in Southwest Nigeria focusing specifically on comparing their digital literacy level against theoretical threshold, identifying their strengths and weaknesses across various digital literacy domains, establishing whether there is a significant difference in their digital literacy level against the standard threshold, and examining the relationship between the digital literacy level and smart cooperative adoption. The study results show below average digital literacy level among the trustees. This finding is contextually plausible given that a large number of cooperative leaders do not belong to the generation Z (gen Z) who are the natural digital natives. The majority (57.3%) of the trustees were at least 40 years old. Digital native is a term coined by Marc Prensky in 2001 referring to individuals born during or after the rise of the information age who are greatly exposed to digital technologies (Prensky, 2001) and usually digitally literate.

The study results also show the trustees had high competencies in information and data literacy (IDL) but low competencies in digital content creation (DCC). These findings align with the literature and might not be unconnected to the high level of internet penetration and smartphone use in the country (The Guardian Nigeria, 2025) that provide access to online information and data. The DigComp literature shows that information-consumption competencies (IDL) develop more organically through everyday information-seeking behaviour than production competencies (DCC) which require active creation and editing practice (Calvani et al., 2009; Ilomäki et al., 2016; Vuorikari et al., 2022).

The DCC deficit is considered to be highly consequential for smart-cooperative governance because digital content creation is not a peripheral skill in the cooperative governance context but a fundamental enabling capability for cooperative leaders. A trustee who cannot create a digital meeting agenda, draft a formatted financial report, or produce a member communication via digital channels may find it difficult to perform the basic administrative functions of a smart cooperative. The $d = -0.73$ effect size for DCC represents a large practical gap by conventional standards (Cohen, 1992) a critical knowledge gap in this digital competency area.

The moderate positive correlation found between the DLI and readiness are theoretically significant. The $r = 0.47$ is a medium effect by conventional standards (Cohen, 1992) and the $R^2 = 0.22$ is substantial for a single-independent variable regression model. The $R^2 = 0.22$

implies that the variable included in the model (DLI) singly account for 22% of variation in smart cooperative readiness. They both imply that digital competence significantly associates with trustees' readiness to adopt smart cooperatives. The 78% unexplained variance in Readiness, however, is equally informative. It signals that digital competence alone cannot drive smart-cooperative adoption. Therefore, factors like facilitating conditions (e.g. device access, connectivity, institutional support), social influence (leadership endorsement, peer adoption), and motivational factors (perceived relevance, affordability) may collectively shape the remaining variance.

6. POLICY IMPLICATIONS

The policy implication of this study findings is that policies aimed at promoting cooperative digitalisation or the adoption of the smart cooperative model need to factor in rigorous training on cooperative leadership on digital content creation. The cooperative federations and ICOPRON may need to have courses to promote digital literacy with substantial importance allotted to digital content creation competencies.

7. CONCLUSION AND RECOMMENDATIONS

This study examined digital literacy among cooperative trustees across Southwest Nigeria using the DigComp 3.0 framework. The study found that the trustees are, on balance, not digitally literature enough to adopt the smart cooperative model. The trustees digital literacy level varies across the digital literacy domains. While the trustees are above average in the information and data literacy domain, they are deficient in the digital content creation domain. Digital literacy is significantly and positively associated with smart-cooperative readiness. Based on the study findings, it is recommended that digital literacy training programmes for cooperative leaders should focus more on digital content creation and Problem Solving.

8. SUGGESTION FOR FUTURE STUDIES

Future research should extend this study's OLS regression framework to a full UTAUT-informed structural equation model (SEM) in order to test both direct and indirect paths from DigComp domain scores through PE, EE, SI, and FC to Readiness. A longitudinal panel design is also suggested as it can help establish the causal direction of the DLI–Readiness relationship and enable measurement of competence growth following training programme implementation.

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