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The Function of AI in Relation to Social Responsibility and Innovation: A Study of Women-Owned Small and Medium Enterprises in Vietnam

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Abstract. The aim of this research is to analyze the effect of corporate social responsibility (CSR) on innovation. Examine the function of artificial intelligence (AI), acting both as a direct catalyst for innovation and as a mediator of the relationship between employee CSR and innovation.The study group consists of 688 women-owned small and medium-sized enterprise (SME) managers in Vietnam. The writers additionally employed Smart PLS4 software to evaluate the model and research hypotheses.The results show that CSR practices concerning employees, customers, suppliers, and the environment affect IN in women-owned SMEs in Vietnam. Among them, CSR associated with employees exerts the strongest influence. AI enhances innovation while also influencing the effect of CSR on employees and innovation. The research adds to the understanding of AI. The influence of AI on innovation and its moderating effect on CSR's impact on employees and innovation. The research explains the effect of CSR on stakeholders in women-owned small and medium enterprises in Vietnam.

Keywords: AI, Innovation, Small and medium enterprises references, Social responsibility.

1. INTRODUCTION

Vietnam presently boasts approximately 900,000 businesses, with small and medium enterprises making up roughly 97% of the total, employing 51% of the workforce, and contributing over 40% of GDP. Around 20% of them (165,876 enterprises) are owned by women. Most women-owned businesses are either small (69%), micro (28%), or medium (3%) in size (GSO, 2023). Women-owned SMEs have played a role in empowering women, boosting investment in human resources for the health and education of children, particularly girls, and enhancing social advantages. Businesses have viewed the implementation of CSR as an important strategic focus in order to incorporate social and environmental objectives into their operations (Baumgartner, 2014). Social responsibility enhances social life quality and fosters positive connections with various stakeholders such as employees, customers, suppliers, shareholders, communities, and others (Hillman & Keim, 2001). Nevertheless, the adoption of CSR in women-owned SMEs in Vietnam is challenging due to restricted funding and limited ability for innovation. Hence, it is becoming increasingly important and significant to study this subject in women-owned SMEs in Vietnam.

Recent research indicates that embracing social responsibility can lead to higher levels of innovation (Husted & Allen, 2007; Zhou et al., 2020). Herrera (2015) suggested that when stakeholders are involved in the product innovation process, it can also lead to process innovation within enterprises. Innovation is a tactic to address the development requirements of stakeholders. Moreover, according to Barney (2001), the resource-based theory states that businesses can achieve a CA by enhancing their ability to innovate (Clemens & Bakstran, 2010; Sirmon et al., 2011). Businesses will create new ideas as a result of embracing social responsibility with stakeholders. Thus, by engaging in CSR activities, businesses can improve their reputation, boost profits, gain a competitive advantage, and enhance overall efficiency (Omidvar & Palazzo, 2023). Beside that, AI is a tool that utilizes AI to boost performance across various sectors, proving to be a burgeoning field in all industries striving to enhance efficiency and productivity (Gazi et al., 2024; Nishant et al., 2020). AI is considered a major technological breakthrough of the 21st century, transforming business organizations and society in ways previously unimaginable (Khan et al., 2024). AI is now a crucial element in business innovation projects, process upgrades, and transformation, providing an edge in competitiveness and business performance to companies embracing data-driven and digital surroundings (Chowdhury et al., 2022; Gazi et al., 2024). Nevertheless, studies have examined the influence of AI on innovation and the moderating effect of AI on employee social responsibility regarding innovation. Specifically, the application of social responsibility in innovation among women-owned small and medium enterprises in Vietnam remains fairly restricted, necessitating further empirical studies on this subject. From the identified gap, our study helps to address the theoretical and practical void regarding the influence of social responsibility on innovation, as well as the effect of AI on innovation, with the following key contributions: Firstly, the findings of this research clarify the uncertainties present in the existing literature concerning the impact of AI on innovation. Particularly the mediating function of AI in the relationship between employee social responsibility and innovation. Secondly, the research results bridge the gap regarding the influence of social responsibility on innovation in women-owned small and medium enterprises in Vietnam. In conclusion, the study's findings aid in advancing the objectives of integrating social responsibility, innovation, and AI within businesses, particularly in the context of women-owned SMEs in Vietnam. Simultaneously, this research caters to the interests of various interdisciplinary fields, encompassing academics, specialists, and

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business leaders.

2. LITERATURE

Stakeholder theory started to rise in prominence during the mid-1980s (Freeman, 2010; Freeman & Reed, 1983). Companies have obligations to stakeholders including customers, suppliers, and employees (Jonker & Foster, 2002). Organizations adopting this viewpoint are anticipated to fulfill social obligations to external stakeholders such as local communities and the environment (Simmons, 2004). Researchers have found that any organization can concentrate on satisfying stakeholder expectations (i.e., stakeholder orientation), and that approach is expected to enhance BP (Phillips et al., 2010). Numerous academic definitions and theoretical viewpoints exist regarding the idea of social responsibility to stakeholders (Matten & Moon, 2008) leading to some confusion for companies when implementing them in their management contexts (Carroll, 1999). Nonetheless, within numerous definitions of social responsibility, a shared aspect exists where CSR is perceived as a voluntary obligation by a company towards several responsibilities (Van Marrewijk, 2003) that extend beyond legal and regulatory standards (McWilliams & Siegel, 2001) to its stakeholders.

2.1. Social Responsibility and Innovation

Social responsibility is an idea that is continually being updated (Carroll, 2021; Matten & Moon, 2020) and has been modified to fit the economic, political, and social contexts of each era (Sarkar & Searcy, 2016). Social responsibility is perceived as a self-imposed obligation by a business towards various responsibilities (Van Marrewijk, 2003) that extend beyond statutory and regulatory demands (McWilliams & Siegel, 2001) to its stakeholders such as customers, suppliers, employees, communities, the environment. These responsibilities result in a lasting obligation to consider the expectations and interests of all parties engaged in or impacted by the company's activities in their business choices (Smith, 2003). Programs focused on social responsibility assist businesses in developing new connections and enhancing current ones. For instance, by implementing environmental programs, companies cultivate fresh connections with environmental groups, local communities, and others (Sharma & Vredenburg, 1998). Furthermore, by showing goodwill and reliability (Kervyn et al., 2012), CSR initiatives enhance a company's current relationships. Firms that prioritize social responsibility tend to experience higher levels of trust, satisfaction, and loyalty from a variety of stakeholders, such as customers, employees, investors, business partners, and communities (Klein & Dawar, 2004; Surroca et al., 2010). Companies that excel in their social responsibility towards stakeholders are likely to gain more creative suggestions for products and processes from employees, customers, and suppliers (Luo & Du, 2015; Tukker & Jansen, 2006). Strong connections between stakeholders and the company will encourage stakeholders to willingly provide information and resources, enabling the company to engage with and leverage the external knowledge available in its stakeholder network (Tukker & Jansen, 2006). Stakeholders frequently have unique and original knowledge/expertise that enhances the firm's internal knowledge, making it vital for the firm's innovation initiatives. For instance, customers can share their perspectives on changing market trends and hidden demands (Luo & Du, 2015; Uzzi & Lancaster, 2003); Community environmental groups have enhanced understanding of ecological and societal concerns (Porter & Kramer, 2018). In light of the aforementioned observations, this research puts forth the following hypotheses:

H_{1a}: Responsibility to employees has a positive impact on corporate innovation.
H_{1b}: Responsibility to customers has a positive impact on corporate innovation.
H_{1c}: Responsibility to suppliers has a positive impact on corporate innovation.
H_{1d}: Responsibility to the community has a positive impact on corporate innovation.
H_{1e}: Responsibility to the environment has a positive impact on corporate innovation.

2.2. AI and Innovation

AI is being utilized to improve performance across various industries, and it is a growing area in all sectors aiming to boost effectiveness and output (Nishant et al., 2020). AI has started to transform organizations and society in unpredictable ways. AI plays a crucial role in influencing business innovation efforts, updating manufacturing and business operations, and establishing a competitive advantage.

The significance of AI in innovation abilities is crucial for both theoretical and practical dimensions because of its influence on innovation and organizational factors (von Krogh, 2018). AI can affect the capability lifecycle and serve as a selection event in the transformation or development of new capabilities (Helfat & Peteraf, 2003). Additionally, the literature recognizes numerous practices, routines, and ultimately capabilities as significant methods for impacting diverse AI applications in innovation (Davenport & Ronanki, 2018; Gama & Magistretti, 2023). Consequently, it is essential to reflect on how AI tools can progress the area of innovation management (Cennamo et al., 2020; Glikson & Woolley, 2020; Haenlein et al., 2019). Consequently, based on the preceding observations, this research proposes:

H_2: AI positively impacts innovation.

2.3. AI, Innovation and Responsibility to Employees

AI can create more pertinent suggestions for specific employees in organized tasks. AI's capacity to swiftly and thoroughly examine vast quantities of data allows it to generate "personalized" recommendations on a large scale, meaning it can provide precise and individualized suggestions (Aggarwal & Singh, 2021; Huang & Rust, 2018). Although human managers can provide tailored recommendations, their cognitive constraints hinder the rate at which they analyze data and their capacity to accomplish this for numerous instances. To put it differently, AI improves the significance of feedback given to specific employees by effectively catering to each individual's distinct work circumstances and difficulties (Tong et al., 2021). The AI program evaluates the usual workflow of each employee, assigns a "productivity score," and finds methods to enhance workflow efficiency (Luo et al., 2021). Nonetheless, current research has not investigated how AI influences innovation or whether it changes the relationship between employee engagement and innovation (Khan et al., 2024). Consequently, the absence of studies regarding the effect of AI on innovation and the role of AI in moderating the connection between CSR and innovation among employees requires investigation. Consequently, based on the preceding observations, this research puts forth the following hypotheses:

H_3: AI moderates the relationship between social responsibility to employees and innovation.

From 7 research hypotheses, the proposed research model has 7 variables including 32observations (see Figure 1). In which, CSR to employees, CSR to customers, CSR to suppliers, CSR to the community, CSR to the environment are independent variables; AI is both an independent variable and a moderating variable; innovation is the dependent variable (see Figure 1).

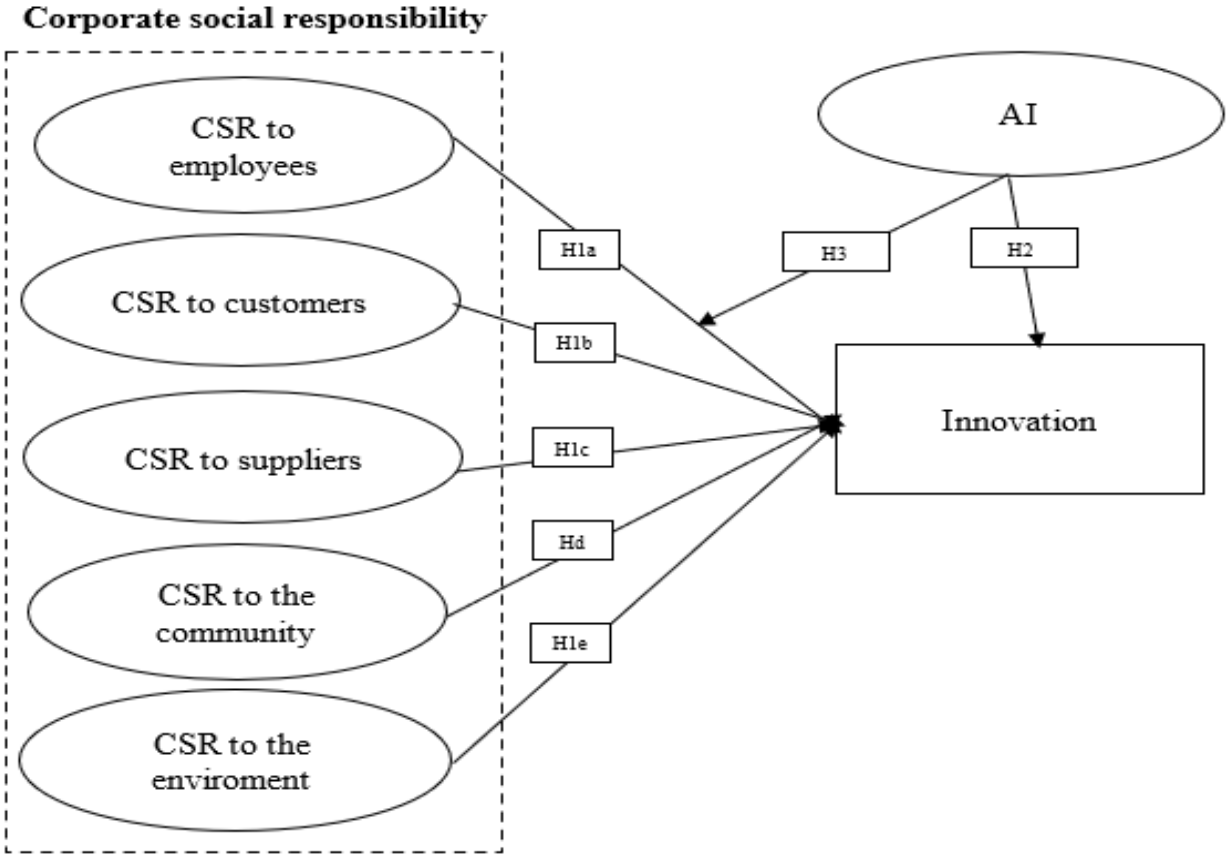


Figure 1: Conceptual framework.

3. METHODS

The measurement scales for the variables in the research model are derived from earlier studies. In which the scales for social responsibility variables (responsibility to employees, customers, suppliers, community, and environment) are derived from Hammann et al. (2009), Lindgreen and Swaen (2010), and Martinez-Conesa, Soto-Acosta and Palacios-Manzano (2017); the innovation scale is sourced from Bocquet et al. (2013), Lee and Choi (2003), and Martinez-Conesa, Soto-Acosta and Carayannis (2017); AI scale is sourced from Khan et al. (2024).

The measured variables are assessed through a five-point Likert scale which includes 1: totally disagree, 2: disagree, 3: somewhat disagree, 4: neutral, 5: somewhat agree, 6: agree, 7: totally agree. The second section consists of inquiries regarding personal and business details, comprising 6 questions related to age, education background, work experience, years of business operation, industry sector, and number of employee at the company.

Regarding the sample size, the authors utilized the structural equation modeling approach based on partial least squares structural equation modeling using Smart PLS4 software. As stated by Hoyle (1995), a sample size

ranging from 100 to 200 is a suitable foundation for applying the path model. Consequently, to guarantee the analysis, the authors aim to obtain 200-250 observations. The survey was carried out conveniently, relying on the personal connection network of the research team; using an online form and directly distributing the form to the respondents. The participants of the survey are 688 female-owned managers of SMEs in Vietnam. Descriptive statistical analysis with 6 characteristics of the research sample gives results in Table 1. Regarding age, most respondents are older than 35 years (50.1%), aligning with the traits of managerial roles. Most respondents held college or university degrees (73.1%). Regarding seniority, most respondents possessed 5 to 10 years of professional experience (40.3%). Regarding the duration of the company's operation, the firms had been active for 6 to 10 years (57.3%). The primary area of activity for the businesses was the fashion sector (19%). The employee range of 51 to 100 represented the largest share, making up 43.2%.

Table 1: Sample demographics.

Index		Frequency	Ratio (%)	Index		Frequency	Ratio (%)
Age range	Under 24 years old	82	11.9	Operation year of company	Under 5 years	86	12.5
	25 to 34 years old	261	37.9		6 to 10 years	394	57.3
	Over 35 years old	345	50.1		11 years and over	208	30.2
Education level	High school graduate	49	7.1	Company field of operation	Food processing	66	9.6
	College, university	503	73.1		Education	74	10.8
	Postgraduate	136	19.8		Fashion	131	19.0
					Beauty	98	14.2
					Beverage	85	12.4
					Tourism	123	17.9
					Other	111	16.1
Years of service	Under 3 years	66	9.6	Number of employees	Under 50	155	22.5
	3 to 5 years	173	25.1		51 to 100	297	43.2
	5 to 10 years	277	40.3		101 to 200	236	34.3
	Over 10 years	172	25.0				

4. RESULTS

To assess the measurement model, the authors examined the quality of the observed variables via the outer loading coefficient, the scale's reliability using Cronbach's Alpha coefficient and composite reliability CR, and the scale's convergence through average variance extracted. As per Bollen (1984), the Cronbach's Alpha for every scale ought to exceed 0.7; the outer loading coefficient must be more than 0.7 (Hair Jr et al., 2021); the composite reliability CR needs to surpass 0.7 and the average variance extracted should be at least 0.5 (Fornell & Larcker, 1981).

Following the initial estimation, the authors removed the observed variable RE5, RTE1, AI4 due to an outer loading coefficient of less than 0.7. The results of the measurement model, after the removal of 4 observed variables, are presented in Table 3. The Cronbach alpha coefficients for all variables range from 0.770 to 0.902, while the CR coefficients for all variables exceed 0.7, and the AVE index is greater than 0.5. This indicates that every latent variable in the model accounts for over 50% of the variance in the scales (Hair, 2016). Thus, the dependability and uniformity of the scales and variables within the research model are ensured (Hair, 2016).

Table 2: Measurement model evaluation results through indicators.

Code	Items	Outer Loading Factor	Cronbach ' Alpha	CR (rho_a)	CR (rho_c)	AVE
RE1	"Our company cares about the interests of employees when making decisions".	0.803				
RE2	"Support employees to be ready for further training	0.841	0.857	0.863	0.903	0.699
RE3	Help employees achieve work-life balance".	0.844				
RE4	"Understand the importance of stable employment".	0.855				
RC1	"Our company makes commitments to quality".	0.841				
RC2	"Our company makes price commitments".	0.860				
RC3	"Inform customers about the proper use and risks of the product".	0.848	0.871	0.872	0.911	0.720
RC4	"Take necessary steps to avoid customer complaints".	0.845				
RS1	"Our company considers the interests of the supplier to make decisions".	0.751				
RS2	"Ask the supplier about our company image".	0.805	0.809	0.812	0.874	0.635
RS3	"Check out the supplier's reviews".	0.838				
RS4	"Notify suppliers of changes in our company".	0.792				
RTC1	"Our company makes commitments to quality".	0.756				
RTC2	"Our company makes price commitments".	0.782				
RTC3	"Inform customers about the proper use and risks of the product".	0.779	0.770	0.701	0.708	0.510
RTC4	"Take necessary steps to avoid customer complaints".	0.774				
RTE2	"Support cultural and sports activities".	0.739				
RTE3	"See yourself as part of the community and care about the	0.932	0.839	0.898	0.902	0.757

	development of the community".					
RTE4	"Implement programs to support disadvantaged groups".	0.925				
AI1	"We possess the infrastructure and skilled resources to apply AI information processing system"	0.853				
AI2	"We use AI techniques to forecast and predict environmental behavior"	0.916				
AI3	"We develop statistical, self-learning, and prediction using AI techniques".	0.910	0.902	0.904	0.932	0.774
AI5	"We use AI outcomes in a shared way to inform decision-making"	0.838				
IN1	"The number of new products/services launched is higher than the industry average".	0.799				
IN2	"The number of innovative products/services launched is higher than the industry average".	0.822				
IN3	"Number of new or improved internal processes higher "than your industry average".	0.789				
IN4	"Senior management emphasizes research and development".	0.780	0.886	0.887	0.913	0.636
IN5	"Over the past five years, new product lines have been introduced".	0.788				
IN6	"The changes introduced in our new products over the past five years have been significant".	0.805				

The HTMT index was utilized (Henseler et al., 2015) to assess the discriminant validity of the variables in the research model. Kline (2015) states that discriminant validity between constructs is confirmed when the HTMT index is less than 0.85. The findings presented in Table 3 indicate that the HTMT index values for each construct satisfy the criteria, thus confirming the establishment of discriminant validity (Kline, 2015).

Table 3: HTMT Index.

	AI	IN	RC	RE	RS	RTC	RTE	AI x RE
AI								
IN	0.513							
RC	0.373	0.706						
RE	0.572	0.518	0.323					
RS	0.390	0.697	0.648	0.317				
RTC	0.132	0.061	0.054	0.099	0.094			
RTE	0.353	0.422	0.305	0.271	0.282	0.105		
AI x RE	0.422	0.051	0.101	0.347	0.095	0.026	0.260	

To assess the model and examine the research hypotheses, indicators including: path coefficient value (β) for endogenous latent variables, T-Value, P-Value, effect size f2, confidence interval CI, and R^2 are employed. The research findings are presented in Table 6, Table 7, and

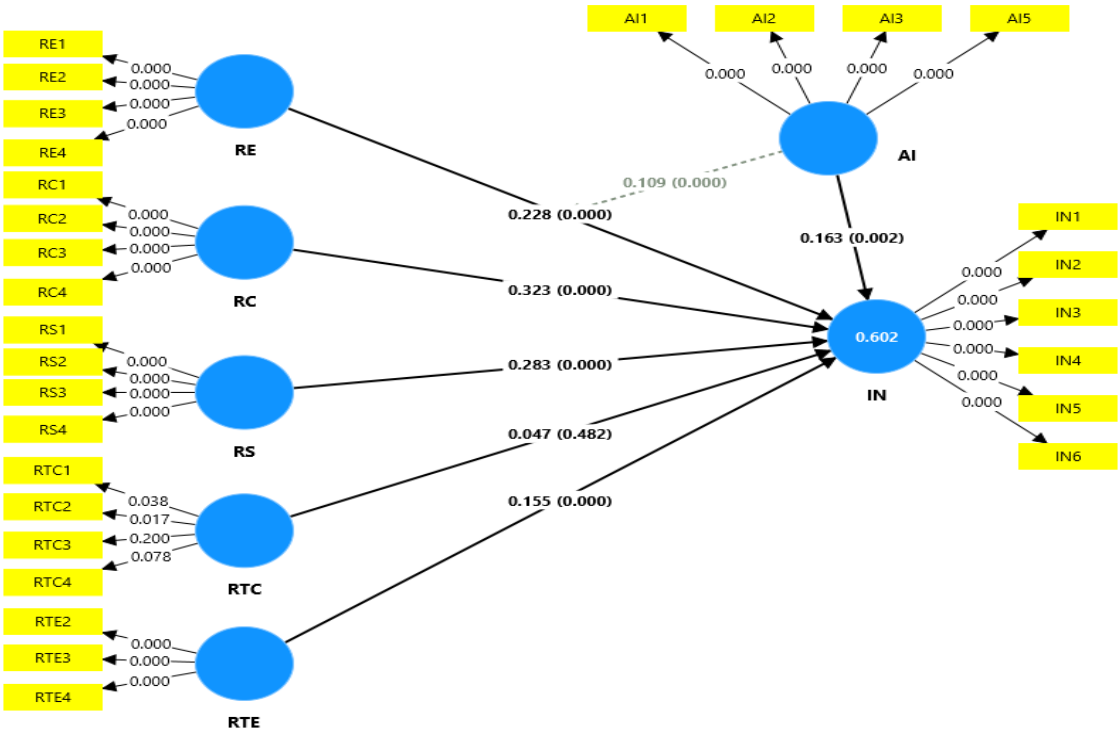


Figure 2: Structural Equation Modeling.

According to the indicators presented in Table 4 and Figure 2, 6 out of 7 hypotheses were accepted with P-value <0.05 and T-Value >1.65; hypothesis H1d was rejected since P-value = 0.482 >0.05 failed to meet the criteria. The factors responsibility to employees, responsibility to customers, responsibility to suppliers, responsibility to the community, and responsibility to the environment all positively influence innovation in women-owned small and medium-sized enterprises in Vietnam (hypotheses H1a, H1b, H1c, H1e). Among these, responsibility to customers has the most significant effect on innovation, with $\beta = 0.323$, while responsibility to suppliers positively influences innovation with $\beta = 0.283$. Additionally, the factor responsibility to employees also shows a positive effect on innovation, with $\beta = 0.228$; Environmental responsibility positively impacts innovation but is the weakest factor ($\beta = 0.155$). AI influences to innovation ($\beta = 0.163$)) (hypothesis H2) and also moderates the relationship between responsibility to employees and innovation ($\beta = 0.109$ (hypothesis H3).

Table 4: Hypothesis testing results (Direct impact).

Hypothesis	Path Coefficient (B)	Standard Deviation	T-Value	P-Value	VIF	Result
H1a: RE -> IN	0.228	0.039	5.790	0.000	1.365	Accept
H1b: RC -> IN	0.323	0.052	6.166	0.000	1.652	Accept
H1c: RS -> IN	0.283	0.049	5.732	0.000	1.321	Accept
H1d: RTC -> IN	0.047	0.066	0.703	0.482	1.003	Reject
H1e: RTE -> IN	0.155	0.033	4.758	0.000	1.667	Accept
H2 AI -> IN	0.163	0.052	3.136	0.002	1.722	Accept
H3: AI x RE -> IN	0.109	0.025	4.372	0.000	1.358	Accept

The adjusted R^2 coefficient illustrates how much of the variance in endogenous variables is accounted for by exogenous variables (Hair, 2016; Henseler et al., 2015). Cohen (2013) proposed that an R^2 greater than 0.4 indicates a large effect, an R^2 between 0.25 and 0.4 signifies a medium effect, and an R^2 below 0.1 represents a weak effect. Figure 2 displays the modified R^2 coefficient of determination. Table 5 presents the adjusted R^2 coefficient of determination for the variable "innovation" at 0.598. The independent variables responsibility to employees, responsibility to customers, responsibility to suppliers, responsibility to the environment, and AI accounted for 59.8% of the variation in the variable "innovation" in women-owned small and medium enterprises in Vietnam.

Table 5: Coefficient of determination R^2

	R^2	Adjusted R^2
Innovation	0.602	0.598

5. DISCUSSION

The initial novel finding of the research indicates that AI positively influences innovation in Vietnamese women-owned SMEs. Simultaneously, AI contributes to overseeing social responsibility towards employees, which positively influences innovation. When effectively applying social responsibility and utilizing artificial intelligence to assist employees in their workflows, it generates innovative initiatives in products and processes while enhancing innovation efficiency within companies. Artificial intelligence (AI) is becoming more significant in the realm of business management (Luo et al., 2021). AI has been examined as a digital technology capable of changing and revolutionizing our comprehension of innovation (Magistretti et al., 2019). In academic writings, AI is acknowledged as a developing area with significant promise (Brem et al., 2021), seen as a technology that can perceive, interpret, inform, and assess information.

Secondly, the study findings indicate that social responsibility positively influences innovation in small and medium enterprises owned by women in Vietnam. The higher the responsibility, the clearer the innovative efforts. This finding aligns with the studies conducted by Luo and Du (2014); Martinez-Conesa et al. (2017), and Zhou et al. (2020). The research indicates that responsibility to customers has the greatest influence on the innovation of businesses. Since customers are the key stakeholders, companies consistently innovate their products and manufacturing processes to effectively fulfill their requirements. Consumers react favorably to environmental and social product initiatives (Glaveli, 2021; Marquina Feldman & Vasquez-Parraga, 2013); Moreover, responsibility to employess positively influences innovation in women-owned SMEs in Vietnam. Workers are crucial to the organization's success and shape the innovation choices of the company (Spitzeck & Hansen, 2010; Zhou et al., 2020); Additionally, the responsibility to suppliers impacts expenses, delivery durations, and risks associated with sourcing raw materials, which enhance product innovation and manufacturers' responsiveness to the market (Hult & Scott Swan, 2003; Martinez-Conesa, Soto-Acosta, & Palacios-Manzano, 2017); Ultimately, the factor of environmental responsibility impacts the innovation of businesses, as pollution, greenhouse gas emissions, and resource depletion are primarily driven by processing and manufacturing companies. Consequently, companies have sought to address that issue by engaging in environmental management actively through innovative approaches to their products and manufacturing processes (Walker, 2012). Addressing environmental issues, fostering green innovation is viewed as a strategic approach that can notably decrease environmental pollution and provide business benefits to companies (Wong et

al., 2012; Zailani et al., 2014)

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All figures are to be numbered using Arabic numerals. Figures should always be cited in text in consecutive numerical order. Each figure should have a concise caption describing accurately what the figure depicts. Figure captions begin with the term Figure in bold type, followed by the figure number, also in bold type. Identify previously published material by giving the original source in the form of a reference citation at the end of the figure caption.

6. DISCUSSION

The findings of this research carry significant consequences for decision-makers and managers in grasping the impact of stakeholders on innovation. Managers and leaders must incorporate the ideas and expectations of stakeholders into innovation processes and products to successfully address their needs. They need to allocate additional time and resources from the company to foster innovative thinking, as AI influences innovation and employees develop significant competitive strategies in fast-paced, competitive markets.The study sample size was limited and the survey was conducted at convenience, thus affecting the representativeness of the sample and hindering the generalizability of the study findings. This indicates that further research is needed to collect data from a broader and more accurate group. Additionally, future studies could delve into the impact of AI on CSR with customers, suppliers, the environment. Despite the limitations of the study, the findings still have important implications for theory, researchers, and organizations seeking to promote CSR, AI, and AI in women-owned SMEs in Vietnam.

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