The Seybold Report

ISSN 1533-9211

DOI: 10.5281/zenodo.13622666

# APPRAISING THE IMPACT OF RELATIONAL CAPITAL ON INNOVATION CAPABILITY OF HIGH-TECH ENTERPRISES IN CHINA—A PLS -SEM APPROACH

**RUI ZHU**

Doctor of Philosophy Program Student, College of Innovation and Management, Suan Sunandha Rajabhat University, Bangkok, Thailand.
Lecture, Liuzhou Institute of Technology, Guangxi, China. Email:151727577@qq.com

**NIYOM SUWANDEJ ***

Assistant Professor, PhD, College of Innovation and Management, Suan Sunandha Rajabhat University, Bangkok, Thailand. *Corresponding Author Email: niyom.su@ssru.ac.th

**Abstract**

**Purpose** – This study aims to appraise the impact of relational capital (RC) on the innovation capability (IC) of High-tech enterprises in China. It also examines the role of Knowledge integration as a mediating factor in enhancing IC. **Design/methodology/approach** – The study employs a quantitative research design, collecting data from 308 key executives of High-tech enterprises in China. Analyses are conducted using Smart-partial least square (PLS) version 4.1.0.3, incorporating confirmatory factor analysis and PLS relational equation modeling. **Findings** – The RC factor directly influences the enterprises' IC. Additionally, knowledge integration partially mediates the relationship between RC and IC. The impact of knowledge integration on IC is found to be more significant compared to the direct effect of RC on IC. **Practical implications** – Management teams in the High-tech industry should emphasize the role of RC as a key component in fostering innovation. RC represents a strategic asset in today's rapidly evolving technological landRCape. Managers must understand the implications of enhancing relational capital to develop strategies that bolster innovation capabilities and address disparities in knowledge integration processes. **Originality/value** – This study specifically addresses the linkage between RC, IC, and knowledge integration. It contributes to the existing theories of intellectual capital by exploring the complementary effects of RC and IC, with knowledge integration serving as a positive partial mediator. Achieving robust relational capital is crucial for boosting innovation and maintaining a competitive edge in the market.

**Keywords:** Knowledge Integration, Relational Capital, Innovation Capability, High-Tech Enterprises, Smart – PLS.

## 1. INTRODUCTION

The rapid advancement of technology and the increasing complexity of global markets have highlighted the crucial role of innovation in maintaining competitive advantage, particularly for High-tech enterprises(Adam and Alofaysan, 2023). In this context, the concept of Relational Capital (RC) has emerged as a key factor in fostering innovation capabilities (IC). Relational Capital, encompassing the relationships and networks that an enterprise maintains with its customers, suppliers, and other stakeholders, is considered a vital strategic asset. It not only provides access to external knowledge and resources but also facilitates the integration and application of this knowledge within the organization. This study focuses on exploring the impact of RC on the innovation capabilities of High-tech enterprises in China. Given China's significant role in the global technology market, understanding how RC contributes to

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

innovation is of paramount importance. The research also delves into the mediating role of Knowledge Integration, a process through which firms assimilate and apply external knowledge to enhance their internal capabilities. By examining this mediating effect, the study aims to provide a comprehensive understanding of how RC influences IC, both directly and indirectly through knowledge integration.

Employing a quantitative research design, data were collected from 308 key executives in High-tech enterprises across China. The analyses were conducted using Smart-partial least square (PLS) version 4.1.0.3, incorporating confirmatory factor analysis and PLS relational equation modeling. The findings reveal that RC has a significant direct impact on IC, with Knowledge Integration playing a partial mediating role. Interestingly, the study found that the effect of Knowledge Integration on IC is more pronounced than the direct impact of RC, underscoring the importance of effective knowledge processes in leveraging relational assets for innovation.

The practical implications of this study are particularly relevant for management teams in the High-tech sector. By highlighting the strategic value of RC, the research suggests that managers should focus on enhancing relational networks and fostering a culture of collaboration and knowledge sharing. Such efforts can lead to more effective innovation strategies, thereby helping enterprises to stay competitive in a rapidly evolving technological landscape.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### 2.1 Underpinnings Theoretical

Knowledge management (KM) is a process that enhances an organization's ability to effectively organize and access vital knowledge. This is based on three theories: resource-based theory, knowledge-based theory, and organizational learning theory.

1） Resource-based theory emphasizes a firm's internal resources and abilities as the primary drivers of long-term competitive advantage and exceptional performance. It divides resources into tangible and intangible assets, such as cash and physical assets, and intangible assets like knowledge, reputation, and intellectual property(Jiao et al., 2019). The VRIO system assesses the possibilities for acquiring a competitive edge by considering value, scarcity, replicability, and organizational support for these resources.

2） Knowledge-based theory emphasizes the use of knowledge in forming and preserving an organization's competitive advantage. Key ideas include recognizing knowledge as a strategic advantage, learning and production of knowledge, integration and application of knowledge, and a routine based on knowledge-based capabilities (Kengatharan, 2019). This theory emphasizes the strategic importance of knowledge and the need for companies to actively monitor and use their knowledge resources to gain a competitive edge and surpass competitors.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

3） Organizational learning theory is based on cognitive processes within companies and how they affect their performance and adaptability. It acknowledges that companies go through cycles of learning, acquiring, evaluating, and using fresh knowledge and ideas to improve their competitiveness and efficiency(Bernal-Torres et al., 2023). The main principles of this theory include learning both inside and outside, interpreting and making sense of information, and successfully applying knowledge to enhance performance. Establishing a favorable learning environment and infrastructure is essential for organizations to become more flexible, innovative, and generally performing.

### 2.2 Relational Capital

Relational capital is the value generated by an organization's relationships with external partners, such as customers, suppliers, and other stakeholders (Ramírez-Solis et al., 2022). It represents the strength and quality of the organization's network and the benefits it derives from those relationships. Strong relationships can include intangible assets like trust, reputation, loyalty, and brand equity, as well as tangible assets like contracts, agreements, and licenses. High relational capital can lead to increased customer satisfaction, repeat business, and loyalty, as well as access to new markets, resources, and knowledge through partnerships and collaborations (Ryu et al., 2021).

To build and enhance relational capital, organizations need to invest in building strong and trusted relationships with their external partners, which involves effective communication, understanding and meeting partner needs, delivering high-quality products or services, and demonstrating integrity and transparency in business dealings. Actively managing and maintaining these relationships over time ensures their longevity and value.

Relational capital is crucial for creating a competitive advantage and long-term success. It is defined by various definitions and measurements, including social relationships, trust, shared knowledge, customer-oriented operation, supplier relations, stakeholders, and business networks and strategic alliances (Ramírez-Solis et al., 2022). Dimensions of relational capital include relationships with all internal and external stakeholders, business networks and strategic alliances, collaboration networks, contracts and agreements, social networks, customer loyalty, image and brand, organizational climate, social and environmental commitment, sales growth, and efficiency of structural capital.

### 2.3 Innovation Capability

Innovation capability is a crucial method for problem-solving and sustaining a competitive edge. It has the potential to provide novel goods, services, and other outcomes, thus enhancing corporate performance and market returns(Han et al., 2022).

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 (Aljuboori et al., 2021). Some academics define innovation as the collection of actions that generate novel creations, and innovation performance as the entirety of the consequences stemming from this procedure.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

Innovation competency refers to the capacity to consistently convert information and ideas into novel goods, processes, and systems, benefiting both the organization and its stakeholders. It is linked to the process of organizational learning and is related to the creation of novel knowledge. The capacity for innovation inside a company grows via the accumulation of diverse internal and external stimuli.

Innovation capability includes fundamental assets like research, development, production, and marketing, as well as supplemental assets like social capital, which facilitates resource access and support in society through trust-based networks.

It is an inherent capacity that influences the entire company(Han et al., 2022). It is seen as a key resource for companies to establish and maintain a competitive edge, as well as in the execution of their entire strategy.

Forsman (2011) measures knowledge exploitation, entrepreneurial capabilities, risk management capabilities, networking capabilities, development capabilities, change management capabilities, market and customer knowledge, planning and commitment to the management capability, marketing capability, innovative capability, R&D capability, operations capability, knowledge and skills capability, information and communication capability, and external environmental capability.

### 2.4 Knowledge Integration

Knowledge integration capability is a crucial aspect of an organization's core competitiveness, requiring the collection, organization, and creation of diverse types of information through member comprehension and assimilation(Azari et al., 2020). Information is considered an immutable asset that requires learning, assimilating, and retaining it to develop innovative thinking within a team.

Knowledge integration is not a simple superimposition of knowledge but a dynamic coupling of knowledge elements facilitated by the dynamic flux of acquired information within the team. In the digital economy, knowledge integration capability is defined as the ability to implement knowledge innovation and filter, analyze, and reorganize disparate information and resource components from within and without the team.

The knowledge-based approach emphasizes the significance of knowledge as a resource for sustainable innovation and competitive advantage. Organizations must consistently acquire, refine, and integrate external data with internal expertise to establish a novel knowledge system that could potentially function as the bedrock for their principal competitive edge. Transaction cost theorists argue that the market mechanism is inadequate for transactions involving tacit information, leading to hybrid forms of inter-firm governance.

Knowledge integration is a critical determinant of a company's competitiveness, facilitating the incorporation of specialized knowledge into business operations. Knowledge fusion, inter-firm governance, and social capital are all components of this process, aiming to generate new products and market opportunities via information exchange and communication across organizational boundaries.

ISSN 1533-9211

DOI: 10.5281/zenodo.13622666

### 2.5 Hypothesis and research model

Reviewing relevant literature and research, the measures for every variable are 8 dimensions. The hypothesis development is as follows:

Hypothesis 1: Relational capital is positively associated with Innovation capability.

Hypothesis 2: Relational capital has a positive relationship with Knowledge integration.

Hypothesis 3: Knowledge integration is positively correlated with Innovation capability.

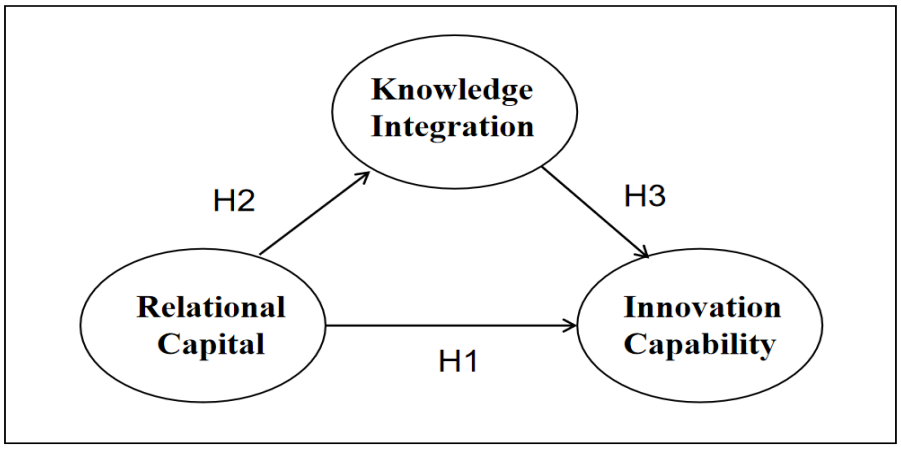



**Figure 1: Conceptual model**

## 3. METHODOLOGICAL FOUNDATION

### 3.1 Sample selection

A positivism-based quantitative research strategy was used. Quantitative information collection strategies are far more structured than qualitative information gathering methods (DeFranzo, S. E., 2011). A nonprobability approach and a convenient sampling technique were used. The population frame for this study consisted of all high-tech enterprises in Chongqing Municipality of China in 2024 (Buenechea-Elberdin et al., 2018).

(Ma et al. 2022) (Memon et al., 2021)Researcher made significant contributions to statistics and research methods by proposing that the estimated sample size be 20 times that of the observed variables. This study proposed eight observed variables, and the sample size was estimated to be at least 160 participants.

### 3.2 Survey instrument

The model was tested using a structural equation modelling technique. Data were analyzed with the statistical software SMART-PLS Version 4.1.0.3, which is widely used in the social sciences (Zia et al., 2023). The PLS method has been shown to be effective for estimating the path coefficients of structural models and is becoming increasingly popular in social sciences

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

research due to its ability to test models under non-normality conditions with small to medium samples (Hair JF et al., 2023) (Buenechea-Elberdin et al., 2018).

The PLS algorithm determines the significant loadings, weights, and path coefficients, while the bootstrap method determines the level of hypotheses and mediation (Shmueli et al., 2019). As a result, this study utilized a two-stage approach (Memon et al., 2021). The measurement model was evaluated first, followed by the structural model.

## 4. DATA ANALYSIS AND RESULTS

### 4.1 Measurement Model

As previously described in the methodology section, this study followed the (Hair JF et al., 2023). The model was tested in two stages, as suggested by, with the first stage assessing the measurement model using Cronbach's Alpha. Cronbach's alpha values for all variable dimensions range between 0.861 and 0.936. These values demonstrate a variety of dimensions with significantly high internal consistency, indicating the reliability and consistency of the items within each scale. The recommended values for Average Variance extraction, Composite Reliability, and Factor Loadings are more than 0.5 and 0.7, respectively (Chin WW.2008).

Table 4.1 shows that the average variance extracted (AVE), composite reliability (CR), and factor loadings for all indicators of the three variables (human capital, knowledge integration, and innovation capability) exceed 0.7.

**Table 4.1: Validity and Reliability for Constructs**

| Variables | Dimension | Items | Cronbach's alpha | Loadings | CR | AVE |
|---|---|---|---|---|---|---|
| Relational Capital (Cronbach's Alpha = 0.933) | Relationship with customer | RCU1 | 0.869 | 0.818 | 0.870 | 0.656 |
| | | RCU2 | | 0.808 | | |
| | | RCU3 | | 0.805 | | |
| | | RCU4 | | 0.826 | | |
| | | RCU5 | | 0.792 | | |
| | Relationship with supplier | RSU1 | 0.888 | 0.837 | 0.888 | 0.690 |
| | | RSU2 | | 0.831 | | |
| | | RSU3 | | 0.800 | | |
| | | RSU4 | | 0.848 | | |
| | | RSU5 | | 0.839 | | |
| | Relationship with stakeholders | RST1 | 0.883 | 0.819 | 0.883 | 0.681 |
| | | RST2 | | 0.835 | | |
| | | RST3 | | 0.810 | | |
| | | RST4 | | 0.856 | | |
| | | RST5 | | 0.804 | | |
| Knowledge Integration (Cronbach's Alpha = 0.965) | Social | SO1 | 0.876 | 0.783 | 0.878 | 0.670 |
| | | SO2 | | 0.802 | | |
| | | SO3 | | 0.857 | | |
| | | SO4 | | 0.826 | | |
| | | SO5 | | 0.822 | | |
| | Cooperative | CO1 | | 0.787 | 0.864 | 0.646 |
| | | CO2 | | 0.821 | | |

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

| | | | | | | |
|---|---|---|---|---|---|---|
| | | CO3 | 0.863 | 0.790 | | |
| | | CO4 | | 0.793 | | |
| | | CO5 | | 0.826 | | |
| Innovation Capability (Cronbach's Alpha = 0.945) | Technology-related Innovation(R &D) | TI1 | 0.870 | 0.843 | 0.871 | 0.658 |
| | | TI2 | | 0.799 | | |
| | | TI3 | | 0.767 | | |
| | | TI4 | | 0.815 | | |
| | | TI5 | | 0.828 | | |
| | Process-related Innovation (Manufacturing) | PI1 | 0.857 | 0.798 | 0.857 | 0.637 |
| | | PI2 | | 0.805 | | |
| | | PI3 | | 0.778 | | |
| | | PI4 | | 0.830 | | |
| | | PI5 | | 0.778 | | |
| | Market-related Innovation (Marketing) | MI1 | 0.841 | 0.776 | 0842 | 0.612 |
| | | MI2 | | 0.773 | | |
| | | MI3 | | 0.744 | | |
| | | MI4 | | 0.770 | | |
| | | MI5 | | 0.844 | | |

Discriminant validity is critical to ensuring the validity of a measurement tool. By verifying discriminant validity, researchers can improve the reliability and explanatory power of their findings. As can be seen in Table 4.2, the square root of the AVE (diagonal value) for each variable is greater than the matched correlation measure, indicating a satisfactory direction of discriminant validity (Son TT et.al., 2020). The first-order constructs demonstrate good discriminant validity as per the Fornell-Larcker Criterion. In Table4.3, The second-order constructs also demonstrate good discriminant validity based on the Fornell-Larcker Criterion. Overall, the measurement model has satisfactory convergent and discriminant validity.

**Table 4.2: The first order-Discriminant Validity (Fornell-Larcker Criterion)**

| | CO | IC | KI | MI | PI | RC | RCU | RST | RSU |
|---|---|---|---|---|---|---|---|---|---|
| **CO** | **0.804** | | | | | | | | |
| **IC** | 0.476 | **0.710** | | | | | | | |
| **KI** | 0.904 | 0.541 | **0.737** | | | | | | |
| **MI** | 0.413 | 0.933 | 0.493 | **0.782** | | | | | |
| **PI** | 0.402 | 0.873 | 0.456 | 0.761 | **0.798** | | | | |
| **RC** | 0.456 | 0.479 | 0.510 | 0.444 | 0.377 | **0.712** | | | |
| **RCU** | 0.419 | 0.353 | 0.436 | 0.333 | 0.278 | 0.847 | **0.810** | | |
| **RST** | 0.389 | 0.443 | 0.453 | 0.408 | 0.341 | 0.886 | 0.639 | **0.825** | |
| **RSU** | 0.378 | 0.444 | 0.434 | 0.408 | 0.355 | 0.864 | 0.583 | 0.652 | **0.831** |

**Table 4.3: The Second order-Discriminant Validity (Fornell-Larcker Criterion)**

| | Relational Capital | Knowledge Integration | Innovation Capability |
|---|---|---|---|
| Relational Capital | **0.712** | | |
| Knowledge Integration | 0.510 | **0.737** | |
| Innovation Capability | 0.479 | 0.541 | **0.710** |

ISSN 1533-9211

DOI: 10.5281/zenodo.13622666

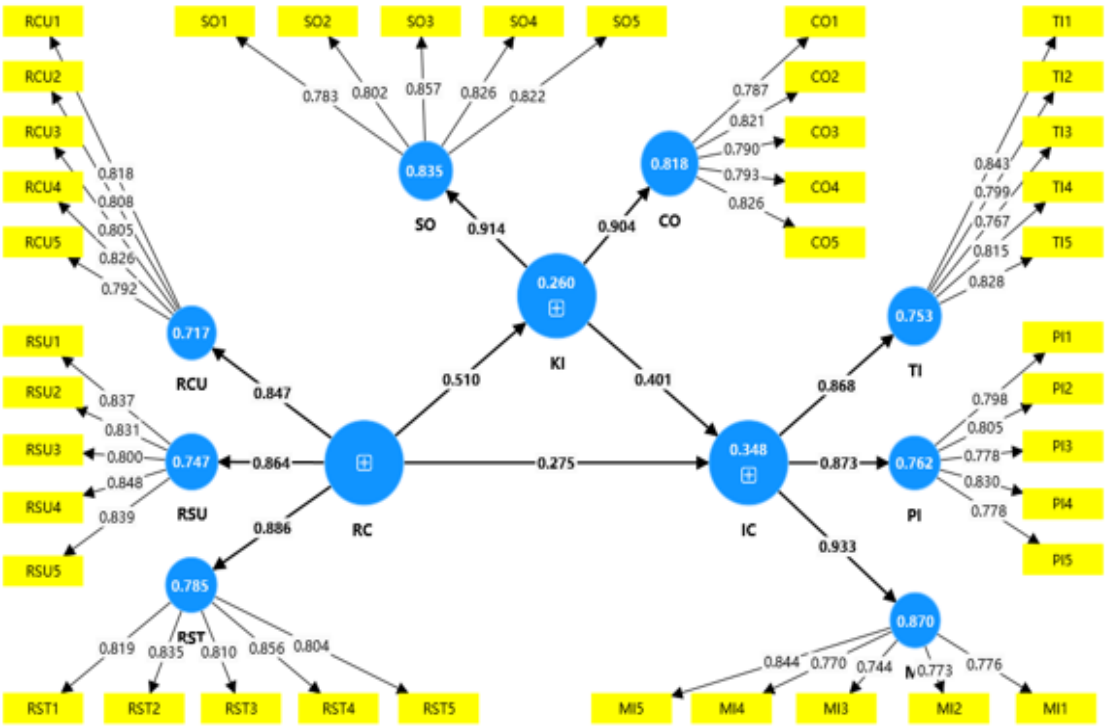
### 4.3 Structural Model

Table 4.4 presents the structural model analysis results, showing the relationships between Innovation Capability (IC), Knowledge Integration (KI), and Relational Capital (RC). The path of coefficient (KI -> IC) is 0.587, indicating a positive and significant relationship between Knowledge Integration and Innovation Capability. The path coefficient (RC->IC) is 0.513, suggesting a positive and significant relationship between Relational Capital and Innovation Capability. The path coefficient (RC->KI) is 0.554, showing a positive and significant relationship between Relational Capital and Knowledge Integration. The discriminant validity analysis using the Fornell-Larcker Criterion confirms that both first-order and second-order constructs exhibit good discriminant validity. The structural model analysis further reveals significant positive relationships between Relational Capital, Knowledge Integration, and Innovation Capability, highlighting their interdependencies and collective impact on organizational performance. Figure 4.2 shows the calculation results of the structural model.

**Table 4.4: The Second order-Discriminant Validity (HTMT)**

| | Innovation Capability | Knowledge Integration | Relational Capital |
|---|---|---|---|
| Innovation Capability | | | |
| Knowledge Integration | **0.587** | | |
| Relational Capital | 0.513 | **0.554** | |

**Figure 4.2: Structural Model Results**



The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

The second phase of model testing, the authors used the PLS algorithm and bootstrapping to test the hypothesized significance levels and mediators. Bootstrapping was used for 5000 iterations of the bundling process to determine the significance level. Table 4.5 presents the regression model results for Innovation Capability and Knowledge Integration.

**Table 4.5: Regression**

| | R-square | R-square adjusted |
|---|---|---|
| Innovation Capability | 0.348 | 0.344 |
| Knowledge Integration | 0.260 | 0.257 |

(Chin et al. 2008) classified the dependent variable as "large," "reasonable," and "low" based on the value of R2, with R2 values of 0.67 and above indicating a strong effect, R values of 0.33 and above indicating a medium effect, and R values of 0.19 indicating a weak effect. A value of 0.33 or higher indicates a medium effect, while an R2 value of 0.19 indicates a weak effect. The value of R2 for Innovation Capability is 0.348, and the adjusted R2 is 0.344, while R2 for Knowledge Integration is 0.260, and the adjusted R2 is 0.257. This demonstrates that Innovation Capability are moderately influenced by the Knowledge Integration; thus, significant variance is observed in an endogenous variable.

Table 4.6 shows the structural modelling and hypothesis testing results.

**Table 4.6: Hypothesis Testing**

| Hypothesis | Original sample (O) | T statistics (\|O/STDEV\|) | P values | Decision |
|---|---|---|---|---|
| Relational Capital -> Innovation Capability | 0.479 | 8.907 | 0.000 | Accepted |
| Relational Capital -> Knowledge Integration | 0.51 | 9.178 | 0.000 | Accepted |
| Knowledge Integration -> Innovation Capability | 0.401 | 5.701 | 0.000 | Accepted |

A total of three hypotheses were tested in this study and all hypotheses were significantly positive. And all hypotheses were found significant and positive. Relational Capital has a significant and positive effect on Innovation Capability (β=0.479, t=8.907, p=0.000), as well as Relational Capital has a significant and positive effect on Knowledge Integration (β=0.51, t=9.178, p=0.000), Finally, this study also concluded that Knowledge Integration also partially mediated the relationship between Relational Capital and Innovation Capability(β=0.401, t =5.701, p=0.000).

**Table 4.7 The Value of f-square**

| | f-square |
|---|---|
| Relational Capital -> Innovation Capability | 0.086 |
| Relational Capital -> Knowledge Integration | 0.351 |
| Knowledge Integration -> Innovation Capability | 0.182 |

The effect size $f^2$ describes the influence of exogenous latent construal's on endogenous latent construal's, as mentioned by Hair et al. (Hair et al., 2023) (Cohen J, 1988) suggested $f^2$ sizes of 0.35 (showing large effects), 0.15 (showing medium effects) and 0.02 (showing small effects). $f^2$ results, as shown in Table 4.7, reveal the range of effect sizes between large and medium effects in this study.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

## 5. DISCUSSION AND CONCLUSIONS

### 5.1 Discussion

The purpose of this study was to assess the impact of relational capital (RC) on the innovation capability (IC) of high-tech enterprises in China, as well as to investigate the role of knowledge integration (KI) as a mediator in enhancing IC. The findings offer important insights into the relationships between these variables. The analysis shows that relational capital has a significant positive impact on innovation capability (β=0.479, t=8.907, p=0.000). This suggests that high-tech companies that effectively manage and leverage their relationships with customers, suppliers, and other stakeholders are more likely to improve their innovative capabilities. Relational capital gives you access to external knowledge and resources, which are essential for innovation processes. This finding is consistent with previous research that has shown the importance of strong external relationships in fostering innovation (Forsman, 2011).

The study found a significant positive correlation between relational capital and knowledge integration (β=0.51, t=9.178, p=0.000). This implies that relational capital promotes the assimilation and application of external knowledge within the organization. Effective relational capital management can result in improved knowledge integration processes, in which diverse information and resources are synthesized to generate new knowledge and innovation. This lends support to the knowledge-based view (KBV), which emphasizes the strategic importance of knowledge in maintaining a competitive advantage (Al-Shammari & Almulla, 2023).

Knowledge integration has a significant direct impact on innovation capability (β=0.401, t=5.701, p=0.000) and partially mediates the relationship with relational capital. This demonstrates the importance of knowledge integration in converting relational capital into innovative outcomes. The integration of external knowledge and internal capabilities improves the firm's ability to create new products, services, and processes. This finding emphasizes the importance of creating a culture of knowledge sharing and continuous learning within high-tech companies in order to maximize innovation potential. Effect Size and Variance The effect size ($f^2$) analysis shows that relational capital has a medium to large impact on knowledge integration ($f^2$=0.351) and a medium impact on innovation capability ($f^2$=0.086). The impact of knowledge integration on innovation capability is medium ($f^2$=0.182). Relational capital and knowledge integration have a significant impact on innovation capability, with a $R^2$ value of 0.348 indicating moderate influence.

### 5.2 Conclusion

The study adds to our understanding of how relational capital influences innovation capability in high-tech firms, with knowledge integration playing an important mediating role. The findings highlight the strategic importance of managing external relationships and integrating knowledge to promote innovation. Enhancing Relational Capital: High-tech companies should prioritize developing and maintaining strong relationships with their external partners. Effective communication, trust, and collaboration are required to leverage relational capital and gain access to valuable knowledge and resources. Fostering Knowledge Integration: Organizations should create an environment that encourages knowledge sharing and

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

integration. This can be accomplished by implementing knowledge management systems, encouraging cross-functional teams, and fostering a culture of continuous learning. Strategic Focus on Innovation: Management teams should recognize the role of relational capital and knowledge integration in driving innovation. By strategically focusing on these areas, high-tech companies can improve their innovation capabilities and maintain a competitive advantage in the rapidly changing technological landscape. This study explores the relationship between relational capital, knowledge integration, and innovation capability, adding to existing intellectual capital theories. The study's demonstration of the complementary effects of relational capital and knowledge integration provides valuable insights for high-tech enterprises seeking to boost innovation and achieve long-term success.

To summarize, relational capital is a critical strategic asset for high-tech companies, and effective management, combined with strong knowledge integration processes, can significantly improve innovation capability. This study emphasizes the importance of strategic investments in relational capital and knowledge management for maintaining a competitive advantage in the high-tech industry.

## 6. LIMITATIONS AND FUTURE DIRECTIONS

### 6.1 Limitations

1) Geographic Limitation

The study is limited to high-tech enterprises in China. The findings may not apply to high-tech enterprises in other regions or countries with distinct cultural, economic, and technological environments. Future studies should consider a more diverse sample from various geographic locations to improve the generalizability of the findings.

2) Sampling Technique

The use of a non-probability and convenient sampling technique may result in sampling bias because the sample does not accurately represent the entire population of high-tech enterprises. This may limit the external validity of the findings. Future research could use random sampling methods to ensure a more representative sample.

3) Cross-Sectional Design

The study uses a cross-sectional design, which collects data at one point in time. This reduces the ability to determine causality between relational capital, knowledge integration, and innovation capability. Longitudinal studies are required to investigate causal relationships and trends over time.

4) Measurement Tools

Although the study used established questionnaires to assess relational capital, knowledge integration, and innovation capability, self-reported data is susceptible to bias, such as social desirability and recall bias. Future research could use a variety of data sources, such as objective performance metrics and third-party evaluations, to validate the findings.

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

5) Model Complexity

The study investigates the direct and indirect effects of relational capital and knowledge integration on innovation capability. However, other potential moderating and mediating variables, such as leadership style, and technological infrastructure, were overlooked. Future research should investigate these additional factors to gain a more complete understanding of the relationships.

### 6.2 Future Directions

Future research should broaden its geographic scope to include high-tech enterprises from various countries and regions. This would enable cross-cultural comparisons and a better understanding of how relational capital and knowledge integration influence innovation capability in different contexts. Exploring Longitudinal Effects: Longitudinal studies would aid in determining the causal relationships between relational capital, knowledge integration, and innovation capability. This approach would shed light on how these relationships evolve over time and their long-term impact on organizational performance. Future research should consider including additional moderating and mediating variables. This would provide a more comprehensive picture of the factors influencing innovation capability in high-tech companies.

Although this study focuses on high-tech enterprises, future research could look into the impact of relational capital and knowledge integration in other industry sectors. Comparing different industries would aid in identifying sector-specific factors and determining the generalizability of the findings. Assessing the Impact of Digital Transformation: As digital transformation continues to reshape industries, future research should look into how digital tools and technologies affect the relationships between relational capital, knowledge integration, and innovation capability. Understanding the role of digitalization may provide useful insights for boosting innovation in the digital age. By addressing these limitations and exploring these future directions, researchers can expand on the study's findings to gain a more complete understanding of the factors that drive innovation capability in high-tech enterprises and beyond.

**References**

1) Adam, N.A., Alofaysan, H., 2023. External Knowledge Flows and Small and Medium-Sized Enterprises' Innovation Capabilities Enhancement: An Empirical Investigation. Sustainability 15, 4071. https://doi.org/10.3390/su15054071

2) Aljuboori, Z.M., Singh, H., Haddad, H., Al-Ramahi, N.M., Ali, M.A., 2021. Intellectual Capital and Firm Performance Correlation: The Mediation Role of Innovation Capability in Malaysian Manufacturing SMEs Perspective. Sustainability 14, 154. https://doi.org/10.3390/su14010154

3) 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.

4) Azari, M.J., Aspelund, A., Eide, A.E., 2020. Knowledge integration in international SMEs – The effects on firm innovation and performance. Cogent Bus. Manag. 7, 1849890. https://doi.org/10.1080/23311975.2020.1849890

The Seybold Report
ISSN 1533-9211
DOI: 10.5281/zenodo.13622666

5) Bernal-Torres, C.A., Amaya, N., Gómez-Santos, L., Mojica-Macias, J.P., Sierra-Parra, D., 2023. Interrelation between the Dynamic Capabilities of Knowledge Management, Learning, Adaptation, with Innovation in Medium and Large Companies in an Emerging Economy in Times of Pandemic. Glob. Bus. Rev. 09721509221146412. https://doi.org/10.1177/09721509221146412

6) Buenechea-Elberdin, M., Kianto, A., Sáenz, J., 2018. Intellectual capital drivers of product and managerial innovation in high-tech and low-tech firms. RD Manag. 48, 290–307. https://doi.org/10.1111/radm.12271

7) Cohen, J. (1988). Set correlation and contingency tables. Applied psychological measurement, 12(4), 425-434.

8) DeFranzo, S. E. (2011). What's the difference between qualitative and quantitative research. Snap Surveys, 16.

9) Forsman, H. (2011). Innovation capacity and innovation development in small enterprises. A comparison between the manufacturing and service sectors. Research policy, 40(5), 739-750.

10) Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M., 2019. When to use and how to report the results of PLS-SEM. Eur. Bus. Rev. 31, 2–24. https://doi.org/10.1108/EBR-11-2018-0203

11) Han, W., Wang, P., Jiang, Y., Han, H., 2022. Nonlinear Influence of Financial Technology on Regional Innovation Capability: Based on the Threshold Effect Analysis of Human Capital. Sustainability 14, 1007. https://doi.org/10.3390/su14021007

12) Jiao, H., Wang, Y., Liu, M., 2019. The effect of the social network of the top management team on innovation in cultural and creative industries: A study based on knowledge network embedding. J. Chin. Hum. Resour. Manag. 10, 4–18. https://doi.org/10.1108/JCHRM-10-2018-0021

13) Kengatharan, N., 2019. A knowledge-based theory of the firm: Nexus of intellectual capital, productivity and firms' performance. Int. J. Manpow. 40, 1056–1074. https://doi.org/10.1108/IJM-03-2018-0096

14) Kim, M. S., Lee, S. H., & Kim, J. G. (2021). Evaluation of factors affecting arsenic uptake by Brassica juncea in alkali soil after biochar application using partial least squares path modeling (PLS-PM). Chemosphere, 275, 130095.

15) Memon, M.A., T., R., Cheah, J.-H., Ting, H., Chuah, F., Cham, T.H., 2021. PLS-SEM STATISTICAL PROGRAMS: A REVIEW. J. Appl. Struct. Equ. Model. 5, i–xiv. https://doi.org/10.47263/JASEM.5(1)06

16) Ramírez-Solis, E.R., Llonch-Andreu, J., Malpica-Romero, A.D., 2022. Relational capital and strategic orientations as antecedents of innovation: evidence from Mexican SMEs. J. Innov. Entrep. 11, 42. https://doi.org/10.1186/s13731-022-00235-2

17) Ryu, D., Baek, K.H., Yoon, J., 2021. Open Innovation with Relational Capital, Technological Innovation Capital, and International Performance in SMEs. Sustainability 13, 3418. https://doi.org/10.3390/su13063418

18) Shmueli, G., Sarstedt, M., Hair, J.F., Cheah, J.-H., Ting, H., Vaithilingam, S., Ringle, C.M., 2019. Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. Eur. J. Mark. 53, 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

19) Wicks, A. M., & Chin, W. W. (2008). Measuring the three process segments of a customer's service experience for an out-patient surgery center. International journal of health care quality assurance, 21(1), 24-38.

20) Zia, U., Zhang, J., Alam, S., 2023. Role of tacit knowledge management process and innovation capability for stimulating organizational performance: empirical analysis, PLS-SEM approach. Kybernetes. https://doi.org/10.1108/K-03-2023-0444