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## **The Moderating Role of Digital Literacy in the Relationships Among Financial Socialization, Locus of Control, and Personal Financial Management Behavior Among Economics Students**

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### **Abstract**

This study examines the moderating role of digital literacy in the relationships among financial socialization, locus of control, and personal financial management behavior among economics students at Hanoi University of Natural Resources and Environment. Drawing on the theory of planned behavior, financial socialization theory, locus of control theory, and the digital literacy perspective, the paper proposes an integrated model that incorporates direct, mediating, and moderating effects. Data were collected from 267 valid survey responses from economics students between September 2025 and April 2026. Partial least squares structural equation modeling (PLS-SEM), implemented in SmartPLS 4, was used to assess both the measurement model and the structural model. The findings show that financial socialization has a positive effect on both personal financial management behavior and locus of

control. Locus of control also has a positive effect on personal financial management behavior and partially mediates the relationship between financial socialization and personal financial management behavior. Digital literacy does not significantly moderate the direct relationship between financial socialization and personal financial management behavior. However, it positively moderates the relationship between financial socialization and locus of control, as well as the relationship between locus of control and personal financial management behavior. The study clarifies a social-psychological-technological mechanism underlying students' financial behavior and provides implications for personal finance education, digital literacy development, and student support programs in the context of digital finance.

**Keywords:** Financial Socialization, Locus of Control, Digital Literacy, Personal Financial Management Behavior, PLS-SEM, Economics Students

### **1. Introduction**

In the context of accelerating digital transformation, personal financial management behavior is increasingly shaped by the simultaneous influence of social, psychological, and technological factors. For students, especially those majoring in economics, this is a critical period in which financial awareness, attitudes, and habits are formed. In Viet Nam, however, many students still experience difficulty controlling spending, lack long-term financial plans, and remain relatively dependent on financial support from their families.

At Hanoi University of Natural Resources and Environment (HUNRE), economics students are exposed to professional knowledge related to economics, finance, and management. Nevertheless, the translation of such knowledge into effective real-life personal financial management remains limited. At the same time, the rapid development of digital financial services, such as e-wallets, digital banking, and online investment platforms, has changed the ways in which students access, use, and manage financial resources. These services create opportunities for more convenient financial management, but they may also increase impulsive spending, overconsumption, and poorly controlled financial decisions.

Previous studies suggest that personal financial management behavior is influenced by multiple determinants, among which financial socialization and locus of control are particularly important. Financial socialization refers to the process through which individuals acquire financial knowledge, attitudes, and behaviors from family and the broader social environment. Locus of control reflects the degree to which individuals believe that their financial outcomes are under their own control

rather than determined by luck, fate, or external circumstances.

In a digital financial environment, students with the same level of financial socialization or locus of control may behave differently depending on their level of digital literacy. Students with higher digital literacy are better able to access financial information, use digital financial tools, evaluate online content, and make informed decisions than those with lower digital literacy. Therefore, digital literacy is expected to change the strength of the relationships among financial socialization, locus of control, and personal financial management behavior.

Although many studies have investigated the direct effects of financial socialization and locus of control on personal financial behavior, the moderating role of digital literacy in these relationships has not been sufficiently examined, especially in the context of university students in Viet Nam. This constitutes the main research gap addressed by the present study.

For these reasons, this study investigates the moderating role of digital literacy in the relationship between financial socialization, locus of control, and personal financial

management behavior among economics students at Hanoi University of Natural Resources and Environment. The research contributes empirical evidence on the determinants of personal financial management behavior in the digital transformation era and provides a basis for proposing solutions to improve students' financial management capacity.

From the perspective of a scientific article, the central issue is not only to identify the factors affecting personal financial management behavior, but also to clarify the mechanism through which these factors operate. Financial socialization may exert a direct effect on behavior, while also being internalized through locus of control. In the digital finance context, digital literacy may alter the intensity of these relationships. Such an integrated approach helps explain the gap between 'knowing' about finance and actually 'practicing' sound personal financial management among students.

## 2. Literature Review, Theoretical Foundation, and Research Hypotheses

### 2.1 Literature review and research gaps

**Table 1:** Selected studies related to the research topic

Study	Research focus	Key findings relevant to this article
Nguyen Do Bich Nga <i>et al.</i> (2023) <sup>[17]</sup>	Financial literacy and personal financial management skills of students in the digital transformation period	Financial classes, family financial education, part-time work, student clubs, and financial knowledge influence financial literacy and personal financial management skills.
Tran Thi Dieu Huyen (2024) <sup>[24]</sup>	Personal financial management among students at Quy Nhon University	Family financial education, financial literacy, and controlled spending styles have positive effects on personal financial management.
Perry and Morris (2005) <sup>[19]</sup>	The role of perceived control, knowledge, and income in financial behavior	Locus of control is an important explanatory factor for differences in personal financial behavior.
Shim <i>et al.</i> (2010) <sup>[23]</sup>	Financial socialization of first-year college students	Parents, work experience, and education play significant roles in shaping students' financial capabilities and behavior.
Gudmunson and Danes (2011) <sup>[7]</sup>	Family financial socialization theory	Financial socialization transmits not only knowledge but also attitudes, beliefs, and long-term financial behavior.
OECD/INFE (2023) <sup>[18]</sup>	Financial competence in the digital context	Digital literacy and digital financial literacy are important conditions for safe access to, processing of, and use of financial information.

**Source:** Compiled by the author from the literature review.

### Research limitations and gaps

A synthesis of domestic and international studies shows that personal financial management behavior has attracted substantial scholarly attention, with diverse approaches from cognitive, psychological, and social perspectives. Despite their important contributions, existing studies still reveal several limitations that warrant further examination.

First, most domestic studies have mainly focused on the direct effects of factors such as financial literacy, financial attitudes, family financial education, and personal characteristics on financial management behavior. While these studies provide useful empirical evidence, they rarely develop and test highly integrated research models, particularly models involving mediating and moderating relationships. Variables such as locus of control and digital literacy are often examined separately rather than being placed in interaction with financial socialization to explain financial behavior comprehensively.

Second, many studies still adopt traditional approaches and have not fully reflected the rapid digital transformation currently taking place. International studies have begun to confirm the important role of financial technology and digital literacy in shaping personal financial behavior. In Viet Nam, however, this factor has been addressed only to a limited extent. In particular, the role of digital literacy as a

moderating variable in the relationship between financial socialization and personal financial management behavior remains underexplored.

Third, in terms of research subjects, most domestic studies focus on specific groups such as workers, students in general, or students at particular universities. This limits the generalizability of findings and does not sufficiently capture the characteristics of economics students, who may have better access to financial and technological information but still face challenges in managing their personal finances.

Fourth, previous studies have mainly used cross-sectional data collected at a single point in time. As a result, they have not reflected changes in financial behavior over time or evaluated the long-term effects of influencing factors. In addition, some studies have not adequately considered differences among groups by gender, income, year of study, or level of technological access, thereby limiting their ability to explain diversity in personal financial management behavior.

Fifth, although international studies have examined psychological factors such as locus of control and executive functioning in shaping financial behavior, the integration of these factors with financial socialization and the digital environment remains limited. In particular, the relationship among locus of control, financial socialization, and digital

literacy has not been simultaneously examined within a single model. This leaves a gap in explaining the combined mechanism through which these variables influence personal financial management behavior.

These limitations indicate a significant research gap in the development of an integrated model that simultaneously examines the roles of financial socialization, locus of control, and digital literacy in explaining students' personal financial management behavior, particularly in the current digital transformation context.

### Necessity of the study

The review of domestic and international studies shows that personal financial management behavior is important both theoretically and practically, especially for students who are in the process of forming financial habits and capabilities for the future. In the current socio-economic context, characterized by rapid digital transformation, personal financial behavior is influenced not only by traditional factors such as financial literacy, attitudes, and social environment, but also by emerging factors such as digital literacy and the ability to access financial technologies.

Although many studies have confirmed the role of financial socialization in shaping personal financial behavior and the role of locus of control in orienting behavior, these factors are usually examined independently. In a digital context, the ability to receive, process, and apply financial information through technological platforms depends substantially on digital literacy. This calls for a deeper investigation of digital literacy not only as a direct determinant, but also as a moderating factor in the relationships among financial socialization, locus of control, and personal financial management behavior.

Economics students, despite their relative advantage in accessing financial and technological information, still face difficulties in applying financial knowledge to personal financial management. This suggests a gap between awareness and behavior, requiring more in-depth research into the factors and mechanisms at work in a specific context. Furthermore, prior Vietnamese studies have been limited in developing integrated research models that consider the interaction among social, psychological, and technological factors. The moderating role of digital literacy in the relationship between financial socialization and personal financial management behavior has not been clearly tested. This is an important research gap that the present study seeks to address.

Accordingly, the study entitled 'The Moderating Role of Digital Literacy in the Relationships among Financial Socialization, Locus of Control, and Personal Financial Management Behavior among Economics Students at Hanoi University of Natural Resources and Environment' is necessary and meaningful both scientifically and practically. It contributes to the literature on personal financial behavior and provides empirical evidence for improving students' financial capacity in the digital era.

### 2.2 Theoretical foundation

The theory of planned behavior (TPB), proposed by Ajzen (1991) [1], explains how behavioral intentions lead to actual behavior. According to this theory, human behavior results from a deliberate decision-making process and is directly influenced by the intention to perform the behavior. Behavioral intention, in turn, is determined by three core

components: attitude toward the behavior, subjective norms, and perceived behavioral control.

TPB emphasizes that when individuals hold a positive attitude toward a behavior, perceive social support for that behavior, and believe that they can control its performance, their behavioral intention becomes stronger and the likelihood of actual behavior increases. Owing to its logical structure and explanatory power, TPB has been widely used in behavioral research, including research on personal financial behavior.

In this study, TPB is applied in a simplified and context-adjusted manner. Financial socialization is regarded as a proxy for subjective norms, reflecting the influence of the social environment on personal financial behavior. Locus of control is treated as an approximate representation of perceived behavioral control, indicating the extent to which individuals believe that they can control their financial decisions. The attitudinal component is not modeled separately, but is indirectly reflected through financial socialization and personal perceptions of financial matters. Personal financial management behavior is treated as the behavioral outcome in the model.

Financial socialization theory originates from studies of consumer socialization. Ward (1974) [28] was among the first scholars to lay the foundation for the concept. Financial socialization refers to the process through which individuals, especially children and adolescents, acquire knowledge, skills, attitudes, and norms related to money and financial behavior through interaction with social agents during their development.

Moschis and Churchill (1978) [14] expanded consumer socialization theory and emphasized the role of socialization agents such as family, peers, schools, and mass media. They argued that financial behavior does not form randomly but is the outcome of a social learning process in which financial norms, values, and beliefs are transmitted through observation, imitation, and social interaction.

In the modern personal finance context, Shim *et al.* (2010) [23] define financial socialization as a conscious or unconscious learning process regarding financial knowledge, attitudes, and behaviors through direct or indirect guidance from parents, peers, schools, and media. Their study shows that early financial socialization experiences have long-lasting effects on financial behavior in adulthood, particularly decisions related to spending, saving, and personal financial management.

Taken together, these perspectives show that financial socialization theory views personal financial behavior as the product of a long-term socialization process in which family, peers, and social information sources play central roles. This theory provides a solid theoretical basis for explaining how social agents influence financial behavior and for examining the relationships among financial socialization, psychological characteristics, and personal financial management behavior in contemporary socio-economic settings.

Locus of control theory was proposed by Rotter (1966) [22] within the framework of social learning theory. It explains how individuals perceive the relationship between their own actions and the outcomes they obtain in life. Locus of control reflects an individual's belief about whether life outcomes are mainly the result of personal effort, ability, and decisions or are determined by external factors such as luck, fate, or the influence of other people.

In personal finance research, locus of control is used to explain differences in financial management behavior across individuals. Those with an internal locus of control tend to plan finances, control spending, save, and take responsibility for their financial decisions. By contrast, those with an external locus of control are more likely to be passive, to exercise less control over spending, and to attribute financial outcomes to external circumstances.

Rotter's locus of control theory therefore provides an important theoretical foundation for explaining the psychological dimension of personal financial management behavior. It is particularly relevant when studying the relationship among personal cognition, financial socialization, and financial behavior, as well as when considering the moderating roles of individual capabilities and characteristics in modern socio-economic contexts.

The concept of digital literacy was systematically articulated by Gilster (1997) [6], who argued that digital literacy is not merely the ability to use computers or digital devices, but the ability to understand and use information effectively in digital environments. Digital literacy reflects the cognitive capability of individuals when interacting with information delivered through digital technologies, especially the internet.

Gilster emphasized that digital literacy is a higher-order thinking capability that includes searching, evaluating, analyzing, and synthesizing information from multiple digital sources rather than purely technical manipulation. In the digital environment, individuals face large volumes of multidimensional and difficult-to-verify information. Therefore, digital literacy requires the ability to evaluate the reliability, authenticity, and value of information before using it in decision-making.

According to Gilster (1997) [6], digital literacy consists of four core components: (i) the ability to search for and access digital information; (ii) the ability to understand and interpret information content; (iii) the ability to critically evaluate information in a specific context; and (iv) the ability to apply information to problem solving and decision-making. These components enable individuals not only to access technology, but also to control information in digital environments consciously and responsibly.

In modern socio-economic contexts, Gilster's digital literacy perspective provides a foundation for studying the role of technology in individual behavior, particularly decision-making behavior. Digital literacy is a necessary condition for effective participation in learning, work, and personal life management in a digital society. A lack of digital literacy may lead to exposure to misinformation, ineffective decision-making, and increased risk in complex fields such as finance.

Building on Gilster's ideas, later studies extended digital literacy to specialized fields, including education, healthcare, and finance, giving rise to related concepts such as digital financial literacy. In finance, digital literacy enables individuals to understand, evaluate, and use digital financial platforms, thereby supporting spending management, saving, investing, and financial risk control.

Lyons *et al.* (2020) further expanded this concept by arguing that digital financial literacy is not merely knowledge or technical skill, but the ability to use digital technologies to achieve personal financial goals in a volatile and risk-prone environment. From this perspective, digital financial literacy helps individuals convert financial knowledge and

socialization experiences into actual financial behavior through digital platforms, thereby strengthening autonomy and personal financial control.

## 2.3 Definitions of research variables

### *Personal financial management*

Personal financial management refers to the process by which individuals plan, organize, implement, and control their financial resources in order to achieve short-term and long-term financial goals. It includes managing income and expenditure, saving, investing, using credit, insurance, taxes, and retirement planning (Kenton, 2024; Falahati & Paim, 2011 [5]). In this study, personal financial management is understood as a set of individual behaviors related to planning, controlling, and effectively using financial resources, including expense management, credit use, saving, and investment, with the aim of achieving present and future financial goals.

### *Locus of control*

Locus of control is a concept proposed by Julian B. Rotter to describe how individuals perceive their ability to control events in their lives. It indicates the extent to which people believe that outcomes are caused by their own effort and actions or by external factors such as luck, circumstances, or the influence of others. In this study, locus of control is understood as a relatively stable individual tendency to perceive and evaluate the degree of personal control over life outcomes, reflected through internal and external control orientations.

### *Financial socialization*

Financial socialization is the process through which individuals acquire and form knowledge, skills, attitudes, and behaviors related to finance through interactions with social agents such as family, peers, schools, and the surrounding environment (Hilgert *et al.*, 2003) [10]. This process plays an important role in establishing the foundation for personal financial decisions throughout life. In this study, financial socialization is defined as the process through which individuals learn and develop financial knowledge, skills, attitudes, and behaviors through socialization agents such as family, school, peers, and the digital environment.

### *Digital literacy*

Digital literacy is understood as a set of knowledge, attitudes, and capabilities that enable individuals to use digital tools and technologies effectively to access, manage, evaluate, analyze, and create information in digital environments. It extends beyond technical skills to include critical thinking, communication, collaboration, and content creation in different digital contexts. In the context of digital finance, digital literacy is closely related to digital financial literacy. According to OECD/INFE (2023) [18], digital financial literacy refers to the ability to access, understand, and use financial information in digital environments safely in order to make sound financial decisions. In this study, digital literacy is understood as a set of knowledge, skills, and capabilities that help individuals use technology and information effectively in digital environments, including information processing, communication, content creation, safety, and problem solving, thereby supporting adaptation and decision-making in the digital context.

### 2.4 Research model and hypotheses

Based on the theoretical foundation and prior studies, this research proposes a model to analyze the relationships among financial socialization, locus of control, digital literacy, and personal financial management behavior among students. The model is designed as an integrated framework that simultaneously examines direct, indirect, and moderating effects among the variables.

Accordingly, the research model does not merely examine the direct effects of financial socialization and locus of control on personal financial management behavior, but also clarifies the mediating role of locus of control and the moderating role of digital literacy in these relationships.

In the proposed model, financial socialization is the independent variable; personal financial management behavior is the dependent variable; locus of control is the mediating variable; and digital literacy is the moderating variable.

On the basis of the theoretical review and previous empirical evidence, seven hypotheses are proposed. They represent three groups of relationships: the direct effects of financial socialization and locus of control on personal financial management behavior; the mediating role of locus of control; and the moderating role of digital literacy in the model.

**Table 2:** Summary of research hypotheses

Hypothesis	Statement	Expected sign
H1	Financial socialization has a positive effect on personal financial management behavior.	+
H2	Financial socialization has a positive effect on locus of control.	+
H3	Locus of control has a positive effect on personal financial management behavior.	+
H4	Locus of control mediates the relationship between financial socialization and personal financial management behavior.	+
H5	Digital literacy moderates the relationship between financial socialization and personal financial management behavior.	+
H6	Digital literacy moderates the relationship between financial socialization and locus of control.	+
H7	Digital literacy moderates the relationship between locus of control and personal financial management behavior.	+

Source: Proposed by the author.

### 3. Research Methodology

#### 3.1 Research design, data, and sample

The study adopts a mixed-method approach combining qualitative and quantitative methods. The qualitative method is used to synthesize the theoretical foundation and to select and adjust measurement scales appropriate to the research

context. The quantitative method is used to test the proposed model and hypotheses using survey data.

The data include both secondary and primary sources. Secondary data were collected from research papers, theses, dissertations, and reports related to financial socialization, locus of control, digital literacy, and personal financial management behavior. Primary data were collected through a questionnaire survey of economics students at Hanoi University of Natural Resources and Environment.

The questionnaire was designed in an online format using Google Forms and distributed through social networking platforms such as Facebook and Zalo. Convenience sampling combined with snowball sampling was employed to expand access to respondents.

After collection, the data were cleaned, coded, and analyzed using suitable statistical tools. The main analytical procedures included descriptive statistics, reliability testing, and analysis of the relationships among variables in the research model.

The study used convenience and snowball sampling within the population of economics students. A total of 282 questionnaires were distributed, of which 267 valid responses were retained for analysis, yielding a valid response rate of 94.68%. This sample size is adequate for PLS-SEM analysis given the number of latent variables and observed indicators in the model.

**Table 3:** Characteristics of the valid survey sample (n = 267)

Criterion	Group	Percentage (%)
Gender	Female	56.4
Gender	Male	43.6
Age	Under 20	23.0
Age	20-21	37.6
Age	22-23	27.7
Age	Over 23	11.7
Part-time work	Yes	48.9
Part-time work	No	51.1
Year of study	First year	22.0
Year of study	Second year	24.8
Year of study	Third year	28.0
Year of study	Fourth year	25.2

Source: Compiled from the survey data.

#### 3.2 Measurement scales and questionnaire

The measurement scales were adapted from previous studies to ensure the reliability and validity of the measurement instrument while maintaining relevance to the context of economics students at Hanoi University of Natural Resources and Environment.

Before the official survey was conducted, the scales were adjusted in terms of wording and content to ensure clarity, comprehensibility, and contextual appropriateness for the target respondents. All observed variables were measured using a five-point Likert scale ranging from 1 ('Strongly disagree') to 5 ('Strongly agree').

**Table 4:** Measurement structure used in the study

Latent variable	Code	Number of observed items	Main measurement content	Source/adaptation
Financial socialization	XHHTC	11	Receiving financial information from friends, the Internet, media, and parental financial education.	Shim <i>et al.</i> (2010) [23]; Gudmunson & Danes (2011) [7]
Locus of control	DKSTL	7	Students' beliefs about their ability to control, regulate, and take responsibility for personal financial outcomes.	Rotter (1966) [22]; Perry & Morris (2005) [19]
Digital literacy	NLS	6	Ability to solve technological problems, learn new digital applications, update technologies, search for and evaluate digital information.	Gilster (1997) [6]; OECD/INFE (2023) [18]
Personal financial management behavior	HVQLTCCN	4	Price comparison, timely payment, expense recording, and spending within budget.	Dew & Xiao (2011) [4]; Mien & Thao (2015) [13]

Source: Compiled and adapted by the author from previous studies.

### 3.3 Data analysis method

After collection, the data were cleaned, coded, and analyzed using SPSS and SmartPLS 4. SPSS was used for descriptive statistics and initial data processing, while SmartPLS 4 was employed to test the research model using the PLS-SEM approach.

The measurement model was assessed to evaluate the reliability and validity of the constructs. Reliability was examined using Cronbach's alpha and composite reliability. Values of 0.70 or higher were considered acceptable. Convergent validity was assessed using outer loadings and average variance extracted (AVE). Observed variables with outer loadings of 0.70 or higher were considered satisfactory, while AVE values of 0.50 or higher indicated adequate convergent validity. Discriminant validity was examined using the heterotrait-monotrait ratio (HTMT), with values below 0.85 indicating that the constructs were sufficiently distinct.

After the measurement model satisfied the required criteria, the structural model was assessed to test the research hypotheses using bootstrapping in PLS-SEM. Path coefficients, t-statistics, and p-values were used to determine statistical significance. At the 5% significance level, a hypothesis was accepted when the p-value was below 0.05. The coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), and multicollinearity diagnostics were also examined. Multicollinearity was assessed using the variance inflation factor (VIF), with VIF values below 5 indicating no serious multicollinearity problem.

## 4. Research Results

### 4.1 Descriptive statistics of the sample

Based on the sampling procedure and questionnaire design described above, 282 survey questionnaires were distributed, of which 267 valid responses were obtained, corresponding to a valid response rate of 94.68%. Several descriptive statistics of the sample are presented as follows.

Among the 267 valid responses, the gender distribution was relatively balanced, with 56.4% female and 43.6% male respondents. By age group, students aged 20-21 accounted for the largest proportion, at 37.6%. Students under 20 accounted for 23.0%, those aged 22-23 accounted for 27.7%, and those over 23 accounted for the lowest proportion, at 11.7%. Regarding part-time work, 48.9% of respondents reported having a part-time job, while 51.1% did not. In terms of academic year, first-year students accounted for 22.0%, second-year students for 24.8%, third-year students for 28.0%, and fourth-year students for 25.2%. Overall, the sample distribution is reasonably balanced and appropriate for subsequent analysis.

### 4.2 Measurement model assessment

The results indicate that most observed variables in the model had outer loadings above the recommended threshold of 0.70. Specifically, the items measuring financial socialization (XHHTC) had outer loadings ranging from 0.853 to 0.944, suggesting that the items adequately reflected the construct of students' financial socialization.

For the locus of control scale (DKSTL), items DKSTL1, DKSTL2, DKSTL5, DKSTL6, and DKSTL7 met the recommended threshold, with loadings ranging from 0.777 to 0.906. DKSTL3 and DKSTL4 had loadings of 0.671 and 0.695, respectively, slightly below the 0.70 threshold. However, because the Cronbach's alpha and composite reliability ( $\rho_c$ ) of the locus of control scale were 0.913 and 0.931, respectively, both items were retained to preserve the theoretical integrity of the scale.

Overall, the observed variables were considered acceptable for subsequent analysis. The measurement scales demonstrated adequate convergent validity and could be used to assess reliability, discriminant validity, and the structural model.

**Table 5:** Outer loadings of observed variables

Observed variable	XHHTC	HVQLTCCN	DKSTL	NLS
XHHTC1	0.906			
XHHTC2	0.853			
XHHTC3	0.918			
XHHTC4	0.888			
XHHTC5	0.916			
XHHTC6	0.933			
XHHTC7	0.902			
XHHTC8	0.938			
XHHTC9	0.944			
XHHTC10	0.870			
XHHTC11	0.914			
HVQLTCCN1		0.932		
HVQLTCCN2		0.922		
HVQLTCCN3		0.916		
HVQLTCCN4		0.917		
DKSTL1			0.852	
DKSTL2			0.868	
DKSTL3			0.671	
DKSTL4			0.695	
DKSTL5			0.777	
DKSTL6			0.906	
DKSTL7			0.892	
NLS1				0.927
NLS2				0.913
NLS3				0.901
NLS4				0.939
NLS5				0.949
NLS6				0.917

Source: Compiled from SmartPLS 4 results.

Table 6 reports the composite reliability assessment results. All constructs in the model met the required reliability criteria. Cronbach's alpha ranged from 0.913 to 0.979, while composite reliability (rho\_c) ranged from 0.931 to 0.981. These results indicate that all constructs have high reliability and that the observed variables adequately represent their respective latent variables.

**Table 6:** Reliability assessment results

Construct	Cronbach's alpha	Composite reliability (rho c)
Personal financial management behavior (HVQLTCCN)	0.941	0.958
Digital literacy (NLS)	0.966	0.972
Financial socialization (XHHTC)	0.979	0.981
Locus of control (DKSTL)	0.913	0.931

Source: Compiled from SmartPLS 4 results.

The results show that all measurement scales satisfied the requirements for reliability and convergent validity. Specifically, the personal financial management behavior scale (HVQLTCCN) had a Cronbach's alpha of 0.941 and an AVE of 0.850, indicating high reliability and strong convergence among the observed items. Overall, all constructs had Cronbach's alpha values above 0.70 and AVE values above 0.50. Therefore, the scales were considered reliable and valid for subsequent discriminant validity assessment and structural model testing.

**Table 7:** Convergent validity assessment results

Construct	Cronbach's alpha	Average variance extracted (AVE)
Personal financial management behavior (HVQLTCCN)	0.941	0.850
Digital literacy (NLS)	0.966	0.855
Financial socialization (XHHTC)	0.979	0.824
Locus of control (DKSTL)	0.913	0.662

Source: Compiled from SmartPLS 4 results.

The HTMT results presented in Table 8 show that all HTMT values between pairs of constructs were below 0.85. This indicates that the measurement scales achieved discriminant validity; in other words, the constructs measured conceptually distinct aspects of the phenomenon under investigation.

Overall, the HTMT values are within the acceptable threshold recommended by Henseler *et al.* (2015) [9]. Therefore, the measurement model satisfies reliability and validity criteria, allowing the study to proceed to the assessment of the structural model and the testing of hypotheses.

**Table 8:** HTMT values of the constructs

	HVQLTCCN	NLS	XHHTC	DKSTL
HVQLTCCN				
NLS	0.114			
XHHTC	0.709	0.227		
DKSTL	0.606	0.134	0.528	

Source: Compiled from SmartPLS 4 results.

### 4.3 Structural model assessment

The analysis results show that neither the measurement model nor the structural model suffered from serious multicollinearity. This indicates that the variables in the

research model were relatively independent and suitable for evaluating the structural model and testing the hypotheses.

**Table 9:** Multicollinearity assessment results

	HVQLTCCN	NLS	XHHTC	DKSTL
NLS	1.101			1.092
XHHTC	1.441			1.133
DKSTL	1.395			

Source: Compiled from SmartPLS 4 results.

The model fit results in Table 10 show that the SRMR value was below 0.08. This indicates that the research model fits the empirical data well and is appropriate for explaining the relationships among the variables.

**Table 10:** Model fit results

	Saturated model	Estimated model
SRMR	0.042	0.042

Source: Compiled from SmartPLS 4 results.

The results in Table 11 show that the R<sup>2</sup> and adjusted R<sup>2</sup> values of the endogenous constructs were acceptable. The R<sup>2</sup> value for personal financial management behavior (HVQLTCCN) was 0.580, while the adjusted R<sup>2</sup> was 0.572. This indicates that the independent variables in the model, including financial socialization, locus of control, and digital literacy, explained 57.2% of the variance in students' personal financial management behavior. This explanatory power can be considered relatively strong for behavioral research.

Overall, the adjusted R<sup>2</sup> values in the model were greater than 0.10, suggesting that the proposed model has satisfactory explanatory relevance and that the independent variables explain a substantial proportion of the variance in the endogenous constructs.

**Table 11:** R-squared results

	R-squared	Adjusted R-squared
HVQLTCCN	0.580	0.572
DKSTL	0.281	0.273

Source: Compiled from SmartPLS 4 results.

The results in Table 12 show that the effect sizes of the variables differed across relationships. Financial socialization (XHHTC) had an f<sup>2</sup> value of 0.389 for personal financial management behavior (HVQLTCCN), indicating a large effect. XHHTC also had an f<sup>2</sup> value of 0.261 for locus of control (DKSTL), indicating a medium effect. Locus of control had an f<sup>2</sup> value of 0.124 for HVQLTCCN, indicating a small effect. Digital literacy had f<sup>2</sup> values of 0.001 for both HVQLTCCN and DKSTL, suggesting no meaningful direct effect on these endogenous variables.

Overall, financial socialization emerged as the strongest predictor in the research model, especially with respect to students' personal financial management behavior.

**Table 12:** f-squared effect size results

	HVQLTCCN	NLS	XHHTC	DKSTL
HVQLTCCN				
NLS	0.001			0.001
XHHTC	0.389			0.261
DKSTL	0.124			

Source: Compiled from SmartPLS 4 results.

### 4.4 Hypothesis testing

The results indicate that most relationships in the model were statistically significant, providing empirical evidence for testing the proposed hypotheses. With respect to direct effects, financial socialization (XHHTC) had a strong positive effect on personal financial management behavior (HVQLTCCN), with  $\beta = 0.491$ ,  $T = 10.487$ , and  $p = 0.000$ . This indicates that a higher level of financial socialization is associated with better personal financial management behavior among students.

Financial socialization also had a positive effect on locus of control (DKSTL), with  $\beta = 0.462$ ,  $T = 9.293$ , and  $p = 0.000$ . This suggests that access to financial knowledge and experience contributes to strengthening students' perceived psychological control. In addition, locus of control had a positive effect on personal financial management behavior, with  $\beta = 0.269$ ,  $T = 6.191$ , and  $p = 0.000$ , indicating that students with a stronger sense of psychological control tend to make more rational and effective financial decisions.

**Table 13:** Direct relationship testing results

Relationship	Original sample	Sample mean	Standard deviation	T-statistic	p-value
XHHTC -> HVQLTCCN	0.491	0.489	0.047	10.487	0.000
XHHTC -> DKSTL	0.462	0.463	0.050	9.293	0.000
DKSTL -> HVQLTCCN	0.269	0.272	0.043	6.191	0.000

Source: Compiled from SmartPLS 4 results.

For the relationship between financial socialization (XHHTC) and personal financial management behavior (HVQLTCCN), the interaction term NLS x XHHTC had  $\beta = 0.062$  and  $p = 0.185$ , which is greater than 0.05. This indicates that digital literacy did not significantly moderate this direct relationship. In other words, the impact of financial socialization on personal financial management behavior did not vary significantly across different levels of students' digital literacy.

By contrast, in the relationship between XHHTC and locus of control (DKSTL), the interaction term NLS x XHHTC had  $\beta = 0.154$  and  $p = 0.003$ , which is statistically significant at the 1% level. The positive coefficient indicates that as digital literacy increases, the relationship between financial socialization and locus of control becomes stronger. Digital literacy does not directly increase locus of control; rather, it enhances the effect of financial socialization on locus of control. Among economics students, those with higher digital literacy are better able to use financial information sources, thereby allowing financial socialization to exert a stronger influence on perceived psychological control.

Similarly, in the relationship between locus of control (DKSTL) and personal financial management behavior (HVQLTCCN), the interaction term NLS x DKSTL had  $\beta = 0.158$  and  $p = 0.001$ , indicating a positive and statistically significant moderating role of digital literacy. Specifically, when digital literacy is high, the positive effect of locus of control on personal financial management behavior becomes stronger. This suggests that digital literacy helps individuals translate psychological control into concrete financial behavior more effectively.

Overall, digital literacy functions as a genuine moderating

variable, altering the strength of certain relationships in the model rather than exerting a direct effect on the outcome variables. It does not moderate the relationship between financial socialization and personal financial management behavior, but it strengthens the effect of financial socialization on locus of control and the effect of locus of control on personal financial management behavior. This underscores the amplifying role of digital literacy, particularly in relationships involving psychological mechanisms.

**Table 14:** Moderating role of digital literacy

Interaction relationship	Original sample	Sample mean	Standard deviation	T-statistic	p-value
NLS x XHHTC -> HVQLTCCN	0.062	0.058	0.047	1.326	0.185
NLS x XHHTC -> DKSTL	0.154	0.153	0.052	2.970	0.003
NLS x DKSTL -> HVQLTCCN	0.158	0.159	0.046	3.454	0.001

Source: Compiled from SmartPLS 4 results.

The indirect effect analysis shows that the effect of financial socialization on personal financial management behavior through locus of control was statistically significant, with  $\beta = 0.124$ ,  $T = 5.174$ , and  $p = 0.000$ . This confirms the presence of an indirect mechanism through which financial socialization influences personal financial management behavior via locus of control.

Accordingly, locus of control can be regarded as an important mediating variable in the research model. This finding clarifies the mechanism by which financial socialization affects personal financial management behavior and highlights the role of psychological factors in shaping and improving students' financial behavior.

**Table 15:** Indirect effect testing results

Indirect relationship	Original sample	Sample mean	Standard deviation	T-statistic	p-value
XHHTC -> DKSTL -> HVQLTCCN	0.124	0.126	0.024	5.174	0.000

Source: Compiled from SmartPLS 4 results.

### 5. Discussion

Using a combination of qualitative and quantitative methods, the study tested the proposed research model and hypotheses. The findings not only reaffirm several foundational theories in financial behavior research but also provide empirical evidence from the Vietnamese context, particularly among economics students at Hanoi University of Natural Resources and Environment. The results also reveal certain differences from previous studies, thereby opening directions for deeper discussion.

First, the relationship between financial socialization and personal financial management behavior was positive and statistically significant. The standardized coefficient was  $\beta = 0.489$ , with an original sample value of 0.491, a standard deviation of 0.047,  $T = 10.487$ , and  $p = 0.000$ . This supports the hypothesis that financial socialization improves students' personal financial management behavior. The result is consistent with the arguments of Shim *et al.* (2010) [23] and Gudmunson and Danes (2011) [7], who emphasized that family, schools, and social environments are important agents in the formation of financial awareness and behavior

among young people.

This finding confirms that financial socialization plays a foundational role in enhancing students' personal financial management behavior. Therefore, improving financial management capacity requires strengthening financial socialization through three main agents: family, educational institutions, and social media. Families should function as the first environment for financial education; universities should integrate personal financial management into curricula; and digital platforms and media should provide accessible, practical, and student-relevant financial content. These elements are essential for building sustainable financial capability and long-term financial autonomy among students.

Second, financial socialization had a positive and statistically significant effect on locus of control. The standardized coefficient was  $\beta = 0.463$ , the original sample value was 0.462, the standard deviation was 0.050,  $T = 9.293$ , and  $p = 0.000$ . This means that higher levels of financial socialization are associated with stronger positive locus of control. The finding is consistent with financial socialization theory, according to which learning from family, peers, schools, and media helps shape beliefs and positive behavioral orientations.

Third, locus of control had a positive effect on personal financial management behavior ( $\beta = 0.269$ ). This implies that individuals with a stronger internal locus of control are more likely to show positive financial behavior, such as planning expenditures, saving, and managing money effectively. This result is consistent with Perry and Morris (2005) [19], who identified locus of control as an important predictor of financial behavior. In the context of HUNRE economics students, locus of control reflects the student's belief in their ability to manage financial conditions and make active decisions. When students believe that they can deal with overspending, financial shortfalls, and financial pressures, they are more likely to behave responsibly and with discipline in managing personal finances. The belief that financial outcomes depend mainly on personal effort and decisions also encourages students to set clear financial goals and persist in achieving them.

Fourth, locus of control partially mediated the relationship between financial socialization and personal financial management behavior. The significant indirect effect ( $\beta = 0.124$ ) confirms that financial socialization influences personal financial management behavior not only directly but also indirectly by forming and strengthening students' locus of control. This result is consistent with prior studies showing that psychological factors mediate the relationship between financial socialization and financial behavior. For example, Shim *et al.* (2010) [23] and Serido *et al.* (2013) argued that financial socialization contributes to the formation of financial autonomy and control, which then influence financial behavior. Perry and Morris (2005) [19] also emphasized the role of locus of control as a key psychological mechanism that converts financial awareness into practice.

Fifth, digital literacy did not significantly moderate the relationship between financial socialization and personal financial management behavior ( $\beta = 0.062$ ). However, this result should not be interpreted as a rejection of the role of digital literacy in the model. Rather, it suggests that although digital technologies facilitate access to financial information, the conversion of such information into actual

behavior still depends heavily on traditional socialization channels. This finding is consistent with the views of Jorgensen and Savla (2010) [11] and Gudmunson and Danes (2011) [7], which emphasize the dominant role of family and direct social environments. It may also reflect the reality that students' digital literacy is currently more oriented toward information access than toward sophisticated financial decision-making and behavioral change.

Sixth, the interaction between digital literacy and financial socialization had a positive and statistically significant effect on locus of control ( $\beta = 0.154$ ;  $T = 2.970$ ;  $p = 0.003$ ). This confirms that digital literacy moderates the relationship between financial socialization and locus of control. In other words, the effect of financial socialization on the formation of internal control beliefs is not fixed but depends on the individual's level of digital literacy. This can be explained through Rotter's (1966) [22] locus of control theory: the ability to access, process, and apply information strengthens individuals' belief in their own capacity to control outcomes, thereby encouraging more positive behavior.

Seventh, digital literacy positively moderated the relationship between locus of control and personal financial management behavior ( $\beta = 0.159$ ). This means that the higher the level of digital literacy, the stronger the effect of locus of control on personal financial management behavior. The result is compatible with the financial behavior approach of Dew and Xiao (2011) [4], according to which financial behavior is the outcome of transforming cognition, skills, and supporting tools into specific practices.

Overall, digital literacy should not be viewed merely as a supplementary skill. It functions as an amplifying condition that strengthens the effect of psychological control on financial behavior. Therefore, improving students' financial management capacity requires not only developing autonomy and confidence in personal financial control, but also improving digital literacy through technology training, the use of digital financial applications, and skills for evaluating online financial information. Universities should integrate digital financial education into curricula and encourage students to use technology as an effective personal financial management tool.

## 6. Policy Implications and Recommendations

### 6.1 Implications for students

Students should proactively build a minimum personal financial management system, including a monthly budget, expense tracking tools, and short-term financial goals. As the results indicate that locus of control plays an important role, students need to shift from a passive response to financial difficulties toward an active mindset in which they adjust expenditures, prioritize essential spending, and gradually create a small emergency fund.

Regarding digital literacy, students should use technology as a management tool rather than merely as a consumption channel. Digital banking applications, e-wallets, spreadsheets, and expense tracking applications should be used to strengthen financial discipline. At the same time, students need to develop the ability to evaluate the reliability of online financial information.

### 6.2 Implications for families

Families should strengthen financial education for their children from an early stage by teaching them how to use money, save, and plan reasonable expenditures. Parents

should also create an open environment for discussing financial matters, thereby helping students develop positive financial awareness and behavior.

### 6.3 Implications for universities and educational institutions

Universities should promote the integration of personal financial education into training programs or organize extracurricular activities related to financial management and digital financial skills. They should also provide opportunities for students to participate in practical experiences, seminars, and digital finance activities to improve their ability to apply financial knowledge in real-life contexts.

Universities can design practical personal finance education modules, such as student budgeting, cash-flow management, safe use of bank accounts, identification of online consumption risks, and evaluation of financial information on digital platforms.

### 6.4 Implications for media and financial institutions

Financial institutions and financial education media providers should offer transparent, easy-to-understand, and immediately applicable content for students. Priority should be given to budget simulation tools, overspending alerts, payment reminders, and short digital financial education courses.

## 7. Conclusion, Limitations, and Future Research Directions

This study examined the moderating role of digital literacy in the relationships among financial socialization, locus of control, and personal financial management behavior among economics students at Hanoi University of Natural Resources and Environment. It aimed to identify the determinants of students' personal financial management behavior in the context of digital transformation.

Based on foundational theories and a review of previous studies, the author developed a research model consisting of financial socialization, locus of control, digital literacy, and personal financial management behavior. The study used both qualitative and quantitative methods, with data analyzed through SPSS and SmartPLS to assess scale reliability, the measurement model, the structural model, and the proposed hypotheses.

The findings show that financial socialization has the strongest positive effect on students' personal financial management behavior. This indicates that exposure to financial knowledge, experience, and behavior through family, school, and the social environment plays a crucial role in shaping personal financial behavior.

Locus of control also significantly affects personal financial management behavior. Students with stronger internal control tendencies are more likely to manage their finances effectively than those who depend more heavily on external factors.

In addition to direct effects, the findings show that digital literacy moderates certain relationships in the model. This indicates that the ability to access, use, and apply digital technologies can influence the extent to which social and psychological factors affect students' personal financial management behavior in the current digital transformation context.

Overall, the study contributes to the theoretical and empirical understanding of students' personal financial management behavior in digital environments. It also provides a basis for designing interventions to improve students' financial management capacity.

The study has several limitations. First, it used cross-sectional data and convenience sampling within a single university, so the generalizability of the findings should be interpreted with caution. Second, the variables were measured through self-reported responses, which may be subject to perceptual bias or social desirability bias. Future studies could expand the survey scope to multiple universities, compare economics and non-economics students, or incorporate additional variables such as financial pressure, digital consumption behavior, personal income, family financial support, and specialized digital financial literacy.

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