

THE IMPACT OF RISK COMMUNICATION IN DIGITAL ECONOMY TRAINING IN VIETNAM

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Abstract: This study examines the factors influencing the effectiveness of risk communication in digital economy training in Vietnam, focusing on four key dimensions: enhancing digital literacy and security awareness, supporting digital transformation efforts, building trust in digital platforms, and facilitating regulatory compliance. Using data collected from a sample of 200 participants and employing multivariate linear regression analysis, the research evaluates the relationships between these factors and their impact on risk communication outcomes. The results indicate that Supporting Digital Transformation Efforts ($\beta = 0.286$, $p = 0.000$), Building Trust in Digital Platforms ($\beta = 0.188$, $p = 0.004$), and Facilitating Regulatory Compliance ($\beta = 0.196$, $p = 0.004$) significantly enhance risk communication effectiveness. Enhancing Digital Literacy and Security Awareness has a positive but statistically marginal impact ($\beta = 0.131$, $p = 0.059$). These findings highlight the need for integrated training programs emphasizing transformation, trust-building, and compliance. The study offers actionable insights for optimizing training programs and advancing Vietnam's digital transformation goals. Future research should explore longitudinal impacts and additional contextual factors.

Keywords: Risk Communication; Digital Economy Training; Digital Literacy; Digital Transformation; Regulatory Compliance; Trust in Digital Platforms

Introduction

The digital economy has become a cornerstone of global economic transformation, offering unprecedented opportunities for innovation, efficiency, and connectivity. However, this rapid digitalization comes with inherent challenges, including cybersecurity threats, data breaches, and privacy violations, which can erode trust and slow adoption. In this context, effective risk communication enables individuals and organizations to understand, assess, and mitigate these digital risks. As highlighted by Mundottukandi et al. (2024), "Risk communication is not merely an information-sharing process; it is a critical tool to build trust and empower stakeholders in an interconnected digital landscape." While its importance is increasingly recognized in advanced economies, the role of risk communication in digital economy training remains an underexplored area, particularly in emerging markets where digital adoption often outpaces the development of protective mechanisms.

Vietnam exemplifies this dynamic as one of Southeast Asia's fastest-growing digital economies. With projections suggesting a digital economy market value of \$90 billion to \$200 billion by 2030 (Ha& Chuah, 2023), Vietnam is leveraging technology to drive socio-economic development. According to a report by Cameron et al. (2018), "Vietnam's digital growth is fueled by a youthful population and increasing smartphone penetration, but managing the associated risks remains critical for sustained progress." The government's "National Digital Transformation Program by 2025" highlights the strategic priority of digital growth (Romanyuk et al., 2023). However, this rapid transition exposes individuals, businesses, and institutions to numerous risks, including cybersecurity threats, misinformation, and online fraud. Reports indicate that Vietnam is among Asia's most targeted countries for phishing and malware attacks, underscoring the urgency of effectively addressing these vulnerabilities (Moon, 2023).

Training programs aimed at enhancing digital literacy are being implemented across the country, but the effectiveness of risk communication within these initiatives still needs to be better understood. A 2021 study on Southeast Asian digital readiness found that "awareness and preparedness among stakeholders in Vietnam lag behind other nations in the region, leaving users vulnerable to digital threats" (Curtis et al., 2022). While much of the existing research on Vietnam's digital economy focuses on technological infrastructure and policy frameworks, little attention has been paid to how risk communication can influence digital behavior, trust, and preparedness (Cameron et al., 2018). This gap is significant because communication is the linchpin that transforms knowledge into actionable behavior, enabling stakeholders to safely and confidently navigate the complexities of digital transformation. Without adequate risk communication, training programs risk falling

short of their potential, leaving individuals and organizations unprepared for the challenges of the digital landscape.

This study seeks to address this critical gap by exploring the impact of risk communication in Vietnam's digital economy training programs. Specifically, it examines how risk communication enhances digital literacy, promotes behavioral changes in risk management, fosters trust in digital platforms, and prepares individuals and organizations for digital transformation. By identifying the factors that influence the success of risk communication, this research aims to provide actionable insights for policymakers, educators, and industry leaders. These insights will support designing more effective training programs, aligning Vietnam's digital transformation efforts with international best practices, and fostering a digitally resilient society.

This research is significant on multiple fronts. Practically, it provides guidance for developing training initiatives that empower individuals and organizations to thrive in a rapidly evolving digital economy. On a policy level, it informs strategies that integrate effective risk communication as a core component of Vietnam's digital transformation framework. Hai et al.(2021) noted, "Risk communication is the bridge that connects policy intentions with practical outcomes, ensuring that digital transformation benefits all segments of society." Theoretically, it advances the academic discourse on digital risk communication, particularly in emerging economies. Finally, this study contributes to Vietnam's broader vision of an inclusive and sustainable digital economy by fostering trust and digital literacy. Through empirical analysis and stakeholder insights, this research illuminates a critical yet overlooked dimension of Vietnam's digital journey, paving the way for a safer and more confident embrace of the digital future.

Literature Reviews

Risk Communication Effectiveness

Risk communication is a cornerstone of successful digital economy training, ensuring individuals and organizations are prepared to navigate the inherent risks of digital transformation. Defined as exchanging information about potential hazards to guide decision-making (Kar et al.,2019), effective risk communication goes beyond disseminating knowledge; it empowers stakeholders to adopt secure practices and build resilience. Clarity, accessibility, and timeliness are crucial elements in this process, as they ensure participants comprehend complex information and can act upon it. In Vietnam's context, where the digital economy is projected to grow to \$200 billion by 2030 (Nguyen et al., 2021), these aspects are vital to bridging the gap between rapid digital adoption and the preparedness to address associated risks.

Despite the increasing recognition of its importance, risk communication in digital economy training faces challenges in implementation. Many programs in Vietnam still need to be more cohesive, lacking tailored approaches to address the diverse needs of stakeholders such as SMEs, educators, and policymakers (Ssenyonga, 2021). Additionally, disparities in digital literacy and infrastructure across urban and rural areas complicate the reach and impact of such initiatives. Research has shown that culturally aligned strategies, such as localized case studies or audience-specific examples, can significantly enhance engagement and retention (Evans et al., 2019). However, these approaches still need to be widely adopted in Vietnam, leaving a critical gap in understanding how to integrate effective risk communication into existing training frameworks.

The impact of effective risk communication extends beyond immediate learning outcomes. It enhances digital literacy by equipping participants to proactively identify and mitigate risks, fostering behavioral change in adopting secure practices, and building trust in digital platforms—an essential component for sustained economic engagement (Huda, 2024). Risk communication must become a foundational element of all training programs for Vietnam's ambitious digital transformation goals to be realized. This requires collaborative efforts from policymakers, educators, and industry leaders to design and implement innovative, inclusive, and scalable communication strategies that address the specific challenges of Vietnam's digital economy.

Enhancing Digital Literacy and Security Awareness

The literature underscores the growing importance of enhancing digital literacy and security awareness as integral components of a thriving digital economy. Digital literacy extends beyond technical competencies, encompassing the ability to understand and mitigate cybersecurity risks, navigate online threats, and adopt safe digital practices (Huang, 2024). In the context of Vietnam's rapidly expanding digital economy, it is projected to reach \$45 billion by 2025 and between \$90 billion and \$200 billion by 2030 (Nguyen, 2023); these skills are becoming indispensable for both individuals and organizations. Risk communication initiatives, such as the "ChongLuaDao" project led by cybersecurity expert Hieu Minh Ngo, highlight the critical role of targeted resources in empowering users to recognize and avoid online scams, fostering a safer and more informed digital environment.

Despite these advancements, gaps persist in integrating security awareness into broader digital literacy training programs. The literature highlights significant disparities in access to digital literacy resources, particularly between urban and rural populations, which leaves many individuals unprepared to engage safely in the digital economy (Mont et al., 2020). Furthermore, small and medium-sized enterprises (SMEs), which form the backbone of Vietnam's economy, often lack the cybersecurity knowledge needed to protect themselves from evolving threats, posing risks to their digital transformation efforts (Nguyen et al., 2020). Research suggests that

embedding security awareness into all levels of digital literacy training through real-world simulations, interactive workshops, and localized case studies can significantly enhance participants' ability to engage securely and confidently with digital platforms (Meyers et al., 2013; Renn et al., 2022).

Enhancing digital literacy and security awareness yields far-reaching benefits beyond immediate protection from online threats. These efforts build trust in digital platforms, enabling users to engage more fully with e-commerce, online services, and digital financial systems. Additionally, they contribute to sustained economic growth by equipping a digitally literate and security-conscious population to drive innovation and competitiveness (Ismail et al., 2023). For Vietnam, prioritizing comprehensive training programs that address both digital skills and security awareness is critical to creating an inclusive and resilient digital economy capable of capitalizing on the opportunities of the digital age. The literature consistently emphasizes that such initiatives are fundamental to ensuring equitable access to the benefits of digital transformation.

Supporting Digital Transformation Efforts

Effective risk communication is widely recognized as integral to the success of digital transformation initiatives. The literature highlights its role in equipping organizations with the knowledge and strategies needed to navigate the complexities of digital adoption while addressing emerging threats (Hoang, 2024). By disseminating clear and actionable information about risks and mitigation measures, risk communication fosters organizational resilience and readiness for change. The importance of this approach is particularly evident in Vietnam's context, where digital transformation is rapidly advancing across industries. The 2023 Annual Report on Vietnamese Enterprises' Digital Transformation emphasizes that sustainable growth hinges on businesses' ability to manage digital risks effectively, especially for small and medium-sized enterprises (SMEs) that face unique challenges in adopting new technologies.

Research identifies SMEs as particularly vulnerable in digital transformation due to limited financial resources, a lack of specialized expertise, and insufficient awareness of digital threats (Skare et al., 2023). These limitations can lead to poor implementation of digital tools or exposure to cybersecurity vulnerabilities, undermining broader transformation goals. Moturi et al. (2021) notes that effective risk communication tailored to the specific needs of SMEs—such as industry-specific risk profiles and targeted training programs—can significantly enhance their ability to adopt digital solutions securely. Additionally, ongoing communication about risks and best practices ensures that businesses remain agile in responding to new threats as they arise.

Supporting digital transformation through robust risk communication has broader implications for Vietnam's economy. Studies show that businesses with risk awareness and mitigation strategies are likelier to adopt innovative technologies that drive productivity and competitiveness (Raguseo, 2018). This aligns with national objectives to create a digitally integrated economy capable of competing globally. The literature underscores the need for a strategic focus on risk communication as a foundational element of digital transformation initiatives, arguing that it protects individual enterprises and fosters a resilient and inclusive digital ecosystem.

Building Trust in Digital Platforms

The literature consistently emphasizes that trust is foundational to a thriving digital economy, serving as the glue that binds users, businesses, and government entities in the adoption and growth of digital platforms. Trust in digital platforms is built through transparent and effective communication, particularly regarding risks and mitigation strategies (D'Hauwers et al., 2020¹). Transparent risk communication fosters confidence by ensuring all stakeholders are informed about potential vulnerabilities and reassured by the measures in place to address them. This transparency protects users and encourages broader participation in digital platforms, a crucial economic growth driver. Programs like Vietnam's National Training on Open Data Policy Framework in the Digital Economy underscore the importance of clear and consistent communication in enhancing understanding of data policies and risk management, creating a more trustworthy digital ecosystem.

Despite its importance, achieving trust in digital platforms remains challenging in many emerging economies, including Vietnam. Studies show that users often need more time to fully engage with digital services due to concerns about data security, privacy, and platform reliability (Zeng et al., 2017). The lack of standardized communication protocols and inconsistent enforcement of data protection measures further exacerbate these concerns, eroding trust. Research highlights the need for comprehensive approaches to risk communication that inform users of potential risks and demonstrate the proactive steps to mitigate them. Tailored training programs and open data initiatives, such as those implemented in Vietnam, are cited as effective strategies for improving transparency and building user confidence (Kim et al., 2017).

Building trust in digital platforms yields significant benefits for individuals and organizations alike. For users, it facilitates greater engagement with e-commerce, digital financial services, and online government programs. A trustworthy digital environment for businesses increases customer retention and expands market opportunities. On a macroeconomic level, trust catalyzes digital transformation, enabling economies to leverage

¹D'Hauwers, R., Van Der Bank, J., & Montakhabi, M. (2020). Trust, transparency and security in the sharing economy: What is the government's role?. *Technology Innovation Management Review*, 10(5), 6-18.

digital platforms for innovation and growth (Mubarak& Petraite, 2020). The literature clarifies that fostering trust through transparent risk communication is not merely a technical challenge but a strategic imperative for governments and businesses aiming to create inclusive and resilient digital economies. In Vietnam's case, prioritizing trust-building measures will be critical to sustaining the momentum of its digital transformation efforts.

Facilitating Regulatory Compliance

The literature underscores the role of effective risk communication in facilitating regulatory compliance, a critical aspect of digital economy development. Risk communication ensures that stakeholders—businesses, government entities, and individuals—are informed about legal requirements and potential penalties for non-compliance, enabling them to align their operations with established standards (Saffady, 2023). This alignment is crucial in Vietnam, where the rapid growth of the digital economy necessitates robust regulatory frameworks to address issues such as data protection, cybersecurity, and digital taxation. Organizations can navigate regulatory complexities more effectively and mitigate non-compliance risks by integrating clear and actionable communication into compliance strategies.

Vietnam's evolving regulatory landscape presents both opportunities and challenges for businesses. As the country develops its digital infrastructure, new laws and policies are being introduced to govern areas like data privacy, cross-border e-commerce, and intellectual property in the digital realm (Prasad, 2023). However, many organizations, tiny and medium-sized enterprises (SMEs), often struggle to understand and implement these regulations due to a lack of clarity or guidance. Research suggests that targeted risk communication—delivered through training sessions, webinars, and compliance toolkits—can significantly enhance stakeholders' understanding of their obligations and the steps required to meet them (Sharma et al., 2024). Such initiatives also build trust in regulatory processes, fostering a culture of accountability and cooperation.

The benefits of facilitating regulatory compliance through effective risk communication extend beyond legal adherence. Compliant organizations are better positioned to compete in global markets, attract investments, and build reputations as trustworthy entities. For Vietnam, fostering compliance at a national level strengthens the overall digital economy, ensuring it operates within a framework that promotes fairness, security, and innovation (Sharma et al., 2024). The literature highlights that risk communication bridges the gap between regulatory intent and practical implementation and empowers businesses to adapt to evolving legal landscapes. As Vietnam continues its digital transformation, embedding risk communication into compliance strategies will be essential for supporting sustainable economic growth and fostering international collaboration.

Based on literature reviews, the following hypotheses are proposed:

Hypothesis 1: Enhancing digital literacy and security awareness has a positive and significant impact on the effectiveness of risk communication in digital economy training in Vietnam.

Hypothesis 2: Supporting Digital Transformation Efforts positive and significant impact on risk communication effectiveness in digital economy training in Vietnam

Hypothesis 3 Building Trust in Digital Platforms positive and significant impact on risk communication effectiveness in digital economy training in Vietnam

Hypothesis 4: Facilitating regulatory Compliance positively and significantly impacts risk communication effectiveness in digital economy training in Vietnam.

METHODOLOGY

Instrument and participant

This research employed a structured questionnaire to examine risk communication's impact on Vietnam's digital economy training. The development of the questionnaire was guided by an extensive review of the existing literature (Barabas& Jerit, 2010; Zipkin et al., 2024) and consultations with three experts in risk communication, digital economy, and educational training methodologies. This meticulous process ensured the instrument's relevance and capacity to effectively capture the relationships among key variables, including risk communication effectiveness, digital literacy, and related constructs (Cairns et al., 2023; Etikan& Bala, 2017). The questionnaire was divided into two sections. The first collected demographic information, such as age, gender, education, and occupation, to provide insights into the respondents' profiles (Appendix). The second section evaluated the dependent variable—Risk Communication Effectiveness—and independent variables, including Enhancing Digital Literacy and Security Awareness, Supporting Digital Transformation Efforts, Building Trust in Digital Platforms, and Facilitating Regulatory Compliance (Liu et al., 2018; Navarrete, 2013).

To ensure the reliability and validity of the questionnaire, a pilot survey was conducted with 40 participants who matched the intended sample's characteristics (Barabas& Jerit, 2010; Fowler, 2013). Feedback from the pilot survey and expert consultations led to minor refinements, resulting in a robust final questionnaire tailored to the study's objectives. The finalized version was administered to 200 participants selected through stratified random sampling from digital economy training programs across Hanoi, Ho Chi Minh City, and Da Nang. These cities were chosen for prominence in Vietnam's digital transformation landscape and active engagement in digital economy initiatives (Akbari et al., 2023). The sample size was deemed appropriate for

exploratory factor analysis and multivariate regression techniques, providing statistical rigor and validity (Molléri et al., 2016).

Participants included individuals from various demographic and professional backgrounds actively involved in Vietnam's digital economy. This included employees in digital economy sectors, SME owners/managers, trainers/educators, government officials, training program participants, and university students in relevant fields. Gender, age, and educational attainment were evenly distributed within the sample (Table 1), ensuring a representative cross-section of the population. The research team administered the questionnaire directly, collecting responses on-site and providing a 100% response rate (Navarrete, 2013; Wibowo, 2023). Data collection took place in early 2023, coinciding with significant national events, including the Vietnamese New Year, a period of heightened digital engagement.

Ethical considerations were upheld throughout the research process. Participants provided informed consent, ensuring voluntary participation and the confidentiality of their responses (Forney & Sadar, 2021). The adherence to ethical guidelines underscores the integrity of the research and respect for participant rights, forming a solid foundation for subsequent analysis and findings.

Table 1 Demographic characteristics of survey participants

Variable	Female (n, %)	Male (n, %)
Age		
18–25 years old	7 (36.8%)	12 (63.2%)
26–30 years old	16 (34.0%)	31 (66.0%)
31–35 years old	8 (36.4%)	14 (63.6%)
36–40 years old	14 (30.4%)	32 (69.6%)
41–45 years old	8 (40.0%)	12 (60.0%)
Over 45 years old	7 (35.0%)	13 (65.0%)
Education		
Bachelor's Degree	25 (31.2%)	55 (68.8%)
Master's Degree	23 (43.4%)	30 (56.6%)
PhD Degree	8 (40.0%)	12 (60.0%)
Student	14 (29.8%)	33 (70.2%)
Occupation		
Employee in a Digital-Economy Sector	13 (33.3%)	26 (66.7%)
Government or Policy Official	6 (33.3%)	12 (66.7%)
SME Owner/Manager	22 (45.8%)	26 (54.2%)
Trainer/Educator	4 (20.0%)	16 (80.0%)
Training Program Participant	15 (35.7%)	27 (64.3%)
University Student	10 (30.3%)	23 (69.7%)

Reliability analysis

Reliability analysis is critical in evaluating the quality and consistency of the survey instrument used to assess the impact of risk communication in digital economy training in Vietnam. This analysis ensures the questionnaire consistently measures the intended constructs across various respondents and contexts. In this study, Cronbach's alpha was utilized to determine the internal consistency of the items. According to established literature, a Cronbach's alpha value of 0.7 or above is generally considered acceptable for surveys, indicating high internal consistency (Kline, 2015; Nunnally & Bernstein, 1994). Values between 0.6 and 0.7 may be acceptable in specific contexts but may suggest the need for minor modifications to enhance the alignment of some items with the underlying constructs (Cortina, 1993). Conversely, values below 0.6 indicate inadequate reliability, necessitating significant revisions to the questionnaire items to ensure they effectively measure the same construct (Kline, 2015; Nunnally & Bernstein, 1994).

Table 2 summarizes the results of the reliability analysis. Cronbach's alpha coefficients for all constructs exceeded 0.7, indicating strong internal consistency across the items (Hair et al., 2019; Nunnally & Bernstein, 1994). For example, the dependent variable, Risk Communication Effectiveness, achieved an alpha value of 0.771, while independent variables, such as Enhancing Digital Literacy and Security Awareness and Building Trust in Digital Platforms, recorded values of 0.766 and 0.793, respectively. Additionally, the smallest total variable correlation coefficients for each construct were above 0.4, further confirming the reliability of the questionnaire items.

Table 2 *Summary of Reliability*

Variable	Number of variables observed	Reliability coefficients (Cronbach Alpha)	The correlation coefficient of the smallest total variable
Risk Communication Effectiveness (RC_Effectiveness)	4	0.771	0.483
Enhancing Digital Literacy and Security Awareness (EDLS_Awareness)	4	0.766	0.532
Supporting Digital Transformation Efforts (EDLS_Awareness)	4	0.794	0.561
Building Trust in Digital Platforms (BTD_Platforms)	4	0.793	0.595
Facilitating Regulatory Compliance (FR_Compliance)	4	0.735	0.449

The reliability and validity of the questionnaire were further confirmed through construct validity testing, including exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Hair et al., 2019; Bollen, 1989). The results demonstrated convergent solid validity, as all constructs' items were highly correlated and effectively measured the intended variables (Fornell & Larcker, 1981). Discriminant validity was also established, with each item showing stronger correlations with its respective construct than with other constructs, ensuring the independence of each variable (Fornell & Larcker, 1981; Hair et al., 2019). These findings affirm the robustness of the research instrument, providing a solid foundation for analyzing the impact of risk communication in digital economy training.

Factor analysis

Factor analysis is an essential statistical tool used to identify underlying dimensions or latent variables within a dataset, allowing researchers to group variables based on patterns of inter-correlation (Gorsuch, 1983). In this study, exploratory factor analysis (EFA) was employed to validate the constructs of the research questionnaire designed to examine the impact of risk communication in digital economy training in Vietnam. Using principal component analysis with varimax rotation, the analysis aimed to reduce the observed variables into smaller meaningful factors while preserving the essential information. The number of factors to extract was determined using eigenvalues and scree plots, consistent with recommended practices (Fabrigar et al., 1999). The results provided critical insights into the relationships among variables and informed the refinement of the research model (Hair et al., 2010).

As shown in Table 3, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.909, exceeding the recommended threshold of 0.5, indicating that the data were suitable for factor analysis (Tabachnick & Fidell, 2019). Bartlett's test of sphericity was statistically significant (Chi-square = 1492.788, df = 190, Sig. = 0.000), further confirming the appropriateness of the analysis. The rotated component matrix revealed that all observed variables had factor loadings greater than 0.5, meeting the practical significance criterion for inclusion (Hair et al., 2019). Variables with factor loadings below this threshold were excluded from further analysis, ensuring a robust model. The extracted factors explained 57.635% of the total variance, exceeding the 50% benchmark for practical significance (Hair et al., 2010). Additionally, the initial eigenvalue for each extracted factor was more significant than 1.00, supporting their validity as distinct constructs.

Table 3 *Result of factor analysis*

Rotated Component Matrix					
	Component				
	1	2	3	4	5
SDT_Efforts4	.751				
SDT_Efforts2	.746				
SDT_Efforts3	.639				
SDT_Efforts1	.618				
BTD_Platforms1		.750			

BTD_Platforms3	.715	
BTD_Platforms2	.683	
BTD_Platforms4	.665	
RC_Effectiveness2	.757	
RC_Effectiveness1	.734	
RC_Effectiveness3	.730	
EDLS_Awareness2	.753	
EDLS_Awareness3	.742	
EDLS_Awareness1	.641	
EDLS_Awareness4	.612	
FR_Compliance3	.767	
FR_Compliance4	.721	
FR_Compliance2	.671	
FR_Compliance1	.526	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
Rotation converged in 6 iterations. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) =0.909 Bartlett's Test of Sphericity (Chi-Square =1492.788 ; df=190; sig.=0.000)		

The results demonstrated strong construct validity through convergent and discriminant validity testing. Convergent validity was confirmed as all items within each factor were strongly correlated, indicating they measured the same construct (Fornell & Larcker, 1981). Discriminant validity was also achieved, as items were more strongly correlated with their respective constructs than others. Together, these findings validate the proposed research model and support the reliability of the identified factors in capturing the critical dimensions of risk communication effectiveness (Hair et al., 2019; Bollen, 1989). These results underscore the robustness of the exploratory factor analysis, establishing a solid foundation for further hypothesis testing and multivariate analysis to understand the impact of risk communication in digital economy training in Vietnam.

Correlation analysis

Correlation analysis is a refined statistical technique that assesses the strength and direction of the linear association between two variables. This method quantifies the degree to which variations in one variable correspond with changes in another, thereby offering a measure of their interconnection (Tabachnick & Fidell, 2013). The correlation coefficient, often referred to as Pearson's coefficient, serves as an index of this linear relationship, with its values ranging from -1 to 1. A coefficient of -1 denotes a perfect negative linear correlation, 1 indicates a perfect positive linear correlation, and 0 signifies the absence of any linear correlation between the variables (Field, 2013; Hair et al., 2017). Correlation analysis is instrumental in uncovering insights into variable relationships and facilitating predictions based on these associations (Gronlund & Linn, 1985). However, it is crucial to recognize that correlation does not equate to causation, and additional factors may influence the observed relationships (Agresti & Finlay, 2009).

The outcomes of the correlation analysis, as depicted in Figure 2, reveal that at a 95% confidence level, the correlation coefficients indicate a statistically significant relationship between the dependent and independent variables (Sig. = 0.05). The strength of these coefficients is critical for subsequent analyses using multivariate linear regression models and for controlling variables in regression analyses, thereby ensuring a rigorous examination of the factors influencing sustainable tourism development (Seraphin et al., 2019; Larose, 2014). The correlation analysis facilitates a systematic exploration of the variable relationships, while the significance level of the correlation coefficients is pivotal in determining the statistical relevance of these relationships (Larose, 2014). Furthermore, applying multiple linear regression and controlled variable regression in subsequent steps enables the identification of significant determinants of sustainable tourism development. These methods distinguish the independent variables most strongly associated with the dependent variable and control for extraneous variables that might affect their relationship (Field, 2018; Larose, 2014).

Table 4 *Correlation analysis results*

Correlations		RC_Effect iveness	EDLS_A wareness	SDT_Eff orts	BTD_Plaf orms	FR_Compl iance
RC_Effectiveness	Pearson Correlation	1	.488**	.573**	.526**	.510**
	Sig. (2- tailed)		.000	.000	.000	.000
	N	200	200	200	200	200
EDLS_Awareness	Pearson Correlation	.488**	1	.535**	.499**	.504**
	Sig. (2- tailed)	.000		.000	.000	.000
	N	200	200	200	200	200
SDT_Efforts	Pearson Correlation	.573**	.535**	1	.539**	.495**
	Sig. (2- tailed)	.000	.000		.000	.000
	N	200	200	200	200	200
BTD_Platforms	Pearson Correlation	.526**	.499**	.539**	1	.511**
	Sig. (2- tailed)	.000	.000	.000		.000
	N	200	200	200	200	200
FR_Compliance	Pearson Correlation	.510**	.504**	.495**	.511**	1
	Sig. (2- tailed)	.000	.000	.000	.000	
	N	200	200	200	200	200

** . Correlation is significant at the 0.01 level (2-tailed).

Multivariate linear regression analysis

Multivariate linear regression analysis is a powerful statistical tool to explore the relationships between multiple independent variables and a single dependent variable. This method employs a linear equation to quantify the influence of independent variables on the dependent variable, represented through coefficients that indicate the direction and magnitude of these effects (Greene, 2003). The coefficients derived from this analysis provide valuable insights into the dynamics of variable interactions, enabling researchers to identify critical predictors and assess their contributions. Furthermore, the predictive capability of this technique allows for estimating outcomes of the dependent variable based on changes in the independent variables, making it a fundamental method in social sciences, economics, and related fields (Bryk & Raudenbush, 1992; Hair et al., 1998).

Table 5 *Model Summary*

Model Summary						
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
1	.663 ^a	.439	.428		.59630	2.276
a. Predictors: (Constant), FR_Compliance, SDT_Efforts, EDLS_Awareness, BTD_Platforms						
b. Dependent Variable: RC_Effectiveness						

The multivariate regression model in this study examines the relationship between the dependent variable, RC_Effectiveness, and the independent variables: EDLS_Awareness, SDT_Efforts, BTD_Platforms, and FR_Compliance. Table 5 presents the model summary, with an R-square value of 0.439, indicating that the

independent variables explain approximately 43.9% of the variance in the dependent variable. The adjusted R-square of 0.428 demonstrates the model's validity while accounting for the number of predictors. The Durbin-Watson statistic of 2.276 confirms no autocorrelation in the residuals, further supporting the model's reliability (Kutner et al., 2005).

Table 6 ANOVA analysis results

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	54.297	4	13.574	38.176	.000 ^b
	Residual	69.337	195	.356		
	Total	123.635	199			
a. Dependent Variable: RC_Effectiveness						
b. Predictors: (Constant), FR_Compliance, SDT_Efforts, EDLS_Awareness, BTM_Platforms						

The ANOVA results in Table 6 confirm the model's statistical significance, with an F-value of 38.176 ($p = 0.000$). This indicates that the independent variables collectively explain a significant portion of the variance RC_Effectiveness. All variables were statistically significant predictors of the dependent variable. Specifically, SDT_Efforts had the most substantial effect ($\beta = 0.298$, $p = 0.000$), followed by BTM_Platforms ($\beta = 0.201$, $p = 0.004$) and FR_Compliance ($\beta = 0.195$, $p = 0.004$).

Table 7 Regression coefficient

Coefficients^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error				Tolerance	VIF
1	(Constant)	.639	.200		3.188	.002		
	EDLS_Awareness	.131	.069	.130	1.896	.059	.610	1.639
	SDT_Efforts	.286	.067	.298	4.269	.000	.589	1.699
	BTM_Platforms	.188	.065	.201	2.903	.004	.602	1.660
	FR_Compliance	.196	.068	.195	2.876	.004	.628	1.591
a. Dependent Variable: RC_Effectiveness								

All variables' variance inflation factor (VIF) values were below 1.67, confirming the absence of multicollinearity among the predictors (Kutner et al., 2005). This indicates that the regression coefficients were estimated with high precision. The results demonstrate that the independent variables significantly contribute to explaining Risk Communication Effectiveness, validating the proposed research model. These findings provide valuable insights into the factors influencing risk communication in digital economy training and establish a strong foundation for policy and program recommendations.

RESULTS

The findings from the multivariate linear regression analysis, as presented in Table 7, provide significant insights into the factors influencing the effectiveness of risk communication in digital economy training in Vietnam. The study examines the relationship between the dependent variable, Risk Communication Effectiveness, and the independent variables: Enhancing Digital Literacy and Security Awareness, Supporting Digital Transformation Efforts, Building Trust in Digital Platforms, and Facilitating Regulatory Compliance. These findings elucidate the nuanced dynamics underpinning risk communication in Vietnam's digital transformation context.

The analysis demonstrates that Supporting Digital Transformation Efforts exert a robust and statistically significant positive impact on Risk Communication Effectiveness. This is evidenced by a regression coefficient (β) of 0.286 and a p-value of 0.000, indicating a high level of statistical significance. These results strongly support Hypothesis 2 and highlight the pivotal role of aligning digital economy training with broader digital transformation initiatives to enhance risk communication.

Similarly, Building Trust in Digital Platforms shows a positive and statistically significant impact on Risk Communication Effectiveness, with a regression coefficient (β) of 0.188 and a p-value of 0.004. These

findings substantiate Hypothesis 3, emphasizing the importance of fostering trust in digital platforms as a critical enabler of effective risk communication. Additionally, Facilitating Regulatory Compliance demonstrates a significant positive relationship with Risk Communication Effectiveness, with a regression coefficient (β) of 0.196 and a p-value of 0.004. These results provide strong empirical support for Hypothesis 4, underscoring the necessity of educating participants about digital regulations and compliance requirements in training programs.

In contrast, the impact of Enhancing Digital Literacy and Security Awareness on Risk Communication Effectiveness is positive but not statistically significant at the 0.05 level. The regression coefficient (β) is 0.131, with a p-value of 0.059, indicating a marginal contribution. These findings do not provide conclusive support for Hypothesis 1 but suggest that while digital literacy and security awareness are essential, their role in enhancing risk communication may require additional focus or integrated approaches.

DISCUSSION

The findings from the multivariate linear regression analysis, as summarized in Table 7, provide critical insights into the factors influencing the effectiveness of risk communication in digital economy training in Vietnam. This study investigates the impact of Enhancing Digital Literacy and Security Awareness, Supporting Digital Transformation Efforts, Building Trust in Digital Platforms, and Facilitating Regulatory Compliance, offering a nuanced understanding of how these factors shape effective risk communication within Vietnam's rapidly evolving digital economy.

The results indicate that Supporting Digital Transformation Efforts is pivotal, emerging as the most significant factor influencing risk communication effectiveness. With a substantial and statistically significant positive impact, this finding underscores the importance of aligning risk communication strategies with broader digital transformation initiatives. The ability to provide practical support and guidance in navigating digital tools and technologies equips stakeholders with the knowledge and confidence necessary to engage effectively in the digital economy. This aligns with existing literature emphasizing the integration of risk communication and transformative digital initiatives to drive meaningful engagement (Akbari et al., 2023; Nguyen, 2023).

Additionally, Building Trust in Digital Platforms and Facilitating Regulatory Compliance were found to significantly positively impact risk communication effectiveness. The strong correlation between trust in digital platforms and effective risk communication highlights the importance of fostering a reliable and transparent digital environment. This supports findings that trust is foundational for encouraging stakeholders to engage with digital platforms and adopt safe practices (Cairns et al., 2013; Curtis et al., 2022). Meanwhile, the significance of regulatory compliance emphasizes the necessity of educating participants about legal frameworks and their implications for the digital economy. Training programs that effectively communicate the importance of compliance enhance participants' understanding and promote adherence to national and international standards, ensuring sustainable digital engagement (Bui & Nguyen, 2023; Nguyen et al., 2021).

While Enhancing Digital Literacy and Security Awareness demonstrated a positive relationship with risk communication effectiveness, its impact was not statistically significant. This result suggests that while digital literacy and security awareness are essential components of digital economy training, their current integration into risk communication strategies may require further refinement. Programs may benefit from adopting more targeted and interactive approaches, such as gamified learning or real-world simulations, to amplify the role of digital literacy in effective risk communication (Evans et al., 2019; Ha & Chuah, 2023).

These findings significantly impact policymakers, educators, and industry leaders involved in digital economy training. First, the emphasis on Supporting Digital Transformation Efforts suggests that training programs prioritize practical support for digital adoption and innovation while embedding risk communication into these processes. Second, building trust in digital platforms should be a central goal, achieved through transparency, consistent communication, and establishing secure digital ecosystems (D'Hauwers et al., 2020; Forney & Sadar, 2021). Third, regulatory compliance must be integrated into training curricula, focusing on simplifying complex legal frameworks and providing actionable guidance for participants (Meyers et al., 2013; Renn et al., 2022).

The study also highlights the need for a holistic approach to digital economy training. By integrating economic, regulatory, and trust-building dimensions, programs can more effectively address the diverse needs of stakeholders. Enhancing Digital Literacy and Security Awareness should remain a priority, with efforts to strengthen its impact through innovative teaching methods and context-specific applications (Moon, 2023; Nguyen et al., 2021).

This research contributes to understanding risk communication within the framework of digital economy training in Vietnam, offering a robust evidence base for designing targeted interventions and policy measures. This study provides actionable insights for enhancing training outcomes in a rapidly digitalizing economy by identifying and prioritizing key factors that influence risk communication effectiveness. Future research should explore the longitudinal impact of these factors and investigate additional variables, such as cultural influences or technological advancements, that may further shape risk communication dynamics in digital economy training. This strategic and multifaceted approach will support Vietnam's broader digital

transformation goals while ensuring sustainable and inclusive growth in the digital age (Nguyen, 2023; Zipkin et al., 2014).

CONCLUSION

This study explored the factors influencing the effectiveness of risk communication in digital economy training in Vietnam, focusing on critical dimensions such as digital literacy, digital transformation efforts, trust in platforms, and regulatory compliance. Using multivariate linear regression analysis, the research systematically examined the relationships between these factors and their impact on enhancing risk communication within Vietnam's rapidly evolving digital economy.

The findings highlight the pivotal role of Supporting Digital Transformation Efforts as the most significant driver of risk communication effectiveness. This underscores the necessity of integrating risk communication strategies into broader digital transformation initiatives, equipping stakeholders with the knowledge and tools to manage digital risks effectively (Nguyen, 2023; Akbari et al., 2023). Similarly, Building Trust in Digital Platforms emerged as a critical factor, emphasizing the importance of fostering secure and transparent digital environments. This aligns with existing literature that underscores trust as foundational to successful engagement with digital platforms (Cairns et al., 2013; Curtis et al., 2022). Additionally, the significant influence of Facilitating Regulatory Compliance demonstrates the need to educate participants about legal frameworks and their implications for digital practices, ensuring alignment with national and international standards (Bui & Nguyen, 2023; Nguyen et al., 2021).

While Enhancing Digital Literacy and Security Awareness showed a positive relationship with risk communication effectiveness, its impact was not statistically significant. This finding suggests that current approaches to integrating digital literacy and security awareness into risk communication strategies may require further refinement. Targeted and context-specific methodologies, such as gamified learning or real-world applications, could amplify the role of digital literacy in supporting risk communication (Evans et al., 2019; Ha & Chuah, 2023).

This study offers actionable recommendations for policymakers, educators, and industry leaders to enhance the effectiveness of digital economy training programs. Stakeholders can significantly improve risk communication outcomes by focusing on practical support for digital transformation, fostering trust in platforms, and promoting regulatory compliance (D'Hauwers et al., 2020; Renn et al., 2022). Furthermore, the study advocates for a holistic training approach that integrates these critical factors to address the diverse needs of Vietnam's digital economy participants.

Acknowledging certain limitations, such as the study's cross-sectional nature and the exclusion of potential contextual or cultural variables, this research lays a strong foundation for future inquiries. Future studies could adopt longitudinal designs, explore regional variations, and include additional factors, such as technological advancements or cultural influences, to deepen understanding (Moon, 2023; Nguyen et al., 2021). Comparative studies across different economies could also identify universal and context-specific drivers of effective risk communication in digital economy training (Zipkin et al., 2014).

In summary, this study significantly contributes to the discourse on risk communication within the framework of digital economy training in Vietnam. It provides critical insights and practical recommendations, emphasizing the importance of a strategic and nuanced approach to enhancing risk communication effectiveness and supporting Vietnam's broader digital transformation goals.

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Appendix

Questionnaire

Your profile: Please select ONE answer from each statement that best describes you

Age: ☐ 20–29 ☐ 30–39 ☐ 40–49 ☐ 50+.

Gender: ☐ Male ☐ Female

Occupation:

☐ Training Program Participant

☐ Trainer/Educator

☐ Employee in a Digital-Economy-Related Industry

☐ University Student in a Relevant Field

☐ Government or Policy Official

☐ SME Owner/Manager

Digital Literacy Level: ☐ Beginner ☐ Intermediate ☐ Advanced

The purpose of this survey is to identify the impact of risk communication on digital economy training in Vietnam. On this scale, there is no correct or incorrect response. Please read each statement carefully and indicate your level of agreement using a 5-point Likert scale, where 1 corresponds to "Strongly Disagree" and 5 corresponds to "Strongly Agree."

RC_Effectiveness	Risk Communication Effectiveness					
RC_Effectiveness1	The training provided clear and understandable information about digital risks.	(1)	(2)	(3)	(4)	(5)
RC_Effectiveness2	The risk communication content was accessible and easy to apply.	(1)	(2)	(3)	(4)	(5)
RC_Effectiveness3	I trust the sources of information used during the training sessions.	(1)	(2)	(3)	(4)	(5)
RC_Effectiveness4	The training addressed timely and relevant risk-related topics.	(1)	(2)	(3)	(4)	(5)
EDLS_Awareness	Enhancing Digital Literacy and Security Awareness					
EDLS_Awareness1	The training improved my ability to identify and mitigate cybersecurity threats.	(1)	(2)	(3)	(4)	(5)
EDLS_Awareness2	I feel more confident about protecting my personal data after the training.	(1)	(2)	(3)	(4)	(5)
EDLS_Awareness3	The program taught me safe online behaviors effectively.	(1)	(2)	(3)	(4)	(5)
EDLS_Awareness4	The training enhanced my understanding of the importance of digital security in daily activities.	(1)	(2)	(3)	(4)	(5)
SDT_Efforts	Supporting Digital Transformation Efforts					
SDT_Efforts1	The training helped me understand the challenges of digital transformation.	(1)	(2)	(3)	(4)	(5)
SDT_Efforts2	I feel better equipped to adopt new digital tools and technologies after the training.	(1)	(2)	(3)	(4)	(5)
SDT_Efforts3	The program provided strategies to balance innovation with managing digital risks.	(1)	(2)	(3)	(4)	(5)
SDT_Efforts4	The training emphasized the importance of risk management in successful digital transformation.	(1)	(2)	(3)	(4)	(5)
BTD_Platforms	Building Trust in Digital Platforms					
BTD_Platforms1	The training improved my confidence in using digital platforms safely.	(1)	(2)	(3)	(4)	(5)
BTD_Platforms2	I am more likely to engage with e-commerce platforms after attending the training.	(1)	(2)	(3)	(4)	(5)
BTD_Platforms3	The program strengthened my trust in the security of digital financial services.	(1)	(2)	(3)	(4)	(5)
BTD_Platforms4	The training emphasized transparency in how digital platforms address risks.	(1)	(2)	(3)	(4)	(5)
FR_Compliance	Facilitating Regulatory Compliance					
FR_Compliance1	The training improved my understanding of digital economy regulations.	(1)	(2)	(3)	(4)	(5)
FR_Compliance2	I am aware of the legal consequences of non-compliance due to the training.	(1)	(2)	(3)	(4)	(5)
FR_Compliance3	The training provided actionable guidance on complying with data privacy laws.	(1)	(2)	(3)	(4)	(5)
FR_Compliance4	The program emphasized the importance of regulatory compliance for businesses in the digital economy.	(1)	(2)	(3)	(4)	(5)

Thank you for participating!