

A Study of Causal Factors, Knowledge Management, and Technology Adoption for Corporate Social Responsibility in the Electric Vehicle Industry toward Sustainability

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Abstract

This study focuses on personal factors, causal factors, and knowledge management, and their influences on the adoption of technology for corporate social responsibility (CSR) within the electric vehicle (EV) industry toward sustainability. The sample group consists of 400 EV users in Thailand, with data collected via questionnaires. Statistical analyses included frequency, percentage, analysis of observed variables, measurement models, and structural equation modeling (SEM) using the Partial Least Square (PLS) method.

The results indicate that personal factors significantly affect causal factors in knowledge management, which in turn influence technology adoption for sustainable EV business operations. Both measurement and structural equation models confirmed the consistency of the research framework with empirical data across all indicators. These findings assist businesses in identifying strengths and weaknesses, leading to the formulation of appropriate policies and strategies to create added value for both businesses and society in the long term.

Keywords: Knowledge management, Technology acceptance, Corporate Social Responsibility (CSR), Sustainability

Background and Statement of the problem

In an era of rapid technological advancement and increasing environmental awareness, electric vehicles have become an attractive option for consumers and the automotive industry. The shift from internal combustion vehicles to electric vehicles impacts technology and the market and deeply concerns social dimensions and sustainability. The electric vehicle business is not limited to the production and distribution of vehicles but also requires knowledge management related to this new technology to continuously develop products and services that meet the needs of customers and society. In addition, the acceptance of technology by employees and executives is an important factor affecting the success of the business and also affects the organization's social responsibility Manner, P., Tikka, V., Honkapuro, S., Tikkanen, K., & Aghaei, J. (2024), EKumar, R. (2024), Zhang, Y., Lu, M., & Shen, S. (2021), Sovacool, B. K., Kester, J., Noel, L., & Zarazua de Rubens, G. (2020), Bello, A. N., Sogunro, E. O., & Adeniyi, M. (2024), Mulyono. (2024). Research gaps Despite the large amount of research on EVs, there are still several interesting research gaps, including the link between knowledge management and social responsibility. Most research focuses on the technological and economic factors of EVs. However, relatively little research still studies the link between organizational knowledge management and social responsibility in EV businesses. The influence of technology acceptance. Most research studies the factors affecting consumer technology acceptance. However, limited research still studies the influence of technology acceptance by employees and executives within organizations on social responsibility. Sustainability in the context of the EV business: Although EVs are seen as a sustainable option, issues still need to be considered, such as battery waste management and the impact of EV parts production on the environment. Arsih, V., & Animah. (2024), Nwachukwu, C., et al. (n.d.), Sivarajah, U., Irani, Z., Gupta, S., & Mahroof, K. (2020), Talbot, D., Raineri, N., & Daou, A. (2021), Roos, N., & Guenther, E. (2020), Ponte, S. (2020), Budur, T., Abdullah, H., Rashid, C. A., & Demirer, H. (2023). Interesting research This research is interesting because it answers current challenges. This research helps to understand the factors that affect the EV business's success and the industry's sustainability. Create new knowledge. This research will help fill the gap and create new knowledge about the link between knowledge management, technology adoption, and social responsibility, leading to improved operations. The research results can be used to improve the knowledge management process within the organization and

encourage employees and executives to participate in innovation and develop the business for sustainable growth. 16. Yumhi, Y., Dharmawan, D., Febrian, W. D., Sutisna, A. J., & Syahribulan. (2024), Nakash, M., & Bouhnik, D. (2024), Prameswari, N. H. R., Habibah, N. M., Chorer, M. M., & Mun, M. A. S. (2024), Hamid, N., Munizu, M., & Mardiana, R. (2024), Farooq, R. (2024), Patwary, A. K., Alwi, M. K., Rehman, S. U., Rabiul, M. K., Babatunde, A. Y., & Alam, M. M. D. (2024), Nazarian, A., Shahzad, M., Ding, X., & Appolloni, A. (2024), Athaillah, T., Aulia, M. R., & Shalwati. (2024). Expected Impacts The results of this research are expected to have impacts in many areas, including Organizational level: helping EV business organizations to develop more effective knowledge management processes, encourage employees to accept new technologies, and create an organizational culture that emphasizes social responsibility; Industrial level: helping the automotive industry develop good practices in knowledge management and promoting sustainability; Social level: helping society realize the importance of developing EVs and related technologies, and promoting sustainable development; Kapser, S., & Abdelrahman, M. (2020), Sohn, K., & Kwon, O. (2020). The researchers attempted to complement the linkage of knowledge management, technology adoption, and social responsibility in the context of the EV business. This will help to better understand the overall picture of sustainable EV industry development, leading to guidelines for knowledge management development and technology adoption promotion that will lead to socially responsible business operations in the EV industry. The research results may lead to appropriate policies and strategies for entrepreneurs, investors, and the government to support sustainable and socially responsible EV industry development.

Objective

1. This study focuses on personal factors, causal factors, knowledge management, and influences on the adoption of technology for the social responsibility of the EV business toward sustainability

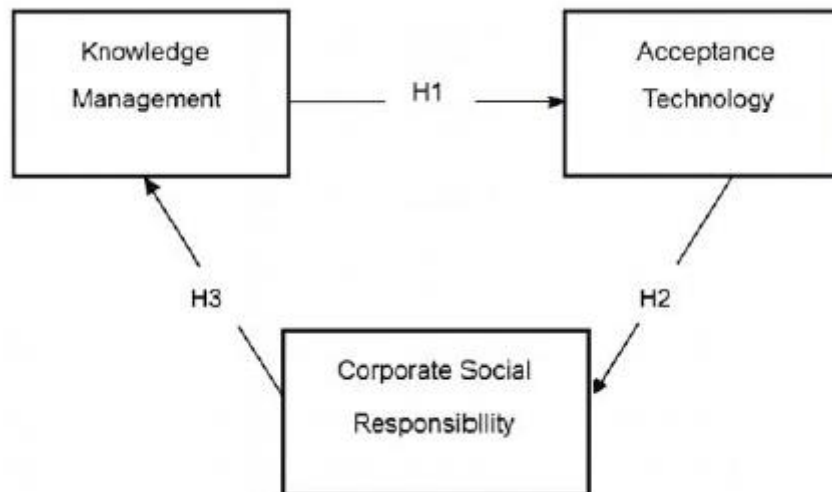
Research hypothesis

1. Knowledge management influences technology adoption in the electric vehicle business.

2. Knowledge management influences the social responsibility of the electric vehicle business.

3. Knowledge management influences the social responsibility of the electric vehicle business.

Conceptual Framework



Research Methodology

Research Instrument Validation

1. Content Validity: The questionnaire was developed and submitted to the independent research advisor to ensure content coverage aligned with the research objectives. Four experts in research instrumentation subsequently evaluated the items for completeness and consistency. They provided suggestions to refine the language for more direct and appropriate communication. The Index of Item-Objective Congruence (IOC) was then calculated, resulting in a perfect consistency index of 1.00.

2. Reliability Testing: To ensure a rigorous research process, the reliability of the instrument was tested with a non-sample population of 40 individuals. Using Cronbach’s Alpha Coefficient formula, the analysis yielded a reliability score of 0.87, confirming the high internal consistency and thoroughness of the research methodology.

Data Collection

The researcher collected primary data using a questionnaire distributed to a sample group of 400 electric vehicle (EV) users in Bangkok. To ensure the feasibility of data collection within the target population, a convenience sampling method was employed.

Data Analysis

The statistics used in analyzing the data in this research included frequency, percentage, mean, standard deviation, and structural equation modeling (SEM) using PLS-SEM data analysis.

Research Results

Demographics

Population and sample used in the research

Population is a company listed on the Stock Exchange of Thailand

The sample group consists of 400 customers who use electric vehicles in Bangkok, selected using a convenience sampling method.

Descriptive Statistics

The statistics used in analyzing the data in this research included frequency, percentage, mean, standard deviation, and structural equation modeling (SEM) using PLS-SEM data analysis

Table 1 Frequency percentage

Variable		Frequency	Percentage
sex	Male	212	53.00
	Female	188	47.00
status	Single	198	49.50
	Married	171	42.80
	Divorced/Widowed	20	5.00
	Separated	11	2.80
age	Under 30 years old	203	50.70
	30 - 49 years old	176	44.00
	50 - 59 years old	14	3.50
	60 years old and above	7	1.80
education	Below bachelor's degree	102	25.50
	Bachelor's Degree	298	74.50
occupation	Students	47	11.80
	Private company employees	234	58.50
	Civil servants/State enterprises	45	11.30
	Traders	51	12.80
	Farmers	15	3.80
	Others	8	2.00
income	Less than or equal to 20,000 baht	37	9.30
	20,000 – 30,000 baht	219	54.80
	30,001 – 40,000 baht	48	12.00
	More than 40,000 baht	96	24.00
Electric vehicle usage experience	Already have an electric car	38	9.50
	Deciding to buy	132	33.00
	Someone recommended to buy	105	26.30
	Have family member use	55	13.80
	Have friend use	62	15.50
	Other	8	2.00
Residing	Bangkok	134	33.50
	perimeter	133	33.30
	Other	133	33.30

Discussion

Objective 1: To analyze the measurement model of causal factors of knowledge management influence of technology adoption towards social responsibility of electric vehicle business. This research is crucial in understanding the complex relationship between these factors and their influence on the adoption of technology for social responsibility in the electric vehicle business

(Coefficient determinant)

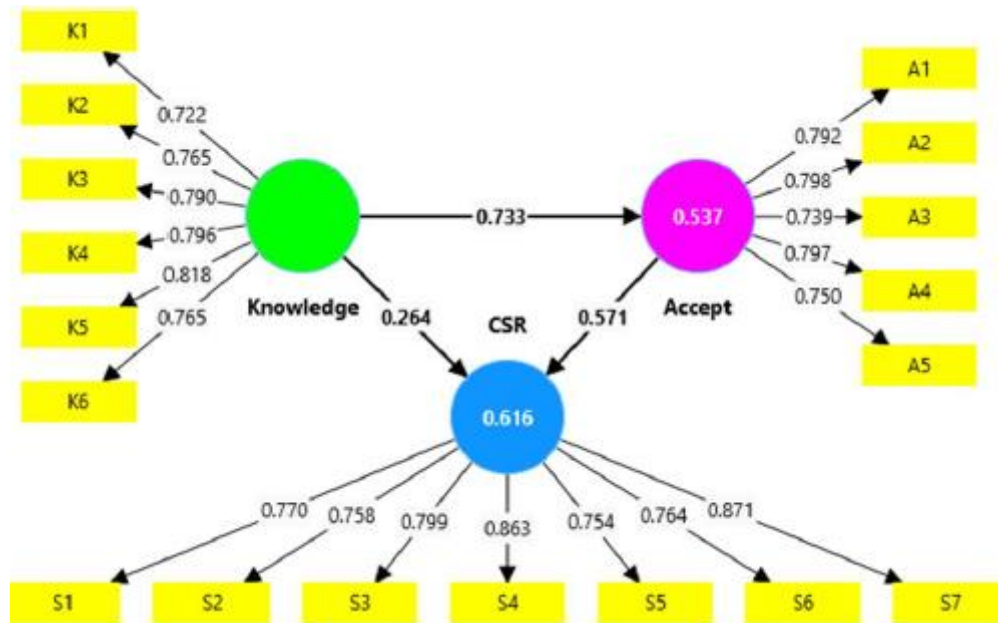


Figure 2 Measurement model

From the analysis of the influence between the dependent and independent variables, it can be explained by the proportion of the variance of the endogenous latent variable that is explained by the independent variable, the coefficient of prediction of the endogenous latent variable R² or R-Square, where R² should be no less than 0.25. It is considered that the independent variable can explain the variance in the dependent variable. The research results found that the variables of knowledge management, technology acceptance, and corporate social responsibility of electric vehicle companies have a coefficient of prediction higher than 0.25, indicating that the independent variable can explain the variance in the latent variable.

Table 2 Outer Loading Matrix

	Accept	CSR	Knowledge
A1	0.792		
A2	0.798		
A3	0.739		
A4	0.797		
A5	0.750		
K1			0.722
K2			0.765
K3			0.790
K4			0.796
K5			0.818
K6			0.765
S1		0.770	
S2		0.758	
S3		0.799	
S4		0.863	
S5		0.754	
S6		0.764	
S7		0.871	

(Outer loading)

The standardized outer loading of indicator variables should be less than 0.70. If it is lower than this, the variable should be considered. Table 3 shows the weights of external components. All indicator variables have outer loading greater than 0.7. Therefore, it can be concluded that all indicator variables used in the study are reliable.

Partial Least Square Structural Equation Modeling Results and Discussion.

Objective2: To analyze the structural equation of the causal factors of knowledge management influence of technology acceptance towards social responsibility of electric vehicle business

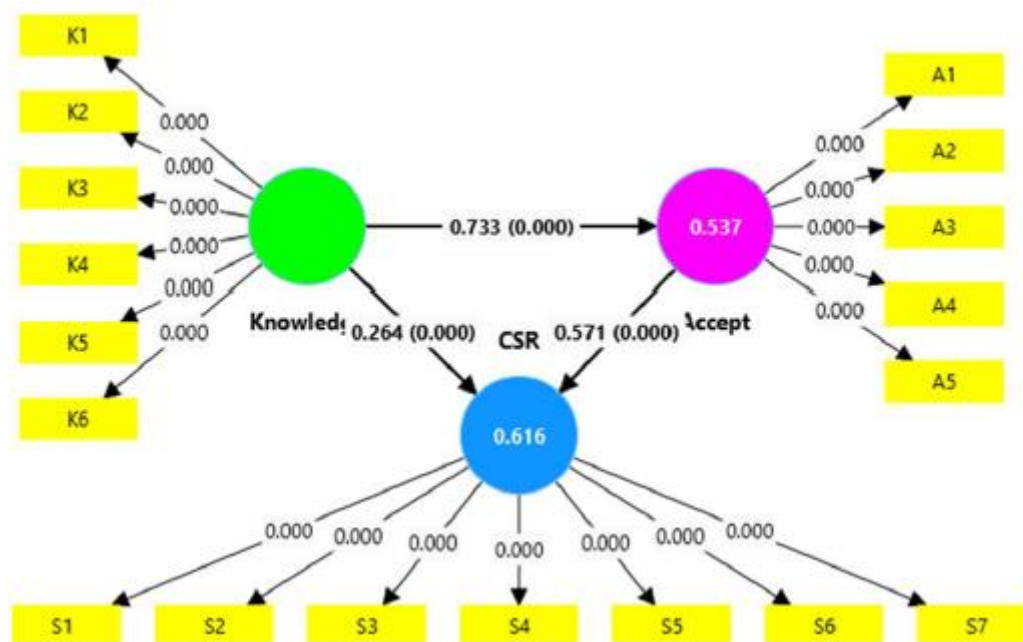


Figure 3 The PLS Structural model Knowledge, Corporate Social responsibility, Accepted

Hypothesis testing for structural model evaluation by PLS-SEM method uses the statistical significance test of parameters by Bootstrapping process. It uses the hypothesis test with two-tailed rejection zone. The coefficient has a significance level of 0.05, i.e. $p < 0.05$ and t-Statistics is greater than the path coefficient supporting the research hypothesis. It can be explained according to the relationship group as follows

Objective 3: To develop a model of causal factors of the electric vehicle business towards sustainability.

A robust sustainability analysis model for the electric vehicle business should encompass economic, social, and environmental dimensions. Internationally recognized models, such as the Triple Bottom Line (3P) model that considers Profit, People, and Planet, or the United Nations' SDG (Sustainable Development Goals) model, which emphasizes the 17 Sustainable Development Goals, can be applied. Additionally, specialized models, like the Life Cycle Assessment model to assess environmental impacts throughout the product's lifecycle, or the Value Chain Analysis model to analyze added value and points that create positive or negative impacts in the supply chain, can be integrated for a comprehensive approach

Discussion

Conducting a sustainability analysis of the electric vehicle business can yield significant benefits. It can help businesses identify their strengths, weaknesses, opportunities, and obstacles in sustainable business operations. The finding that social responsibility carries the highest weight in technology acceptance aligns with the research of Kapser and Abdelrahman (2020) and Sohn and Kwon (2020), who emphasized that risk perception and intelligent product features are key drivers of user acceptance. Furthermore, the significant impact of KM on business sustainability is consistent with the findings of Budur et al. (2023), which highlight the essential role of knowledge processes in achieving sustainability goals. The study also supports the views of Nazarian et al. (2024), who identified green innovation and knowledge management as vital components for sustainable development.

Table 3 Research Hypothesis

	Research hypothesis	T-statistics	Test results
H1	Knowledge management influences the adoption of EV technology in the business	11.119	support
H2	Knowledge management influences the social responsibility of electric vehicle business	25.054	support
H3	Technology adoption influences the social responsibility of electric vehicle businesses	4.957	support

Comment *** $p < 0.01$, ** $p < 0.05$

Conclusion

It was found that the aspect of social responsibility had the highest weight in accepting the technology of the electric vehicle business, followed by the aspect of social responsibility of the electric vehicle business and the aspect of knowledge management of the electric vehicle business, in which all components and indicators passed the criteria for checking the consistency of empirical data.

Practical Implications

The research results indicate that the knowledge management model significantly influences the adoption of EV technology towards sustainability, especially in terms of social

responsibility, which has the highest weight. This means that knowledge management related to EV technology, such as sharing knowledge about environmental impacts, building community networks, or developing environmentally friendly products, will help businesses gain more social acceptance. In addition, adopting information technology also plays an important role in driving changes toward sustainability, reflecting the importance of using technology to manage knowledge and promote collaboration within the organization.

The research also found that although knowledge management in the EV business has the lowest weight, it is an equally important factor. Having a systematic and effective knowledge management system will allow businesses to access information related to EV technology quickly and easily, resulting in more efficient decision-making and operations.

In conclusion, the knowledge management model plays an important role in driving the adoption of EV technology towards sustainability, affecting social responsibility, information technology adoption, and EV business knowledge management. Therefore, focusing on knowledge management is essential for businesses that want to grow sustainably in the era of EVs. In line with research Kapser, S., & Abdelrahman, M. (2020), Sohn, K., & Kwon, O. (2020).

Additional recommendations

Emphasize the importance of social responsibility: There should be clear communication about environmentally and community-friendly operations.

Promote the use of information technology: Use technology to manage knowledge, such as creating a database, using AI to analyze data, or creating a platform for knowledge sharing.

Develop a knowledge management system: Create a systematic and efficient system to provide employees with easy access to relevant information.

Policy Implications

Knowledge management models' policy implications on EV technology adoption are significant. Having a strong and effective knowledge management model will help promote the exchange of knowledge and dissemination of EV technology knowledge more widely, which will lead to the development of policies that facilitate the acceptance and adoption of

this technology more widely, such as the formulation of policies to promote the production and use of EVs, the creation of charging infrastructure, and the support of research and development of related technologies. In addition, knowledge management enables government and private agencies to coordinate and work together more effectively to achieve the goal of promoting the use of EVs and reducing the impact on the environment in the long term.

Limitations and Future Research Directions

Future research should focus on developing intelligent and flexible knowledge management systems and establishing learning communities to promote knowledge and experience exchange so that knowledge management can more effectively support the development of electric vehicles and achieve sustainability goals.

Data Availability

The necessary data should cover both technical aspects, such as battery performance, price, production costs, and environmental impacts, as well as social aspects, such as consumer attitudes, government policies, and charging infrastructure. In addition, quantitative data related to sales, energy consumption, and greenhouse gas reductions are also necessary to assess the impact of this technology. However, this data may be scattered in various sources and in different formats. Therefore, collecting and analyzing this data requires appropriate tools and techniques, such as data mining and quantitative analysis, to obtain reliable results and use them to develop measures to promote the use of electric vehicles.

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