



Research on the Influence of Digital Attitudes of “New Farmers” on Digital Citizenship Literacy: The Mediating Role of Digital identity Management

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Abstract. The development of new-generation information and digital technologies such as the Internet of Things and big data has not only brought earth-shaking changes to rural areas, but also promoted the modernization and transformation of farmers' production capacity and way of thinking. As an emerging force in agricultural modernization, "new farmers" follow the development trend of informatization and intelligence, becoming an important driving force for promoting the digital transformation of agriculture. Based on social cognitive theory, this study uses questionnaire survey method to explore the influence model of "new farmers" digital attitudes on digital citizenship literacy, and analyzes the mediating effect of digital identity management. The results of this study expand the research on influencing factors of digital citizenship literacy, and also provide theoretical reference for promoting the digital transformation of agricultural talents and promoting the modernization development of agriculture and rural areas.

Keywords: New Farmers; Digital Citizenship Literacy; Digital Attitude; Digital Identity Management.

1 Introduction

In the contemporary context of profoundly reshaping global competition paradigms, the digital literacy and skills of the entire population have increasingly become a key indicator of international competitiveness and soft power in the digital economy. In 2021, the Cyberspace Administration of China pointed out that digital technologies are profoundly transforming human thinking, lifestyles, modes of production, and driving deep changes in global political, economic, technological, cultural, and security landscapes¹. In recent years, driven by both policy support and technological advancements, the "new farmers" group has rapidly emerged, embracing digital technologies and actively utilizing tools such as new media and e-commerce. Their sense of agency and digital practice capabilities have significantly strengthened, making them an increasingly vital force in promoting agricultural modernization and rural transformation.

¹ http://www.cac.gov.cn/2021-11/05/c_1637708867754305.htm

However, as an emerging group, academia has yet to develop a systematic and in-depth theoretical understanding of the conceptual connotation, behavioral characteristics, and digital capacity development mechanisms of "new farmers." Particularly within the dynamically evolving conceptual framework of digital citizenship literacy, there are notable variations in the cognitive, affective, and behavioral tendencies of "new farmers" toward digital technologies—referred to as digital attitudes. How such differences ultimately influence their overall level of digital citizenship literacy through specific digital behavioral practices remains a topic requiring urgent exploration.

Against this research backdrop, this paper focuses on "new farmers" as the study subjects, aiming to delve into the mechanism through which their digital attitudes affect digital citizenship literacy. It seeks to explore the developmental pathway from intrinsic attitudes to explicit literacy and proposes corresponding strategies for enhancing digital citizenship literacy. This study represents both a deepening and supplementation of research on the influencing factors of digital citizenship literacy. It also expands the interdisciplinary integration of "new farmers" research and digital literacy theory, while providing theoretical references for formulating strategies to enhance the digital literacy of rural talent, accelerate the development of digital villages.

2 Theory and Hypotheses

2.1 "New Farmers"

Existing literature on "new farmers" and related groups primarily revolves around their definition, composition, characteristics, values, social functions, and developmental support. Regarding definition and group composition, scholars generally emphasize the diverse backgrounds and novel identities of "new farmers." For instance, zhan (2025) proposed "New-generation farmers" adhere to the philosophy of ecological agriculture, leverage internet-based thinking and emerging digital technologies, and engage in agricultural production, operations, and entrepreneurial practices, injecting new vitality and momentum into the comprehensive revitalization of rural areas^[1]. Wang(2014) further elaborates on the connotations of their "newness," which manifests in three aspects: a new cohort of farmers, emerging agricultural business models, and fresh driving forces for rural revitalization^[2]. While foreign studies do not directly employ the term "new farmers," they have conducted in-depth explorations of "new professional farmers," sharing comparable conceptual ground with domestic research and jointly focusing on the transformation and modernization of the farming population.

Based on this, the present study defines "new farmers" as a group of modern agricultural practitioners equipped with internet-based thinking and market analysis capabilities. They possess not only solid foundational knowledge of agriculture but also proficiency in modern agricultural technologies. Committed to engaging in agricultural production and management activities or assisting farmers in market circulation of agricultural products, they inject new vitality into the development of modern agriculture through innovative agricultural business models.

2.2 Digital Citizenship Literacy

In terms of conceptual connotation, Chen et al. (2022) propose that digital citizenship literacy is the core competency and essential quality that citizens must possess in a digital society, serving as a subset of civic core literacy^[3]. Zheng et al. (2020) further clarify that digital citizenship literacy encompasses not only behavioral habits and key competencies for using digital technologies in learning, daily life, and work but also the values and essential character of using digital technologies in a lawful, regulated, and ethical manner^[4]. The definition by the International Society for Technology in Education (ISTE) emphasizes that digital citizens are individuals who can safely, legally, and ethically use digital information and tools^[5].

Regarding its constituent elements, Mike et al. (2011) propose the REP framework for digital citizenship literacy, dividing it into three dimensions: respect for oneself/respect for others, educate oneself/connect with others, and protect oneself/protect others^[6]. Jones et al. (2016) argue that digital citizenship literacy evolves from digital literacy and should emphasize courteous online behavior and civic online participation^[7]. Florence (2020) further specifies that cyberbullying, digital footprints, digital privacy, digital netiquette, and digital identity are crucial components of digital citizenship literacy^[8]. Drawing on the interpretation of digital citizenship literacy by the Cyberspace Administration of China in 2021, this study posits that digital citizenship literacy constitutes a comprehensive set of qualities and abilities required for citizens in a digital society, encompassing digital acquisition, creation, utilization, evaluation, interaction, and related competencies.

2.3 Digital Attitude

Digital attitudes refer to the perspectives and inclinations that individuals hold toward digital technologies and online information. They reflect individuals' cognitive and affective stances toward the digital world, embody subjective agency, and directly influence the acquisition and application of digital knowledge and skills. When engaging with digital technologies and information, "new farmers" evaluate and assess the value and significance of these technologies based on their own cognitive frameworks, objectives, and processes, thereby forming either positive or negative digital attitudes. These attitudes are primarily manifested in a high degree of recognition, emphasis on, and reliance on digital technologies. "New farmers" believe that digital technologies can enhance the efficiency and quality of agricultural production.

2.4 Digital Identity Management

Regarding digital identity management, although there is currently no specific theoretical framework to support its analysis, relevant literature exists on the subject. According to Dang (2023), digital identity refers to the methods and means of creating and perceiving identity in the digital world^[9]. It encompasses unique descriptive data and relational information. At the individual level, the establishment of a digital identity enables the recognition of an individual's identity and makes it possible to track, trace,

and evaluate their behaviors. Moreover, as the credential for individual access to digital platforms and the carrier of digital traces, digital identity not only constitutes a virtual persona archive but also carries significant economic value. It reflects the authentic representation of a natural person's identity from the physical society within the digital space.

This study posits that the digital identity management of "new farmers" involves the collection, organization, storage, protection, and utilization of identity information pertaining to this specific group through digital technological means. This process ensures the optimization, upgrading, and sustainable development of agricultural production activities.

2.5 Hypotheses and Theoretical Model

Social cognitive theory posits that the individual, the environment, and behavior are both independent and interrelated. Individuals, through their subjective agency, can influence their own behaviors, while the outcomes of behaviors, in turn, provide feedback that affects individuals' emotions and attitudes. This constitutes a mutually deterministic closed loop, reflecting a dynamic and reciprocal relationship between the individual and the environment. Behavior, in this context, serves as the mediating link between the person and the environment, facilitating a cyclical interaction among the three.

Based on this theoretical analysis, digital attitude is considered a significant subjective factor influencing digital citizenship literacy, while digital identity management serves as the foundation for "new farmers" to conduct production activities in the digital age. Accordingly, this study proposes the following theoretical model (as illustrated in Figure 1) and hypotheses:

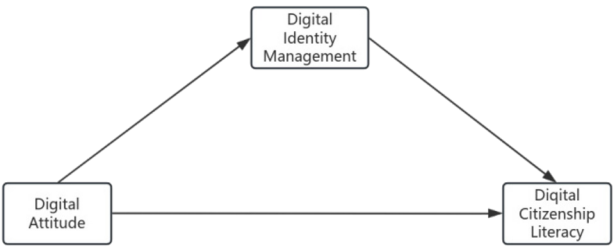


Fig. 1. Theoretical Model.

- Hypothesis H₁: Digital attitude is positively correlated with digital citizenship literacy. That is, digital attitude can directly and positively predict the level of digital citizenship literacy.
- Hypothesis H₂: Digital identity management plays a mediating role between digital attitude and digital citizenship literacy. In other words, digital attitude can indirectly influence digital citizenship literacy through the mechanism of digital identity management.

3 Research Methods

3.1 Research Object

This study employed an online questionnaire survey targeting the "new farmers" group, defined as modern agricultural practitioners equipped with internet-based thinking and market analysis capabilities. A total of 198 questionnaires were collected, and after excluding 11 invalid responses, 187 valid datasets were retained. The basic demographic information of the sample is presented in Table 1 below.

Table 1. Sample Information.

Sample Characteristics	Values	Frequency	Valid Percent-age (%)
Gender	Male	80	42.80%
	Female	107	57.20%
Age	25 Years Old and Below	41	21.90%
	26–35 Years Old	61	32.60%
	36–45 Years Old	45	24.10%
	46 Years Old and Above	40	21.40%
	Vocational High School/ High School or Lower	44	23.50%
Educational Attainment	Associate Degree	35	18.70%
	Bachelor's Degree	87	46.50%
	Master's Degree or Above	21	11.20%
Years Engaged in Modern Agriculture	Less than 5 Years	98	52.40%
	5–10 Years	48	25.70%
	More than 11 Years	41	21.90%

3.2 Research Tool

This study adopts the Digital Citizenship Literacy Scale developed by Moon-sun Choi based on conceptual analysis of digital citizenship and expert interviews, and the scale measure uses a five-point Likert scale and consists of 26 items across five dimensions: critical perspective, technical skills, interpersonal networks, local/global awareness, and internet-based political engagement^[10]. Widely recognized and applied internationally, this scale is a mature instrument that has undergone rigorous academic validation, demonstrating strong reliability and validity in Table 2. In accordance with the objectives of this research, 3 items from the original scale that were inconsistent with the context of this study were deleted.

Table 2. Reliability Analysis of Variables.

Variable	Cronbach's Alpha	Number of Items
Digital Attitude	0.899	9
Digital Citizenship Literacy	0.956	23
Digital Identity Management	0.900	6
Overall Questionnaire	0.962	42

Drawing on this established scale, the questionnaire was designed and comprises four sections: digital attitudes, digital citizenship literacy, digital identity management, and basic demographic information. The reliability of each scale was assessed using Cronbach's α coefficient. The results indicate that the 3 scales involved in this study have reliability coefficients exceeding 0.85, suggesting excellent internal consistency and high credibility of the questionnaire. This confirms that the items within each scale are coherent and suitable for further statistical analysis.

4 Results

4.1 Correlation Analysis

Using Pearson correlation analysis in SPSS 27.0, the results indicate a significant positive correlation between digital attitude and digital citizenship literacy, a significant positive correlation between digital attitude and digital identity management, and a significant positive correlation between digital identity management and digital citizenship literacy. The specific correlation coefficients are as follows in Table 3:

Table 3. Means, standard deviations, and correlations.

	Mean	SD	1	2	3
1. Digital Attitude	3.902	0.738	1		
2. Digital Citizenship Literacy	3.676	0.744	.752**	1	
3. Digital Identity Management	3.650	0.816	.719**	.857**	1

Note 1): $n=187$; * $p < 0.01$, $p < 0.05$

Note 2): Data source: Compiled based on analysis results from SPSS 27.0.

4.2 Mediation Effect Testing

The Table 4 results show that digital attitude, as an independent variable, has a significant impact on the dependent variable digital citizenship literacy ($\beta=0.547$, $p<0.001$) and the mediating variable digital identity management ($\beta=0.394$, $p<0.001$). After incorporating digital identity management into the model, the regression coefficient of digital attitude on digital citizenship literacy increases but remains significant ($\beta=0.720$,

$p<0.001$). This indicates that digital identity management plays a partial mediating role in the relationship between digital attitude and digital citizenship literacy, thereby supporting the hypothesis.

Table 4. Regression coefficient table about digital identity management on Digital Attitude and Digital Citizenship Literacy

Variables	Digital Citizenship Literacy					
	M1		M2		M3	
	β	t	β	t	β	t
Independent variable						
Digital Attitude	0.547	2.437**	0.394	2.754**	0.720	3.712**
Mediators						
Digital Identity Management					0.394	2.754**
R2	0.517		0.772		0.566	
F	198.107**		311.961**		241.061**	

Note): Data source: Compiled based on analysis results from SPSS 27.0.

To further ensure the accuracy of the mediation analysis, this study employed Model 4 from the PROCESS macro for SPSS (version 4.0 in SPSS 27.0) to examine the mediating role of digital identity management in the relationship between digital attitude and digital citizenship literacy. The analysis was conducted using the Bootstrap method. The results indicated that the 95% bias-corrected confidence interval for the indirect effect of digital identity management on digital citizenship literacy was [0.3652, 0.5826]. As the interval does not include zero, with a significance level of $p<.001$, the indirect effect is statistically significant. Furthermore, the 95% confidence interval for the direct effect was [0.1835, 0.3847], which also excludes zero. This pattern of results confirms that digital identity management plays a partial mediatingrole between digital attitude and digital citizenship literacy. Consequently, hypothesis H2 is supported. The specific mediation model is presented in the Table 5 below.

Table 5. The Mediating Role of Digital Identity Management: A PROCESS Analysis.

Path	B	SE	LLCI	ULCI
Direct Effect	0.2841	0.051	0.1835	0.3847
Indirect Effect	0.4737	0.0547	0.3652	0.5826

Note): Data source: Compiled based on analysis results from SPSS 27.0.

5 Conclusion

Based on the framework of social cognitive theory, this study empirically investigates the influence mechanism of "new farmers" digital attitudes on digital citizenship literacy, and validates the mediating role of digital identity management in this relationship. The findings indicate that digital attitudes, as individuals' cognitive and affective orientations toward digital technologies, significantly and positively predict digital citizenship literacy. A positive digital attitude not only motivates "new farmers" to actively adopt and apply digital technologies but also enhances their digital competencies in areas such as agricultural production and market circulation, thereby effectively improving their overall level of digital citizenship literacy.

The mediating effect of digital identity management reveals that it not only strengthens the identifiability, credibility, and security of "new farmers" in cyberspace but also provides institutional and technical support for their participation in digital social activities. Through standardized digital identity management, individuals can more effectively protect their privacy rights, establish digital credibility, and thereby enhance their confidence and sense of responsibility in using digital technologies.

Finally, the findings also suggest that further efforts should be made in areas such as guiding individual cognition, constructing digital identity systems, and providing education and training. By strengthening "new farmers" digital attitudes and identity management capabilities, their digital citizenship literacy can be comprehensively improved, thereby injecting sustained momentum into rural revitalization and agricultural modernization.

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