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Intellectual Capital, Innovation Capability, Knowledge Integration of Hi-Tech firms in Thailand

Phatthararuethai Kenikasahmanworakhun[1], Papraporn Jinain[2*], Napaporn Khantanapha[3*], Thanadat Thanathanchuchot[4*], Thanakorn Thanathanchuchot[5*], Sukhumpong Channuwong[6]

[1,5*,6] Faculty of Management, Shinawatra University, Thailand

[2*] Rajamangala University of Technology Krungthep

[3*]South East Asia University, Thailand

[4*]Suvarnabhumi Institute of Technology

***Corresponding Authors:**

Email ID: thanakorn.t@siu.ac.th

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ABSTRACT

Innovation is a crucial strategic component that enables firms to gain a sustainable competitive advantage and achieve long-term success. This research aimed to 1) examine the relationships between human capital, organizational capital, relational capital, and knowledge integration effect on innovation capability of Hi-Tech firms; 2) determine knowledge integration play the mediating role impact between human capital, organizational capital, relational capital on innovation capability of Hi-Tech firms in Bangkok, Thailand. This study used a quantitative research method to fully utilize the advantages of answer the research questions more comprehensively. Population was executive from to 10 Hi-Tech in Bangkok and sample 280 respondent via on simple random sampling, Statistic analyze by SEM. The research reveals that 1. human capital, organizational capital, relational capital, and knowledge integration positive effect on innovation capability 2) knowledge integration play the mediating role impact between human capital, organizational capital, relational capital on innovation capability of Hi-Tech firms in Bangkok, Thailand. These study results had various theoretical, practical, and policymaking implications as discussed by the authors

Keywords: *Intellectual Capital, Innovation Capability, Knowledge Integration, Hi-Tech firms.*

1. INTRODUCTION

Innovation is a crucial strategic component that enables firms to gain a sustainable competitive advantage and achieve long-term success. It is directly associated with possessing the necessary skills and talents (Channuwong et al., 2025; Ramadan, B. M. et al, 2017). Innovation is the process of generating novel ideas and implementing them inside organizations, utilizing both internal and external resources. Enterprises attain market competitiveness by innovating and creating new goods and models. This leads to the transformation of development techniques and the enhancement of economic benefits, ultimately facilitating long-term growth.

Science and technology catalyze the advancement of a nation's economy. Western countries prioritize the development of creative thinking in talented individuals. Developed nations lead the globe in constructing methodologies, doing research & development on equipment, and effectively converting technology into productivity. China, as a growing nation, is consistently enhancing its capacity for innovation and striving to become a leading inventive country. This is a crucial strategic objective for national development and a significant factor in enhancing total national power.

High-tech firms are knowledge-intensive economic organizations that are primarily focused on the research and development and manufacture of high-tech products. They also provide technical service consulting and other related services and are motivated by a commitment to innovative performance.

There are 10 Hi-Tech companies in Bangkok Thailand, encompassing telecommunications, e-commerce, and digital services: Advanced Info Service (AIS), True Corporation, dtac (Total Access Communication), SCG (Siam Cement Group), ThaiBev, Lazada Thailand, Shopee Thailand, Agoda, and Google Thailand (Bootcamp ,2024). In general, a high-tech firm is an

organization that aims to improve its innovation performance and rely on innovation for survival (Wu et al., 2020). To maintain their competitive advantages in the face of economic globalization, market internationalization, and the rapid development of scientific and technological innovation, technological enterprises must improve their awareness of innovation and quickly transform technological and product innovation into innovative performance. High-tech firms are the most active among all types of businesses. They have emerged as a new economic force due to their distinctive innovation and rapid growth. They play a key strategic role in raising the country's scientific and technical standards, as well as its innovative capabilities. Become a powerful engine for China's national economy's long-term growth and innovation.

Research Objectives

1.To examine the relationships Between human capital, organizational capital, relational capital, and knowledge integration effect on innovation capability of Hi-Tech firms in Bangkok, Thailand.

2. To determine knowledge integration play the mediating role impact between human capital, organizational capital, relational capital on innovation capability of Hi-Tech firms in Bangkok, Thailand.

Hypothesis

H1: Human Capital is positively associated with Innovation Capability

H2 Structural Capital is positively associated with Innovation Capability

H3 Relational Capital is positively associated with Innovation Capability

H4 Human Capital has a positive relationship with Knowledge Integration

H5 Structural Capital has a positive relationship with Knowledge Integration

H6 Relational Capital has a positive relationship with Knowledge Integration

H7 Knowledge Integration is positively correlated with Innovation Capability

Methodology

This paper employs a structured literature review to explore intellectual capital (human capital, organizational capital, relational capital) affect innovation capability (knowledge absorption capability, Achievement transformation capability) of top 10 Hi-Tech firms in Bangkok Thailand. This study intends to use a quantitative research method to fully utilize the advantages of answer the research questions more comprehensively. Population were executive from 10 Hi-Tech and sample size 20 X 14 = 280 respondent via on simple random sampling, Statistic analyze by SEM. Intergrade both result for interpretive research, researchers strive to gain a deeper understanding of the underlying meaning, relationships, and influencing factors of a phenomenon.

2. LITERATURE REVIEW

1) Human Capital refers to the knowledge, skills, abilities, and expertise possessed by individuals within an organization. It encompasses the education, training, experience, and capabilities that individuals bring to their work. Human capital is a critical resource for organizations as it directly contributes to their productivity, performance, and competitive advantage (Bontis, 1998).

2) Structural capital comprises the intangible resources that enhance the value and competitiveness of an organization. It comprises the physical and virtual structures, operations, and legal documents that facilitate the generation, distribution, and application of knowledge (Cuozzo et al., 2017).

3) Relational capital refers to the value generated by an organization’s relationships with external partners, such as customers, suppliers, and other stakeholders. It represents the strength and quality of the organizations network and the benefits it derives from those relationships (Blaique et al., 2023).

4) Knowledge as an immutable resource that is not immediately used. Innovative thinking can only be formed inside the team by learning, absorbing, and remembering information that progresses from perceptual awareness to rational thought (Channuwong & Ruksat, 2022; Azari, M. J et al., 2020). According to Migdadi, M. M. (2022).), knowledge integration is a dynamic coupling of knowledge elements through the dynamic flow of gained information within the team, rather than a simple superimposition of knowledge. In his concept of knowledge integration based on knowledge absorption, Migdadi makes the case that knowledge integration may sift through outside data and resources and restructure their usage once they are understood.

5) Innovation Capability is devoted significant effort to researching innovation as a crucial method for problem-solving and sustaining a competitive edge. Muller asserts that innovation has the potential to provide novel goods, services, and other outcomes, hence enhancing corporate performance and market returns (McIver, D.et al (2019). According to Ur Rehman innovation performance refers to the combination of a company's output performance and the use of knowledge

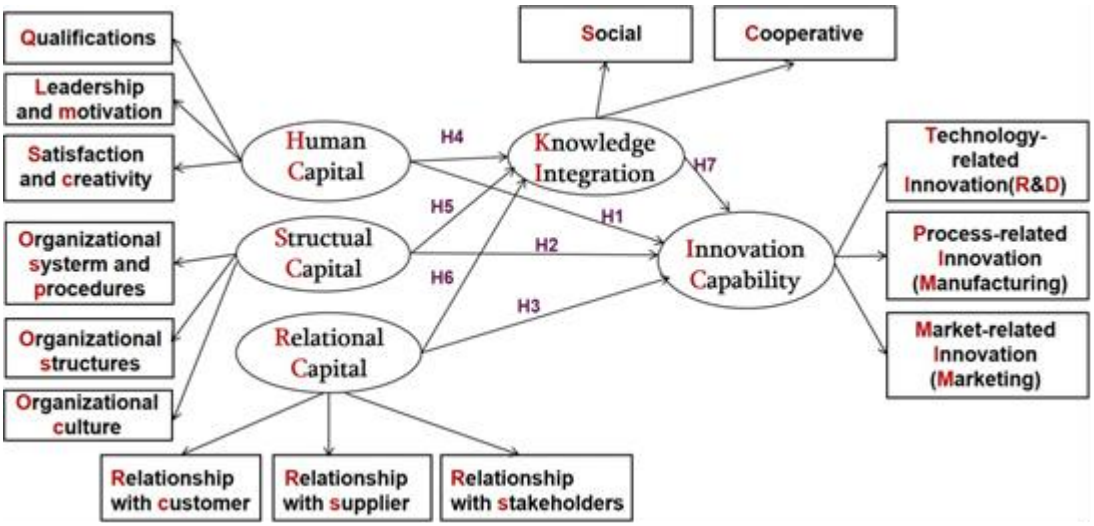
technologies in innovation activities throughout everyday production operations (Ur Rehman, et al . (2022)

6) Theoretical Framework of Resource-Based Theory

Resource-based theory, or the resource-based view (RBV), is a strategic management concept that emphasizes a firm's internal resources and skills as the main drivers of long-term competitive advantage and exceptional performance (Barbieri et al., 2021b).

And the Knowledge-based Theory (KBV), or Knowledge-based View (KBV), emphasizes the significance of knowledge in establishing and maintaining an organization's competitive advantage (Al-Shammari & Almulla, 2023). This implies that knowledge is a highly advantageous asset capable of fostering exceptional performance and sustained prosperity.

Conceptual framework



3. METHODOLOGY

Sampling and data collection

Data collected for thus study is actually the input obtained from different of Hi-Tech firms in Bangkok Thailand and all the data collected from these firms was then accumulated together. The data has been collected from 280 executives' working in these Hi-Tech firms in Bangkok Thailand. The purposive sampling technique has been employed by the researcher so that an appropriate sample may be selected for research and questionnaire filling. The indicators that have been used by the researcher in this study are obtained from the past studies and thus the validity of the measures can be made sure. The employees from which the questionnaire was filled include the senior management. In addition, the officials from higher positions such as directors were also involved in questionnaire filling. All of them were selected on the basis of their enough and appropriate knowledge about the concerned topic of the study. The questionnaire used for the research process was carefully designed by using appropriate order of questions and the content easily understood by the respondents.

Measurement

The variables have been measured by using appropriate measurement items, which have been discussed in this section vividly.

The first independent variable Innovation Capability measured by using 3 items named as (R&D Capability, Manufacturing Capability, and Marketing Capability) . Independent 3 variable, 1) Human Capital is measured by 3 items as (Qualifications, Leadership and Motivation, and Satisfaction and creativity) 2) Structural Capital is measured by 3 items as (Organizational systems and procedures, Organizational structures, and Organizational culture) 3) Relational Capital is measured by 3 items as (Relationship with customer, Relationship with supplier, Relationship with stakeholders). Mediating variable Knowledge Integration is measured by 2 items as (Social, Cooperative)

Statistical analysis

In order to analyze the collected data, SPSS and SEM have been used by the researcher. Different tests and techniques have been employed through this software and the analysis results have been obtained by the researcher. Demographic analysis, descriptive analysis and factor analysis have been obtained from SPSS. In the similar way, confirmatory factor analysis and structure equation modeling have been obtained by using SEM Software.

4. DATA ANALYSIS

Demographics

The total number of respondents from which the data was collected was 280, among which 150 males and 130 females were included. Other than this, according to the age of the respondents, 83respondents are having age less than 25 years, 121 are having age from 25 to 35 years, 65 people are having age from 35 to 45 years and in the last, just 11 respondents are having age more than 45 years. Apart from age, experience of the employees has also been considered and the researcher has found out that 40 respondents were having the experience of less than 2 years in the organization. Moreover, 124 respondents are having the experience of 2 to 5 years, 90 respondents are having the experience of 5 to 8 years while the remaining 26 employees have the working experience of more than 8 years in that particular organization.

Descriptive Statistics

As per the obtained results related to the descriptive statistics of the collected data, it has been confirmed that there is no out liar in the data. This result is supported by the values of minimum and maximum statistics, which are lying in the range of five-point Likert scale. On the other hand, as the skewness values from the table are seen to be within the appropriate range i.e. in between -1 and +1. Thus, the data is considered to be normal and fit to enter the next step.

Descriptive Statistics. N (280)

Table 1:	Minimum	Maximum	Mean	S D.	Skewness	
Human Capital (HC)	284	1.00	5.00	3.3879	1.05811	-.414	.145
Structural Capital (SC)	284	1.00	5.00	3.6954	1.18352	-.649	.145
Relational Capital (RC)	284	1.00	5.00	3.6479	1.18575	-.681	.145
Knowledge integration (KC)	284	1.00	5.00	3.5751	1.18831	-.706	.145
Innovation Capability (IC)	284	1.00	5.00	3.4718	1.03264	-.435	.145
Valid N (listwise)				280			

KMO and Bartlett's Test

KMO and Bartlett's test are used in order to find out if the factor analysis of a particular study is useful or not. In this regard, it is estimated that if the value of KMO test is very close to 1.00, it will be beneficial for the study. In addition, it has also been estimated that if the value of Bartlett's test is less than 0.05, it will also be beneficial for the study. The fulfillment of both conditions can be seen in the table 2.

Table 2: KMO and Bartlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.898
Bartlett's Test of Sphericity	Approx. Chi-Square	5533.373
	Df	120
	Sig.	.000

Hair, J. F. et al (2017)

Rotated Component Matrix

The results of rotated component matrix have been given in table 3. As per these results, the values of factor loading have been observed to be greater than 70% thus indicating that the data collected is eligible to be applied different tests and techniques. Moreover, cross loading error is absent in the data.

Table 3: Rotated Component Matrix

	Component				
	1	2	3	4	5
HC1	.854				
HC2	.895				
HC3	.831				
SC1		.898			
SC2		.905			
SC3		.891			
RC1			.892		
RC2			.890		
RC3			.884		
KC1				.866	
KC2				.871	
IC1					.901
IC2					.842
IC3					.861

Convergent and discriminant validity

In table 4, the results of convergent and discriminant validity can be seen evidently. According to the results presented in the table, the composite reliability CR values for all variables are more than 0.7 while average variance extracted AVE values are more than 0.5. The researcher has also found out that the variables are having loadings different from each other. This confirms the authenticity of the collected data.

Table 4: Convergent and Discriminant Validity

	CR	**AVE**	**MSV**	**HC**	**SC**	**RC**	**KC**	**IC**
HC	0.934	0.876	0.286	**0.936**				
SC	0.953	0.773	0.299	0.474	**0.879**			
RC	0.873	0.774	0.299	0.535	0.547	**0.880**		
KC	0.921	0.817	0.325	0.436	0.503	0.514	**0.957**	
IC	0.915	0.856	0.325	0.490	0.502	0.443	0.570	**0.978**

Confirmatory Factors Analysis

According to the results of confirmatory factor analysis CFA given in table 5, it can be observed that the values for all the indicators linked with CFA are present within the appropriate range given in the table (Hassan, Hameed, Basheer, & Ali, 2020; Iqbal & Hameed, 2020). This indicates that the hypothetical model is fit for use in the study.

Table 5: Confirmatory Factors Analysis

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.957

GFI	Equal or greater .80	.927
CFI	Equal or greater .90	.984
IFI	Equal or greater .90	.984
RMSEA	Less or equal .08	.058

Hair, J. F. et al (2017)

Structural equation modeling

The table 6 of structure equation modeling shows that the impact of stakeholder's pressure and government on the quality performance of the organization is significant but the impact of costumer's willingness to pay on quality performance has been found as insignificant. On the other hand, the mediating impact of environmental and social sustainability factors between all the independent variables i.e. stakeholder's pressure, costumers' willingness to pay and government regulations and the dependent variable, quality performance has been found as significant.

Table 6: Structural Equation Modeling

Total Effect	**Human Capital**	**Structural Capital**	**Relational Capital**	**Knowledge integration**
Knowledge integration	.217**	.227**	.267**	.000
Innovation Capability	.260***	.273**	.233***	.246**
Direct Effect	Human Capital	Structural Capital	Relational Capital	Knowledge integration
Knowledge integration	.217**	.227**	.267**	.000
Innovation Capability	.256**	.287**	.198**	.246**
Indirect Effect	Human Capital	Structural Capital	Relational Capital	Knowledge integration
Knowledge integration	.000	.000	.000	.000
Innovation Capability	.053**	.056**	.066**	.000

Figure 1: Structure Equation Model

5. CONCLUSION AND DISCUSSION

Conclusion

From research result can conclusion as follow:

1)The human capital, which includes workers' skills, knowledge, and constant learning, is a key driver of innovation in high-tech companies. Employees with high technical skills and extensive industry knowledge are better able to contribute to creative processes, allowing businesses to remain competitive in a quickly changing technology context.

Structural capital, which encompasses the firm's organizational procedures, intellectual property, and general infrastructure, is also critical in promoting and maintaining innovation. Well-established procedures and a robust intellectual property portfolio serve as a solid platform for ongoing innovation.

Relational capital, or the networks, partnerships, and external ties that a company maintains, was determined to be as essential. high-tech enterprises that actively connect with external stakeholders, such as suppliers, consumers, and research institutes, have a greater chance of gaining access to new information, technologies, and market insights. These external links enable the interchange of information and ideas, which is critical for generating innovation.

2). knowledge integration as a critical mediating role element impact between human capital, organizational capital, relational capital on innovation capability of Hi-Tech firms, the capacity to successfully integrate information from multiple sources—both internal and external—is critical for converting intellectual capital's potential into real inventive results. Firms that thrive in knowledge integration are able to merge disparate knowledge sources, respond swiftly to market changes, and create creative goods and services that satisfy changing client demand

In conclusion, this study emphasizes the crucial role of intellectual capital and knowledge integration in generating innovation inside high-tech firms in Bangkok, Thailand may greatly improve their innovation skills by efficiently managing and exploiting their intellectual capital, assuring long-term development and competitiveness in a dynamic and complex economic environment. The research offers useful insights for practitioners and policymakers on how to support innovation in high-tech industries, especially in places experiencing fast economic and technological development

Discussion

From research result the author would like to make a discussion especially in the tested hypothesis result as follow:

1 Human Capital is positively associated with Innovation Capability. The results of the study showed that there is a significant positive association between human capital (such as employee knowledge and training programs) and the potential to innovate. Organizations that had more sophisticated human capital indicated better levels of innovation results. And human capital plays in fostering innovation. They brought attention to the significance of employing specialized technical skills, having in-depth understanding of the sector, and engaging in ongoing education in order to enable businesses to innovate successfully (Bangbon et al., 2023; Bontis, 1998).

2) Structural Capital is positively associated with Innovation Capability, the research revealed that there is a considerable positive association between structural capital and innovative capabilities (Cuozzo et al., 2017; Sirathanakul et al., 2023). Companies who made investments in the management of intellectual property and the optimization of their processes reported greater levels of innovation performance. emphasized the need of well-established procedures, a solid intellectual property portfolio, and supported infrastructure in order to maintain innovation

3) Relational Capital is positively associated with Innovation Capability, the research revealed that correlation between relational capital and creativity capacity, according to the findings of the study, which were quantitative in nature (Rehman, et al., 2022). In addition to reporting greater levels of innovative activity, businesses that reported having strong external contacts and partnerships also reported this. Building networks and collaborations with external stakeholders such as research institutions, customers, and suppliers can help to improve innovation capability (Channuwong, 2014). In order to get access to fresh information and technology that fuel innovation, these ties were considered to be of utmost importance.

REFERENCES

[1] Azari, M. J., Aspelund, A., & Eide, A. E. (2020). Knowledge integration in international SMEs – The effects on firm innovation and performance. Cogent Business & Management, 7(1), 1849890. https //doi.org/10.1080/23311975.2020.1849890

[2] Al-Shammari, M., & Almulla, S. M. (2023). Knowledge sharing enablers, processes, and innovation capability in a telecommunications company in an emerging market economy A mixed-methods case study approach. International Journal of Innovation Science. https //doi.org/10.1108/IJIS-12-2022-0241

[3] Bangbon, P., Snongtaweeporn, T., Channuwong, S. et al. (2023). Strategic human resource management for organizational performance of Thai higher education institutions.

[4] Journal of Positive Psychology and Wellbeing, 7(2), 897-911.

[5] Barbieri, B., Buonomo, I., Farnese, M. L., & Benevene, P.(2021b). Organizational Capital A Resource for Changing and Performing in Public Administrations. Sustainability, 13(10), 5436. https //doi.org/10.3390/su13105436

[6] Bootcamp (2024) -thailand-tha-top-10-tech-companies-to-work-for-in-thailand-in-2024 https://www.nucamp.co/blog/coding-Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. Management Decision, 36(2), 63–76. https //doi.org/10.1108/00251749810204142

[7] Blaique, L., Abu Salim, T., & Mir, F. A. (2023). Does human capital mediate the relationship between digital competence and service innovation capability? Evidence from the UAE during covid-19 pandemic. International Journal of Innovation Science. https //doi.org/10.1108/IJIS-11-2022-0214

[8] Channuwong, S., Tongvijit, M., Bangbon, P. (2025). The influence of cultural factors on organizational justice of public organizations in Bangkok. Journal of Neonatal Surgery, 14(3), 1-9.

[9] Channuwong, S., & Ruksat, S. (2022). Buddhist teachings for improving mental health during the COVID019 pandemic. The Journal of Behavioral Science, 17(2), 29-41.

[10] Channuwong, S. (2014). The strategic management of Coca-Cola and Starbucks company. Journal of Business Administration and Languages, 2(2), 55-58.

[11] Cuozzo, B., Dumay, J., Palmaccio, M., & Lombardi, R. (2017). Intellectual capital disclosure A structured literature review. Journal of Intellectual Capital, 18(1), 9–28. https //doi.org/10.1108/JIC-10-2016-0104

[12] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (Second edition). SAGE.

[13] Hassan, S. G., Hameed, W. U., Basheer, M. F., & Ali, J. (2020). Zakat compliance intention among self-employed people: evidence from Panjub, Pakistan. AL-ADWAH, 34(2), 80-96.

[14] McIver, D., Fitzsimmons, S., & Lengnick-Hall, C. (2019). Integrating knowledge in organizations Examining performance and integration difficulties. Knowledge Management Research & Practice, 17(1), 14–23.

[15] https//doi.org/10.1080/14778238.2018.1538667

[16] Migdadi, M. M. (2022). Social capital impact on mass customization capability and innovation capabilities: The mediating role of absorptive capacity. Journal of Business & Industrial Marketing, 37(12), 2488–2500. https //doi.org/10.1108/JBIM-06-2021-0312

[17] Rehman, S., Elrehail, H., Alsaad, A., & Bhatti, A. (2022). Intellectual capital and innovative performance A mediation-moderation perspective. Journal of Intellectual Capital, 23(5), 998–1024. https //doi.org/10.1108/JIC-04-2020-0109

[18] Ramadan, B. M., Dahiyat, S. E., Bontis, N., & Al-dalahmeh, M. A. (2017). Intellectual capital, knowledge management and social capital within the ICT sector in Jordan. Journal of Intellectual Capital, 18(2), 437–462. https//doi.org/10.1108/JIC-06-2016-0067

[19] Sirathanakul, K., Harnpanich, B., Channuwong, S., Bangbon, P., Niangchaem, L., Sutthadaanantaphokin, K. (2023). The influence of human resource management on educational administration of Thai Private Universities. Migration Letters, 20 (S1), 423-436.