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IT companies business model, knowledge management practices and innovation culture: Basis for innovation intelligence framework

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Abstract

Amid the current economic downturn, market uncertainty, and competitive pressures in the information technology (IT) sector, enhancing knowledge management practices, business model, and innovative cultural practices can support the development of technological, rational, and efficient intelligent innovation system. Such improvements can bolster organizational competitiveness, establish a sustainable innovation framework, and lay a solid foundation for long-term growth. This study aimed to examine the impact business models, knowledge management practices, and innovation culture on performance innovation, proposing an intelligent innovation framework based on these interrelationships. By systematically analyzing the relationship between these factors and their unique context within the IT industry, the study provided new theoretical insights and practical guidance for constructing the company's innovation framework. Data for the study were collected through a questionnaire survey targeting company samples. Analytical methods including weighted averages and the Shapiro-Wilk were employed. The survey results reveal a significant correlation between a company's business model and knowledge management practices, particularly in fostering knowledge creation and sharing. Additionally, there is a moderate positive correlation between business models and cultural innovation, highlighting the critical role of knowledge management in improving business model optimization and promoting innovation. The study also highlights the correlation between business models and innovation culture, indicating that enhancing cultural innovation initiatives can optimize value proposition, strengthen customer relationship management, and ultimately improve financial performance and revenue. While cultural innovation plays a crucial role in the interplay between business models and knowledge management practices, there remains substantial room for further research and practical applications to leverage cultural innovation for business model optimization, knowledge management, and performance enhancement.

Keywords: business model, knowledge management practices, innovation culture, innovation intelligence

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1. Introduction

The rapid advancement of the internet, big data, artificial intelligence, and other cutting-edge technologies poses new challenges and opportunities for technology companies as globalization and economic integration accelerate. To successfully navigate this evolving landscape, technology companies must adopt sound and sustainable business models that align with national policies, societal needs, and technological trends. A robust knowledge management system, leveraging information systems to efficiently gather, organize, and share knowledge, is crucial for sustaining high performance through innovation in both business and technology. A company's competitive edge hinges on its business model. According to the business canvas model, a sound business model encompasses a strong value proposition, effective customer relationships, and a sustainable revenue stream. To maximize customer value, businesses must deliver solutions that meet customer needs efficiently and effectively. By integrating internal and external operational factors, companies can create a robust and competitive operating system. To stay ahead, businesses must continually optimize their business models, leverage big data analytics to inform strategic decisions, and adapt to emerging technologies, evolving customer demands, and shifting market dynamics.

Technology companies must conduct a thorough analysis of market needs, technical advantages, target markets, and competitive landscapes to develop successful business models. A deep understanding of market demands, coupled with a strong technological foundation, is essential. To achieve this, companies must: Accurately position products or services to meet specific market needs. Continuously optimize offerings to align with evolving market demands. Leverage technological advantages to establish a strong competitive edge. Gain insights into customer needs and pain points through rigorous market research and analysis. Innovation is crucial not only in product development but also in business model design.

Knowledge, encompassing both tangible and intangible assets, is the lifeblood of technology companies. This includes technological reserves, experiential learning, and intellectual property. It is acquired through practice, education, and research, and often manifests in the form of prior experience, best practices, standards, documentation, patents, and other relevant materials. Effective knowledge management is essential for capturing, organizing, and disseminating knowledge. By implementing strong knowledge management practices, technology companies can: Enhance market competitiveness, build a robust knowledge base, facilitate seamless knowledge transfer within the organization. Knowledge management empowers technology companies to: Share experiences, collaborate effectively, and enhance innovation capabilities. Effectively manage internal knowledge resources to promote innovation, identify business opportunities, and drive continuous improvement. Accurately collect, organize, and analyze knowledge information to support informed decision-making, reduce risks, and improve outcomes. Facilitate knowledge sharing, collaborative work, and avoid redundant efforts to improve work efficiency and team cooperation. Safeguard core knowledge, enhance competitive advantage, and ensure sustainable growth. By implementing robust knowledge management practices, technology companies can unlock the full potential of their knowledge assets and achieve long-term success.

Innovation is the lifeblood of technology companies, driving growth, velocity, and operational excellence. Fostering a strong corporate innovation culture is essential to ensure that innovation permeates every aspect of the business, from strategic planning to operational execution. Enterprise innovation encompasses cultural, technological, managerial, and strategic dimensions. These elements are interconnected, and a holistic approach is necessary to address challenges and seize opportunities. The ultimate goal of innovation is to create a robust corporate innovation framework that strengthens market competitiveness and drives improved business performance.

This study aims to investigate and analyze the optimization of business models, knowledge management practices, and innovation culture within Beijing's IT companies, particularly in the context of economic downturns and intense market competition. By examining the innovative practices and achievements of various companies and conducting correlation analyses across different dimensions, this study seeks to develop an innovative, intelligent practice framework. This framework will serve as a valuable reference for IT companies to foster corporate culture innovation, enhance competitiveness, improve business performance, and ultimately promote the sustainable and healthy development of the IT industry.

Objectives of the Study - This study examined the relationship of business model, knowledge practices and innovation culture of technology company in Beijing China that served as basis for the development of Innovation Intelligence framework. Specifically, this study described IT companies business model in terms of value proposition, customer relationship and revenue streams. Moreover, it determined knowledge practices in terms of creation, sharing, application and measurement. Assessed the innovation culture in terms of business vision and objectives, resource support, and innovation action. Tested the significant relationship among the three major variables and developed Innovation Intelligence framework.

2. Methods

Research Design - The researcher employed a mixed-methods approach, combining qualitative and quantitative research techniques. To gather data on specific research objects at various levels of technological maturity, an offline questionnaire was designed. This methodology effectively captured detailed information on the dependent variables, enabling the researcher to draw accurate and reliable conclusions.

Participants of the Study - In this study, respondents were employees of five technology companies in Beijing, China, with 100 employees from each company answered the questionnaire. This study focused on employees in technology companies' main departments which included 238 technical engineers, 97 marketing personnel, 74 product managers, 69 department managers, and 22 company leaders.

Instruments of the Study - Based on questionnaire data, the QuestionStar online platform was used to conduct a questionnaire survey on the relationship between business models, knowledge management practices, cultural innovation, and corporate performance of technology small and medium-sized enterprises. Through data collection and analysis, analytical conclusions were formed to help enterprises improve their talent structure and performance. The questionnaire comprised of four parts. The first part introduces the basic information of the respondents, including age, gender, work experience, educational background, etc. The second part mainly investigated the business model of enterprises. The third part investigated the practical experience of enterprise management. The fourth part examined the innovation capability, training, and development of enterprises. The questionnaire passed the reliability test and Cronbach alpha, and the test results are shown in Table A. The relevant dimensions of all variables are acceptable, all dimensions of knowledge management practice variables are excellent, while the dimension of innovation culture is good.

Table A
Reliability Test Result Summary

Variable	Cronbach's Alpha	Remarks
1A. Value Proposition	0.750	Acceptable
1B. Customer Relationship	0.917	Excellent
1C. Revenue Streams	0.898	Good
2A. Creation	0.916	Excellent
2B. Sharing	0.951	Excellent
2C. Application	0.934	Excellent
2D. Measurement	0.925	Excellent
3A. Vision and Objective	0.862	Good
3B. Resource Support	0.898	Good
3C. Innovation Action	0.880	Good

Legend: George and Mallery (2003) provided the ff rule of thumb: ≥0.90 = Excellent; ≥0.80 = Good; ≥0.70 = Acceptable; ≥0.60 = Questionable; ≥0.50 = Poor; <0.50 = Unacceptable

Data Gathering Procedure - Based on the characteristics of technology companies, researchers designed questionnaires for different positions and personnel and solicited opinions on the questionnaire on a small scale. After the questionnaire design is completed, applications need to be submitted separately to the department leaders and company leaders of the researchers. After the application from the company leadership is approved, researchers conducted a questionnaire survey and collected information through offline surveys, email, and mobile surveys.

Data Analysis - Weighted mean and rank were used to describe IT companies business model in terms of value proposition, customer relationship and revenue streams. Knowledge practices were determined in terms of creation, sharing, application and measurement. While the innovation culture was assessed in terms of business Vision and Objectives, Resource support, and innovation action. The result of Shapiro-Wilk Test showed that p-values of all variables were less than 0.05 which means that the data set was not normally distributed. Therefore, Spearman rho was used as part of the non-parametric tests to determine the significant relationship. All analyses were performed using SPSS version 28.

Ethical Considerations - To ensure ethical research practices, the study strictly adhered to privacy and confidentiality protocols. Anonymous surveys and face-to-face interviews were conducted to protect the identity of participants. Collected data was used solely for research purposes and not for commercial or other activities. The study received approval from the LPU-B-Research Ethics Review Committee and was conducted with the informed consent of participants. Researchers obtained written consent from respondents and assured them that their participation was voluntary. All precautions were taken to safeguard the well-being and privacy of participants.

3. Results and discussion

Table 1
Summary Table on IT Companies Business Model

Key Result Areas	Composite Mean	VI	Rank
Value Proposition	2.89	Agree	1
Customer Relationship	2.82	Agree	2.5
Revenue Streams	2.82	Agree	2.5
Grand Composite Mean	2.84	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 1 presents the summary table on the IT company business model with a composite mean of 2.84 with verbal interpretation as agree. The business model is the key to the sustainable and healthy operation of IT companies, with the enterprise value proposition as the core factor. It is necessary to formulate enterprise strategies and development plans based on market and demand, establish a scientific and reasonable CRM management mechanism, continuously improve product quality and customer satisfaction, and ensure a competitive advantage in the market.

According to the comprehensive average of the summarized data, the value proposition has the most advantage (2.89). Value proposition is the best embodiment of IT company's innovation ability, the ability to coordinate resource combinations to develop new products and services, and the ability to shape valuable products and services to meet specific customer needs. Companies with strategic vision utilize artificial intelligence to enhance their value proposition innovation for customers, investors, and other stakeholders. Summarized and analyzed the development of value propositions, business ecosystems, and artificial intelligence business value cases, and developed a rapidly expanding IT company value proposition framework (Tanev et. al.,2022). With the increasing trend of mobile inter-connectivity and transparency in the market, various industries have a clear demand for refined customer operation processes. Only by leveraging technological means and using CRM (Customer Relationship Management) software to connect the entire process from marketing, sales to service, can we truly achieve information-based management of customer relationships

throughout the entire process. Only then can we achieve the full chain digitization of enterprise business processes from front-end customer acquisition to back-end customer service, and improve customer management efficiency, Redefining CRM is connecting to the end (Wang, 2019).

Table 2
Summary Table on Knowledge Management Practices

Key Result Areas	Composite Mean	VI	Rank
Creation	2.81	Agree	2.5
Sharing	2.81	Agree	2.5
Application	2.84	Agree	1
Measurement	2.79	Agree	4
Grand Composite Mean	2.81	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 2 presents the summary table on the knowledge management practices with a composite mean of 2.81 with verbal interpretation as agree. The IT companies participating in the survey all adopt a complete knowledge management practice system, including mechanisms for knowledge creation, acquisition, sharing, application, and effectiveness testing. According to the summary data of knowledge management practices, the application value of knowledge management is the highest (2.84). The application value of knowledge management to enterprises is reflected in multiple aspects, including enhancing innovation capabilities, professional business capabilities, strategic decision-making capabilities, and market competitiveness. In the process of practicing knowledge management, enterprises should establish more scientific and comprehensive knowledge management norms, promote knowledge sharing and innovation, continuously improve and enhance knowledge management levels, and thus achieve better performance. The comprehensive average of knowledge creation and knowledge sharing is in the middle (2.81). IT companies should pay more attention to knowledge creation and sharing, establish a solid foundation in knowledge management, in order to provide support for knowledge application.

Table 3
Summary Table on Innovation Culture

Key Result Areas	Composite Mean	VI	Rank
Vision and Objectives	2.76	Agree	3
Resource Support	2.81	Agree	2
Innovation Action	2.92	Agree	1
Grand Composite Mean	2.83	Agree	

Legend:3.50-4.00=Strongly Agree;2.50-3.49=Agree;1.50-2.49=Disagree;1.00-1.49=Strongly Disagree

Table 3 presents the summary table on the innovation culture with a composite mean of 2.83 with verbal interpretation as agree. Innovation culture is the core driving force for the survival and development of IT companies. Innovation culture is reflected in the vision and mission of the enterprise. It requires cohesion and joint participation from the company's management to grassroots employees in order to achieve innovation goals and reflect innovation value.

According to the comprehensive data analysis of innovation culture, the overall average innovation action is the highest (2.92), innovation resource support (2.81), and enterprise vision goals (2.76). The survey results fully reflect the result-oriented management style of Chinese IT enterprises, which places more emphasis on cultural innovation action practice. On the other hand, there is room for improvement in innovation system support and resource support. At the same time, the integration of company vision, corporate culture, and innovation is not high, IT enterprises need to build an innovative culture from a macro perspective. The proportion of IT industry in social and commercial activities in China has been increasing year by year, contributing greatly to the development of the Chinese economy. Corporate culture is the spiritual driving force for development, and a healthy corporate culture as a basic element can provide a continuous source of power for enterprise development. The core logic of market competition is the competition of innovation level, and the construction of innovation culture is crucial for the development of the company. Based on the current development status of IT enterprises in the new era, this paper analyzes the significance of innovation culture for enterprises and puts

forward corresponding suggestions for the construction of enterprise innovation culture, providing suggestions for sustainable development and promoting healthy economic development (Chen, 2023).

Table 4
Relationship Between Business Model and Knowledge Management Practices

Variables	rho	p-value	Interpretation
Value Proposition			
Creation	0.668**	< .001	Highly Significant
Sharing	0.680**	< .001	Highly Significant
Application	0.398**	< .001	Highly Significant
Measurement	0.338**	< .001	Highly Significant
Customer Relationship			
Creation	0.702**	< .001	Highly Significant
Sharing	0.716**	< .001	Highly Significant
Application	0.478**	< .001	Highly Significant
Measurement	0.398**	< .001	Highly Significant
Revenue Streams			
Creation	0.715**	< .001	Highly Significant
Sharing	0.729**	< .001	Highly Significant
Application	0.495**	< .001	Highly Significant
Measurement	0.422**	< .001	Highly Significant

***. Correlation is significant at the 0.01 level*

Table 4 shows the result of the relationship between business model and knowledge practices. As seen in the table, the computed rho-values ranging from 0.398 to 0.729 indicate a weak to strong direct relationship among the sub variables of business model and knowledge practices. There was a statistically significant relationship between business model and knowledge practices because the obtained p-value were less than 0.01. According to the analysis of data rho-values, the relationship between business model knowledge management practices is highly significant, with a focus on knowledge creation and knowledge sharing both exceeding 0.65. Knowledge management practices bring revolutionary changes to business model innovation. Traditional business models rely on centralized resources, vertical integration through business, and economies of scale to reflect competitive advantages. By adopting knowledge management practices, business information can be quickly and accurately obtained, market resources can be efficiently integrated, and market changes can be more effectively addressed. Enterprise managers can focus on knowledge creation and sharing, continuously establish and expand their core competitiveness, and create more commercial value for the company.

Knowledge management is a crucial tool for preserving competitive advantages in an era where knowledge is the primary differentiator for IT organizations. Knowledge sharing is critical to boosting an organization's overall capabilities to meet strategic objectives and has a favorable effect on the vitality of knowledge generation inside the firm. Investigating the connection between knowledge sharing and promoting the vitality of knowledge production in businesses, pertinent recommendations are made in order to help businesses improve their capacity for knowledge creation and become more competitive in the knowledge and information economy (Wang et. al.,2012). Technology innovation is the cornerstone of a robust nation and the secret to reviving China, which is undergoing an economic revolution. Businesses and organizations across all sectors follow national innovation policies, promote "mass entrepreneurship and innovation," increase innovation efficiency, and shorten innovation routes by taking targeted actions. This study investigates the effects of a maker's goal orientation on information sharing and creativity in the setting of mass production, using the growing maker community as the research object (Wu, 2018).

Table 5 presents the result of the relationship between business model and innovation culture. As seen in the table, the computed rho-values ranging from 0.331 to 0.457 indicate a weak to moderate direct relationship among the sub variables of business model and innovation culture. There was a statistically significant relationship between business model and innovation culture because the obtained p-value were less than 0.01. From the perspective of relationship analysis, there is a moderate relationship between the business model's value proposition, customer relationship, and revenue composition, as well as the vision goals, innovation

support, and innovation actions of the innovation culture.

Table 5
Relationship Between Business Model and Innovation Culture

Variables	rho	p-value	Interpretation
Value Proposition			
Vision and Objectives	0.364**	< .001	Highly Significant
Resource Support	0.299**	< .001	Highly Significant
Innovation Action	0.375**	< .001	Highly Significant
Customer Relationship			
Vision and Objectives	0.401**	< .001	Highly Significant
Resource Support	0.332**	< .001	Highly Significant
Innovation Action	0.457**	< .001	Highly Significant
Revenue Streams			
Vision and Objectives	0.396**	< .001	Highly Significant
Resource Support	0.331**	< .001	Highly Significant
Innovation Action	0.441**	< .001	Highly Significant

***. Correlation is significant at the 0.01 level*

But the implicit relationship between business models and innovation culture is something we should pay more attention to. Business model innovation includes innovation in products or services, market positioning, and channels. Proposed alternative paths for transforming and innovating enterprise business models and provided underlying logical interpretations and development direction ideas for various new business models (Li et. al.,2021). Through continuous innovation and optimization, enterprises can better adapt to market changes and provide competitive products and services. Corporate culture is the soul of an organization and has a significant impact on its innovation capability. Only a positive and innovative corporate culture can stimulate the creative potential of organizations and provide a solid foundation for business model innovation. Google, as a globally renowned technology company, is characterized by its open and innovative corporate culture. The working atmosphere at Google encourages employees to come up with new ideas and innovations, and provides time and resources to achieve these innovations. This open culture provides favorable environment for Google's business model innovation, continuously promoting the company's continuous development and growth.

Table 6
Relationship Between Knowledge Practices and Innovation Culture

Variables	rho	p-value	Interpretation
Creation			
Vision and Objectives	0.386**	< .001	Highly Significant
Resource Support	0.299**	< .001	Highly Significant
Innovation Action	0.409**	< .001	Highly Significant
Sharing			
Vision and Objectives	0.365**	< .001	Highly Significant
Resource Support	0.316**	< .001	Highly Significant
Innovation Action	0.409**	< .001	Highly Significant
Application			
Vision and Objectives	0.441**	< .001	Highly Significant
Resource Support	0.330**	< .001	Highly Significant
Innovation Action	0.464**	< .001	Highly Significant
Measurement			
Vision and Objectives	0.587**	< .001	Highly Significant
Resource Support	0.358**	< .001	Highly Significant
Innovation Action	0.418**	< .001	Highly Significant

**. Correlation is significant at the 0.01 level

Table 6 shows the result of the relationship between knowledge management practices and innovation culture. As seen in the table, the computed rho-values ranging from 0.2991 to 0.587 indicate a weak to moderate direct relationship among the sub variables of knowledge practices and innovation culture. There was a statistically significant relationship between knowledge practices and innovation culture because the obtained p-value were less than 0.01.

Knowledge management is the optimal path for IT companies to acquire valuable data assets, and innovation culture is the foundation of enterprise development and the key to achieving knowledge management. Innovation culture refers to the influence of various cultural elements such as values, work methods, and communication methods within an enterprise on innovation behavior and results. Knowledge management and innovation culture are the driving force and core competitiveness of enterprise development. Only by continuously improving knowledge management capabilities and building an innovative culture can we meet the needs of enterprise development, achieve sustainable development and long-term survival. Based on resource-based theory, dynamic capability theory, and enterprise knowledge theory, this study integrates big data capability, knowledge management, innovative organizational culture, and business model innovation into a research framework, and establishes a conceptual model of the relationship between big data capability, knowledge management, innovative organizational culture, and business model innovation (He, 2020). With the digitalization and intelligent development of technology enterprises, the platform economy is maintaining a high level of development globally. Simply based on customer requirements or pre-defined product supply models from suppliers is not popular, and continuous improvement is needed in value creation, value acquisition, and resource allocation. A new service framework design mindset that provides sustainable creation and cross functional approaches is needed to align service deliverables (value creation) with customer needs (value acquisition).

Proposal for Innovation Intelligence Framework

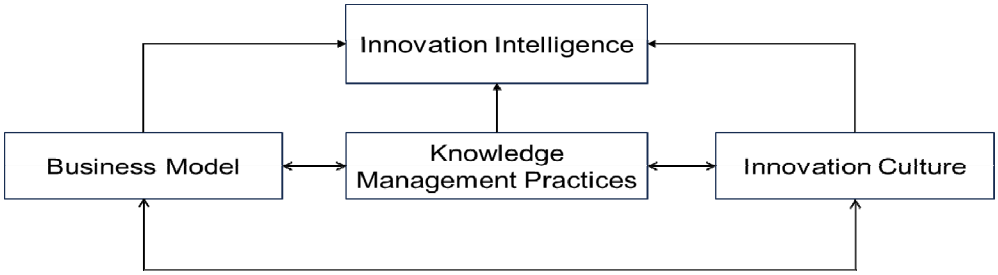

Figure 1. Innovation Intelligence Framework

The Innovation Intelligence Framework is grounded in the vision and goals of business models, integrated with knowledge management practices and continuous innovation. This framework enables companies to foster cultural innovation and improve organizational performance. A significant correlation exists among the three variables of business model, knowledge management practice, and innovation culture in the innovation intelligence framework. Combined with survey data analysis results, it is shown that in the actual operation and management of IT companies, knowledge management is the new foundation of cultural innovation and business model, and cultural innovation is the driving force of business model innovation. The three complement and promote each other.

4. Conclusion and recommendation

The respondents generally agreed with the business model structure of their IT company in terms of value proposition, customer connections, and income streams. Respondents moderately agreed the company's knowledge create, sharing, application, and measurement of knowledge management practices. The respondents moderately agreed the cultural innovation of the company in terms of vision and objectives, resource support, and innovation actions. A highly significantly relationship was found between the business model, knowledge management practices and cultural innovation. A framework for intelligent innovation in IT companies was developed based on the findings. The company may improve revenue streams through technological and product business model innovation. The management may improve knowledge management practices, prioritize the creation of knowledge, and facilitate cross-departmental information exchange and application communication. The marketing department may strengthen customer relationship management by implementing monitoring and

responsive strategies. The leaders of the company may deepen innovative activities, improve business processes, and adapt to market advancements. The company may optimize its innovation management methods for greater efficiency and effectiveness. Future researchers are encouraged to conduct extensive studies on business models, knowledge management approaches, and innovation culture in key activities and Ideological innovation dimensions.

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